U.S. Fish & Wildlife Service

Willamette Valley National Wildlife Refuges

Ankeny, Baskett Slough, and William L. Finley National Wildlife Refuges

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Final Comprehensive Conservation Plan and Environmental Assessment

A Vision of Conservation

Nestled amid the fields and towns of Oregon's Willamette Valley, three National Wildlife Refuges—William L. Finley, Ankeny, and Baskett Slough—preserve a relic of the Valley's native landscape. In winter, seven sub-species of Canada geese abound, feeding and resting in marshes and fields, while ducks throng to refuge sloughs.

As winter turns to spring, songbirds arrive, homing in on flourishing native grasses, while a diverse array of wildflowers blooms in expanses of wet and upland prairies. In these prairies, rare flowers and butterflies continue an ancient symbiosis. Riparian forests meander along backwaters and river tributaries, supporting elk, bobcat, and numerous birds. Populations of the rare species Oregon chub, Western pond turtle, and red-legged frog find secure homes in refuge ponds and sloughs.

People wander at leisure through the refuges, enjoying the sights, sounds, and smells of the restored Valley landscape, including ancient knarled oak trees, early settlers' barns and houses, and a full diversity of native Valley plants and animals.

Comprehensive Conservation Plans provide long-term guidance for management decisions and set forth goals, objectives, and strategies needed to accomplish refuge purposes and identify the U.S. Fish and Wildlife Service's best estimates of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations, and as such, are primarily used for strategic planning and program prioritization purposes. The plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

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Willamette Valley
National Wildlife Refuges

Ankeny, Baskett Slough, and William L. Finley
National Wildlife Refuges

Final Comprehensive Conservation Plan
and
Environmental Assessment

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September 2011

Approved: Acting
Regional Director, Region 1
Portland, Oregon

9/26/11
Date

U.S. Fish and Wildlife Service
Willamette Valley National Wildlife Refuge Complex
Comprehensive Conservation Plan
Approval Submission

In accordance with the National Wildlife Refuge System Administration Act, as amended, the U.S. Fish and Wildlife Service completed a Comprehensive Conservation Plan (CCP) for Ankeny, Baskett Slough, and William L. Finley National Wildlife Refuges. The purpose of this CCP is to specify a management direction for the Refuges for the next 15 years. The goals, objectives, and strategies for improving Refuge conditions—including the types of habitat we will provide, partnership opportunities, and management actions needed to achieve desired future conditions—are described in the CCP. The Service's preferred alternative for managing the Refuges, as well as the effects on the human environment, are described in this CCP and Environmental Assessment.

This CCP is submitted for the Regional Director's approval by:

Doug Spencer, Project Leader — 9-7-2011 (Date)
Willamette Valley National Wildlife Refuge Complex

Concur: Bob Flores — 9/12/2011 (Date)
Refuge Supervisor

Concur: Robin West — 9-12-11 (Date)
Regional Chief, National Wildlife Refuge System

Finding of No Significant Impact
for the
Ankeny, Baskett Slough, and William L. Finley National Wildlife Refuges
Comprehensive Conservation Plan

Marion, Polk, Benton, and Linn Counties, Oregon

The U.S. Fish and Wildlife Service (Service) has completed a Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) for Ankeny, Baskett Slough, and William L. Finley National Wildlife Refuge (Refuges). The CCP will guide management of the Refuges for 15 years. The CCP/EA describes our proposals for managing the Refuges and their effects on the human environment under three alternatives, including the no action alternative.

Decision

Based on our comprehensive review and analysis in the CCP/EA, we selected Alternative 2 for implementation, because it will guide management of the Refuges in a manner that:

- Achieves the mission of the National Wildlife Refuge System, and the purposes, vision, and goals of the Refuges.
- Maintains and restores the ecological integrity of the Refuges' habitats and populations.
- Addresses the important issues identified during the CCP scoping process.
- Addresses the legal mandates of the Service and the Refuges.
- Is consistent with the scientific principles of sound wildlife management and endangered species recovery.
- Facilitates priority public uses appropriate and compatible with the Refuges' purposes and the Refuge System mission.

Summary of the Actions to be Implemented

Implementing the selected alternative will have no significant impacts on the environmental resources identified in the CCP/EA. Refuge management under the selected alternative will protect, maintain, and enhance habitat for priority species and resources of concern, and improve the public's opportunities to enjoy wildlife-dependent recreation.

Under Alternative 2, an emphasis on providing habitat for wintering geese would remain. Green forage for geese would continue to be provided primarily through cooperative farming agreements with local farmers. Cooperative farming could be impacted; however, the Refuges would pursue measures to help retain the services of cooperative farmers, such as providing enhanced irrigation capabilities (these would help the farmers to better establish green forage crops and perhaps grow other cash crops); providing additional lure crops such as corn or other grains; the Refuges taking over farming on certain high goose use fields; the Service offsetting a portion of the costs to cooperative farmers; etc. Goose use should be no less than Alternative 1 and could increase if specific goose management strategies are implemented. Wetland habitat management and restoration activities would also be intensified to improve habitat for geese and other wildlife.

Management and enhancement would continue in remnant native habitats and recently restored areas. In addition, approximately 845 additional acres on the three Refuges would be restored to wetland, wet prairie, riparian, oak woodland, or upland prairie/oak savannah habitats, over the next fifteen years. Threatened and endangered species management would continue to be a priority, guided by recovery plans where applicable. Existing populations of several threatened and endangered species would be strengthened through habitat management activities, and several new populations would be established on the three Refuges.

Wildlife observation and interpretation would continue to be emphasized as the cornerstone of the public use program. Several new trails and viewing facilities would be added. Interpretive signs/ materials, including online materials, would be developed and added. Major special events would occur at a frequency of about 3-4/year and monthly weekend interpretive programs would occur.

Environmental education efforts would be expanded with an objective of reaching more students and schools, particularly at W.L. Finley Refuge. Outdoor classroom shelters would be added. In addition, funding would be sought to construct an Environmental Education Center, indoor classroom facilities, and an interpretive exhibit area on W.L. Finley Refuge.

A new option to hunt either sex deer would be added on W.L. Finley. In addition, new upland locations would be available for deer hunting during a portion of the restricted firearms season; this will require closure of two hiking trails for a week in November. The restricted firearms season would be shortened and shifted to later in the State season. A youth waterfowl hunt and a September goose hunt would be provided at Baskett Slough Refuge. Fishing would be promoted at the Willamette River by developing safe fishing access and a canoe launch at Snag Boat Bend.

The current area closed to public access would remain in effect to provide sanctuary during the wintering waterfowl season on the three Refuges with the exception that major portions of the Snag Boat Bend Unit would be open year-round.

The Refuges would develop an elk management plan cooperatively with ODFW after completion of the CCP (within 1-2 years of CCP implementation). The Refuges would continue to expand conservation partnerships, volunteer programs, and outreach to local communities. Proactive cultural resource management would occur by repairing/maintaining the historic structures on W.L. Finley Refuge and by adding associated interpretive facilities.

This alternative also proposes protection, conservation, and management of additional lands within the Willamette Valley that could contribute to the Refuges' purposes and goals by providing wintering habitat and forage for Canada geese, providing protection, enhancement, and restoration of native habitats and rare Willamette Valley species, and providing opportunity for additional wildlife-dependent public use. The Refuges would undertake a subsequent land protection planning process to identify specific tracts of lands for these purposes.

Public Involvement and Changes Made to the Selected Alternative Based on Comments

We incorporated a variety of public involvement techniques in developing and reviewing the CCP/EA. This included two open houses, several planning updates, numerous meetings with partners and elected officials, and public review and comment on the Draft CCP/EA. The details of our public involvement program are described in the CCP in Appendix A.

Based on the public comments we received and considered, Alternative 2 as described in the CCP/EA has been slightly modified.

- The archery deer hunt dates have been changed to late August to September 30.

- The shotgun deer hunt has been changed to a restricted firearms hunt (muzzleloaders will be permissible weapons).
- Hunter orange will be required only of youth hunters.
- The fishing season at Snag Boat Bend Unit has been changed to year-round.
- The site plans and costs for the W.L. Finley Environmental Education Center have been modified. The cost of constructing the center under the new design was increased.
- Additional text on how the Refuges will use scientific information for managing under changing climatic conditions has been added.
- Clarification on how fields have been selected for restoration under the action alternatives was added.
- The prioritization system in Appendix E (Implementation) was modified, and priorities changed to follow.
- Under cultural resource management, the clause that some buildings may be removed in the future if unsafe was deleted.
- Some maps were updated.

Conclusions

Based on review and evaluation of the information contained in the supporting references, I have determined that implementing Alternative 2 as the CCP for Ankeny, Baskett Slough, and William L. Finley National Wildlife Refuges is not a major Federal action that would significantly affect the quality of the human environment within the meaning of section 102(2)(c) of the National Environmental Policy Act of 1969. Accordingly, we are not required to prepare an environmental impact statement.

Acting

Regional Director

9/26/11

Date

Supporting References

U.S. Fish and Wildlife Service. May 2011. Willamette Valley National Wildlife Refuge Complex Draft Comprehensive Conservation Plan and Environmental Assessment.

Note: This Finding of No Significant Impact and supporting references are available for public review at the Willamette Valley National Wildlife Refuge Complex, 26208 Finley Refuge Road, Corvallis, Oregon 97333 and U.S. Fish and Wildlife Service, Division of Planning, Visitor Services, and Transportation, 911 NE 11th Avenue, Portland, Oregon, 97232. These documents can also be found on the Internet at http://pacific.fws.gov/planning/. Interested and affected parties are being notified of our decision.

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1.1 Introduction and Background

"[it deserves] all the praises Bestowed on it as it is the finest country I have ever seen."
John McLoughlin, 1832, remarking on the Willamette Valley

Within a few short decades of Lewis and Clark's famed expedition to the Pacific, Euroamerican settlers flooded into Oregon's Willamette Valley. Favorable missionary accounts in religious journals lured many. At the same time, various politicians and publicists began to actively promote occupation and settlement of the Oregon Country; the Northwest was repeatedly described as a "New Eden," or earthly paradise, in eastern newspapers.

While in 1841, the population of whites, Canadians, and mixed race persons was estimated at only 700-800, by 1860 the estimated Euroamerican population in the Willamette Valley numbered 52,000 (Oregon History Project). The settlers were intent on farming and met with little resistance from the native Kalapuyans, most of whom already been decimated by diseases brought by earlier explorers and fur traders. Provisional land laws allowed claims of up to 640 acres for married white or half-breed couples (after 1850 this was cut to 320 acres). To gain title, improvements needed to be made on the lands (Oregon History Project, www.ohs.org.).

In 1848 gold was discovered along the American River in California's Sierra Nevada; in 1851 more gold was found in the area of Yreka, California. Historians estimate that within seven years of the first discovery, the gold rush attracted 300,000 people to California. This huge influx of people created instant markets for Oregon products – specifically wheat and lumber. The stage had been set for the loss and modifications of the Willamette Valley's original habitats. The Valley's wet prairie, oak savanna, wetlands, and riparian habitats were of little inherent value to settlers, so they remained essentially unprotected by any network of public lands until another hundred years had passed. Even today, 96 percent of the Valley's land ownership is private (ODFW 2006).

A system of National Wildlife Refuges (refuges or NWRs), managed by the U.S. Fish and Wildlife Service (Service), was established in the mid-Willamette Valley during the 1960s. The immediate concern preceding refuge establishment was protection of a small sub-species of Canada goose called the dusky Canada goose. In response to this concern, the Migratory Bird Commission approved establishment of three refuges: Ankeny, Baskett Slough, and William L. Finley.

Decisions made today for refuge management will have far-reaching consequences for the hundreds of species dependent on these habitats, as well as for the millions of current and future inhabitants of the Valley. This document is a plan for the next fifteen years. We have attempted to think through the critical resources and public-use issues carefully, so as to design a plan that can best meet the conservation and recreation challenges of the coming years.

1.2 Significance of the Willamette Valley Refuge Complex

The refuge's seasonal wetlands and farmed agricultural fields provide important resting and feeding areas for migrating waterfowl and shorebirds within the Pacific Flyway, and support the core populations of wintering geese in the Valley. In particular, the refuges hold the largest number of wintering dusky Canada geese within their range. At peak numbers, the refuges also hold more wintering ducks than any location in western Oregon south of the Columbia River (USFWS 2010b). The refuges support some of the largest and most ecologically significant blocks of native habitat in the Willamette Valley. At W.L. Finley NWR, the Muddy Creek floodplain and tributaries cover one of the most intact riparian floodplain woodlands remaining. The tract of wet prairie found in the Willamette Valley Floodplain Research Natural Area (RNA) is the largest remaining example of this habitat found in the state. The prairies of Baskett Slough NWR support the largest population of the endangered Fender's blue butterfly within its range, and support some of the largest concentrations of declining grassland birds as well as several listed and rare plant species. Oak woodlands are another important habitat found on the refuges and are managed to support a diversity of wildlife species, especially migratory songbirds.

The combination of native and agricultural habitats on the Willamette Valley refuges results in a diversity of lands which support more than 300 species of birds, mammals, fish, reptiles, and amphibians, 9 of which are federally listed as threatened or endangered. Overall, the refuge lands are key to healthy populations of wildlife dependent on these rare habitats and are critical to the recovery efforts underway for several listed species.

For human visitors, the Valley provides a welcome recreational destination that showcases Valley habitats in a relatively flat, accessible setting. There are very few public lands available for recreation in the Valley. Finally, the historic resources allow visitors to learn about the ways of life of Euroamerican settlers in the 19th century.

1.3 Proposed Action

The Service is proposing to adopt and implement a Comprehensive Conservation Plan for Ankeny, Baskett Slough, and William L. Finley National Wildlife Refuges, each located in the Willamette Valley of Western Oregon. Ankeny is located within Marion County, Baskett Slough is located within Polk County, and William L. Finley (also referred to as W.L. Finley throughout this document) is located within Benton County. This document is a Comprehensive Conservation Plan and Environmental Assessment (CCP/EA) for the three Refuges. The CCP sets forth management guidance for the Refuges over the next 15 years, as required by the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 688dd -688ee, as amended by the National Wildlife Refuge System Improvement Act of 1997). The Improvement Act mandated that CCPs be developed for all refuges in the National Wildlife Refuge System.

The proposed action in the CCP/EA is to implement Alternative 2, which has been identified as the Service's Preferred Alternative. This CCP/EA explores two other options (alternatives) for the CCP and discloses anticipated effects for each alternative, pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321-4347). Alternatives are presented in Chapter 2, and effects are analyzed in Chapter 6. Appendices provide supporting information.

The goals, objectives, and strategies under Alternative 2 best achieve the purpose and need for the CCP while maintaining balance among the varied management needs and programs. Alternative 2 addresses the issues and relevant mandates, and is consistent with principles of sound fish and wildlife management. For details on the specific components and actions comprising the range of alternatives, see Chapter 2.

1.4 Purpose and Need for Action

The purpose of the CCP is to provide reasonable, scientifically-grounded guidance for ensuring that over the next fifteen years, the refuges:

- Maintain areas to contribute to healthy, viable wintering Canada goose populations (especially dusky Canada geese) in the Willamette Valley while reducing depredation on private agricultural lands in the Valley;
- Enhance and restore native habitats representative of the historic Willamette Valley (including wet prairies, wetlands, upland prairies, oak savannas, oak woodlands, mixed forests, and riparian and riverine habitats), and provide for the plants and wildlife that utilize these habitats, i.e., ducks, swans, neotropical migratory birds, wading birds, mammals, reptiles, amphibians, and fish;
- Contribute to the protection and recovery of federally threatened and endangered species and their habitats within the Willamette Valley;
- Provide compatible wildlife-dependent recreation opportunities for visitors, fostering an appreciation and understanding of the refuges' fish, wildlife, plants, and their habitats;
- Protect and interpret the cultural heritage and resources of the refuges;
- Collect scientific information (inventories, monitoring, research, or scientific assessments) necessary to support adaptive management decisions; and
- Actively engage in off-refuge conservation efforts in the Willamette Valley.

The CCP is needed for a variety of reasons. Primary among these are the need to review the appropriate role of these refuges within the context of the entire Lower Columbia/Willamette Valley wintering Canada goose area and to ensure that the refuges continue to provide plentiful and reliable forage supplies for the goose population and minimal disturbance during the wintering period. In addition, the CCP is needed to determine where and how additional on-refuge native habitat restoration work should best occur, to determine the desired habitat conditions to be achieved in these native habitats over the next fifteen years, and to identify and deal with key threats to these habitats, including invasives. The CCP is also needed to determine which actions will best maintain and increase populations of rare species, as well as to design a strategy, in concert with other affected/involved parties, for elk management.

The CCP is needed to analyze the refuges' public-use programs, and to ensure that adequate consideration of the six Refuge System wildlife-dependent uses (wildlife observation, wildlife/nature photography, environmental education, interpretation, hunting, and fishing) has occurred. In addition, the CCP is needed to determine what improvements or alterations should be made in the current programs and services offered to Refuge visitors, especially in light of a growing regional population, changing demographics, desired outcomes for visitor experiences, and new compatibility requirements.

There is also a need to determine how best the refuges should manage and maintain historic and other cultural resources on the refuges. Finally, the CCP is needed to address the question of managing ongoing refuge programs and commitments with limited budgetary and staffing resources.

1.5 Setting

The Willamette Valley Refuges are situated within the Willamette Valley in Western Oregon (Map 1). The Willamette Valley is the most heavily-settled area in Oregon and is the site of much of the State's industry, agriculture, and government. Approximately 180 miles long, the Valley includes the lower mainstem of the Willamette River, the nation's 13th largest river, as well as numerous tributaries.

The refuges, measuring 11,110 acres, comprise a tiny percentage of the overall Valley acreage of approximately 2.5 million acres, but they are disproportionately important as reservoirs of the Valley's biological diversity. Further information regarding the Valley's geology, soils, climate, and hydrology is found in Chapter 3 of the Draft CCP/EA.

1.6 The National Wildlife Refuge System

The 150-million acre National Wildlife Refuge System (Refuge System, NWRS) encompasses 551 national wildlife refuges, thousands of small wetlands, and other special management areas. The Refuge System is the world's largest network of public lands and waters set aside specifically for conserving wildlife and protecting ecosystems. From its inception in 1903, the Refuge System has grown to encompass refuges in all 50 states and waterfowl production areas in 10 states. More than 36 million visitors annually fish, hunt, observe and photograph wildlife, or participate in environmental education and interpretive activities, on these national wildlife refuges.

The System is managed by the U.S. Fish and Wildlife Service, an agency within the Department of the Interior. The Service is the principal Federal agency responsible for conserving, protecting and enhancing fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

U.S. Fish and Wildlife Service Mission: The mission of the Service is "working with others, to conserve, protect and enhance fish and wildlife and their habitats for the continuing benefit of the American people." National natural resources entrusted to the Service for conservation and protection include migratory birds, endangered and threatened species, inter-jurisdictional fish, wetlands, and certain marine mammals. The Service also manages national fish hatcheries, enforces federal wildlife laws and international treaties on importing and exporting wildlife, assists with state fish and wildlife programs, and helps other countries develop wildlife conservation programs.

National Wildlife Refuge System Mission and Goals: The mission of the Refuge System is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (16 U.S.C. 688dd -688ee, as amended).

Conservation is the fundamental mission of the Refuge System. The goals of the National Wildlife Refuge System, as articulated in the Mission Goals and Purposes Policy (601 FW1) are:

- Conserve a diversity of fish, wildlife, and plants and their habitats, including species that are endangered or threatened with becoming endangered.

- Develop and maintain a network of habitats for migratory birds, anadromous and inter-jurisdictional fish, and marine mammal populations that is strategically distributed and carefully managed to meet important life history needs of these species across their ranges.

- Conserve those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or underrepresented in existing protection efforts.

- Provide and enhance opportunities to participate in compatible wildlife-dependent recreation (hunting, fishing, wildlife observation and photography, and environmental education and interpretation).

- Foster understanding and instill appreciation of the diversity and interconnectedness of fish, wildlife, and plants and their habitats.

1.7 Refuge System Laws and Directives

Refuges are guided by various federal laws and executive orders, Service policies, and international treaties. Fundamental are the mission and goals of the Refuge System and the designated purposes of the refuge unit as described in establishing legislation, executive orders, or other documents establishing, authorizing, or expanding a refuge. The hierarchical relationship of these documents in regards to refuge-specific planning and management are illustrated in Figure 1-1.

Key concepts and guidance of the Refuge System derive from the National Wildlife Refuge System Administration Act of 1966, as amended (16 U.S.C. 688dd -688ee), the Refuge Recreation Act of 1962, as amended (16 U.S.C. 460k-460k-4), Title 50, subchapter C of the Code of Federal Regulations, and the Fish and Wildlife Service Manual. These regulations govern general administration of units of the Refuge System.

Figure 1-1. Hierarchy of Guidance in the National Wildlife Refuge System

Applicable Federal laws and executive orders

⇩

U.S. Fish and Wildlife Service Mission

⇩

Refuge Purposes

⇩

National Wildlife Refuge System Mission*/Goals/Policies

⇩

Ecosystem Vision/Goals/Objectives

⇩

Refuge Vision

⇩

Refuge Goals

⇩

Refuge Objectives

⇩

Refuge Strategies

⇩

Developed or revised as part of the CCP process

Projects

Developed as part of the CCP or with Step-down Management Plans

* established by law

1.7.1 National Wildlife Refuge System Administration Act

Of all the laws governing activities on National Wildlife Refuges, the Refuge Administration Act undoubtedly exerts the greatest influence. The National Wildlife Refuge System Improvement Act (Improvement Act) amended the Refuge System Administration Act in 1997 by including a unifying mission for all national wildlife refuges as a System, a new process for determining compatible uses on refuges, and a requirement that each refuge be managed under a Comprehensive Conservation Plan, developed in an open public process.

The Refuge Administration Act states that the Secretary shall provide for the conservation of fish, wildlife and plants, and their habitats within the System as well as ensure that the biological integrity, diversity, and environmental health of the System are maintained. House Report 105–106 accompanying the Improvement Act states ''… the fundamental mission of our System is wildlife conservation: wildlife and wildlife conservation must come first.'' Biological integrity, diversity, and environmental health are critical components of wildlife conservation. As later made clear in the Biological Integrity, Diversity and Environmental Health Policy (601 FW 3) "the highest measure of biological integrity, diversity, and environmental health is viewed as those intact and self-sustaining habitats and wildlife populations that existed during historic conditions."

"Big Six"

The six wildlife-dependent recreational uses identified under the Refuge System Improvement Act are hunting, fishing, wildlife observation and photography, environmental education and interpretation. These uses are to receive enhanced consideration over other uses in planning and management.

Under the Refuge Administration Act, each refuge must be managed to fulfill the Refuge System mission as well as the specific purposes for which it was established. The Refuge Administration Act requires the Service to monitor the status and trends of fish, wildlife, and plants in each refuge.

Additionally, the Refuge Administration Act identifies six wildlife-dependent recreational uses for the Refuge System: hunting, fishing, wildlife observation and photography, environmental education and interpretation. Under the Refuge Administration Act, the Service is to grant these six wildlife-dependent public uses special consideration in the planning for, management of, and establishment and expansion of units of the National Wildlife Refuge System. The overarching goal of wildlife-dependent public use programs is to enhance opportunities and access to quality, wildlife-dependent visitor experiences on refuges while managing refuges to conserve fish, wildlife, plants, and their habitats. When determined compatible on a refuge-specific basis, these six uses assume priority status among all uses of the refuge in question. The Service is to make extra efforts to facilitate priority wildlife-dependent public use opportunities.

When preparing a CCP, refuge managers must re-evaluate all general public, recreational, and economic uses (even those occurring to further refuge habitat management goals) proposed or occurring on a refuge for appropriateness and compatibility. No refuge use may be allowed or continued unless it is determined to be appropriate and compatible. Generally, an appropriate use is one that contributes to fulfilling the refuge purposes, the Refuge System mission, or goals or objectives described in a refuge management plan. A compatible use is a use that, in the sound professional judgment of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge. Updated appropriate use and compatibility determinations for existing and proposed uses for the Willamette Valley Refuges are in Appendices B and C of this Draft CCP/EA.

The Refuge Administration Act also requires that, in addition to formally established guidance, the CCP must be developed with the participation of the public. Issues and concerns articulated by the public play a role in guiding alternatives considered during the development of the CCP, and together with the formal guidance, can play a role in selection of the preferred alternative. It is Service policy that CCPs are developed in an open public process and that the agency is committed to securing public input throughout the process. Appendix A of the Draft CCP/EA details public involvement that has been undertaken during the CCP process.

1.7.2 Other Laws, Policies, and Orders

Many other laws govern the U.S. Fish and Wildlife Service and Refuge System lands. A list and brief description of each can be found at http://www.fws.gov/laws/Lawsdigest.html. In addition, over the last few years, the Service has developed or revised numerous policies and Director's Orders to reflect the mandates and intent of the Improvement Act. Some of these key policies include the Biological Integrity, Diversity, and Environmental Health Policy (601 FW 3); the Compatibility Policy (603 FW 2); the Comprehensive Conservation Planning Policy (602 FW 3); Mission, Goals, and Purposes (601 FW 1), Appropriate Refuge Uses (603 FW 1); Wildlife-Dependent Public Uses (605 FW 1); Wilderness-Related policies (610 FW 1-5) and the Director's Order for Coordination and Cooperative Work with State Fish and Wildlife Agency Representatives on Management of the National Wildlife Refuge System. These policies and others in draft or under development can be found at http://refuges.fws.gov/policymakers/nwrpolicies.html.

In developing a CCP, refuges must consider these broader laws and policies as well as Refuge System and ecosystem goals and visions. The CCP must be consistent with these and also with the Refuge purpose. Figure 1-1 illustrates the hierarchy of planning guidance in the Service.

1.8 Willamette Valley Refuges Establishment History and Refuge Purposes

1.8.1 Legal Significance of the Refuge Purpose

The purpose for which a refuge was established or acquired is of key importance in refuge planning. Purposes must form the foundation for management decisions. The purposes of a refuge are specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit.

Unless the establishing law, order, or other document indicates otherwise, purposes dealing with the conservation, management, and restoration of fish, wildlife, and plants, and the habitats on which they depend take precedence over other purposes in the management and administration of any unit. Where a refuge has multiple purposes related to fish, wildlife, and plant conservation, the more specific purpose will take precedence in instances of conflict. When an additional unit is acquired under an authority different from the authority used to establish the original unit, the addition takes on the purpose of the original unit, but the original unit does not take on the purpose of the addition.

By law, refuges are to be managed to achieve their purposes. When a conflict exists between the Refuge System mission and the purpose of an individual refuge, the refuge purpose may supersede the Refuge System mission. Within a CCP, refuge purposes are the driving force in the development of the vision statements, goals, objectives, and strategies and are critical to determining the compatibility of all existing and proposed refuge uses.

1.8.2 Migratory Bird Conservation Act

With passage of the Migratory Bird Conservation Act in 1929 (16 U.S.C. §§ 715-715r, as amended), the Migratory Bird Conservation Commission was established to approve land acquisitions from the Migratory Bird Conservation Fund for the National Wildlife Refuge System that are considered important to waterfowl. The commission was established largely in response to public concern over plummeting waterfowl populations during the "Dust Bowl" days of the 1920s and 30s, reflecting the National Wildlife Refuge System's early commitment to waterfowl protection. Since its inception, the commission has approved more than 4.5 million acres of land acquisitions for the 150 million acre National Wildlife Refuge System.

The commission's responsibilities increased significantly with passage of the North American Wetlands Conservation Act of 1989, which provides funding to encourage partnerships to protect, enhance, and restore wetlands and other habitats for migratory birds and wildlife in the United States, Canada, and Mexico.

The commission meets three times each year to review proposals for refuge acquisitions and wetlands conservation projects. Members of the Migratory Bird Conservation Commission are the Secretary of the Interior, who serves as chairman; two members of the U.S. Senate; two members of the U.S. House of Representatives; the Secretary of Agriculture; and the Administrator of the Environmental Protection Agency.

While its importance to waterfowl remains, the refuge system today hosts a variety of habitats supporting all kinds of wildlife, including many of the Nation's endangered species, big game animals such as buffalo and elk, prairie wildflowers, forests, trophy trout, and tiny butterflies.

1.8.3 History of Refuge Establishment and Purposes

The first evidence of official interest establishing a refuge for waterfowl in the Willamette Valley was within a Migratory Bird Conservation Commission memorandum dated January 12, 1937 (MBCC Memorandum # 17, Willamette Migratory Waterfowl Refuge, Marion County, Oregon). This memorandum requested the Commission to fund the purchase of ten parcels, totaling 317.76 acres, seven miles north of Salem for the Bureau’s cooperative game management school at Oregon State University.

Serious consideration of establishing national wildlife refuges in the Valley began in the late 1950s and early 1960s. Biologist David Marshall, Chairman for Region 1’s Land Acquisition Refuge Committee for the Bureau of Sport Fisheries and Wildlife, conducted a two-year study of land and water resources of the Willamette Valley for the purpose of implementing the Pacific Flyway Waterfowl Management Plan (historical document, unknown date, referred to within the Willamette National Wildlife Refuge management plan of 1967). In 1963, former Regional Director Paul T. Quick stated in a letter to Honorable Wayne L. Morse, United States Senator, “An important aspect of the [Pacific Flyway Waterfowl Management] plan is the acquisition of lands suitable for development and management to protect a basic breeding population of ducks and geese; control waterfowl damage to crops which occurs in the absence of suitable feeding and resting grounds; and make more adequate provision for recreational enjoyment and use of the waterfowl resource, including public hunting.” Regional Director Quick also stated, “It was determined that three to four areas aggregating between 10,000 and 13,000 acres should be acquired to accomplish the waterfowl management plan objective.

At present waterfowl are concentrated at the north and south ends of the valley to a degree which seriously limits opportunities for recreational use of the resources.” Marshall identified 17 sites in his assessments. In 1963, the region decided to pursue five of them for acquisition, and three eventually became part of the Willamette Valley National Wildlife Refuge Complex.

1.8.4 William L. Finley Refuge

***Purposes for Establishing this National Wildlife Refuge*:**

- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds..." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Supporting Documentation for establishing this National Wildlife Refuge: A memo of interest from Biologist Marshall to Acting Regional Refuge Supervisor, dated April 11, 1961, regarding the area later acquired as the Muddy Creek Division, stated, "The Muddy Creek area has many refuge qualities not inherent with other Willamette Valley sites. It has an abundance of deer, furbearers, upland game and migratory bird species, in addition to waterfowl. The college is interested in it from the standpoint of it providing them with an outdoor laboratory for wildlife students. These qualities should be given attention in as much as an increasing amount of our refuge use is geared around [the] student and nature enthusiast. Some of our most ardent supporters of this proposed project are most interested in these aspects. We would thus not want to develop the entire proposed Muddy Creek acreage as a goose and duck area. On the contrary, some of its brush, trees and other cover should be left in its present condition."

Regional Director Quick stated in a letter dated February 11, 1963, to Congresswomen Edith Green, "The wetlands in the Muddy Creek drainage of Benton County have been, and continue to be, a focal point for ducks and geese." The Regional Director also wrote in his letter, "The Cabell estate which for some 60 years has been used for agricultural and hunting purposes represents about 60% of the project acreage." He continued, "In addition there have been discussions with the Benton County Park Commission, sportsmen's organizations, and other groups, for the purpose of developing a coordinated approach to inter-related plans for management of land, water and wildlife resources, and proposals for outdoor recreation. As a result of these meetings, we are aware that there is a great deal of public support for the project."

On May 11, 1962, an Ascertainment Report prepared by Service biologist David Marshall for the proposed Muddy Creek National Wildlife Refuge (present William L. Finley NWR) was submitted to the Director of the Service by the Regional Director in Portland, Oregon. This report stated the purpose to acquire these lands was, "to provide wintering habitat and protection for migratory waterfowl – principally the western Canada goose." Continued remarks included in this report stated, "This proposed refuge will be the nucleus of a group of small refuges considered necessary to provide habitat for western Canada geese and other waterfowl wintering in the Willamette Valley. There is a demonstrated need for [a] closed refuge area for protection of the resource and for use in controlling crop depredations. At the same time there is need for additional opportunity for public hunting. Waterfowl habitat is continually being lost as the result of flood control, drainage and reclamation accomplishments in the Willamette drainage. Many are small private enterprises but in the aggregate the area affected is substantial."

On February 19, 1963, the Migratory Bird Conservation Commission approved the acquisition of the Muddy Creek Division (later renamed the William L. Finley National Wildlife Refuge, after the early twentieth century renowned wildlife photographer) of the Willamette National Wildlife Refuge (later renamed the Willamette Valley National Wildlife Refuge Complex). Memorandum #4 of the Migratory Bird Conservation Commission justification for the purchase of lands for the Muddy Creek Division, dated February 19, 1963, stated, "Recent inventories indicate that of a total population of 21,000 geese of this species, 14,000 winter in the Willamette Valley**.** According to

Oregon State Game Commission personnel, harvest of the western Canada goose is heavy. Hunting pressure in the Valley on weekends causes the birds to literally spend the daylight hours on the wing. The acquisition of the proposed Willamette Refuge will provide some protection for these geese. Large numbers of ducks, swans, and water birds use the area. Mourning doves and band-tailed pigeons water and roost on the west side of Pigeon Butte and have been nearly eliminated by over-hunting. Thus the area is of value for the protection of other migratory birds as well. Establishment of refuge areas will make possible some opportunity for public hunting." (The Commission was referring to the dusky Canada goose, which at that time was referred to by some biologists as the western Canada goose.)

In 1972, there was a need to return to the Migratory Bird Commission to obtain additional funds to continue acquisition, as land values in the area had risen. Commission notes from that meeting redefined the purpose of the Refuge as "to provide (1) feeding and nesting areas for migratory waterfowl; (2) wintering range primarily for the dusky Canada goose; and (3) production habitat for several species of ducks." (MBCC Memo #9, Mar. 10 1972.) In David Marshall's memoirs, he reminisced that Henry Cabell, the owner of one of the main tracts at Finley, wanted to see the estate remain intact and saw its value as an outdoor classroom for Oregon State College.

There was some opposition from Benton County and other counties in establishing a refuge. The main issue was the removal of land from the county tax roll. Benton County's disapproval of the refuge resulted in a bill passed by the Oregon legislature which made state approval for a refuge acquisition conditional upon county approval. Dave Marshall stated in his memoirs, "This bill faced much lobbying against it by the Oregon Audubon Society and Oregon Duck Hunters Association." Dave Marshall also stated that his first wife Betty, together with Mirth Tufts representing the Audubon Society, met with former Governor Mark Hatfield and presented their case opposing this bill. The Governor viewed this matter from a legal standpoint, thinking that it was not good for a county to have the power to nullify a matter that might be in the interest of the state as a whole. The Governor then vetoed the bill. So acquisition of the first national wildlife refuge in the Willamette Valley began with the purchase of eventually 5,325 acres.

Conclusion: The various MBCC memos and other supporting documentation converge on the management direction for W.L. Finley as protection of wintering areas for dusky Canada geese and other migratory waterfowl. The concern was motivated by the loss of historic waterfowl habitat in the Willamette Valley and the excessive hunting pressure on geese, especially duskies. After review by the planning team, specific management practices mentioned in the MBCC memos are not interpreted as primary management direction because better methods for providing food, water, and sanctuary for wintering waterfowl exist today and will continue to be developed as we learn more about the interrelated ecology of the area. Ancillary public benefits were foreseen from the establishment of the refuge, including a reduction in crop depredation, the potential for recreational enjoyment of the waterfowl resource, including some opportunity for hunting, and the opportunity for the nearby colleges and universities to use the area as an outdoor laboratory for wildlife students. These are also not interpreted as refuge purposes because the establishment history documentation points to the primary reason for refuge establishment as protection for the geese and other birds. If well-planned and executed, these other uses can be provided for under refuge management plans. Finally it should be noted that production habitat for ducks was mentioned. Strategies for enhancing wintering habitats, such as creating dewatered or very shallow water during spring/summer to provide for optimal growth of annual seed-bearing plants, conflict with management practices emphasizing brood production. From a review of the establishment history it was determined that any production habitat should be incidental and secondary to the more primary intent to manage the refuge for the benefit of wintering birds.

Snagboat Bend Unit (part of William L. Finley) Purpose:

- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds..." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Supporting Documentation for Establishing this Unit: A fourth national wildlife refuge was proposed in the mid-1960s to help reach a target goal of 13,000 acres needed for the protection of the dusky Canada goose wintering population, as specified under the Pacific Flyway Waterfowl Management Plan and approved by the Oregon Game Commission. The proposal was to acquire an additional 2,387 acres for a fourth national wildlife refuge. During Biologist David Marshall's initial biological assessment of the Willamette Valley for establishing a national wildlife refuge, he identified "Peoria" as a potential site. He stated, "It comprises about 1000 acres extending 3 miles south from the town of Peoria on both sides of River Road. It is listed because of its ideal location and possibilities for water developments, probably on a pump basis, on the west side of the area. The east side which is much higher would be of value for dry land waterfowl food crops. Gravel bars along the Willamette River in the vicinity of Peoria have long been favorite Canada goose hunting spots."

In December 1999, a Conceptual Management Plan proposed Snag Boat Bend as an addition to the William L. Finley NWR. This area is along the Willamette River floodplain, a few miles south of the town of Peoria, in Linn County. In 2000, the Migratory Bird Conservation Commission approved acquiring 341 acres of land from The Nature Conservancy (TNC) to establish this new unit of the William L. Finley Refuge. In June 2006, the Migratory Bird Conservation Commission approved acquiring an additional 35 acres through a purchase of the Conte Tract adjacent to the northeast corner of this unit. Primary management goals for the Snag Boat Bend unit were established in the Conceptual Management Plan written during the acquisition of this unit (USFWS 1999). These are interpreted as management direction further elaborating upon the Migratory Bird Conservation Act purposes specific to W.L. Finley Refuge, and apply only to the Snag Boat Bend Unit.

- Provide high-quality, wintering habitat for migratory waterfowl, especially dabbling ducks (emphasizing mallards and wood ducks), Canada geese, and tundra swans.
- Protect, restore, and develop a diversity of habitats for all migratory birds such as neotropical songbirds, raptors, wading birds, and shorebirds.
- Protect, restore, and develop habitats for and otherwise support recovery of federally listed, endangered, and threatened species, and help prevent the listing of candidate species and species of management concern.
- Protect and restore a diversity of native habitats for indigenous fish, wildlife, invertebrates, and plant species of the Willamette Valley ecosystem.
- Provide high-quality opportunities for wildlife-dependent recreation and environmental education to enhance public appreciation, understanding, and enjoyment of refuge fish, wildlife, habitats, and cultural resources.

1.8.5 Ankeny Refuge

Purposes for Establishing this National Wildlife Refuge:

- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds…" (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Supporting Documentation for Establishing this National Wildlife Refuge: Marshall had concerns that providing only one large refuge, such as Muddy Creek, would not suffice in the protection of the western Canada goose population in the Willamette Valley. Marshall identified "Ankeny Bottoms" in a memorandum dated July 18, 1961, as a potential site for a national wildlife refuge. In his memoirs written some 45 years later (Marshall 2008), Marshall explained that the site had had no history of goose use but was devoted to ryegrass production, an important goose food. However, he had felt strongly that if water was made available, geese would begin to use it. In 2007, Marshall mused that his premonitions had proved correct: after 45 years as a wildlife refuge and after numerous projects providing seasonal and permanent water at the site had been constructed, he wrote "Never in my wildest dreams did I expect Ankeny Bottoms to be such a successful refuge."
A Land Ascertainment Report, L.A.I., Step II, signed by Regional Director Barnaby, dated April 8, 1964, stated, "Ankeny Bottoms is one of three refuges planned for the Willamette Valley. It is an area frequented by both the dusky and western Canada geese, and important for a segment of wintering waterfowl populations in the Pacific Flyway. Under development and management, the area should become a good feeding area for spring and fall migrants, and restore a secondary nesting area. It is of sufficient size to protect a good waterfowl population, yet furnish an attractive site for public hunting."

On June 24, 1964, the Migratory Bird Conservation Commission approved the acquisition of the Ankeny Division of the Willamette National Wildlife Refuge, later renamed the Ankeny National Wildlife Refuge. The Commission authorized the Service to acquire 12 tracts in Marion County, Oregon, totaling 2,857 acres at a price of $774,751, "to provide wintering habitat for dusky Canada geese and other waterfowl. The location of the Ankeny Division is strategic to provide additional protection for these geese. This new division will also create better distribution of waterfowl and aid in reducing crop depredations." Once all lands were purchased, the total acreage for Ankeny NWR was 2,796.

In 1968, there was a need to return to the Migratory Bird Commission to obtain additional funds to continue acquisition, as land values in the area had risen. Commission notes from that meeting redefined the purpose of the refuge as "to provide (1) feeding and nesting areas for migratory waterfowl; (2) wintering range primarily for the dusky Canada goose; and (3) production habitat for several species of ducks." (MBCC Memo #8, November 1968.)

Conclusion: The various MBCC memos and other supporting documentation converge on the key management direction for Ankeny Refuge – the protection of wintering areas for dusky Canada geese and other migratory waterfowl. The concern was motivated by the loss of historic waterfowl habitat in the Willamette Valley and the excessive hunting pressure on geese, especially duskies. After review by the planning team, specific management practices mentioned in the MBCC memos are not interpreted as primary management direction because better methods for providing food, water, and sanctuary for wintering waterfowl exist today and will continue to be developed as we learn more about the interrelated ecology of the area. Finally, it should be noted that production habitat for ducks was mentioned. Strategies for enhancing wintering habitats, such as creating dewatered or very shallow water during spring/summer to provide for optimal growth of annual seed-bearing plants, conflict with management practices emphasizing brood production. From a review of the establishment history, it was determined that any production habitat should be incidental and secondary to the more primary and original intent to manage the Refuge for the benefit of wintering birds.

1.8.6 Baskett Slough Refuge

Purposes for Establishing this National Wildlife Refuge:

- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds…" (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Supporting Documentation for Establishing this National Wildlife Refuge: Biologist David Marshall identified Baskett Slough in an assessment on April 11, 1961: "Past thinking has revealed the desirability of an area on Baskett Slough near Rickreall. This is an area having good goose use at present and would be excellent, providing we could obtain an area there which would meet water and other requirements."

Migratory Bird Conservation Commission, Memorandum #3, Willamette National Wildlife Refuge, Polk County, described the justification and proposed management of Baskett Slough NWR as follows, "A recent aerial reconnaissance flight over the proposed area disclosed 8,000 dusky Canada geese on the area. This represents more than half of the wintering population of this important species. Hunting pressure in the valley on weekends causes the birds to literally spend the daylight hours on the wing. Band returns from this general area represent about 58 percent of the Pacific Flyway returns. Acquisition of this area, together with the rest of the proposed and existing State and Federal areas in the valley will provide important protection for these birds. Inventories of the Baskett Slough area indicate a spring duck population of about 5,000. Under proposed development and management duck and goose populations could be expected to double and duck nesting, which is presently very slight, could be expected to increase greatly." Concerning proposed management activities for this refuge, the above memorandum stated, "The area will be managed primarily for dusky Canada geese. Cultivated lands not left in permanent pastures or planted to rye grass or Sudan grass will be farmed on a sharecrop basis. It is estimated that 800 tons of hay will be produced and 5,000 AUMs of grazing will be available. Timbered uplands should be managed as wildlife habitat and for watershed protection. Fishing will be available in existing or subsequent permanent impoundments and waterfowl, upland game and deer hunting will be permitted on parts of the area." On March 25, 1965, the Migratory Bird Conservation Commission approved the acquisition of the Baskett Slough Division of the Willamette National Wildlife Refuge, later renamed the Baskett Slough National Wildlife Refuge. Total acreage for Baskett Slough NWR was 2,492 acres.

During the latter half of the 1960's, the General Accounting Office (GAO) initiated an investigation of refuge acquisition procedures for areas purchased with "duck stamp" funds. According to Dave Marshall's memoirs, "William L. Finley and Baskett Slough refuges immediately came under close scrutiny." "The GAO pointed out that we had acquired uplands at both refuges with duck stamp funds. While not illegal, they argued that this was not done in the spirit of testimony that then Director Dan Janzen made before Congress supporting the loan on the duck stamp for wetland acquisitions." The GAO report made it to the front page of *The Oregonian* and created local bad press for the Service. Marshall defended the purchase partly on the grounds that the original owners had been asked if they would sell the wetland portions of the properties only and they had refused.

In addition, he pointed out the ecological value of the uplands. Although these arguments were not well received at first, when Ira Gabrielson, former Service Director, came to tour the Refuge, he seemed to agree with Marshall's position. Eventually the GAO investigation was closed and no more was said about the purchase of these lands.

In 1967, there was a need to return to the Migratory Bird Commission to obtain additional funds to continue acquisition, as land values in the area had risen. Commission notes from that meeting redefined the purpose of the Refuge as "to provide (1) feeding and nesting areas for migratory waterfowl; (2) wintering range primarily for the dusky Canada goose; and (3) production habitat for several species of ducks." (MBCC Memo #8, October 1967.)

Conclusion: The various MBCC memos and other supporting documentation converge on the key management direction for Baskett Slough Refuge as protection of wintering areas for dusky Canada geese and other migratory waterfowl. The concern was motivated by the loss of historic waterfowl habitat in the Willamette Valley and the excessive hunting pressure on geese, especially duskies. After review by the planning team, specific management practices mentioned in the MBCC memos are not interpreted as refuge purposes because better methods for providing food, water, and sanctuary for wintering waterfowl exist today and will continue to be developed as we learn more about the interrelated ecology of the area. Ancillary public benefits were foreseen from the establishment of the refuge, including the potential for fishing and hunting.

Fishing is not interpreted as management direction because the only semi-permanent impounded water is Morgan Reservoir, which only collects water from rainfall and off the slopes of the butte. The dam impedes any upstream movement of fish and is occasionally drained for repairs. There is no fish stocking program for the refuge. Fish cannot enter this unit, unless illegally. Hunting is not interpreted as management direction because the establishment history documentation points to the primary reason for refuge establishment as protection for the geese and other birds. If well-planned and executed, this use may be provided for under refuge management plans. Finally it should be noted that production habitat for ducks was mentioned. Strategies for enhancing wintering habitats, such as creating dewatered or very shallow water during spring/summer to provide for optimal growth of annual seed-bearing plants, conflict with management practices emphasizing brood production. From a review of the establishment history it was determined that any production habitat should be incidental and secondary to the more primary and original intent to manage the refuge for the benefit of wintering birds.

1.9 Refuge Ownership and Land Status

Table 1-1 and Map 2 show the lands associated with each of the three refuges. The acreage figures for fee and easement properties are based on realty deeds. The approved refuge boundary indicates a national wildlife refuge boundary approved by the national or regional U.S. Fish and Wildlife Service Director for potential acquisition of lands by the Service.

In addition to the three refuges, the Complex manages a 113-acre property at Oak Creek, which is managed primarily for its population of Bradshaw's lomatium. The Complex also has responsibility for 5 FmHA Conservation Easement properties, which range in size from 12 acres to 185 acres. Some agricultural and a variety of native habitats are found on the easements, including oak/ash riparian forest, oak woodland, wetlands, mixed deciduous-coniferous forest. Except for general recommendations made in Section 2.5, the CCP does not address the FmHA properties. As apparent from Table 1-1, GIS acres can vary by a certain amount from Realty acres, which are based on survey or deed records. Realty acres should be viewed as the most accurate source. However, a variety of analyses was conducted utilizing GIS during the CCP process. Quantitative analysis henceforth in the CCP is based on GIS estimates, *which may slightly over- or under-estimate actual acres or lengths*.

Also note that habitat was not mapped and included in habitat summaries (see Tables 2-1 and 2-2 in Chapter 2) for a portion of Snag Boat Bend unit (part of William L. Finley Refuge) within its approved refuge boundary. This is because management of the area is thought to be still under the authority of the Oregon Division of State Lands. See Section 1.14.10 for further clarification on this realty issue.

Table 1-1. Land Ownership Status

	Approved Refuge Boundary Acres[1]	Acres Owned in Fee[2]	Acres in Easements, Agreement, or Lease [3]
Ankeny	2,814	2,796.33	0
Baskett Slough	2,522	2,492.33	0
William L. Finley	5,791	5,706.00	8.94
Total Acres of Willamette Valley Refuge Complex	**11,127**	**10,994.66**	**8.94**

[1] Acres generated from GIS, rounded to nearest acre. [2] Acres from Realty data (USFWS 2009)
[3] Acres from Realty data (USFWS 2009)

1.10 Relationship to Previous and Future Refuge Plans

1.10.1 Previous Plans

In December 1980, the Refuge released program objectives and guidelines for land management at the three refuges (USFWS 1980). The plan includes a chronological summary of major developments and events at the three refuges. The document also makes reference to a previous planning effort conducted in 1971.

Parts 1 & 2 of Refuge Management Planning, conducted in the 1980s, included step-down Integrated Pest Management, Nuisance Species, Wildlife Monitoring, Fire Management, Public Use, and Habitat Management Plans.

1.10.2 Future Planning

The CCP will be revised every 15 years or earlier if monitoring and evaluation determine that changes are needed to achieve the refuge purposes, vision, goals, or objectives. The CCP provides guidance in the form of goals, objectives, and strategies for refuge program areas but may lack some of the specifics needed for implementation. Step-down management plans will therefore be developed for individual program areas, as needed, following completion of the CCP. Step-down plans require appropriate NEPA compliance.

1.11 Relationship to Other Ecosystem Planning and Assessment Efforts

When developing a CCP, the Service considers the goals and objectives of existing national, regional, state, and ecosystem plans and/or assessments. The CCP is expected to be consistent, as much as possible, with existing plans and assist in meeting their conservation goals and objectives (602 FW 3). This section summarizes some of the key plans reviewed by members of the core team while developing the CCP.

1.11.1 Willamette Valley Region

Willamette Valley Ecoregional Assessment: This assessment (Floberg et.al. 2004) identifies priority areas for conserving the biodiversity of the Willamette Valley-Puget Trough-Georgia Basin ecoregion. Conservation targets identified in the plan include representatives from all taxa.

Willamette Restoration Strategy: This plan is the "Willamette chapter" of the Oregon Plan for Salmon and Watersheds. The plan recommends 27 actions to restore the health of the Willamette Basin. In particular, the Strategy (Jerrick 2001) focuses on actions for water quality, water quantity, riparian protection, floodplains, and fish passage. The plan was developed through a collaborative process involving over 150 partners and participants.

Draft Willamette Subbasin Plan: The Northwest Power and Conservation Council (Council) has overseen the development of plans for each of the 60 interior tributary subbasins of the Columbia River. Subbasin plans are expected to assess the biological potential of the subbasin and to describe opportunities for restoration. Plans also describe the amount of habitat change that has occurred within the subbasin and limiting factors (analogous to stresses/sources in this plan). The plans are the basis for review of proposals for Bonneville Power Administration (BPA) each year by the fish and wildlife agencies and tribes, the Independent Scientific Review Panel, and the Council. This plan evaluates fish, wildlife, and habitat condition within the Willamette Sub-basin. The plan's overall objective is to increase fish & wildlife population trajectories. The plan identifies more than 35 strategies needed to meet its objectives. The priority conservation themes identified in the plan are:

- Deal with the dams—change flow regimes and establish fish passage.
- Fix culverts and diversions to allow fish passage.
- Focus on valley and foothills wildlife.
- Restore lowland riparian areas.
- Restore low-cost, high-return areas of the Willamette River floodplain.
- Let the river cool itself by seeping through streamside gravels, alcoves, and islands.
- Ensure that all priority themes above are taken up and supported in an organized way at the local level.

The Nature Conservancy's Willamette Synthesis Project: The primary goals of the Synthesis Project are to delineate priority terrestrial and freshwater sites where investment in conservation or restoration would best contribute to (1) the health of historically significant and functional habitats, (2) the survival or recovery of imperiled plants and wildlife dependent on those habitats, (3) improved floodplain connectedness to benefit water quality for aquatic biodiversity and (4) overall watershed health. The Synthesis condenses multiple Willamette Basin assessments into a single synthesis map that can guide the conservation or restoration of key sites in the Willamette Basin.

1.11.2 Migratory Birds

Birds of Conservation Concern: Based on the efforts and assessment scores of three major bird conservation efforts (Partners In Flight, the U.S. Shorebird Conservation Plan, and the North American Waterbird Conservation Plan), this report (USFWS 2002) identifies, by Service region and by Bird Conservation Region (BCR), the bird species most in need of conservation attention. The Willamette Valley Refuges are located within BCR 5, for which 27 species are listed; however several of these are seabirds that do not utilize the refuges.

Partners in Flight (PIF): The primary goal of the *Conservation Strategy for Landbirds in the Lowlands and Valleys of Western Oregon and Washington* (Altman 2000) is to ensure long-term maintenance of healthy populations of native landbirds. Specific management activities and strategies are recommended.

North American Waterfowl Management Plan**:** This plan, first formulated in 1986, provides a strategy to protect North America's remaining wetlands and to conserve waterfowl populations through habitat protection, restoration, and enhancement. The plan was updated in 2004 with an emphasis on strengthening the biological foundation, using a landscape approach and expanding partnerships. The 2004 update contains species-specific population objectives and evaluations of whether the continental population is currently short or over the target. There are also flyway goals for production by species, but the plan did not target population objectives for wintering or migratory waterfowl by area (North American Waterfowl Management Plan 2004). Implementation of this plan is accomplished at the regional level by partnership within 11 Joint Venture areas. The Willamette Valley Refuges are located within the area of the Pacific Coast Joint Venture. Many of the projects identified to achieve the NAWMP objectives are eligible for funding under the North American Wetlands Conservation Act (NAWCA). NAWCA authorizes Congressional funding for projects fostering public/private partnerships that support the conservation and restoration of wetland habitats and associated wildlife resources. Given the extent of historic wetlands and ongoing public/private partnerships in the Willamette Valley, this act has been (and continues to be) a tremendous resource for the conservation community in the Valley.

Pacific Flyway Plans: Flyway management plans are the products of Flyway Councils, developed to help state and Federal agencies cooperatively manage migratory game birds. Several flyway management plans pertain to the Willamette Valley Refuges, especially those for the Dusky Canada Goose (Pacific Flyway Council 2008) and other Canada Geese. In addition, the Plan for Northwest Oregon/Southwest Washington Canada Goose Agricultural Depredation Control (Pacific Flyway Council 1998) details specific strategies and guidance by management area for reducing depredation by Canada geese within the Lower Columbia Region/Willamette Valley.

United States Shorebird Conservation Plan/Northern Pacific Coast Regional Shorebird Management Plan: These plans (Brown et al. 2001, Drut and Buchanan 2000) identify numerous landscapes within the northern Pacific coast that provide important habitat for shorebirds. The diversity of wetland habitat types in the Willamette Valley are specifically highlighted as being of regional importance for several species including dunlin, snipe, and killdeer.

Pacific Coast Joint Venture Willamette Valley Implementation Plan: This plan (Roth et al. 2004) is intended to provide a strategic framework for site-specific habitat protection and restoration projects within the Willamette Valley. Primary focus is on migratory birds and their habitats including waterfowl, shorebirds, waterbirds, and landbirds.

1.11.3 State Plans

Oregon Conservation Strategy (OCS): This document, authored by the Oregon Department of Fish and Wildlife (2006), is an overarching strategy for conserving fish and wildlife within the state. The Strategy identifies specific Conservation Opportunity Areas where high-priority species and habitat conservation may be most efficiently addressed. Strategy (high-priority) habitats identified by the OCS within the Willamette Valley include grasslands, oak woodlands, riparian, and wetlands/wet prairies. Three mammals, 10 plants, 5 herptiles, 4 invertebrates, 23 fish species, populations, or segments, and 14 birds are listed as strategy (high priority) species within the OCS; many of these are found on the Willamette Valley Refuges.

Oregon Elk Management Plan: This plan (ODFW 2003) outlines elk management guidelines within the state of Oregon. ODFW manages elk based on management objectives for winter population size and post-season bull ratios in each Wildlife Management Unit in the state. The current management objective size for Roosevelt Elk in the Willamette Valley is zero.

State Comprehensive Outdoor Recreation Plan (SCORP): The 2003 – 2007 Oregon SCORP (Oregon Parks and Recreation Department 2003) includes a comprehensive overview of state recreational trends based on regions.

1.11.4 Other Plans

Willamette Valley Basin Recovery Plan: This plan (USFWS 2010) outlines the main recovery areas, actions, and population objectives for the five listed Willamette Valley plants and the Fender's blue butterfly.

Oregon Chub Recovery Plan: This plan (USFWS 1998) outlines the main recovery areas, actions, and population objectives for the Oregon chub.

***Oregon Partners for Fish and Wildlife Program: Statewide Strategic Plan 2007-2011*:** This plan (USFWS 2007) identifies the ecological importance of the habitats that occur within the Willamette Valley Focus Area. Continued emphasis will be placed on conservation of rare and unique habitats that support declining species on private lands within the Willamette Valley through collaborative partnerships with private landowners, non-governmental organizations, and other agencies.

1.12 Planning Process

Planning Team: A core planning team, consisting of a project leader, deputy project leader, biologist, public use planner, the Refuge Managers, and a regional planner, began developing the CCP in 2006. An extended team assisted in development, particularly in providing comments at key milestones. The extended team consisted of various professionals from other agencies and within the Service. A list of core and extended team members, and their experience, is located in Appendix I.

Resources of Concern: Early in the planning process, the team cooperatively identified species, species groups, and communities of concern for these refuges. A comprehensive list of these resources was compiled based upon review of the plans referenced above, many of which highlight priority species or habitats for conservation. The list was further culled in developing a more targeted assemblage of Priority Resources of Concern. The Priority Resources of Concern table includes 23 focal species that were selected as representatives or indicators for the overall condition of important refuge habitats. Most of the biological emphasis of the CCP is focused on maintaining and restoring these priority resources. See Appendix D for the Comprehensive Resources of Concern and Priority Resources of Concern.

Public Use Planning: Public use planning centered on developing goals, objectives, and strategies around the Big Six uses. Other non-wildlife dependent uses that currently occur were also addressed.

Public Involvement: Public scoping began in January of 2008. Scoping meetings were held in Salem and Corvallis. Public commentary was also solicited through distribution of a planning update to the refuges' mailing list, refuge visitors, and other interested parties. A complete summary of public involvement is in Appendix A.

An internal draft was distributed to Service Region 1 reviewers and members of the extended team, including States and Tribes, in March 2010. All changes requested by reviewers and extended team members and actual changes made were documented.

1.13 Issue Background

Refuge planning policy defines an issue as "any unsettled matter that requires a management decision." The primary intent of a planning process is to make sound decisions and to better address problems and concerns. Thus a key component of the planning process is a structured definition of the issues (problems, concerns, opportunities) that lay before us in the current and future management of the Willamette Valley National Wildlife Refuge Complex.

Issues were derived from many discussions from staff, partners, other agencies, longtime refuge observers, and the public. Each of the issue statements that follow presents background information and is followed by key questions that we hope to resolve in the CCP.

1.14 Key Issues to Address in the CCP

The following issues are within the scope of the CCP/EA and are considered by the Service to be the major issues to address in the planning process.

1.14.1 The Role of the Willamette Valley Refuge Complex in Wintering Goose Habitat

Ankeny, Baskett Slough, and W. L. Finley NWRs were established in the mid-1960s with primary intent being to provide winter habitat for dusky Canada geese and other migratory waterfowl. At that time, approximately 18,000 Canada geese wintered in the Willamette Valley and lower Columbia River floodplain (WV-LCR), nearly all of them identified as duskys. Since that time, the wintering goose population has dramatically increased, with total counts rising as high as 200,000 in the year 2000 [numbers have been over 100,000 each year since 1994 in the WV-LCR] (Pacific Flyway Council 2007).

As geese numbers multiplied, the species composition changed. The Taverner's subspecies increased significantly in the 1970s and more recently, during the 1990s, cackling Canada geese shifted their distribution from California to the WV-LCR. Populations of lesser Canada geese and the resident western Canada geese have also increased. The dusky Canada goose population currently constitutes less than ten percent of the winter flock and remains below Flyway objectives. Population targets are set at the flyway scale.

Since establishment, the refuges have devoted a large portion of land to ensuring an adequate supply of forage for wintering Canada geese. Forage is provided primarily by grass fields, which are planted by cooperative farmers and refuge staff. The geese feed heavily on this green browse during the October - April period that they spend in the Valley. Cooperative farmers then harvest the grass seed during early summer. Cooperative farming provides mutual benefits to both the farmer and the Service at a high degree of cost effectiveness to the Service.

The significant increase in goose numbers poses a number of inter-related challenges. At this time, the refuges and other WV-LCR public lands are not able to meet the forage demands of this population over their wintering period. Depredation on private lands in the WV-LCR has been a concern for at least 20 years, and is the subject of a 1998 management plan prepared by the Pacific Flyway Council and other partners (Pacific Flyway Council 1998). The primary goal of the Depredation Plan is to minimize depredation losses caused by Canada geese. To do so, the plan sets objectives to reduce the total population to 107,000 wintering geese; to increase wintering Canada goose use on public lands while subsequently decreasing use of private lands; to acquire additional public lands; and to increase goose hunting opportunities. The plan also calls for public use restrictions on public lands to decrease harassment of wintering geese. Objectives and strategies in the plan that relate to the farming program on the Willamette Valley Refuge Complex include increasing capability to manage croplands with enhanced water supplies; experimenting with alternative crops; increasing fertilization, liming, and burning of grass fields; increasing use of Integrated Pest Management practices, and providing adequate composition of the major grass types used by Canada geese.

The refuges have implemented several changes associated with these recommendations.
As wintering goose populations in the Valley have risen, geese have increased pressure on the refuges' grass fields, decreasing seed harvest rates. Some fields are so heavily browsed that they provide little seed to harvest. In the past, losses incurred by the refuges' cooperative farmers on the heavily browsed fields have been offset somewhat by profits from productive fields. Goose use of the refuges could reach a point where the losses incurred will not be offset by profits and cooperative farming may not be economically feasible without additional support from the Service.

The three refuges receive a substantial amount of the goose use in the Willamette Valley, but the on-refuge carrying capacity may be at or near maximum levels now. If WV-LCR population numbers continue to rise, alternative off-refuge strategies may be the most effective way to continue to provide goose habitat while minimizing depredations on private lands. Such strategies may include additional land protection via easements, acquisitions, or other means. On the refuges, tradeoffs between maximizing habitat potential for dusky Canada geese and restoring or enhancing rare native habitats may need to be explicitly examined.

Key questions to be addressed in the CCP:

- How much and where shall forage fields, wetlands, and sanctuary be located in order to maximize refuge wintering populations of dusky and other Canada geese?
- What additional measures, if any, should the refuges undertake in order to maximize goose use on existing forage fields?
- If cooperative farming begins to prove infeasible as currently operated, what other strategies could be tried in order to maintain an efficient source of winter forage for Canada geese?
- Should additional water supplies be obtained to enhance crop production?
- How will climate change affect wintering geese populations?
- Are current management strategies working to both support the geese as part of the refuges' establishing purpose and simultaneously minimize off-site goose depredation on farm fields?

1.14.2 Restoration and Maintenance of Native Habitats of the Willamette Valley

Willamette Valley native habitats, including wet prairie, upland prairie, oak savanna, oak woodland, and riparian, have dramatically declined since European settlement. Across the Valley, less than one percent of the native prairies and oak savannas are estimated to remain, while riparian and oak woodland habitats are also greatly diminished. All three refuges contain remnant tracts or components of these rare community types. These communities support many rare and listed species. The loss and fragmentation of prairie and oak habitats has led to the decline of many native plants and animals.

Draining, hydrological simplification, agricultural development, and urbanization were the main factors contributing to the direct loss of these habitats across the Valley, but other factors continue to play a role in the degradation of existing tracts of native habitats. The absence of disturbance regimes which historically maintained these habitats, including fire and flooding, has favored encroachment by woody vegetation and successional changes in these habitats towards climax forest or scrub communities. Invasion of exotic species is an additional threat to the integrity and functioning of these remnant communities.

Some of the tracts of native habitats found on the refuges are considered regionally significant partly due to their size and/or populations of rare species known to exist within these areas. Other portions of refuge land are in active restoration, and over time hopefully will assume the desired characteristics sufficient to support key indicator and dependent species. Given the loss that has already occurred in native habitats throughout the Valley, any maintenance or restoration of native habitats has the potential to contribute greatly to the biological integrity and diversity of the region. Efforts to restore these habitats are extremely time intensive and restoration techniques are not well understood. Basic techniques include long-term removal of woody successional species, including native trees such as Douglas-fir, exotic species control, seeding of native species, and ongoing maintenance using a mowing and burning regime. The refuges have been on the forefront of testing different techniques. Restoration of these habitat types will require a significant commitment of time and funding.

In addition to habitat restoration and maintenance work occurring on the refuges, the Complex provides technical assistance to private landowners who wish to improve or restore native habitats on their own lands. These efforts have been well received by many local landowners and contribute greatly to the environmental health of the Willamette Valley.

Key questions to be addressed in the CCP:

- Where should additional restoration work occur and what criteria should be used in the selection of restoration sites, especially when retiring farm fields to restore to native habitat?
- What specifically are the desired structural attributes and desired community composition for the native habitats for both the near term (15 years) and long term (50 years)?
- What kinds of restoration techniques are proving most fruitful? What management strategies should the refuge pursue to maintain and continue to enhance areas that are partially restored or in fair-to-good condition already?
- What kinds of monitoring and research must be done to contribute to adaptive management to better protect and restore these habitats?
- How will climate change affect these habitats and species dependent on these habitats?

1.14.3 Maintenance and Recovery of Listed and Rare Species

The Valley refuges support nine federally listed species, three candidate species, and 31 Federal species of concern. Recovery plans exist for the federally listed species. Numerous other state-listed species also inhabit the refuges. There are also a number of other species known to be rare under the Willamette Valley/Puget Trough Ecoregional Assessment, and slated for a 100% conservation goal under that plan (Floberg et al. 2004). For several of these, the refuges support 50% or more of the known occurrences of these species.

Many of the rare species known to exist on the refuges are endemic to the Willamette Valley and exist in only a few known locations. The refuges are significant for several of these species for the following reasons:

- ***Red legged frog:*** W.L. Finley is the most populous breeding site known in the Willamette Valley
- ***Fender's blue butterfly:*** largest remaining population on Baskett Butte
- ***Bradshaw's desert parsley:*** population at Oak Creek fee title property larger than all other known extant populations combined
- ***Peacock larkspur:*** largest population in the Valley at W.L. Finley
- ***Oregon chub:*** one of the largest populations in the Valley at Ankeny

Even on the refuges, with ongoing protection and restoration work, some of these species have experienced significant population declines in recent years and one listed species (Willamette daisy) has been extirpated from one of the refuges. The declines are thought to be due to the encroachment of invasive and exotic species, as well as elimination of historic management tools such as fire. Substantial effort needs to be made to remove woody invasive vegetation and exotic species to prevent further declines in these species.

Key questions to be addressed in the CCP:

- What populations of rare species should be targeted at the refuges to meet Recovery Plan objectives?
- Which actions will best maintain and increase populations of rare species at the refuges?
- What kinds of monitoring activities are needed?
- Will actions taken on behalf of focal species benefit other rare species?
- How will climate change affect these species?

1.14.4 Management of Roosevelt Elk, especially on William L. Finley Refuge

Roosevelt elk are indigenous to the Willamette Valley and Western Oregon. Sightings of Roosevelt elk were uncommon at W.L. Finley NWR when the refuge was established in 1964. Sightings usually involved less than five animals, and the elk rarely were seen on consecutive days. This pattern continued until 1989, when a small herd of approximately 20 elk were observed repeatedly throughout the fall and winter. An Oregon State University student, with the assistance of Oregon Department of Fish and Wildlife (ODFW), conducted informal population surveys in 2002-03. The minimum population was estimated at 122, with a 35 calves/100 cows ratio and a bull-to-cow ratio of 48/100. In 2010 the population was estimated at 140-160 (J. Beall pers. comm.), depending on calf production and survival and off-refuge harvest during hunting season. The herd size has been considered stable for the past five years.

ODFW has designated the Willamette Valley Management Unit as an Elk De-emphasis Area (EDA). EDAs are characterized by high percentages of private land with on-going elk damage to private property and agricultural crops, or high potential for such damage. Hunter access to these areas is often limited. The management focus for EDAs is to reduce both numbers and damage caused by elk.

In response to complaints of property (largely fences) and agricultural damage on private lands surrounding W.L. Finley NWR in the late 1990s, ODFW issued special damage control permits. Private land-owner complaints continued as the local elk population increased. In 2002, ODFW established a special hunting unit in the vicinity of the refuge, which included a lengthened season (August 1 through March 31) and either sex harvest. Harvest in the vicinity of the refuge that first year was unofficially estimated at 24 (K. Warren pers. comm.), dominated by large bulls (including the new world's record). In early 2003, ODFW and the Complex agreed to work together on elk damage issues and population assessments. ODFW would obtain harvest information and implement expanded off-refuge hunting opportunities. Organized attempts to capture and radio tag elk calves in 2003 were unsuccessful.

ODFW held a public meeting in February 2003 to discuss the elk population in the vicinity of W.L. Finley NWR with local residents. The general consensus from the meeting was that elk numbers should be reduced. As a result, 50 additional antlerless-only tags were issued for the Muddy Creek Unit beginning in 2005. ODFW held an additional public meeting in Monroe in 2008 to discuss management of local elk populations with local landowners. ODFW agreed to do an assessment of harvest data of elk taken in the vicinity of W. L. Finley Refuge. Harvest data specific to the Muddy Creek unit has not been available in the past in order to accurately measure impacts to the herd. Depredation complaints in the vicinity of the refuge have declined since additional tags were issued and the season was expanded, although problems still exist with damage to grass seed fields, corn crops, and fencing. Most of the depredation complaints around the Refuge have involved elk damaging corn that is grown by farmers or local duck clubs. Electric fences have been used successfully to keep elk from damaging these crops.

Elk are occasionally sighted at Baskett Slough and Ankeny Refuges as well. These animals are known to move frequently between adjacent private lands and the refuges. No elk hunting is currently permitted on the refuges. The elk herd is a popular attraction to the visiting public. A study in Colorado found that the presence of elk greatly increased viewing pleasure (Manfredo and Larson 1993).

Key questions to be addressed in the CCP:

- What herd size within/adjacent to the refuges would minimize off-refuge depredation, ensure compatibility with higher-level refuge goals and objectives (e.g., Canada goose management) and would allow public viewing enjoyment?
- Is the current herd stabilizing in population?
- How effective is the off-refuge hunting season in reducing the local elk herd size and depredation complaints? Under what conditions should additional strategies be employed for managing or reducing the elk population?

1.14.5 Water and Wetland Management

Although wetlands historically occurred on the land base occupied by W.L. Finley, Baskett Slough, and Ankeny Refuges, many of these were drained prior to Service acquisition of the refuges in the 1960s. Early refuge management activities focused primarily on providing grass forage for geese, and wetland acres remained limited.

During the 1990s an active wetland restoration program was initiated on marginal agricultural lands across the three refuges. The response by wildlife was spectacular. Not only did Canada goose use increase, but duck numbers on the refuges approximately doubled and many water and wading birds that had seldom or never before used the refuge began to be regular inhabitants and even began breeding on the refuges. The wetland restoration work was remarked upon by David Marshall, who originally identified the Willamette Valley tracts to be future refuges: "Never in my wildest dreams did I expect Ankeny Bottoms to be such a successful refuge."

Many of the refuge wetlands are drawn down (dewatered) or allowed to drain naturally in late spring/early summer to promote the growth of native moist soil plants. The timing of these drawdowns is critical to prevent the invasion of non-native plants such as reed canarygrass. The balance between providing seasonal areas (which maximize moist soil plant productivity and provide rich food resources for wintering waterfowl) and semi-permanent or permanent wetlands (which can benefit a variety of other fish and wildlife species) needs to be considered.

Key questions to be addressed in the CCP:

- Should additional wetland areas be created, and if so, where?
- What percentage of the wetland base shall be managed as seasonal wetlands and what percent as permanent wetlands?
- What management strategies shall be employed to maintain the healthy functioning and biodiversity supported by the wetland habitats?
- Should additional water rights be obtained to provide more water for year-round storage or water for irrigation?
- What (if any) wetland management procedures or facilities need rethinking in order to address fish passage/entrapment of native and/or listed fish?
- Can tribal access to wetlands for gathering plants be accommodated?
- What water quality issues need to be addressed, if any, and can the refuges make a contribution toward improving water quality on the Willamette River?

1.14.6 Providing Compatible and Sustainable Wildlife-Dependent Recreation for Public Enjoyment

The National Wildlife Refuge System Improvement Act, passed in 1997, identified six uses—hunting, fishing, wildlife observation and photography, and environmental education and interpretation—that receive enhanced consideration in planning and management over all other general public uses on refuges. When compatible, these wildlife-dependent recreational uses are to be strongly encouraged. These uses, as well as other current or proposed uses, receive an extensive compatibility review in the CCP before being allowed.

The key programmatic issues and improvements for public use that need to be addressed in the CCP are described below.

Environmental Education: A small but active and growing environmental education program exists at the Willamette Valley Complex. Approximately 2,100 students participated in the program in 2009. There are currently no buildings set up for the purpose of environmental education. Students and teachers currently gather at existing kiosks and use refuge trails, but this limits the ability of refuge staff to provide display items and other materials. There is a need to create well-designed indoor and outdoor facilities to support the environmental education program.

Growing demand for wildlife viewing: Nationally (USFWS 2007a) and statewide (USFWS 2007b), demand for wildlife viewing is growing by double digits each decade. In addition, by 2040, an additional 1.7 million people will be living in the Willamette Valley, doubling the population that lived in the Valley in the year 2000 (OSER 2000). According to the 2003-2007 Oregon Statewide Comprehensive Outdoor Recreation Plan (Oregon Parks and Recreation Department 2003), the Nature/Wildlife Observation activity grew by 170 percent statewide from 1987-2002. Within the region encompassing the refuges (SCORP Regions 2 and 3), participation in Nature/Wildlife Observation activity grew by 254 percent during those 15 years and was the activity with the single highest growth rate.

To provide quality wildlife viewing, wildlife needs to be present and free from excess disturbance. To date, the refuges have balanced the needs of wildlife against the pressure of human disturbance by providing core areas that are closed to visitors October through March. These closed areas are effective in providing sanctuary for wintering waterfowl. To allow visitors opportunities to better see large concentrations of wildlife during the winter months, boardwalk trails, blinds, and observation platforms have been created to provide visitors targeted access along the edges of the closed areas. Such facilities allow visitors to view wildlife while minimizing disturbance.

Accommodating wildlife-dependent recreation on the refuges for the long term, in a manner that minimizes disturbance and does not impact the habitats protected on the refuges, is an important topic for the CCP.

Interpretation: Currently, Ankeny and Finley Refuges have extensive and well-placed interpretative and informative panels along trails, inside blinds, kiosks, and overlooks. Baskett Slough is currently lacking quality interpretative panels along trails, kiosks, and overlooks. Baskett Slough receives over 100,000 visitors a year who come to the refuge to participate in wildlife-dependent recreation. The little interpretative information that is available at Baskett Slough is not well distributed and is outdated. There is a need to have interpretative displays at Baskett Slough to complete the interpretation at all of the refuges.

Law Enforcement: Vandalism, disturbance to wildlife by trespassing in closed areas, and other violations have been increasing in recent years. As visitation numbers increase there is a growing likelihood for increased violations of rules and regulations. Presently the Complex has a Law Enforcement Officer stationed at W.L. Finley Refuge who covers the Complex. To aid visitors in understanding and following refuge rules, all refuges have boundary signs, area closed signs, and additional signs that provide the visitor with detailed descriptions of refuge rules and regulations. Additionally, volunteers monitor the refuges throughout the year and educate visitors about various regulations and why they are needed.

Maintenance of Facilities: Over the last ten years, many improvements to visitor facilities were completed and visitation increased. More visitors have experienced quality wildlife observation, interpretation and environmental education. Yet the facilities upon which these users depend are beginning to age. Facility maintenance needs to be a priority, both to ensure visitor safety and to avoid long-term degradation of capital investments.

Big Game Hunting: Currently, big game hunting for black-tailed deer takes place only at W.L. Finley under special regulations. The refuge provides an early season archery hunt and a later season shotgun hunt. The program is not designed to meet a biological purpose but is simply available as recreational hunting.

Currently, hunting can occur anywhere on the refuge outside of the areas closed for safety reasons (see Map 14). In the areas where hunting is allowed, there is a potential for different user groups (hunters and birdwatchers) to occupy the same areas, each disrupting the quality of the experience for the other.

The number of people hunting on William L. Finley is small and has been declining in recent years, a trend also seen for hunting regionally and nationally (USFWS 2007a, USFWS 2007b). The number of deer reported harvested on William L. Finley has totaled less than three per year in each of the last 10 years. Some people have suggested allowing elk hunting on W.L. Finley, in part to contribute to local population management strategies for elk.

Waterfowl hunting: When the refuges were first established, some waterfowl and upland bird hunting took place. Waterfowl and upland gamebird hunting was discontinued in the 1980s due to the low mid-winter index of duskys and the disturbance that resulted from hunting. A compatibility determination completed at about that time determined that "conducting a waterfowl hunt program on any of these refuges for ducks and/or geese would result in significant disturbance to these species as well as all other wetland related wildlife using the refuge. This disturbance would force waterfowl, particular geese, off of the refuges and onto private agricultural lands resulting in crop depredation." Since this determination, there has been no waterfowl hunting allowed on any of the Willamette Valley National Wildlife Refuges. The restriction on waterfowl hunting helps to meet a primary objective of the interagency Canada Goose Depredation Plan (Pacific Flyway Council 1998), which calls for increasing goose use on public land via habitat improvements as well as public use restrictions. Sanctuary on public lands is recognized in the Depredation Plan as a specific strategy that helps alleviate depredation on surrounding private lands.

Before the Snag Boat Bend unit was acquired, waterfowl was hunted on or adjacent to the property below the ordinary high water mark along the Willamette River. Interim compatibility determinations in the Conceptual Management Plan, that were written to guide management until a CCP could be developed, indicated that hunting or fishing would not be compatible above the ordinary high-water line or from non-navigable waters surrounding the unit. The Service has no management authority on navigable waters at the property or on waters below the ordinary high-water line; some waterfowl hunting still occurs in these areas.

Key questions to be addressed in the CCP:

- What changes, if any, should be made to the current wildlife observation, photography, environmental education, and interpretive programs and facilities? What improvements to existing facilities are needed? Would any changes in uses or access be appropriate?
- As the population of the Willamette Valley grows and visitation numbers at the refuges rise, will the current areas, facilities, and seasons available for visitation be able to meet visitor needs without compromising the wildlife and habitat?
- Should any additional hunting or fishing opportunities occur within the Willamette Valley National Wildlife Refuge Complex? If so, what kind of program would be compatible with the Refuges' purposes?
- What improvements can be made to law enforcement capabilities to safeguard important refuge facilities and resources?
- Should an entrance fee program be initiated for the Complex to offset costs to maintain public use facilities and programs?

1.14.7 Maintaining Historical Properties and Cultural Resources at the Refuges

The Willamette Valley National Wildlife Refuge Complex has 42 reported archaeological and cultural resource sites on refuge lands. Cultural resource overviews with inventories were completed for all three refuges in the years 1978-1980. These inventories do not meet current standards but do provide a good starting point.

Two structures at W.L. Finley Refuge - the John Fiechter House (1855, one of the oldest houses in Benton County) and the Irwin (Cheadle) Barn - are listed on the National Register of Historic Places. Both of these structures can be seen along the Finley "Auto Tour" Road. Presently, both of these structures are in need of extensive restoration efforts. Several other historic structures and sites exist.

Most of the historic structures present on the refuges have had minimal routine maintenance. Maintenance and restoration dollars for historic structures are limited and usually only general operating funds are available, which must also be used for many other refuge needs. To maintain these structures, the Service competes for grant funds and volunteers provide some of the needed labor. There is a great need for additional funds and labor to properly protect and maintain these buildings. The refuge has partnered with the Benton County Historical Society to help staff and maintain the Fiechter House. Each year they sponsor a house and barn tour for the public to view. A historical buildings assessment was recently initiated and will serve as guidance for allocating scarce dollars toward maintenance and restoration of historic sites.

Prehistoric archeological sites inventoried are remnants of Kalapuyan (Native American) activity dating back over 8,000 years. The sites are generally located in areas that supported camas plants and large numbers of game. Surprisingly few prehistoric tools were observed on the surface during the inventory. The prehistoric cultural debris consisted almost exclusively of obsidian and cryptocrystalline silica flakes, some worked and utilized. According to local informants, the lands were extensively surface collected by local collectors before the refuge was established.

Cultural resource sites are protected under the Archaeological Resources Protection Act, the Native American Graves Repatriation Act, the National Historic Preservation Act, and Refuge System laws and regulations. Refuge personnel take steps to prevent unauthorized collecting. Violations are reported to the Regional Historic Preservation Officer.

Key questions to be addressed in the CCP:

- How can the Service continue to maintain historical structures (Cabell Lodge, Cabell Barns, Fiechter House, etc.) most effectively?
- How can the Service's existing partnerships with historical organizations be utilized to assist with the preservation and restoration of historical structures and sites on the Complex?
- What should the Service do with historical structures that are identified to be unhealthy and/or unsafe (fencing, signage, etc.)? What is the priority of restoration and management for each historical site?
- How and when should the Service update its cultural resource inventories to current standards?

1.14.8 Managing Invasive Species

Invasive species are generally defined as non-native species that harm or have the potential to harm the environment, economy, and/or human health when present in an area. Invasive species often pose a serious threat to native species through competition and predation. On the refuges, reed canarygrass forms dense, persistent stands within wetlands, out-competing native wetland emergent plants. Dense thickets of Himalayan (Armenian) blackberry alter upland prairies and woodlands, preventing regeneration of native vegetation, changing physical characteristics of the habitat type, and reducing food resources for wildlife. Nutria are an invasive example that both displace native species (muskrat) and degrade aquatic habitat. Other introduced species such as the bullfrog and non-native fish (bass, bluegill) disrupt the native ecosystem by preying on native fish (Oregon chub), amphibians, and reptiles.

Nationwide, impacts from invasive species are considered to be the most critical issue facing wildlife refuges. Hundreds of non-native species inhabit the Pacific Northwest, and new potential invasives show up annually. W. L. Finley NWR has attempted to stem small occurrences of false brome, which is widespread in native habitats in Benton County. Milk thistle was recently detected on Baskett Slough NWR, and is a significant threat to the native upland prairie and habitat for several listed species, including the Fender's blue butterfly. Current levels of surveillance may be inadequate to detect newly arrived species before they become firmly established. The impacts of non-native species are often not well understood, and appropriate and cost effective control is often by trial and error. Current management actions to combat invasive species focus largely on containment and suppression, with less effort on prevention, education, research, and monitoring.

Key questions to be addressed in the CCP:

- What surveillance strategy is necessary for early detection of invasives?
- What invasive species should control and management efforts be focused on?
- What biological control agents are available but not yet established on the refuges?
- What invasive species have the greatest potential to threaten native habitats and listed/rare species?
- Considering Integrated Pest Management (IPM) approaches, what are the best control measures for which species?

- Should trapping be used to control exotic animals such as nutria?
- What effect do existing exotic warmwater fish and bullfrogs have on native species?

1.14.9 Maintaining On-going Refuge Programs and Commitments in an Era of Tight Budgets

The Willamette Valley Refuges are critical areas supporting regional U.S. Fish and Wildlife Service priority species, including dusky Canada geese, other geese, migratory waterfowl, waterbirds, and many listed species. The refuges provide some of the only publicly open, wildlife-oriented lands in the Willamette Valley and are increasingly used for recreation and recharge by a growing human population. The Region 1 Workforce Plan completed in 2006 identified these refuges as "focus refuges." Focus refuges receive a higher priority for funding and staff than non-focus refuges.

Currently the staff of Willamette Valley National Wildlife Refuge Complex consists of 17 permanent positions; previous planning efforts have identified this Complex as needing additional permanent staff. These positions remain unfilled and funding and staffing for these refuges remains a concern. Habitat and public use programs have intensified over the last fifteen years, requiring more intensive maintenance and increased commitments of labor and staff. Insufficient maintenance funds over the last few years has resulted in more frequent equipment breakdowns, buildings not being repaired, structures not being replaced, restrooms being closed, and roads/trails showing signs of disrepair.

Key questions to be addressed in the CCP:

- As future public demands for use of refuge lands and facilities increase, will present funding and staff be adequate to meet wildlife-dependent public use commitments?
- As more environmental issues and demands arise in the Willamette Valley, will present funding and staff be adequate to fulfill refuge purposes and meet the mandate to maintain biological integrity?
- How will we resolve the shortfall in maintenance funding for buildings, facilities, and equipment?
- How should the Complex best recruit, train, and manage volunteers to support Refuge activities?

1.14.10 Realty Issues

A number of boundary and ownership issues are in need of resolution to assure clarity and consistency of management. They are summarized below.

Snag Boat Bend Unit: Snag Boat Bend Unit was approved for acquisition as a unit of W.L. Finley NWR with a Conceptual Management Plan signed in 2000. Most of the unit was acquired from The Nature Conservancy. An additional acquisition (Conte tract) subsequently occurred in 2006.

The Unit borders the Willamette River; several deeds cite the "right bank" of the Willamette as the boundary. Ordinarily the State of Oregon (Department of State Lands or DSL) has title to the bed of navigable rivers up to the ordinary high water mark. In Oregon, some tracts along rivers extend to the low water mark, per State legislation that was briefly in effect during the 1800s. It is not known if the Snag Boat tracts were part of this group, thus the extent of Service management authority along the Willamette River boundary remains unclear.

Historical maps and photos show that the Willamette River has altered its course several times since it was first mapped in the mid- to late-1800s. Depending on the nature of the alteration (avulsion vs. erosion/accretion), DSL title to the riverbed may or may not be assumed along the existing riverbed. In addition, during the 1960s, the river was deliberately rechannelized in this area. The old river course sits in the Snag Boat Bend Unit. The rechannelization is considered an avulsion. A deed to the state for the new channel was never executed.

Approving and implementing CCP actions on lands where jurisdiction may not exist or agreements are not in place would be imprudent. To properly clear the issues regarding boundaries, title, and management authority, research and consultation with DSL needs to happen to ascertain boundary and title history, and clarify areas where the Service has full management authority. Where the Service has less than full authority, we should consider undertaking an agreement with DSL to clarify management or to transfer this land from DSL to the Service.

Other areas: In addition, a number of other survey and boundary actions are needed. They are summarized below.

- William L. Finley NWR - (Cabell Tract 14, b, 2.34 acres) Resurvey and post with refuge boundary signs or swap this tract for higher priority lands adjacent to the refuge.
- William L. Finley NWR – (Lot 1(1a), section 29, T. 13 S., R. 5 W., W.M., 0.84 acres) O&C Land owned by the Bureau of Reclamation as an in holding tract. Have this tract transferred to the Service.
- Oak Creek - (Aurich Tract 11 – 113 acres) Establish a right-of-way to this tract on existing private gravel roads making access more accessible to vehicles.
- Transfer or excess Pietrok (20.15 acres) and FmHA Conservation Easement tracts to other agencies or the public sector.
- Resurvey and post with refuge boundary signs, as needed, all remaining FmHA Conservation Easement tracts (Cox Butte 9.65 acres, Salt Creek (12.09 acres), Schellenberg 60 acres, Santiam River 184.66 acres).

1.15 Issues Outside the Scope of the CCP/EA

The only issue raised by the public and not addressed in the CCP/EA is land and water protection outside the existing refuges' boundaries. This issue will be addressed in detail in a separate planning process.

1.16 References

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Chapter 2

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Alternatives, Goals, Objectives, and Strategies

2.1 Considerations in Alternative Design

In drafting the alternatives for this long-term conservation plan, the Service reviewed and considered a variety of resource, social, economic, and organizational aspects important for managing the Refuges. These background conditions are described more fully in Chapters 1, 3, 4, and 5. As is appropriate for a national wildlife refuge, resource considerations were fundamental in designing alternatives. House Report 105-106 accompanying the National Wildlife Refuge System Improvement Act of 1997 states "…the fundamental mission of our System is wildlife conservation: wildlife and wildlife conservation must come first."

The Planning Team reviewed scientific reports and studies to better understand ecosystem trends and the latest scientific recommendations for species and habitats. The Service met with staff from State and Federal agencies and elected officials to ascertain priorities and problems as perceived by others. Refuge staff met with Refuge users, representatives of nonprofit groups, and community organizations to ensure that their comments and ideas were considered during CCP development. Details of public involvement can be found in Appendix A.

A short description of each alternative is presented next, followed by a summary table (Table 2-1). This table summarizes the key differences between the alternatives for the Complex as a whole. A detailed acreage summary for each habitat is also presented for each of the Refuges in Table 2-2.

Beginning in Section 2.7, detailed descriptions of the goals, objectives, and strategies for each alternative are presented. Maps 4, 5, 6, and 7 display the habitat differences between the three alternatives for each Refuge. Maps 8, 9, 10, 11, 12, 13, 14, and 15 display the public use differences between the three alternatives for each Refuge.

2.2 Alternative 1 – No Change

This alternative represents the "no-change" alternative required by the National Environmental Policy Act (NEPA). The Refuges would continue programs at current levels, as described in Chapters 3, 4, and 5. Specifically, the Refuges would continue to emphasize goose management by maintaining cultivated grass fields under a cooperative farming program to provide forage for wintering Canada geese. Other goose management activities, such as managing wetland habitats and providing sanctuary, would also continue. The Refuges would also continue to manage and enhance native habitats (including wetlands, wet prairie, upland prairie/oak savanna, oak woodland, mixed deciduous forests, and riparian) at current levels. No further habitat restoration work would occur. Endangered species management would continue. Existing public uses, including wildlife observation, interpretation, and a small amount of environmental education, wildlife photography, deer hunting, and fishing, would continue with the current facilities and programs in place. No new public use facilities would be developed. The current area closed to public access would remain in effect to provide sanctuary during the wintering waterfowl season. The Refuge would not pursue any additional land protection measures under the no-change alternative.

2.3 Alternative 2 (Service Preferred) – Improved Balanced Approach

This alternative represents a balanced approach among the many competing needs at the Refuges. Overall, habitat and public use programs would continue as currently managed but with many targeted improvements and additions.

An emphasis on providing habitat for wintering geese would remain. Green forage for geese would continue to be provided primarily through cooperative farming agreements with local farmers. Cooperative farming could be impacted however, the Refuge would pursue measures to help retain the services of cooperative farmers, such as providing enhanced irrigation capabilities (these would help the farmers to better establish green forage crops and perhaps grow other cash crops); providing additional lure crops such as corn or other grains; the Refuge taking over farming on certain high goose use fields; the Service offsetting a portion of the costs to cooperative farmers; etc. Goose use should be no less than Alternative 1 and could increase if specific goose management strategies are implemented. Wetland habitat management and restoration activities would also be intensified to improve habitat for geese and other wildlife.

Management and enhancement would continue in remnant native habitats and recently restored areas. In addition, approximately 845 additional acres on the three Refuges would be restored to wetland, wet prairie, riparian, oak woodland, or upland prairie/oak savanna habitats, over the next fifteen years.

Threatened and endangered species management would continue to be a priority, guided by recovery plans where applicable. Existing populations of several threatened and endangered species would be strengthened through habitat management activities, and several new populations would be established on the three Refuges.

Wildlife observation and interpretation would continue to be emphasized as the cornerstone of the public use program. Several new trails and viewing facilities would be added. Interpretive signs/ materials, including online materials, would be developed and added. Major special events would occur at a frequency of about 3-4/year and monthly weekend interpretive programs would occur.

Environmental education efforts would be expanded with an objective of reaching more students and schools, particularly at W.L. Finley Refuge. Outdoor classroom shelters would be added. In addition, funding would be sought to construct an Environmental Education Center, indoor classroom facilities, and an interpretive exhibit area on W.L. Finley Refuge.

A new option to hunt either sex deer would be added on W.L. Finley Refuge. In addition, new upland locations would be available for deer hunting during a portion of the restricted firearms season; this will require closure of two hiking trails for a week in November. The restricted firearms season would be shortened and shifted to later in the State season. A youth waterfowl hunt and a September goose hunt would be provided at Baskett Slough Refuge. Fishing would be promoted at the Willamette River by developing safe fishing access and a canoe launch at Snag Boat Bend.

The current area closed to public access would remain in effect to provide sanctuary during the wintering waterfowl season on the three Refuges with the exception that major portions of the Snag Boat Bend Unit would be open year-round.

The Refuges would develop an elk management plan cooperatively with ODFW after completion of the CCP (within 1-2 years of CCP implementation). The Refuges would continue to expand conservation partnerships, volunteer programs, and outreach to local communities. Proactive cultural resource management would occur by repairing/maintaining the historic structures on Finley Refuge and by adding associated interpretive facilities.

This alternative also proposes protection, conservation, and management of additional lands within the Willamette Valley that could contribute to Refuge purposes and goals by providing wintering habitat and forage for Canada geese, providing protection, enhancement, and restoration of native habitats and rare Willamette Valley species, and providing opportunity for additional wildlife-dependent public use. The Refuges would undertake a subsequent land protection planning process to identify specific tracts of lands for these purposes.

2.4 Alternative 3 – Restore Selected Agricultural Fields to Native Habitats as Resources Permit; Provide Limited Improvements in Public Use Programs

This alternative involves a major shift in management for wintering Canada geese. This alternative recognizes that cooperative farming may be increasingly infeasible and proposes other methods to accomplish goose management: either contract farming (paying farmers to grow crops on the Refuges) and/or force account farming (Refuge staff doing the farming). The Refuge would only farm fields that have been receiving moderate-to-high goose use. Fields that have received lower goose use (on average over the last five to fifteen years) would be converted to native habitats, as budgets and staff time allow. To reduce the costs on contract-farmed or force-account-farmed fields, lowered levels of fertilization and weed control activities would occur. Overall, Refuge farming program costs would increase and goose use would likely decrease. While Alternative 3 is not the Service's preferred alternative, the Service may be compelled to implement this alternative in the future if measures to continue cooperative farming are not successful. If this proves to be the case, a new decision would be released in accordance with NEPA.

Alternative 3 would also emphasize native habitat management and this alternative would create the opportunity to restore approximately 1,564 acres of cropland to native habitat over the next fifteen years since the amount of farmland would be reduced. However, the fields to be restored would likely lie fallow and could become weedy while awaiting staff time and funding for restoration.

Wildlife observation and interpretation would continue to be emphasized as the cornerstone of the public use program. About a third to half as many new observation facilities (trails, viewing overlooks, etc.) would be added as under Alternative 2. The reduced level of public use development is due to the premise that staff and funding resources would be directed towards refuge farming activity. Two or three special events would be held each year on the Refuges. The current area closed to public access on all three Refuges would remain in effect to provide sanctuary during the wintering waterfowl season except for the proposed change at Snag Boat Bend as described in Alternative 2 above. Fishing access to the Willamette River would be provided through a canoe launch at Snag Boat Bend Unit; however, bank fishing access would not be provided.

Deer hunting, threatened and endangered species management, environmental education, elk management, cultural resources, subsequent land protection planning, and conservation partnership activity would occur as under Alternative 2.

Table 2-1. Alternatives Comparison for Willamette Valley Refuge Complex*

Key Indicators of Comparison	Alternative 1 No change	Alternative 2 Improved Balanced Management	Alternative 3 Restoration of Selected Agricultural Fields to Native Habitats; Limited Visitor Improvements
Wintering Geese			
Acres Grass Forage or Grain Crops	4,570	4,175	3,465
Acres Cooperatively Farmed	3,470	2,881	0
Acres under Refuge Farming or Contract Farming	1,101	356	3,465
Acres Cooperatively or Refuge Farmed	0	938	0
Acres Irrigated Cereal Grains	Varies, up to 80	up to 417	up to 346
Acres Wetlands	1,697	1,710	1,803
Acres Wintering Sanctuary	No change on Ankeny, Baskett Slough and W.L. Finley however, major portions of Snag Boat Bend Unit would be open year-round under Alternatives 2 and 3. Decrease from 87 to 84% of Complex.		
Number of Wintering Geese Present	60,000 - 100,000		
Criteria for maintaining specific farm fields in agricultural crop status	Overall goose use, dusky goose use, cooperative farmer interest in continuing to farm the field, estimated cost to the Complex to farm the field, location of field, size of field, topography, etc.	Criteria same as Alt. 1. In addition, the Complex would pursue measures to retain cooperative farmers.	Criteria same as Alternative 1 except cooperative farmer interest is no longer relevant.
Criteria for determining what type of native habitat an area should be restored to once it has been decided to no longer farm the area.	Historical habitat type, soils, topography, hydrology, location, proximity to adjacent habitat, potential opportunity to meet T&E recovery goals, size, etc.	Criteria same as Alt 1. An additional 845 acres would be restored to a variety of native habitat types.	Criteria same as Alt 1. An additional 1,564 acres could be restored to a variety of native habitats once refuge or contract farming operations have been secured.

	Alternative 1	Alternative 2	Alternative 3
Wetland Habitats			
Acres seasonal wetlands	1,343-1,529	1,317-1,504	1,309-1,497
Acres permanent wetlands	168	205	205
Target Condition	Generally defined in previous refuge plans and other literature	To meet attributes specified in Objectives 2a, 2b, and 2c	
Wet Prairie Habitats			
Acres wet prairie	652	885	1,123
Target Condition	Generally defined in previous refuge plans and other literature	To meet attributes specified in Objectives 3a, 3b, 3c, and 3d	
Upland Prairie/Oak Savanna Habitats			
Acres upland prairie/oak savanna	572	1,016	1,203
Target Condition	Generally defined in previous refuge plans and other literature	To meet attributes specified in Objectives 4a, 4b, 4c, and 4d	
Oak Woodland Habitats			
Acres oak woodlands	758	765	764
Condition	Generally defined in previous refuge plans and other literature	To meet attributes specified in Objective 5a	
Mixed Coniferous-Deciduous Habitats			
Acres mixed forests	371	361	370
Target Condition	Generally defined in previous refuge plans and other literature	To meet attributes specified in Objective 6a	
Riparian Habitats			
Acres Riparian habitat	1,807	1,965	2,259
Target Condition	Generally defined in previous refuge plans and other literature	To meet attributes specified in Objectives 7a and 7b	
Riverine Habitats			
Miles protected and maintained	20	20	20
Threatened and Endangered Species (populations per Recovery Zone)			
Populations of Bradshaw's lomatium	2 (Corvallis East and West), per Recovery Plan		
Populations of Fender's blue butterfly	One functioning network (Baskett-Salem), one independent population (Finley-Corvallis), per Recovery Plan		
Populations of Kincaid's lupine, Willamette daisy, and Golden paintbrush	6 (Corvallis West, Salem West)		
Populations of Nelson's checkermallow	3 (Corvallis West, Salem East and West), per Recovery Plan		

	Alternative 1	Alternative 2	Alternative 3
Number of wetlands maintained for Oregon chub	5	6	6
Elk			
Refuge Herd Size Objective	Not established	To be established via elk management plan to be developed in cooperation with ODFW	
Control Measures	None	To be established via elk management plan to be developed in cooperation with ODFW	
Wildlife Observation and Photography			
Observation structures (does not include vehicle pullouts)	15	19	17
Miles auto tour routes	6.1 (including portions on County roads)		
Miles year-round trails	6.8	11.4	9.8
Miles seasonal trails	16.9	19.5	17.2
Designated reservation photo blinds	2	2	2
Interpretation			
General program	Signs, brochure, and website are main interpretive materials	Interpretive materials broader, more diverse use of media, and aimed at broader audience.	
Number special events annually	2-3	3-4	2-3
Number interpretive walks	Sporadic	Monthly	Quarterly
Signs	Same as now; some updates to occur	New signage at key sites on each Refuge	New signage mainly at Baskett Slough
Environmental Education			
Number of students served annually	300-1000	2,500-5,000 students annually	
Outdoor shelters	None	10	10
Environmental Education Center/Indoor classroom sites	None	Included, with 2 classrooms	Included, with 2 classrooms
Staff time / volunteers/ partnerships	Minimal	Much increased	Much increased
Fishing			
Quality Fishing opportunities	Low quality opportunity at Muddy Creek.	High quality fishing opportunity and access promoted at Snag Boat Bend Unit within 5 years of the CCP completion.	Fishing access to Willamette River available via canoe launch; no bank fishing access.
Hunting			
Deer Hunting - Finley	Archery available; 1 month shotgun season available in portion of Refuge; no antlerless harvest	Archery available; antlerless harvest allowed; restricted firearm season shortened but extended into November and allowed in upland areas now closed. Restricted firearms include shotguns and muzzleloaders. No other public uses allowed in hunt areas during first week of November.	

	Alternative 1	Alternative 2	Alternative 3
Youth waterfowl hunt	None	Provided at Baskett Slough	None
September goose hunt	None	Provided at Baskett Slough	None
Partners Program, Volunteers, Outreach			
Partners Program	Continue implementation of Partners Program Strategic Plan; deliver technical and financial assistance to landowners for conservation		
Volunteers	Volunteer assistance occurs regularly but not to full potential. Volunteer management plan to be developed	Increased use and enhanced management of volunteers and interns; volunteer management plan to be developed	
Cultural Resources			
Cultural Resource Management	Management occurs but needs additional resources. Historic structures deteriorating	Cultural resources management strengthened; NHPA compliance strengthened; prioritized list of maintenance and restoration will guide work for historic structures.	
Cultural Resources Interpretation	Little available	New interpretive materials developed; potential for utilizing and promoting the historic area on W.L. Finley evaluated; curricula developed for use in EE program; historic structures reused where feasible.	
Additional Land Protection			
Additional Lands Protected under Subsequent Planning Effort	No	Yes	Yes

* All figures are based on GIS analysis, utilizing the data shown in the Alternative maps.

Table 2-2. Acres* in Each Habitat Type, by Refuge, by Alternative

	ALTERNATIVE 1				ALTERNATIVE 2				ALTERNATIVE 3			
Habitat Type*	**ANK**	**BKS**	**WMF**	**TOTAL**	**ANK**	**BKS**	**WMF**	**TOTAL**	**ANK**	**BKS**	**WMF**	**TOTAL**
Agricultural-Cooperative Farming	576	1141	1754	**3470**	407	925	1549	**2881**	0	0	0	**0**
Agricultural- Refuge Farming	932	0	169	**1101**	122	0	233	**356**	1322	790	1353	**3465**
Agricultural - Refuge or Cooperative Farming	0	0	0		938	0	0	**938**	0	0	0	**0**
Subtotal in Farming	***1508***	***1141***	***1922***	***4570***	***1467***	***925***	***1782***	***4175***	***1322***	***790***	***1353***	***3465***
Seasonal or Permanent Wetland	186	0	0	**186**	187	0	0	**187**	187	0	0	**187**
Seasonal Wetland	302	536	504	**1343**	318	537	462	**1317**	318	537	455	**1309**
Permanent Wetland	42	61	66	**168**	76	61	68	**205**	76	61	68	**205**
Subtotal in Wetland	***530***	***597***	***570***	***1697***	***582***	***597***	***531***	***1710***	***582***	***597***	***624***	***1803***
Administrative/Developed	9	13	15	**38**	9	13	15	**38**	9	13	15	**37**
Non-agricultural Grassland**	276	165	175	**616**	56	21	90	**167**	56	21	81	**158**
Riparian	414	4	1388	**1807**	508	12	1445	**1965**	619	12	1628	**2259**
Wet Prairie	78	59	515	**652**	152	117	615	**885**	187	155	781	**1123**
Mixed Deciduous-Coniferous Forest	0	34	337	**371**	0	24	337	**361**	0	24	347	**370**
Oak Woodland	0	270	488	**758**	0	276	489	**765**	0	276	488	**764**
Upland Prairie/Oak Savanna	0	238	334	**572**	40	536	440	**1016**	40	634	529	**1203**
Total	**2815**	**2522**	**5744**	**11081**	**2814**	**2522**	**5744**	**11081**	**2814**	**2522**	**5744**	**11081**

*Acres are based on GIS maps, and may differ by 1-2 acres from the acres presented in the land status table in Chapter 1 due to rounding errors. Acres in this table have also been rounded, which may cause some numbers to vary slightly.
** Several areas in the habitat type known as non-agricultural grassland will not be converted into other habitat types under Alternatives 2 and 3. These are usually small, isolated fragments of habitat that would be unlikely to be worth the investment to restore into a native habitat type.

Habitat was not mapped and included in habitat summaries for approximately 47 acres of Snag Boat Bend unit (part of William L. Finley Refuge) within its approved refuge boundary (see Secti 1.14.10 for further c Table 1-1. In both c

Habitat was not mapped and included in habitat summaries for approximately 47 acres of Snag Boat Bend unit (part of William L. Finley Refuge) within its approved refuge boundary (see Section 1.9 in Chapter 1). This is because management of the area is thought to be still under the authority of the Oregon Division of State Lands. See Section 1.14.10 for further clarification on this realty issue. As a result, acres shown in this table total 47 acres less than the acres shown in column 1 (Approved Refuge boundary acres) in Table 1-1. In both cases, acres have been calculated using GIS.

2.5 Features Common to All Alternatives

All alternatives contain some common features. These are presented below to reduce the length and redundancy of the individual alternative descriptions.

Actions will be implemented over a period of 15 years as funding becomes available. Implementation priorities are designated in Appendix E.

Implementation Subject to Funding Availability: Under each alternative, actions will be implemented over a period of 15 years as funding becomes available. Funding could be a limiting factor regarding how much, or what part, of the CCP is implemented. As such, project priorities (strategies) have been outlined in Appendix E that should help provide some general guidance and direction towards implementation. Projects have been assigned one of two different rankings. "A" ranked projects are those that substantially contribute to the Refuge purpose and/or to the various goals and objectives within this CCP. These are the projects that would provide the highest degree of resource benefits whether that be wildlife, habitat or public use related. Generally, on-going maintenance activities especially related to existing habitats and public use facilities are within this category. "B" ranked projects are those that contribute to the Refuge purpose and/or to the various goals and objectives within this CCP but to a lesser degree than "A" ranked projects. These projects still provide resource (wildlife, habitat and public use) benefits but not as much as "A" ranked projects. Generally, the development of new facilities, especially those related to public use, are within this category.

Refuge Fire Management: Fire Management Plans were finalized for all three Refuges in 2003. Fire management actions will continue to be guided by the direction set forth in the plans.

Tribal Coordination: Regular communication with Native American Tribes who have an interest in the Refuges will be common to all alternatives. The Confederated Tribes of the Grande Ronde Indian Reservation is the major local tribal entity the Refuges will coordinate and consult with on a regular basis regarding issues of shared interest. Currently, the Service seeks assistance from Tribes in both Native American Graves Protection and Repatriation Act (NAGPRA) and National Historic Preservation Act (NHPA) related issues.

State Coordination: Similarly, under all alternatives, the Service will continue to maintain regular discussions with the Oregon Department of Fish and Wildlife. Key topics for discussion will be Canada goose management, wildlife monitoring, elk management, fisheries management (including fish passage and barriers), hunting and fishing seasons and regulations, endangered species management, and land protection planning efforts.

Complex Headquarters Site Planning: The detailed site planning that is currently underway for the new Complex headquarters will be implemented under all Alternatives.

William L. Finley Environmental Education Center Planning: As part of the CCP process, Refuge Staff evaluated eight potential sites: the Mill Hill parking area, the current Refuge residence area, the area adjacent to the current Headquarters building, the Cabell Lodge area, Woodpecker Loop (old barn site), Field 29 southwest corner, Turtle Flats, and the area north of the current mobile homes near the Headquarters (the homes would be relocated). The site adjacent to the current Headquarters building was chosen. See Appendix K for more details about the site selection process and a draft site map for the facilities.

Implement the Partners Program Strategic Plan: The Complex will continue to implement off-Refuge habitat conservation and restoration actions in the Willamette Valley Focal Area per the Pacific Region Partners for Fish and Wildlife and Coastal Program Strategic Plan (US DOI 2007).

Jurisdiction at Snag Boat Bend Unit: Clarify river boundary and jurisdiction at Snag Boat Bend. Develop agreement, exchange, or other mechanism with Oregon Division of State Lands to ensure management consistency.

Address Climate Change: The Complex will participate in and contribute to climate change assessment efforts, including those underway at a landscape scale, such as the North Pacific Landscape Conservation Cooperative (LCC). LCCs are formal science-management partnerships between the Service, Federal agencies, states, tribes, NGOs, universities, and other entities to address climate change and other biological stressors in an integrated fashion. LCCs provide science support, biological planning, conservation design, research, and design of inventory and monitoring programs. As needed, objectives and strategies will be adjusted to assist in enhancing Refuge resources' resiliency to climate change. The Complex will also continue to pursue and engage in mechanisms to conserve energy in Refuge operations, including the use of fuel efficient vehicles.

Volunteer Program: Volunteer opportunities and partnerships exist in all alternatives. These are recognized as key components of the successful management of public lands and vital to implementation of Refuge programs, plans, and projects, especially in times of declining budgets. The Refuge proposes to enhance the volunteer program under all of the alternatives through several different measures.

A volunteer management plan needs to be developed to address the following for all refuge programs: recruitment and retention of high-quality volunteers to work in all Refuge programs; role of interns; promoting the role of Friends of Willamette Valley NWR Complex; training volunteers in safety, first aid, and various management techniques; outreach to existing and potential volunteers; written evaluation of and by volunteers; volunteer incentives and awards; and on-Refuge housing. On-Refuge housing may be available to volunteers, fire personnel, temporary employees, researchers, or other persons as needed. The Refuge is evaluating potential sites for housing, which includes an area west of the current Refuge quarters near the Administrative Office at W.L. Finley Refuge.

Refuge Revenue Sharing Payment: Annual payments to Counties under the Refuge Revenue Sharing Program will continue according to the established formula and subject to payments authorized by Congress. Total payments made to local counties in recent years are listed in Appendix E.

Fee Program: The Federal Land Recreation Enhancement Act (16 USC 6801-6814) provides the authority to establish, modify, charge, and collect recreation fees at federal recreation land and waters over 10 years, ending 2014. The FLREA authorizes the Recreation Fee Program that allows the collection of entrance and expanded amenity fees. The Act seeks to improve recreational facilities and visitor opportunities on Federal recreational lands by reinvesting receipts from fair and consistent recreational fees and pass sales, and for other purposes. At least 80 percent of the collections return to the specific site of collection to offset program costs and enhance visitor facilities and programs (U.S. Department of Interior Budget Justifications and Performance Information FY 2010).

Development of a Fee Program at the Willamette Valley Refuges is a possibility under all alternatives. An evaluation needs to be conducted to determine if a fee is warranted on the Willamette Valley Refuges especially considering increased facility maintenance costs, decreased budgets, and increased use of facilities.

Maintenance and Updating of Existing Facilities: Periodic maintenance and updating of Refuge buildings and facilities will be necessary regardless of the alternative selected. Periodic updating of facilities is necessary for safety and accessibility and to support staff and management needs and is incorporated in the Service Asset Maintenance Management System. While several new facilities are identified within this CCP, emphasis will be placed on maintaining existing facilities.

Cultivation of Croplands: Croplands, specifically providing grass fields as forage for wintering Canada geese, will continue to be an important habitat management component on all three Refuges over the life of the CCP. See Objectives 1a and 1b.

Endangered Species Act Section 7 Consultations: All projects will be compliant with the Endangered Species Act. Approved consultation processes will be followed for areas potentially affecting listed species or designated critical habitat on a site-specific basis as project implementation occurs. Section 7 consultation was not completed programmatically on the CCP.

Section 106 Compliance: Any new ground-disturbing projects will undergo a review under Section 106 of the National Historic Preservation Act.

Transportation Coordination and Partnerships: Roads, bridges, and trail systems play a vital role in providing access to the public for compatible wildlife dependent recreation opportunities. Under all alternatives, the Service will look for opportunities to partner with the Oregon Department of Transportation and the Departments of Public Works for Polk, Benton, Linn, and Marion Counties to maintain and improve safe and appropriate transportation access from and to the gateway communities.

Integrated Pest Management (IPM): In accordance with 517 DM 1 and 7 RM 14, an IPM approach will be utilized, where practicable, to eradicate, control, or contain pest and invasive species (herein collectively referred to as pests) on the Refuges. Pesticides may be used where physical, cultural, and biological methods, or combinations thereof, are impractical or incapable of providing adequate control, eradication, or containment. Pesticides would be used primarily to supplement, rather than substitute for, practical and effective control measures of other types. If a pesticide should be needed on the Refuges, the most specific (selective) chemical available for the target species would be used unless considerations of persistence or other environmental and/or biotic hazards would preclude it. See Appendix F for a complete description of the IPM approaches to be followed under the CCP.

Water quality: The Complex will comply with the terms of the recently approved Total Maximum Daily Load (TMDL) Implementation Plan, including annual reporting to the Oregon Department of Environmental Quality detailing implementation progress.

Research and Monitoring: Continue to work with regional experts to share information and expertise on habitat management and restoration techniques. Continue to partner with local universities, NGOs, state and local agencies, and others to conduct research that will advance the science of habitat management and restoration on refuge lands. Research that furthers the mission of the Refuge System would be permitted by Special Use Permit under the stipulations specified in the Research Compatibility Determination (Appendix C).

Non-Priority Uses: Allow the following non wildlife-dependent uses at the refuges: bicycling on Finley Refuge Road April 1-October 31, dogs allowed (on leash only and only within parking lots, except for use associated with waterfowl hunting), and picnicking. The following commonly requested activities will continue to not be allowed on the refuges: horseback riding, jogging, dog trials, berry and mushroom picking, and off-road vehicle use. See Appropriate Use Determinations (Appendix B) and Compatibility Determinations (Appendix C) for more information. Such recreational activities not specifically addressed in this document may be allowed on Refuge lands if the Refuge Manager first finds they are appropriate and compatible.

Animal Releases: Pet abandonment and /or unauthorized introductions of wildlife, fish, plants, or their parts are not allowed on the refuges.

FmHA Conservation Easement tracts: Transfer or excess Pietrok (20.15 acres) FmHA Conservation Easement tract to other agencies or the public sector. Resurvey and post with Refuge boundary signs, as needed, all remaining FmHA Conservation Easement tracts (Cox Butte 9.65 acres; Salt Creek 12.09 acres, Schellenberg 60 acres; Santiam River 184.66 acres).

Partnerships and Outreach: Maintain existing and develop new partnerships to enhance collaboration on support of fish and wildlife resources, recreational opportunities, and educational programs, and to explore ways to share funding and seek grants on projects of mutual interest. Specifically, work with local and state governments to promote mutual understanding, encourage environmentally-friendly development, and promote eco-tourism opportunities. Sponsor workshops and training sessions with professional colleagues and the general public on natural process management, agency mission, and Refuge objectives to obtain ideas, techniques, and support for management decisions. Conduct annual congressional staff days, and cultivate relationships with AmeriCorps, scouting organizations, 4-H, and other groups. Develop partnerships that promote and expand eco-tourism opportunities and the enrichment of the human spirit through partnerships with businesses, civic and conservation organizations, and city, county, and state governments. Expand overall outreach efforts locally, regionally, and nationally with respect to all aspects of Refuge management.

Security: After-hours security of the Refuges is an on-going issue that will continue to be addressed under all three alternatives. The Refuge Complex will evaluate the need for improved regulatory signage, increased enforcement efforts, possibly installing gates, etc., in order to respond to the after-hours use that is occurring.

2.6 Alternatives Considered but Not Developed

Maximize Wintering Canada Goose Population: This alternative was considered by the Service. The primary purposes of the Refuges are to protect (provide feeding and resting areas for) wintering Canada geese and other migratory waterfowl. Since the Refuges were first acquired, the populations of wintering geese utilizing them have multiplied ten-fold. To increase wintering geese further is possible and may even be viewed as desirable by some, but many of the strategies required to do so would not be practical. Some of the strategies are listed below. Those strategies that are practical and reasonable have been incorporated into the action alternatives.

Potential Strategies for Increasing Wintering Geese	Practical/Reasonable or Not?
Convert most remaining native habitat to grass crop.	Not reasonable since native habitats are reduced by 90% or more in Willamette Valley and most native species rely on these.
Remove visual barriers such as hedgerows would allow them to become more comfortable.	Practical in some cases. In some others, might necessitate removal of hedgerows that provide valuable habitat to other species, or soil/bank stability).
Create wetlands in depressions, small berms.	Practical.
Eliminate public use of refuges during the wintering period.	Refuge System law promotes provision of access for wildlife dependent uses. Public access as designed allows the Complex to meet goose objectives.
Stricter dictation to cooperative farmers of crop types.	Not practical because this can restrict farmer choice and can raise their costs.
Grow more corn.	Reasonable to a certain point. Not practical to increase substantially because irrigation rights are limited or unavailable and technical/cost feasibility are not optimal at many places where irrigation rights are available. Also, grass crops provide better sustained goose food than corn.
More intensive mowing of wetland edges where reed canary grass is present, to allow geese to make better use of wetlands adjacent to fields.	Practical.
More intensive application of fertilizers to increase growth and productivity during wintering season.	Not practical with traditional agricultural fertilizers because they are not effective in cold and wet conditions, and subsequent runoff worsens water quality. Alternative fertilizer applications may be explored under Goal 13.

Maximize Native Habitats and Eliminate Farming: An alternative to maximize native habitats and eliminate farming was considered. Such an alternative addresses concern on the part of some people that national wildlife refuges should function foremost as repositories of biological diversity. Given the management direction of the three Refuges (especially the direction to provide for wintering Canada geese) and given current management approaches, such an alternative is not appropriate for the Refuges.

2.7 Goals, Objectives, and Strategies Overview

Goals and objectives are the unifying elements of successful refuge management. They identify and focus management priorities, resolve issues, and link to refuge purposes, Service policy, and the Refuge System Mission.

A CCP describes management actions that help bring a refuge closer to its vision. A vision broadly reflects the refuge purposes, the Refuge System mission and goals, other statutory requirements, and larger-scale plans as appropriate. Goals then define general targets in support of the vision, followed by objectives that direct effort into incremental and measurable steps toward achieving those goals. Finally, strategies identify specific tools and actions to accomplish objectives (Adamcik et al. 2004).

In the development of this CCP, the Service has prepared an environmental assessment. The environmental assessment evaluates alternative sets of management actions derived from a variety of management goals, objectives, and implementation strategies.

The goals for the Willamette Valley Refuges over the next fifteen years under the CCP are presented on the following pages. Each goal is followed by the objectives that pertain to that goal. Some objectives pertain to multiple goals and have simply been placed in the most reasonable spot. Similarly, some strategies pertain to multiple objectives.

The goal order does not imply any priority in this CCP. Priorities are assigned in Appendix E.

Readers, please note the following:

- Not all objectives or strategies are included in all alternatives. If an objective is not in a particular alternative, a blank is used to indicate that this objective is not addressed in that alternative.
- Below each objective statement are the strategies that could be employed in order to accomplish the objectives. Check marks alongside each strategy show which alternatives include that strategy. If a column for a particular alternative does not include a check mark for a listed strategy, it means that strategy will not be used in that alternative.
- Most of the habitat objectives indicate the number of acres to be provided at each Refuge. To save space, abbreviations were used. WMF means William L. Finley Refuge; SBB means the Snag Boat Bend Unit of W.L. Finley Refuge; BKS means Baskett Slough Refuge, and ANK means Ankeny Refuge. Acres relating to Snag Boat Bend Unit are separated out from other acres at W.L. Finley Refuge.

Goal 1. Provide agricultural crops for Canada geese, especially duskys, which, together with wetland management and sanctuary, ensures a healthy, viable wintering goose population in support of Pacific Flyway management and depredation control plans.

Objective 1a. Provide green forage for wintering Canada geese.

Provide planted grasses on William L. Finley, Baskett Slough, and Ankeny Refuges, including annual ryegrass, perennial ryegrass, fescue, and improved pasture mix (combination of various grasses and legumes such as clover) to produce green forage for wintering Canada geese (October-April). These green forage crops will have the following attributes:

- Sustained green browse over the entire 7-month wintering period for geese.
- Vegetation height should be 6 inches or less by October 1.
- A diversity of planted grass types should be present on all Refuges.
- Minimal human disturbance through the wintering period.
- Within newly planted fields, ≥ 75% cover of planted grass/pasture species

Objective Applies on the Following Acres, by Alternative	Alt 1	Alt 2	Alt 3
(note – up to 10% acres may be in grain crops – see Objective 1b).	WMF-1905 SBB- 17 BKS-1141 ANK-1508	WMF-1782 SBB- 0 BKS-925 ANK-1467	WMF-1353 SBB-0 BKS-790 ANK-1322
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Utilize cooperative farming agreements with local area farmers (using traditional farm equipment and approaches) to provide green forage crops, including planted grass types and pasture mixes.	Majority of acres above	Majority of acres above	none
2. Utilize Refuge staff and/or contract with local area farmers to provide green forage crops, including planted grass types and pasture mixes.	Some of acres above	Some of acres above	All of acres above
3. Manage (harvest, mow, burn, etc.) grass crops during the summer and replant, as necessary, during fall. No more than a third of the fields would be allowed to volunteer (i.e., self-seed).	✓	✓	✓
4. Where appropriate, use livestock grazing on improved pastures to provide a grass height of <6 inches in pastures by October 1st.	✓	✓	
5. Utilizing mowing treatment, if necessary, to manage grass height in agricultural fields <6 inches by October 1.	✓	✓	✓
6. Conduct periodic soil tests and apply necessary fertilization and liming treatments to maintain proper nutrient and pH levels.	✓	✓	✓
7. Use herbicides and fungicides, as necessary, to control agricultural pests in order to maintain the viability of the grass seed crop to sustain the cooperative farm program.	✓	✓	
8. Use mowing to maintain short vegetation along the agriculture field/wetland interface and along dike slopes and on islands in wetland units to provide additional green	✓	✓	✓

forage for geese.			
9. Evaluate potential to increase grass coverage within planted fields via either increased winter fertilization, increased seeding rates, decreased spacing between plant rows, etc.	✓	✓	✓
10. Where practical, and where soil stability would not be compromised, remove visual barriers such as hedgerows to promote goose use in certain fields.	✓	✓	✓
11. Apply grit (small pieces of crushed gravel) along the edges of selected grass fields as well as on certain roads and on wetland dikes to enhance goose use.	✓	✓	✓
12. Maintain existing public use closures on Ankeny, Baskett Slough and W.L. Finley (see Maps 8, 9, and 11) during the October-March period in order to limit human disturbance to wintering geese. See also Objective 10a.	✓	✓	✓
13. Working with Oregon State University Agricultural Extension Service and area farmers, examine the feasibility of a non-traditional nitrogen concentrate winter/spring fertilizer application on refuge grass crops with the goal of increasing vegetative growth and subsequently providing more winter forage for Canada/cackling geese.		✓	✓
14. Establish 3 Tractor Operator positions (one at each of the three refuges) to assist with the farming program.		✓	✓
15. Establish a Refuge Manager position for Ankeny Refuge and a Refuge Manager position for W.L. Finley Refuge to focus on all Refuge management operations for these stations.		✓	✓

Rationale: In recent years, the Willamette Valley Refuges have supported approximately 60,000-100,000 wintering Canada geese. When these three Refuges were established in the mid-1960s, Canada goose populations in the Willamette Valley/Lower Columbia River region totaled approximately 15,000-25,000. Over the past 40+ years, wintering goose populations within this area have increased to an estimated 150,000-250,000, and are targeted for higher levels yet by the Pacific Flyway Council. No lands that are managed specifically for Canada geese have been added to the Willamette Valley Refuges since the original acquisitions.

The Refuges employ three major strategies for goose management, including: 1) providing agricultural crops via farming; 2) providing wetland habitats for resting, feeding, and roosting; and 3) providing sanctuary or undisturbed areas. All of these strategies are designed to maximize goose use on the Refuges, thereby reducing potential use on private lands. Refuge goose management has been intensified over the past 15 years, resulting in significant increases in goose use. However, the three Refuges do not have the capability of fully meeting the needs of the expanded population within the Willamette Valley. The strategies listed in Objectives 1a and 1b are designed to be able to provide for an estimated 60,000-100,000 Canada geese. Implementing these strategies would increase goose use days on the Refuges but would probably not increase peak use at any one time. One of the desired outcomes is maintaining the presence of the 60,000-100,000 geese over a longer period of time. Additional measures beyond the scope of this plan are needed to provide for the entire goose population that winters in the Willamette Valley. One of these measures would be to evaluate the potential to increase off-Refuge efforts/programs to address the expanding goose population on private lands (see Goal 12).

The majority of the farming undertaken on the three Refuges is conducted by local area farmers working under cooperative farming agreements with the Refuges. The basic premise for the cooperative farming program is that the Refuge is able to provide green forage crops for wintering geese and the local area farmers are then able to harvest the grass seed during the summer months. In recent years, staff have farmed more and more acreage directly (force-account) as the interest in cooperative farming has decreased. This is due to a number of factors, including the rising costs associated with farming as well as the increased goose use which, as a by-product, results in declining profits for the farmers. The Refuges would like to continue the cooperative farming program and could employ measures such as assisting cooperative farmers with certain practices or even farming certain high goose use fields that do not yield any or much return for the farmer (see strategies above). Under Alternative 2, farming for geese will continue on the three Refuges via a combination of cooperative and Refuge farming programs. While Alternative 3 is not the Service's preferred alternative, the Service may be compelled to implement this alternative in the future if measures to continue cooperative farming are not successful. If this proves to be the case, a new decision would be released in accordance with NEPA. The provision of green browse (grass crops) on the three Refuges is perhaps the most important activity on the Refuge Complex. Grass crops grown on the Refuges help provide the necessary food resources for thousands of Canada geese that winter in the Willamette Valley from October to April each year. In addition, the provision of grass on the Refuges helps reduce goose use and thus, crop depredation (damage), to private agricultural lands. Grass seed production (which is harvested during the summer months) is one of the major crop types within the Willamette Valley. These grass crops are generally only a few inches in height when geese first arrive in the fall, creating ideal forage conditions for Canada geese. Although these grass crops are actively growing during the fall/winter months, they usually do not grow more than 6-12 inches during this entire period and are an attractive food source for Canada geese throughout their extensive winter stay. It is imperative that the Refuges provide an adequate amount of green browse in order to help meet the nutritional needs of the geese and to reduce goose use on privately owned agricultural crops.

Habitat maps have been prepared (Maps 4, 5, 6, and 7) that indicate whether the specific farm field would be maintained in an agricultural status or restored to native habitat under the various alternatives in this CCP. A variety of factors were considered to determine if a specific farm field should be maintained in an agricultural crop status under each of the three alternatives. These factors included overall goose use, dusky goose use, cooperative farmer interest in continuing to farm the field, estimated cost to the Refuge to farm the field, location of field, size of field, topography, etc. Both recent (past 5 years) and historical (past 15-20 years) goose use patterns were considered when developing the habitat maps. Generally speaking, if a farm field has been receiving moderate to high goose use or it has been a traditional dusky goose use area, the field would be maintained in an agricultural status as potential goose habitat. There were a few occasions when the farm field would be restored to native habitat although it may not fall into the low goose use category or it may be receiving some use by dusky Canada geese. These areas, such as the farm fields on Baskett Butte at Baskett Slough Refuge, were determined to be better suited for native habitat than as an agricultural crop as they provide an opportunity to help meet other high priority objectives such as threatened and endangered species recovery. Although there would be a reduction in the amount of farmed acres under Alternative 2, overall goose use under Alternative 2 should be similar to Alternative 1 and could increase if specific goose management strategies were implemented.

Maintaining public use closures over portions of the Refuges during the wintering season helps to provide needed disturbance-free areas (sanctuary) for wintering waterfowl in support of Refuge purposes.

Objective 1b. Provide planted grains or cereal crops for wintering Canada geese.			
Provide up to 10% of the total cropland area as planted grains or cereal crops (primarily corn) on the Refuges, in wintertime closed areas, as a source of readily available short-term carbohydrates for wintering Canada geese.			
Objective Applies on Up to the Following Acres, by Alternative	**Alt 1**	**Alt 2**	**Alt 3**
	Varies, up to 80 acres	Up to 417 acres	Up to 346 acres
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Utilize cooperative farming agreements, contracts, or Refuge staff farming using traditional farm equipment and approaches to provide grains or cereal crops.	✓	✓	✓
2. For each refuge, continue to work with all involved parties to evaluate the legal, technical, and economic feasibility of expanding irrigation capability. Ensure that legal water rights are available and that costs, including those costs required to comply with all current regulatory needs, are reasonable before proceeding.	✓	✓	✓
3. Employ a staged knock-down approach to provide targeted availability of corn/grains during the periods between Canada goose hunting seasons as well as post-season.		✓	✓
4. Conduct periodic soil tests and apply proper fertilization and liming treatments, as necessary, to maintain proper nutrient and pH levels.	✓	✓	✓
5. Erect elk/deer proof fence around corn during summer growing season to prevent loss from elk, deer, and other wildlife.		✓	✓
6. Maintain existing public use closures at Ankeny, Baskett Slough and Finley (see Maps 8, 9, and 11) during the October-March period in order to limit human disturbance to wintering geese.	✓	✓	✓

Rationale: Providing grain crops would enable the Refuges to intensify cropland management for wintering Canada geese. Refuge capability to provide these types of crops has been limited in recent years by the lack of funding and irrigation capability. Developing irrigation capability would potentially be simplest at Ankeny Refuge, where an irrigation contract with Sidney Irrigation Cooperative already exists. The potential to obtain delivered water from Greenberry Irrigation District may also be present at W.L Finley Refuge, which would enhance corn production there.

Providing corn on the Refuges could reduce depredation on neighboring private lands. If corn was made available on the Refuges during the break between goose hunting seasons, crop depredation on private lands could be reduced by drawing geese away from private lands at a time when hunting is not available as a hazing tool. Similarly, goose hunting would not be affected by scheduling corn knockdown between the goose hunting periods. The major reason why grain production should be limited to no more than 10% of the total lands in agricultural production is due to the short-term goose use that results. Although large numbers of Canada geese do respond to the availability of corn or other grains, the duration of goose use is limited to the length of time it takes them to consume all of the grain. Generally, it does not take very long (7-14 days) for a large concentration of Canada geese to consume all of the grain within a field, at which point goose use becomes almost non-existent for the remainder of the wintering period. Grass crops that are continually growing during the entire wintering season provide much more sustained goose use than do grain crops.

Goal 2. Maintain, enhance, and restore a diversity of wetland habitats characteristic of the historic Willamette Valley.

Objective 2a. Maintain seasonal wetlands

Maintain seasonal wetlands dispersed throughout William L. Finley, Baskett Slough, and Ankeny Refuges for the benefit of wintering migratory birds (e.g., waterfowl, wading birds, shorebirds) and other native wetland-dependent wildlife species. No less than 70% of these wetlands should have the following attributes at any time.

- Approximately 50% of the seasonal wetland acreage would be managed to produce moist soil plants, specifically promoting spike rush, millet, smartweeds, and water plantain. Within these wetland areas, 50-90% cover of moist-soil plants should be present at the end of the growing season.
- Approximately 50% of the seasonal wetland acreage would be managed to produce native emergent perennials, specifically promoting burreed, wapato, sedges, rushes, and cattails. Within these wetland areas, 40-60% cover of native emergent plants with balance as open water at the end of the growing season.
- Seasonally flooded (September — June) with most wetlands filled naturally with precipitation in the fall. Some wetlands, especially at Ankeny Refuge, will be pumped with water in the fall.
- Heterogeneity of water depths ranging from saturated soils to 18-24 inches in fall/winter with potentially increased depths (25-72 inches) during periods of heavy precipitation.
- <40% cover of undesirable plants (e.g., reed canarygrass and knotgrass).
- <10% cover of invasive plants (e.g., purple loosestrife).
- Presence of woody debris.

Objective Applies on the Following Acres, by Alternative	**Alt 1**	**Alt 2**	**Alt 3**
	WMF- 474 SBB-30 BKS- 536 ANK-302-488	WMF- 430 SBB-32 BKS- 537 ANK-318-505	WMF- 422 SBB-32 BKS- 537 ANK-318-505
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Maintain heterogeneous bottom topography and range of water depths by utilizing dikes, spillways, pumps, and water control structures.	✓	✓	✓
2. Most wetlands would fill via natural flooding from winter precipitation. Employ a staged flood-up plan in the fall/winter, providing lower water levels at the beginning of this period and maximizing water levels by the end of winter.	✓	✓	✓
3. Approximately 50% of the wetland acreage at Ankeny will be flooded via pumping in the early fall with delivered water.	✓	✓	✓
4. Where water control structures exist, maximize water levels in late winter/early spring to control reed canarygrass and knotgrass infestations.	✓	✓	✓
5. Wetlands are typically dewatered or drawn down naturally in the late spring/early summer to promote native wetland plant species establishment. Draw	✓	✓	✓

down seasonal wetland units with extensive riparian stands in late spring to ensure survivability of native trees and shrubs. Where practical, maintain some surface water through June in order to provide habitat for red-legged frogs.			
6. Approximately 50% of the wetland acreage at Ankeny should be irrigated during the summer months to increase moist soil plant seed production from annuals.	✓	✓	✓
7. Control invasive or undesirable plant species using IPM strategies, including mechanical (mowing and disking treatments), biological, and/or chemical (herbicides) means.	✓	✓	✓
12. Place woody debris in selected wetlands to diversify habitat.	✓	✓	✓
13. Control nutria, bullfrogs, and non-native warmwater fish, as needed, in selected wetlands to protect infrastructure (e.g., water control structures, dikes) and to maintain habitat quality. Periodic complete drawdowns may be employed to control these species.	✓	✓	✓
14. Continue to work with all involved parties in addressing fish passage and entrapment issues.	✓	✓	✓
15. Investigate potential for obtaining delivered water for W.L. Finley Refuge from Greenberry Irrigation District.	✓	✓	✓
16. Continue to work with Sidney Irrigation Cooperative to obtain additional delivered water for Ankeny.	✓	✓	✓
17. Conduct an in-depth evaluation on managing and restoring seasonal and permanent wetlands on the Snag Boat Bend Unit.	✓	✓	✓
18. Establish an Engineering Equipment Operator position at Ankeny to focus on maintaining and restoring wetlands, as well as maintaining all refuge roads and facilities.		✓	✓
Rationale: Historically, seasonal wetlands were one of the more predominant habitat types found throughout the Willamette Valley. The amount of wetland habitat has been reduced significantly due to a variety of factors including agricultural conversion, urbanization, channelization, dams and other water development type projects, etc. Seasonal wetlands are an extremely valuable habitat for a multitude of wildlife including many species of migratory birds. Seasonal wetlands provide valuable food resources via the development of seeds from annual moist soil plants and by producing abundant invertebrate populations. Managing seasonal wetland habitats on the Willamette Valley NWR Complex is an extremely important part of the overall Refuge management program. Specifically, seasonal wetlands are instrumental in the Refuges' ability to provide habitat for wintering Canada geese as they are used quite heavily as roosting, loafing, and feeding habitat. In addition, seasonal wetlands are the key habitat on the Refuges for thousands of wintering dabbling ducks (including mallards, pintails, wigeon and green-winged teal) that depend upon seasonal wetlands for feeding, loafing, and roosting habitat. The Refuges employ a number of management strategies in order to provide quality seasonal wetland habitat for wintering waterfowl, migratory shorebirds, wading birds,			

raptors, and many species of reptiles and amphibians, including red-legged frogs and western pond turtles. Also, seasonal wetland areas are managed on the Refuge Complex in order to provide excellent wildlife viewing opportunities for visitors.

Objective 2b. Restore seasonal wetlands.

Restore and maintain seasonal wetlands dispersed throughout William L. Finley and Ankeny Refuges for the benefit of migratory birds (e.g., waterfowl, wading birds, shorebirds) and other native wetland-dependent wildlife species. No less than 70% of these wetland should have the following attributes:

- Within the wetlands managed to produce moist soil plants, approximately 50% cover of moist-soil plants (e.g., spike rush, millet, smartweeds, water plantain) shall be achieved at the end of the growing season within 1 year of restoration. In subsequent years, 50-90% cover of moist soil plants should be present.
- Within the wetlands managed for native emergent perennials, 40-60% cover of native emergent plants (e.g., burreed, wapato, sedges, rushes, cattails) should be present, with the balance as open water at end of growing season within 5 years of restoration.
- Seasonally flooded (September — June) with most wetlands filled naturally with precipitation in the fall. Some wetlands, especially at Ankeny Refuge, will be pumped with water.
- Heterogeneity of water depths ranging from saturated soils to 18-24 inches in fall/winter with potentially increased depths (25-72 inches) during winter due to heavy precipitation.
- <40% cover of undesirable plants (e.g., reed canarygrass, knotgrass).
- <10% cover of invasive plants (e.g., purple loosestrife).
- Presence of woody debris.

Objective Applies on the Following Acres, by Alternative	Alt 1	Alt 2	Alt 3
		WMF-44-0 SBB-2 BKS- 0 ANK-16-35	WMF-52-0 SBB-2 BKS- 0 ANK-16-35
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Utilizing heavy equipment, construct and install all necessary water management facilities (dikes, spillways, water control structures) to restore wetland habitat.		✓	✓
2. Implement strategies 1-17 from Objective 2a.		✓	✓
3. Establish a Maintenance Worker position to focus on maintenance and repairs of Refuge facilities.		✓	✓

Rationale: Beginning in the mid-1990s, the Willamette Valley NWR Complex initiated a major wetland restoration program in order to increase Canada goose use, provide wetland habitat for a variety of other wildlife species, and to improve wildlife viewing opportunities for visitors. Although there were a nominal amount of wetlands on the Refuge prior to this effort, most of the wetland areas that exist today were restored since the mid-1990s. Restoration areas were selected based on knowledge of historic wetland location, soils, topography, etc, and focused on croplands that were receiving low or no use from Canada geese. Monitoring results show that wetland restoration was a tremendous success, significantly increasing Refuge use by wintering waterfowl (both ducks and geese). In addition, these restored wetlands provide habitat for a variety of shorebirds, wading birds, raptors, amphibians, and reptiles. The Refuge Complex has designed many of the major public use areas in close proximity to these restored wetlands as they offer excellent wildlife viewing, photography, interpretation, and environmental education opportunities. As discussed above, wetlands have been reduced significantly throughout the Willamette Valley. Continuing to restore seasonal wetlands on the Refuge Complex will help compensate for the loss of this habitat type in the Valley, provide increased capability to manage for increasing wintering Canada goose populations, provide increased capability to manage for a diversity of other wetland dependent wildlife species, and provide enhanced capabilities for managing wildlife dependent public use activities.

Objective 2c. Maintain and restore permanent wetlands.

Maintain and restore permanent wetlands on William L. Finley, Baskett Slough, and Ankeny Refuges for the benefit of migratory birds (e.g. waterfowl, wading birds) and other wetland-dependent fish and native wildlife species. No less than 70% of these wetlands should have the following attributes:

- Maximum water depths 24-48 inches with potentially increased depths (up to 72 inches) in winter due to heavy precipitation.
- 40-60% cover of open water with submergent plants (e.g., pondweeds) during late summer/early fall period.
- 40-60% cover of native emergent plants (e.g., bulrushes, cattails).
- Presence of woody debris.
- <40% cover of undesirable plant species (e.g., reed canarygrass and knotgrass).
- <10% cover of invasive plants (e.g., purple loosestrife).

Objective Applies on the Following Acres, by Alternative	**Alt 1**	**Alt 2**	**Alt 3**
	WMF- 62 SBB-3 BKS- 61 ANK-42	WMF- 62 SBB-6 BKS-61 ANK-76	WMF- 62 SBB-6 BKS- 61 ANK-76
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Maintain heterogeneous bottom topography and range of water depths by utilizing dikes, spillways, pumps, and water control structures.	✓	✓	✓
2. Pump or divert water into selected wetlands at Ankeny and Finley NWRs during the summer months to maintain water levels.	✓	✓	✓
3. Manage others, including selected wetlands at Baskett Slough, by not dewatering in the spring/summer.	✓	✓	✓
4. Employ water-level management (e.g., complete drawdowns every 5-10 years) to oxidize wetland bottoms and facilitate removal of excessive emergent cover via mechanical treatments.	✓	✓	✓
5. Control invasive or undesirable plant species using IPM strategies, including mechanical (mowing and disking treatments), biological, and/or chemical (herbicide treatment) means.	✓	✓	✓
6. Place woody debris in selected wetlands to improve habitat diversity.	✓	✓	✓
7. Control nutria, bullfrogs, and non-native warmwater fish as needed, from selected wetlands to protect infrastructure (e.g., water control structures, dikes) and to maintain habitat quality. Periodic complete drawdowns may be utilized to control these species.	✓	✓	✓
8. Continue to work with all involved parties in addressing fish	✓	✓	✓

passage and entrapment issues.			
9. Investigate potential for obtaining delivered water for W.L. Finley Refuge from Greenberry Irrigation District.	✓	✓	✓
10. Continue to work with Sidney Irrigation Cooperative to obtain additional delivered water for Ankeny Refuge.	✓	✓	✓
11. Establish a Water Program Manager (Refuge Operations Specialist) position to focus on annual and daily water management operations of permanent and seasonal wetlands, including irrigated croplands and water rights requirements.		✓	✓
Rationale: Permanent wetlands provide year-round habitat for several unique or rare species, including the threatened Oregon chub. The Refuge Complex has restored a number of permanent wetlands since the mid-1990s, with two of these managed primarily for Oregon chub. Currently one of these wetlands contains one of the largest Oregon chub populations found within the Willamette Valley. Permanent wetlands are especially valuable to wildlife during the summer period prior to when seasonal wetlands are flooded by fall precipitation. As the only wetland areas present on the Refuges during the summer months, permanent wetlands provide wildlife viewing opportunities during this time of year when seasonal wetlands are dry. Permanent wetlands are also very important to wintering Canada goose populations as they typically are the main wetlands flooded when geese first arrive in the early fall. Providing permanent wetland areas does present management challenges, including limitations on methods to control invasive plant species and the potential need to obtain additional water for maintaining these areas.			

Goal 3. Protect, maintain, and restore native Willamette Valley wet prairie habitats, with an emphasis on management for rare and listed plant species, native species diversity, and functional attributes for declining grassland birds.

Habitat objectives under Goal 3 refer to four different subcategories of wet prairie habitat (see Chapter 4, Section 4.4). The objectives differ for each of these subcategories.

Objective 3a. Protect and maintain remnant mature wet prairie on William L. Finley NWR.

Protect and maintain 366 acres of remnant mature (historic) wet prairie on William L. Finley NWR for the benefit of declining grassland birds (e.g., western meadowlark), rare and listed species (e.g., peacock larkspur, Bradshaw's desert parsley, Willamette daisy), and native species diversity. Mature wet prairie is characterized by the following attributes:

- <5% canopy cover of woody vegetation over 90% of the prairie.
- Maintain patches of > 120 acres (if opportunities exist < 120 acres, then provide in tracts > 40 acres each).
- > 50% relative cover of native prairie plants.*
- Native prairie species richness > 10 species, including at least 7 forbs and one bunchgrass.*
- < 50% cover of any single species of non-native plant (e.g., velvet grass) .*
- <5% cover of non-natives of particular concern.*
- Variable grass heights up to 4 feet in height.
- Savanna trees, primarily Oregon ash, are present at <1 per acre.
- Tree saplings and shrub sprouts are present.
- Heterogeneous topography includes scattered elongated mounds, pedestals (ant mounds), and

hummocks elevated <12 inches above surface water levels. • Hydrology ranges from saturated soils to standing water between interstitial spaces of mounded topography (Nov-April). * Vegetative attributes are adopted from the prairie quality guidelines from Appendix D of the Recovery Plan (USFWS 2010).

Objective Is Part of the Following Alternatives	**Alt 1**	**Alt 2**	**Alt 3**
	✓	✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Prevent ground disturbing alterations to hydrology that would change the depth and duration of soil saturation and inundation from what presently occurs.	✓	✓	✓
2. Use IPM measures including physical (e.g., hand removal), mechanical (e.g., mowing with Low Ground Pressure (LGP) equipment), biological, and/or chemical (herbicides) to reduce, control, or eliminate invasive plants.	✓	✓	✓
3. Implement a rotational prescribed fire regime on the native prairie habitats to reduce woody vegetation and thatch as well as stimulate native grass and forb growth. Wet prairie will generally be burned on a 3-year rotation. Depending upon weather and vegetative conditions, prescribed fires may be conducted every 2-4 years. All prairie units will be on variable schedules to ensure leaving some unburned units each year for grassland birds.	✓	✓	✓
4. Conduct hand or mechanical treatment of woody vegetation as necessary to facilitate the future use of prescribed fire through all portions of the prairie. Mechanical work is limited to LGP skid-steer tractors with implements to reduce disturbance to the micro-topography. All cut woody vegetation >2” in diameter within the prairie will be removed for offsite disposal (pile burn or chipping).	✓	✓	✓
5. Where appropriate habitat exists, implement measures to supplement existing populations or establish new populations of listed species as described in Goal 9, Objectives 9A, 9B, and 9D.	✓	✓	✓
Rationale: Willamette Valley wet prairies have been reduced to less than one percent of historic levels, making them one of the rarest habitats in the country. Wet prairies support a number of rare plants including three federally listed species and various Species of Concern. The Willamette Floodplain RNA represents one of the largest intact and unplowed wet prairies remaining in the Pacific Northwest. This site supports the world’s largest population of peacock larkspur, a federal Species of Concern, which responds very positively to fire. In addition, the wet prairies support remnant populations of grassland-dependent birds such as the western meadowlark, a rare breeder in the Willamette Valley. These habitats are important for the biological integrity of the refuge because they hold genetic diversity and foundations for habitat improvement and expansion. Because wet prairie plant communities have evolved under conditions of wintertime saturated soils and dry seasonal fires, the management strategies listed above mimic these processes, and will thus benefit all prairie dependent species.			

Objective 3b. Protect and maintain remnant disturbed wet prairie			
Protect and maintain remnant disturbed wet prairie on Baskett Slough and Ankeny NWRs. Remnant disturbed wet prairie is characterized by the following attributes*: • <5% cover of woody vegetation over 90% of the prairie. • Where possible maintain patches in tracts of > 40 ac. each, or adjacent to tracts of remnant mature, or restored prairies. • > 50% relative cover of native prairie plants.* • Native prairie species richness > 10 species, including at least 7 forbs and one bunchgrass.* • < 50% cover of any single species of non-native plant (e.g., velvet grass).* • <5% cover of non-natives of particular concern.* • Variable grass heights up to 4 feet in height. • Tree saplings and shrub sprouts are present. • Savanna trees, primarily Oregon ash, may be present. • Range of topography may include scattered elongated mounds, pedestals (ant mounds), and hummocks elevated <12 inches above surface water levels. • Hydrology ranges from saturated soils to standing water between interstitial spaces of mounded topography (Nov-April). * Vegetative attributes are adopted from the prairie quality guidelines from Appendix D of the Recovery Plan (USFWS 2010)			
Objective Applies on the Following Acres, by Alternative	**Alt 1**	**Alt 2**	**Alt 3**
	WMF-0 BKS- 27 ANK-56	WMF-0 BKS- 27 ANK-56	WMF-0 BKS-27 ANK-56
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
Implement strategies 1-3 from Objective 3a.	✓	✓	✓
4. Implement measures to improve species diversity (i.e., supplemental seeding) following vegetative treatments such as mowing, herbicide application, and/or site scarification.		✓	
5. Where appropriate habitat exists, implement measures to supplement existing populations or establish new populations of listed species as described in Goal 9, Objectives 9A, 9B, and 9D.	✓	✓	
Rationale: The refuge defines remnant disturbed wet prairie sites as those areas where past practices such as changes in hydrology, grazing, lack of fire, or fragmentation have resulted in small patches of remnant sites or sites where non-natives dominate or structure is altered. Although these wet prairies lack the diversity found in mature wet prairies, some still support a number of rare plants including listed species – i.e., Oak Creek wet prairie habitat harbors the largest population of Bradshaw's desert parsley in the Willamette Valley. These habitat remnants, both individually and in combination, are important for the biological integrity of the refuge because they hold genetic diversity and foundations for habitat improvement and expansion. These sites often retain the structure and micro-topography that contributes to the diversity of the wet prairie community. In addition, the wet prairies support remnant populations of grassland birds such as the western meadowlark, a rare breeder in the Willamette Valley. Management of these sites is critical for maintaining rare species. Examples: Oak Creek, Field 1 at Ankeny, Field 1 at Baskett Slough, etc.			

Objective 3c: Protect and maintain wet prairie areas where restoration efforts are in progress.

Protect and maintain wet prairie where restoration is in progress on William L. Finley and Baskett Slough Refuges for the benefit of migratory birds, rare and listed species, and native species diversity. This wet prairie type will be characterized by the following attributes:

- <5% cover of woody vegetation over 95% of the prairie.
- Where possible maintain patches in tracts of >40 acres each, or adjacent to tracts of mature, remnant disturbed, or wet prairie under restoration.
- > 50% relative cover of native prairie plants.*
- < 50% cover of any single species of non-native plant (e.g., velvet grass).*
- <5% cover of non-natives of particular concern.*
- Native prairie species richness > 10 species, including at least 7 forbs and one bunchgrass* with a dominance of annual species in "early successional" sites.
- Variable grass heights up to 4 feet in height.
- Tree saplings and shrub sprouts are largely absent.
- Saturated soils during rainy season, <6" deep except for temporary flood events.
- Hummock topography absent, ant mounds may be present at low density.
- >5% bare ground.

* Vegetative attributes are adopted from the prairie quality guidelines from Appendix D of the Recovery Plan (USFWS 2010)

Objective Applies on the Following Acres, by Alternative	**Alt 1**	**Alt 2**	**Alt 3**
	ANK-50 BKS-33 WMF-177	ANK-50 BKS-33 WMF-177	ANK-50 BKS-33 WMF-177
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Alterations to hydrology and/or grading, that would change the depth and duration of soil saturation and inundation (e.g., to emulate vernal pools), may be undertaken to diversify and improve conditions for the wet prairie plant community.	✓	✓	
2. Use IPM measures including physical (e.g., hand removal), mechanical (e.g., mowing with LPG equipment), biological, and/or chemical (herbicides) to reduce, control, or eliminate invasive plants.	✓	✓	
3. Implement disking to stimulate early successional plant communities and/or control invasives such as reed canary grass in areas not occupied by listed plants.	✓	✓	
4. Implement a rotational prescribed fire regime on the prairie habitats that reduces woody vegetation and thatch and stimulates native forb growth. These prairies may be burned frequently (annually) to achieve specific conditions such as attractiveness to Canada geese, or on a 2-4 year rotation to meet other vegetation management objectives. Burning of prairie units will be on a variable schedule to insure leaving some unburned units each year to benefit grassland birds.	✓	✓	✓
5. Implement measures to increase species diversity (i.e., supplemental seeding) following vegetative treatments such as mowing, herbicide application, and/or site scarification.	✓	✓	
6. Where appropriate habitat exists, implement measures to	✓	✓	

supplement existing populations or establish new populations of listed species as described in Goal 9, Objectives 9A, 9B, and 9D.			

Rationale: Willamette Valley wet prairies have been reduced to <1% of historic levels, making them one of the rarest habitats in the country. These habitats are important for the biological integrity of the refuge at the landscape level, because of the scale of habitat loss that has occurred across the historic range. Beginning in the mid-1990s, restoration of wet prairie has been a priority at the Willamette Valley refuges. This objective applies to those sites where restoration is ongoing. Although "restored" wet prairies may lack the diversity and micro-topography found in other wet prairies, the habitat may still support rare plants including federally listed species. In addition, when adjacent to other wet prairie tracts, these prairies enlarge the area available for populations of grassland birds including the streaked horned lark, a federal candidate species. For grassland birds, patch size can be as important as structure and plant community diversity. Examples include Finley M-dikes, Baskett Dusky Prairie, Finley Field 31, Ankeny Eagle Prairie, Baskett 7Z, etc.

It is unlikely that these wet prairies under restoration will achieve the criteria of mature wet prairie during the life of this plan. The micro-topography found in mature prairies has developed over many years (decades), with vegetation build-up causing hummocks and water-filled depressions between them. The density of ant mounds within a mature prairie also contributes to the diversity of the site. A mature wet prairie often contains well over 100 native plant species. Restoration efforts have improved over time as the diversity of seed for restoration efforts has increased, yet both the species available and the subsequent successful establishment of those species still falls short of the mature prairie. However, the long term goal is to develop these early successional sites into mature wet prairie.

Objective 3d. Restore wet prairie habitat

Restore and maintain wet prairie on William L. Finley, Basket Slough, and Ankeny Refuges, for declining grassland birds and expanded habitat availability for rare plant communities and federally listed species. Within 5 years of the initiation of restoration, these wet prairies will be characterized by the following attributes:

- <5% cover of woody vegetation.
- Restore patches of >40 acres (if opportunities exist <40 acres) provide in tracts with connectivity to existing prairie (wet or upland).
- <25% cover of non-native grasses and forbs.
- >5% bare ground.
- > 50% relative cover of native prairie plants.*
- <5% cover of non-natives of particular concern.*
- Native prairie species richness > 10 species, including at least 7 forbs and one bunchgrass* with a dominance of annual species in "early successional" sites.
- Variable grass heights up to 4 feet in height.
- Tree saplings and shrub sprouts are present.
- Saturated soils during rainy season, <6" deep except for temporary flood events.
- Ant mounds may be present but scattered, hummocks are absent.

* Vegetative attributes are adopted from the prairie quality guidelines from Appendix D of the Recovery Plan (USFWS 2010)

Objective Applies on the Following Acres, by Alternative	Alt 1	Alt 2	Alt 3
		WMF- 101 SBB-0 BKS- 58 ANK-75	WMF- 266 SBB-0 BKS- 96 ANK-110

Strategies Applied to Achieve Objective	Alt 1	Alt 2	Alt 3
Implement strategies 1 thru 6 from Objective 3c.		✓	✓

Rationale: Willamette Valley wet prairies have been reduced to <1% of historic levels, making them one of the rarest habitats in the country. Wet prairies support a number of rare plants including three federally listed species and various Species of Concern, and declining grassland birds. Fields to be restored to wet prairie in the future include poorly drained agricultural fields with wetland soils, sites in close proximity to other wet prairies or of a size large enough (40 acres) to support grassland bird territories, and sites that consistently had low goose use. These sites are being held to a high standard for diversity and non-native cover because, immediately following the discontinuation of farming, it is easier to establish higher native cover when fields are generally weed-free and easily treated with herbicides. When restored these prairies will contain suitable habitat for introduction of federally listed forbs such as Bradshaw's desert parsley.

Goal 4. Protect, maintain, enhance, and restore the native upland prairie/oak savanna habitats characteristic of the historic Willamette Valley, with an emphasis on management for rare and listed plant species, native species diversity, and functional attributes for declining grassland birds.

Habitat objectives under Goal 4 refer to four different subcategories of upland prairie/oak savanna habitat (see Chapter 4, Section 4.5).

Objective 4a. Protect and maintain mid-late successional oak savanna/upland prairie.

Protect and maintain 63 acres of upland prairie/mid-late successional oak savanna on Baskett Slough NWR for the benefit of the federally endangered Fender's blue butterfly (FBB), federally listed upland prairie plants, and grassland and oak-dependent resident and migratory birds (e.g., western meadowlark, western bluebird). This upland prairie/oak savanna habitat is characterized by the following attributes:

- Singular open grown savanna form trees (or small groves) with 100-300 ft spacing between oaks.
- Oaks present on the site are generally >15" diameter at breast height (DBH) and >80 years old.
- Where possible, maintain patches in tracts of >40 acres each (if <40 acres provide connectivity to existing wet or upland prairies or agricultural lands).
- > 50% relative cover of native prairie plants, including known nectar plants for the Fender's blue butterfly.*
- < 50% cover of any single species of non-native plant (e.g. soft brome).*
- <5% cover of non-natives of particular concern.*
- Native prairie species richness > 10 species, including at least 7 forbs and one bunchgrass.*
- Populations of federally listed upland prairie plants present (USFWS 2010).
- Snags may be present at low densities (< 1 per acre).
- Mosaic of low growing native grasses, native forbs, and bare ground without dense canopy vegetation.
- <10% canopy cover of native trees (e.g., Oregon white oak).
- ≤5% cover of bare ground.
- <10% canopy cover of native shrubs (e.g., serviceberry, poison oak).

* Vegetative attributes are adopted from the prairie quality guidelines from Appendix D of the Recovery Plan (USFWS 2010)

Strategies Applied to Achieve Objective	Alt 1	Alt 2	Alt 3
1. Implement effective measures against invasive species, such as hand removal, mowing, and/or herbicide treatment as needed to reduce, control, or eliminate invasive plants. Wiping with herbicide may be effective in the control of tall oatgrass while preserving the native herbaceous understory. Timing of management activities should avoid detrimental impacts to FBB and nectar or host plants.	✓	✓	✓
2. In the absence of prescribed fire, conduct mowing on an annual basis to suppress encroaching woody vegetation and reduce thatch.	✓	✓	✓
3. Use prescribed fire on a periodic rotation (approximately 3-5 year interval). Prescribed fire will be limited to < one third of any one site within occupied FBB habitat (USFWS 2010).	✓	✓	✓
4. Reduce the density of oak trees using hand/mechanical cutting to a general spacing of 100-300 feet across the upland prairie sites. Oak removal should be limited to trees <15 inches DBH. Trees should be moved off the native prairie for a beneficial use such as habitat structures, biomass, or another forest product including donation to community organizations, or disposed of through pile burning.	✓	✓	✓
5. Pursue development of low or no-cost disposal of slash and woody debris as part of Forestry Stewardship projects undertaken in this habitat type.	✓	✓	✓
6. Protect adequate number of regenerating oaks to allow for perpetuation of the oak stand over time. These may be marked for retention when thinning or protected with water/foam during prescribed burning if at risk from fire intensity.	✓	✓	✓
Rationale: Native mature (late-successional) upland prairies and oak savanna habitats have been reduced to <1% of their historic range in the Willamette Valley. The Refuge defines these sites as where oaks > 80 years old are present in a matrix of upland prairie. Agriculture and development are the primary causes for this decline, although the exclusion of fire over the past century has also contributed. These oak savannas/upland prairies support a number of rare species, including two federally listed plants and the endangered Fender's blue butterfly. The oak habitat supports a number of oak-dependent bird species, including the western bluebird, white-breasted nuthatch, and acorn woodpecker (all Species of Concern). The expanses of upland prairie also support breeding populations of western meadowlark, a rare breeder in the Willamette Valley. Baskett Slough NWR contains habitat blocks of oak savanna/upland prairie that serve as important reserves for rare and declining species. Sites occupied with federally listed species will be managed under the guidelines of the Recovery Plan (USFWS 2010).			

Objective 4b. Protect and maintain early successional oak savanna/upland prairie.

Protect and maintain upland prairie/early successional oak savanna on William L. Finley and Baskett Slough Refuges for the benefit of the federally endangered Fender's blue butterfly and grassland and oak-dependent resident and migratory birds (e.g., western bluebird, western meadowlark). This upland prairie/oak savanna habitat is characterized by the following attributes:

- Singular open grown savanna form trees (or small groves) with 50-300 ft. spacing between oaks.
- Oaks present on site are generally <15" DBH and <80 years old.
- Snags are generally absent.
- Where possible, maintain patches in tracts of > 40 acres each (if <40 acres provide

connectivity to existing wet or upland prairies or agricultural lands).

- > 50% relative cover of native prairie plants including known nectar plants for the Fender's blue butterfly.*
- < 50% cover of any single species of non-native plant (e.g., soft brome).*
- <5% cover of non-natives of particular concern.*
- Native prairie species richness > 10 species, including at least 7 forbs and one bunchgrass.*
- Populations of federally listed upland prairie plants present (USFWS 2010).
- Mosaic of low growing native grasses, native forbs, and bare ground with an absence of dense canopy vegetation.
- <20% canopy cover of native trees (e.g., Oregon white oak).
- Up to 5% cover of bare ground.
- <10% canopy cover of shrubs (e.g., serviceberry, poison oak).

* Vegetative attributes are adopted from the prairie quality guidelines from Appendix D of the Recovery Plan (USFWS 2010)

Objective Applies on the Following Acres, by Alternative	**Alt 1**	**Alt 2**	**Alt 3**
	WMF-26 BKS-87	WMF-26 BKS-87	WMF-26 BKS-87
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Implement Strategies 1-4 and 6 from Objective 4A.	✓	✓	✓

Rationale: Early successional oak savanna/upland prairie are defined as those upland sites that lack older oak trees (>80 years old) or where the tree component is occupied primarily by younger age classes of oak. These prairies support a number of rare species, including two federally listed plants and the endangered Fender's blue butterfly. Although the younger oak stands do not have the characteristics of the mature savanna, they still support grassland and oak-dependent bird species such as the western bluebird and western meadowlark. Baskett Slough NWR and W.L. Finley NWR both contain blocks of early successional oak savanna/woodland that over the long term (50-100 years) should develop the characteristics of mid-late successional habitat if proper strategies are implemented. These sites still function in their present condition as important reserves for some rare and declining species. Sites occupied with federally listed species will be managed under the guidelines of the Recovery Plan (USFWS 2010).

Objective 4c. Protect and enhance remnant disturbed oak savanna/upland prairie.

Protect and enhance remnant disturbed upland prairie/oak savanna on William L. Finley and Baskett Slough Refuges for the benefit of grassland and oak-dependent resident and migratory birds (e.g., western bluebird, western meadowlark). This upland prairie/oak savanna habitat is characterized by the following attributes:

- Singular open grown form savanna trees (or small groves) with 50-300 ft. spacing between oaks.
- Where possible maintain patches in tracts of > 40 acres each (if <40 acres provide connectivity to existing prairies (wet or upland) or agricultural lands).
- Oak are of variable age and size.
- Snags may be present at low densities (< 1 per acre).
- >10% cover of native grasses and forbs (e.g., Roemer's fescue, blue wildrye, rose checkermallow).
- < 50% cover of any single species of non-native plant (e.g., soft brome).*
- <20% canopy cover of native trees (e.g., Oregon white oak).
- Up to 5% cover of bare ground.
- <20% canopy cover of native shrubs (e.g., serviceberry, poison oak.)

- <20% cover of invasive grasses (e.g., tall oatgrass), forbs (e.g., meadow knapweed), and shrubs (e.g., Himalayan blackberry).

Objective Applies on the Following Acres, by Alternative	**Alt 1**	**Alt 2**	**Alt 3**
Acres to be achieved by refuge	WMF- 296 BKS-82	WMF-296 BKS-82	WMF- 296 BKS-82

Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Implement IPM measures against non-native species, such as hand removal, mowing, and/or herbicide treatment as needed to reduce, control, or eliminate the target plants. Wiping with herbicide may be effective in the control of tall oatgrass while preserving the native herbaceous understory.	✓	✓	✓
2. Use prescribed fire on a 3-5 year rotation. In the absence of prescribed fire, conduct mowing on an annual basis to suppress woody vegetation and reduce thatch.	✓	✓	✓
3. Reduce the density of oak trees using hand/mechanical cutting to a general spacing of 50-300 feet across the upland prairie sites. Oak removal should be limited to trees less than 15 inches DBH.	✓	✓	✓
4. Implement measures to increase species diversity (i.e., supplemental seeding) following vegetative treatments such as mowing, herbicide application, and/or site scarification.		✓	
5. Implement strategies described in Goal 9 to supplement existing populations or establish new populations of federally listed species where appropriate habitat exists and when determined a priority to meet Recovery Plan goals.		✓	
6. Establish a Prescribed Fire Specialist position to focus developing fire plans, coordination and implementing prescribed burning units throughout the three Refuge and Easements.		✓	✓

Rationale: Although the understory of these remnant disturbed savannas are dominated by non-native grasses, they still have structural function for a number of oak-dependent bird species such as the western bluebird, white-breasted nuthatch, and acorn woodpecker (all federal Species of Concern). In addition, when tracts are large enough (>15 acres), they may provide suitable breeding habitat for grassland birds such as western meadowlarks. Baskett Slough and W.L. Finley NWRs contain blocks of oak savanna/upland prairie with dominant non-native understories. These sites still function in their present condition as important reserves for some rare and declining species, and with enhancement, have the potential to increase diversity and thus support additional rare and/or federally listed species through management actions to enhance presence of native plant species in the understory. Mowing is used as a substitute for prescribed fire, controlling the abundance and quantity of woody vegetation in the understory, especially Himalayan blackberry and poison oak. Without frequent mechanical treatment, the woody vegetation would quickly change the character of the savanna grassland to more shrub dominated. Prescribed fire would then be more difficult to implement, because of either a diminished ability to carry fire or increased risk of escape. However, neither mowing nor prescribed fire significantly decrease the non-native composition in these disturbed habitats.

Objective 4d. Restore and maintain oak savanna/upland prairie for grassland-dependent birds and listed species.			
Restore and maintain upland prairie/oak savanna on William L. Finley, Baskett Slough, and Ankeny NWRs, for the benefit of grassland-dependent resident and migratory birds (e.g., western meadowlark), federally listed species, and other native wildlife. Within 5 years of successful establishment, restored upland prairie habitat will be characterized by the following attributes: • Tree seedlings (Oregon white oak) are present singly or in clumps at a spacing of 50-300 feet (within 6-15 years of successful establishment). In the case where oak woodland is thinned to savanna spacing, the attribute will be singular open grown savanna form trees (or small groves) with 50-300 ft. spacing between oaks. • Snags and shrubs are absent, except in cases where converted from oak or mixed deciduous woodlands where snags may be present at <1 per acre. • Mosaic of low growing native grasses (Roemer's fescue, CA oatgrass, blue wildrye, prairie junegrass), forbs, and bare ground. • Where possible, maintain patches in tracts of >40 acres each (if <40 acres provide connectivity to existing prairies (wet or upland) or agricultural lands). • > 50% relative cover of native prairie plants including known nectar plants for the Fender's blue butterfly.* • < 50% cover of any single species of non-native plant (e.g. false dandelion).* • <5% cover of non-natives of particular concern.* • Native prairie species richness > 10 species, including at least 7 forbs and one bunchgrass.* • Populations of federally listed upland prairie plants present (USFWS 2010). * Vegetative attributes are adopted from the prairie quality guidelines from Appendix D of the Recovery Plan (USFWS 2010)			
Objective Applies on the Following Acres, by Alternative	**Alt 1**	**Alt 2**	**Alt 3**
		WMF-88 SBB-17 BKS-299 ANK-40	WMF-178 SBB-17 BKS-396 ANK-40
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Control invasive/non-native plants and/or other undesirable vegetation using a combination of mechanical treatments (mowing, disking), herbicide application, and prescribed fire. This will likely occur for a 1-3 year period. Avoidance of ground disturbance is desirable in the final year of cleanup to reduce stimulation of invasive plant seeds in the soil.		✓	✓
2. After the invasive/non-native plants are successfully controlled, fall seeding with native species using a no-till drill is preferred, although broadcast seeding and following with a cultipacker/harrow is an optional strategy. Options include using different seed mixes to allow follow-up treatments in Year 1 such as: a. Seed grasses only to allow subsequent applications of broadleaf herbicides (most likely used where grassland bird habitat is initial goal). b. Seed forbs only to allow subsequent applications of grass-specific herbicides (most likely to be used where Fender's blue butterfly habitat is initial goal). c. Seed diverse mixes and spot-treat undesirable vegetation. (used where restoration site has largely weed-free seed bank) d. Seed diverse mixes and conduct frequent low mowing for the		✓	✓

first two years after establishment (used where the seed bank may contain large amounts of weedy annual grasses). A combination of the above options is also possible. Subsequent supplement drilling or out-planting of container plants may be used to increase species diversity, especially on Fender's blue butterfly restoration sites with an emphasis on FBB nectar and host plants (USFWS 2010).			
3. Implement IPM measures such as hand removal, mowing, and/or herbicide treatment as needed to reduce, control, or eliminate weeds and unwanted woody vegetation.		✓	✓
4. Outplant bareroot or container stock of seedling oaks in the late fall/winter at a spacing of 50-300 feet. Conduct supplemental watering twice during the summer growing season (July-Sept) to help with first-year survival. Tubing or other protection from rodents or herbivores may be necessary. Trees should be clearly marked for management purposes until tree height exceeds the grass height (10 +yrs).		✓	
5. Monitor survival of oak plantings in the second growing season and replant as necessary to achieve spacing goals.		✓	
6. Prescribed fire may be used on a 3-5 year rotation to reduce thatch and stimulate forb growth, however, protection of seedling oaks (with wet lines or foam prior to ignition) will be necessary for the first 15-25 years.		✓	✓
7. Implement strategies to establish new populations of listed species (see Goal 9) where appropriate habitat has been established and as determined a priority to achieve Recovery Plan goals.		✓	✓
8. Reduce the density of oak trees using hand/mechanical cutting to a general spacing of 50-300 feet across the oak woodland sites designated for savanna restoration. Trees should be moved from the site for a beneficial use such as habitat structures, biomass, or another forest product including donation to community organizations, or disposed of through pile burning. Sites will be evaluated for this treatment using the Baskett Butte Management Plan (Salix 2005) and the proposed Forest Management Plan for W. L. Finley NWR.		✓	✓
9. Management of the understory will be conducted using the above strategies 1-7 as considered appropriate.		✓	✓
Rationale: The best sites for upland prairie restoration are often historic upland prairies that may currently be marginal agricultural ground or fields where agricultural operations have ceased. Invasive plant management is generally the biggest challenge to restoration, and herbicide applications are often the most effective initial site treatment. Suitable native grass and forb seed with Willamette Valley origins is available commercially for upland restoration. In the short term, these sites can function as suitable habitat for grassland birds such as the western meadowlark. In addition, within 3-15 years, at least 50% of the restored acres at W.L. Finley and Baskett Slough NWRs should be suitable habitat for Fender's blue butterfly and federally listed plant species Restoration of oak savanna characteristics can begin but remain a long-term objective (50-100 years). These sites also have the potential to support listed prairie species with successful introduction and weed control. The Refuge Complex has 616 acres of non-agricultural grasslands, some of which will be utilized before additional lands are converted from active agriculture to upland prairie/oak savanna. Selection and management of oak woodlands considered for conversion to oak savanna will be based on the Baskett Butte Management Plan and the proposed Forest Management Plan for W.L. Finley NWR.			

Goal 5. Maintain oak woodland habitats representative of the historic Willamette Valley.

Objective 5a. Maintain oak woodlands.

Maintain up to 489 and 276 acres of oak woodlands on William L. Finley and Baskett Slough Refuges, respectively, for oak woodland-dependent species (e.g., acorn woodpecker, western wood peewee, western gray squirrel). Oak woodlands would have the following attributes:

- Large oak trees (stand averaging >15 inches DBH with 20% of trees >22 inches DBH) providing snags for cavities and granaries.
- Mature overstory foliage/canopy with >50% edge-to-opening ratio.
- <5% canopy cover of Douglas-fir.
- 40-85% canopy closure with >80% oaks.
- <50% canopy cover of sub-canopy trees (e.g., Oregon white oak, big leaf maple, cascara).
- Up to 80% cover of native shrub and herbaceous species (e.g., blue wildrye, snowberry, filbert).
- <20% cover of invasive/undesirable species (e.g., English ivy, Himalayan blackberry, English hawthorne).
- No false brome present.

Strategies Applied to Achieve Objective	Alt 1	Alt 2	Alt 3
1. Develop Forest Management Plan for all oak and mixed deciduous woodlands on W. L. Finley Refuge. This plan would determine options for conversion of oak woodlands to oak savanna where ecologically appropriate.		✓	✓
2. Using the Baskett Butte Management Plan (Salix 2005) and the Forest Management Plan from Strategy 1, evaluate and prioritize oak stands in need of treatment and focus on those areas that may lose their integrity within the next 15 years from over-topping of other tree species.		✓	✓
3. Implement effective measures such as hand-removal, mowing, and/or herbicide treatment as needed to reduce, control, or eliminate noxious weeds or unwanted woody vegetation.	✓	✓	✓
4. Based on the priorities established in 2, initiate efforts to remove Douglas-fir trees that are over-topping or threaten to overtop existing oaks to meet the attributes listed above. Tree removal would be through traditional logging methods or snag creation.	✓	✓	✓
5. Reduce the density of oak trees where high stocking rates have lead to conditions such that older oaks with large crowns are crowded, or where current densities may prevent trees from developing large crowns. These conditions are usually attributable to the exclusion of fire and exceptionally high seedling survival of specific age classes. Tree removal would be using traditional logging methods.		✓	
6. Evaluate the potential use of prescribed fire within specific oak stands that are determined to have a high level of native diversity, are threatened with invasion of a dominant understory species (i.e., poison oak), or overstory shade tolerant species such as big-leaf maple.		✓	

7. Following management actions to remove woody vegetation or treat noxious weeds, supplemental seeding with native species may be necessary.		✓	✓
8. Pursue development of no-cost waste disposal as part of Forestry Stewardship projects. Until this option exists, allow slash or waste wood to be burned onsite or donated to schools, environmental restoration projects, or communities in need.		✓	✓
9. Where ecologically appropriate, the Baskett Butte Management Plan (Salix 2005) would be used to determine the opportunities to convert oak woodland to oak savanna (for conversion see Objective 4D, Strategy 8).		✓	
Rationale: Oregon white oak woodlands are a declining habitat within the Willamette Valley (for the purposes of this plan, habitat types that could be labeled separately as oak-conifer have been lumped within the oak woodland classification). These habitats are important for the biological integrity of the refuges at the landscape level because of the scale of habitat loss across the historic range. Forestry practices and the encroachment of Douglas-fir are the primary causes for this decline. The oak woodlands support a number of oak-dependent bird species, including the western bluebird, white-breasted nuthatch, and acorn woodpecker (all federal Species of Concern) and the western gray squirrel. Snags within oaks are an important component for these birds and other wildlife, and develop naturally in older oak trees. Baskett Slough and W.L. Finley NWR contain habitat blocks of oak woodland that serve as important reserves for rare and declining species. Examples include South Baskett Butte and Woodpecker Loop Woodland. The Baskett Butte Management Plan (Salix 2005) addresses oak woodland management for Baskett Slough NWR, and W.L. Finley NWR needs a similar plan. Selection and management of oak woodlands considered for conversion to oak savanna will be based on the Baskett Butte Management Plan and the proposed Forest Management Plan for W.L. Finley NWR.			

Goal 6. Maintain mixed deciduous/coniferous forest characteristic of the historic Willamette Valley.

Objective 6a. Maintain mid-late successional, upland mixed coniferous/deciduous forests.

Maintain up to 347 acres and 34 acres on William L. Finley and Baskett Slough Refuges, respectively, of mid-late successional, upland mixed coniferous/deciduous forests for a diverse assemblage of native species, including resident and migratory birds (e.g., Swainson's thrush, pileated woodpecker). This habitat type is characterized by the following attributes:

- Overstory canopy cover 30-90% of coniferous (e.g., Douglas-fir) and deciduous trees (e.g., big-leaf maple, Oregon ash, Oregon white oak).
- Sub-canopy cover 50-70% of deciduous trees (e.g., big-leaf maple) and shrubs (e.g., vine maple, hazel, poison oak, sword fern).
- Snags, defective and dying trees, and down logs representative of the size and age classes are present within each stand, including snags > 25" DBH where available.
- Frequently located on north facing slopes or within moisture-laden draws
- No false brome present.

Strategies Applied to Achieve Objective	Alt 1	Alt 2	Alt 3
1. Develop a Forest Management Plan for all oak and mixed deciduous woodlands on W. L. Finley Refuge, including Maple Knoll RNA. This plan would determine options for conversion of mixed deciduous woodlands to oak woodlands or oak savanna where ecologically appropriate.		✓	✓
2. Selectively remove Douglas-fir with conventional harvest techniques and snag creation as necessary to maintain stand diversity and achieve management goals from within the Finley Forest Management Plan and Baskett Butte Management Plan.		✓	
3. Use tree topping to provide both hard and soft snags of suitable diameter (at least 25” DBH for pileated woodpeckers) that are well distributed within the stands. Repeat in at least in 5-year increments to ensure snags of multiple decay classes.	✓	✓	✓
4. Implement effective measures such as hand-removal, mowing, and/or herbicide treatment as needed to reduce, control, or eliminate invasive plants, with particular focus on false brome.	✓	✓	✓
5. Pursue development of no-cost slash and woody debris disposal as part of Forestry Stewardship projects. Until this option exists, allow slash or wood waste to be donated to schools, environmental restoration projects, or communities in need.		✓	✓
6. Using the Baskett Butte Management Plan (Salix 2005), where ecologically appropriate, consider options for conversion of mixed deciduous woodlands to oak savanna or oak woodlands.		✓	

Rationale: Mixed deciduous and conifer (Douglas-fir) forests are defined as those forested stands where either conifers or big-leaf maple dominate the stand. In some cases these stands were historically oak habitats, but remaining remnant oaks are most often dead or in declining health as a result of over-topping. These habitats support a diversity of wildlife species including large mammals (elk, blacktail deer, and black bear) and forest birds. The maple-dominated sites are important for migrating birds, but are not fire tolerant and are sometimes threatened with dominance and crowding by Douglas-fir. The majority of this habitat type is found on W.L. Finley NWR, and the stands are all less than 80 years old. This younger age class lacks the density of snags that are found in older forests, but management actions can improve future habitat for woodpeckers and cavity nesting birds. The forest areas of W.L. Finley NWR provide an area for year-round recreational uses such as hiking and wildlife observation that do not result in disturbance of migratory waterfowl. Examples of this habitat are found within Maple Knoll Research Natural Area and Mill Hill on W.L. Finley NWR, and the moist draws and drainages on Baskett Butte on Baskett Slough NWR.

Mixed deciduous woodlands are regionally abundant and when adjacent to oak stands, may be considered a threat to the oak habitat through encroachment, as oak habitats are in serious decline within the Willamette Valley ecoregion. For these reasons and where ecologically appropriate, future management may include conversion of some of the mixed deciduous woodlands to oak habitats. However, management options within the Maple Knoll RNA need to consider any special considerations or restrictions to meet the guidelines as identified in the U.S. Fish and Wildlife Service RNA policy and management guidelines (FWS Manual 8 RM 10) and the RNA-specific purposes developed in the original RNA description (Franklin et al. 1972).

Goal 7. Protect, maintain and restore a diversity of native riparian floodplain habitats characteristic of the historic Willamette Valley.

Objective 7a. Protect and maintain mid-late successional Oregon ash-dominated riparian forests.

Protect and maintain mid-late successional Oregon ash-dominated riparian forests on William L. Finley, Baskett Slough, and Ankeny NWRs, respectively, for a diverse assemblage of native riparian-dependent species including migratory landbirds (e.g. yellow warbler) and native amphibians (e.g., red-legged frogs). The following are characteristics of Oregon ash-dominated, mid-late successional riparian forests:

- >50% canopy cover of shrubs with >75% cover as native species (e.g., red-osier dogwood, Douglas' spirea, serviceberry, blue elderberry, Indian-plum, cascara).
- >50% canopy cover of overstory trees (Oregon ash dominated)
- Patch or corridor size ≥ 100 feet.
- Trees >12" DBH providing cavities for nesting wood ducks and other cavity-dependent wildlife
- <25% cover of invasive/undesirable species (e.g., reed canary grass, Himilayan blackberry).

Objective Applies on the Following Acres, by Alternative	Alt 1	Alt 2	Alt 3
Acres to be achieved for objective	WMF-1111 BKS-4 ANK-323	WMF-1111 BKS-4 ANK-323	WMF-1111 BKS-4 ANK-323
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Control invasive species using herbicides or other methods where practical. Follow-up on areas treated for invasives with plantings of native understory species if necessary.	✓	✓	✓

Rationale: A vast majority of the bottomland hardwood riparian habitats have been lost within the Willamette Valley due to agricultural clearing and channel alteration activities. Intact riparian areas serve as corridors for many wildlife species. The Refuge Complex seeks to protect the existing riparian habitats for a diverse assemblage of native wildlife such as migratory landbirds, cavity nesting waterfowl, great blue heron rookeries, bald eagles, red-legged frogs, etc. Riparian habitats also provide improved water quality with shade and filtration. These floodplain areas also function as natural floodwater storage areas during high water events. In addition, riparian zones provide woody debris that increases structural diversity to fish-bearing streams. This habitat and the natural processes supporting it are important for biological integrity, diversity, and environmental health. Reed canary grass is common within open patches of the riparian forest understory. Seed from reed canary grass is carried and deposited throughout the floodplain annually with high water, so it is virtually impossible to prevent re-infestation. A dense, shaded ripairian overstory is the most effective control of reed canary grass within this habitat type.

Objective 7b. Protect and maintain mid-late successional black cottonwood-dominated riparian forests.			
Protect and maintain mid-late successional black cottonwood-dominated riparian forests on William L. Finley (including Snag Boat Bend Unit) and Ankeny NWRs for a diverse assemblage of native riparian-dependent species including migratory landbirds (e.g., yellow warbler) and native amphibians (e.g., red-legged frogs). The following are characteristics of black cottonwood-dominated mid-late successional riparian forests: • >50% understory canopy cover of shrubs with >75% of the understory shrub cover as native species (e.g., willow sp., red-osier dogwood, Douglas' spirea, blue elderberry, Indian-plum). • >50% canopy cover of overstory trees (cottonwood dominated) • Patch or corridor size >100 feet in width. • Trees > 12" DBH with cavities for nesting wood ducks and other cavity-dependent wildlife are present within each stand. • <25% cover of invasive/undesirable species in understory (e.g., reed canary grass).			
Objective Applies on the Following Acres, by Alternative	**Alt 1**	**Alt 2**	**Alt 3**
	WMF-88 ANK-50	WMF-88 ANK-50	WMF-88 ANK-50
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Control invasive species using IPM techniques, including herbicides or other methods where practical. Follow-up on areas treated for invasives with plantings of native understory species if necessary.		✓	✓
Rationale: A vast majority of the riparian habitats have been lost within the Willamette Valley due to agricultural clearing and channel alteration activities. The riparian habitats remaining on the refuges are an important contribution to the biological integrity of the Refuge Complex. The riparian understory vegetation is often dominated by invasive species such as Himalayan blackberry and reed canary grass. A dense, shaded ripairian overstory is the most effective control of reed canary grass within this habitat type. Intact riparian areas serve as corridors for many wildlife species. The Refuge Complex seeks to protect the existing cottonwood-dominated riparian habitats for migratory landbirds, cavity nesting waterfowl, nest sites for great blue herons, bald eagles, and other birds as well as for red-legged frogs and other wildlife. These floodplain areas also function as natural floodwater storage areas during high water events, while contributing improved water quality with shade and filtration. In addition, riparian zones provide woody debris that increases structural diversity to fish-bearing streams.			

Objective 7c. Restore and maintain early successional riparian forests.
Restore new and maintain existing early successional riparian forests in both Oregon ash and black cottonwood forest habitats on William L. Finley and Ankeny Refuges to improve connectivity and functionality of existing stands as well as establish new stands. The following are characteristics of early successional riparian forests: • Patch or corridor size ≥ 100 feet in width, or be adjacent to older riparian age classes. • Where planting occurs, 100-150 trees/acre surviving at Year 5. • 10-50% cover of native shrubs appropriate to the community type. • <25% cover of invasive/undesirable species (e.g., Himalayan blackberry) at Year 5. • Over the long-term (35-50 years), restored sites to have other attributes of Objectives 7a or 7b.

Objective Applies on the Following Acres, by Alternative	**Alt 1**	**Alt 2**	**Alt 3**
	ANK-41 SBB-188 (all early successional in Alt 1)	WMF-57 SBB-188 BKS-8 ANK-135	WMF-240 SBB-188 BKS-8 ANK-246
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Determine proper site preparation techniques (mowing, spraying, seeding native grass understory, etc) and implement prior to planting area to trees.	✓	✓	✓
2. Plant native riparian trees at approximately 250 per acre on suitable lands that will serve as connecting corridors or will expand the width of existing riparian habitats. Although a diversity of species can be used, dominant plantings should reflect the adjacent habitat and appropriate soil type (generally Oregon ash or black cottonwood). Plantings should be phased in over a 15-year period to allow for variability in weather conditions favoring establishment of young trees.	✓	✓	✓
3. Once trees are well established, plant understory shrubs for stand diversity.		✓	✓
4. Conduct supplemental watering once (twice for plantings in sandy or gravelly soils) during the summer growing season (June-Aug) to help with first-year survival. Tubing or other protection from rodents or herbivores may be necessary. Trees should be clearly marked for management purposes until tree height exceeds the grass height (2 +yrs).		✓	✓
5. Reduce competition from grass or other plants with mowing the first 2-3 years, until the trees grow above the understory.	✓	✓	✓
6. Monitor survival in the second growing season and replant as necessary to achieve 5-year stocking target.		✓	✓
7. Control invasive species using herbicides or other methods where practical. This may include weed-block mats to reduce non-native grasses that compete with plantings.	✓	✓	✓
8. Maintain willow and other native riparian species that are coming in on the edges of wetlands.	✓	✓	✓

Rationale: A vast majority of the riparian habitats have been lost within the Willamette Valley due to agricultural clearing and channel alteration activities. Intact riparian areas serve as corridors for many wildlife species. The Refuge Complex seeks to improve the connectivity, function, and value of existing riparian habitats for neotropical migratory birds, cavity nesting waterfowl, nest sites for great blue herons, bald eagles, red-legged frogs, and other wildlife. In addition, new riparian habitat, when mature, would function similarly to existing stands. These floodplain areas also function as natural floodwater storage areas during high water events and provide water quality benefits. Riparian forest development to mid-late successional habitat usually occurs between 40 (cottonwood) and 60 (Oregon ash) years of age, so newly restored riparian habitat will not transition to that stage during the life of the plan.

Goal 8. Protect and maintain riverine habitats representative of the historic Willamette Valley.

Objective 8a. Protect and maintain major rivers and perennial streams.

Protect and maintain a total of 11.3 miles of perennial riverine habitat (e.g., mainstem Willamette River and Lake Creek at Snag Boat Bend and Muddy Creek at W.L. Finley NWR) to benefit native salmonids (spring Chinook salmon, steelhead, and coastal cutthroat trout) by providing rearing habitat and migratory corridors for juveniles and adults. This habitat type will have the following attributes:

- Lack of man-made barriers or other impediments to allow fish passage to appropriate rearing, migratory, and upstream spawning habitats at all flows.
- Presence of in-stream large woody debris and ample recruitment from the riparian zone.
- Intact riparian zones (60 - 300 feet wide on each Refuge stream bank) consisting primarily of native woody and herbaceous vegetation sufficient for natural recruitment of large woody debris.
- Stream banks >90% stable so that <10% of banks are actively eroding on average at any point in time.
- Presence of off-channel aquatic habitats with cover and low energy areas (e.g., backwaters, alcoves, ponds, oxbows, floodplain wetlands) with frequent connections between the river and floodplain.

Objective Applies to the Following Alternatives	**Alt 1**	**Alt 2**	**Alt 3**
	✓	✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Working with partners, investigate opportunities to restore off-channel complexity at the Snag Boat Bend Unit for the benefit of salmonids and other native species (e.g., Pacific lamprey).	✓	✓	✓
2. Use best management practices with respect to the refuge cropland management program, including unfarmed buffers to ensure minimal runoff, erosion, etc., into riverine habitats	✓	✓	✓
3. Continue to work with all involved parties in addressing identified fish passage and entrapment issues on riverine habitats on all three refuges.	✓	✓	✓
4. Protect and improve riparian habitats adjacent to riverine areas using strategies as listed under Objective 7a, 7b, and 7c.		✓	✓
5. Establish a Fisheries Biologist position to focus on fishery management both on and off the three Refuges within the Willamette Valley with emphasis on Oregon chub and salmonids.		✓	✓

Rationale: Riverine habitats on the Willamette Valley NWRC include the Willamette River adjacent to the Snag Boat Bend Unit and Muddy Creek flowing through W.L. Finley NWR. The Service has no control regarding temperature or other water quality parameters of any rivers or streams upstream of the Refuges; only a minor portion of the two mentioned waterways pass through Refuge lands. However, proper management of the adjacent riparian zones can contribute to maintaining or improving water quality. Riparian zones can also serve as a future source of naturally fallen logs over streams to provide channel complexity and fish habitat. The Service uses best management practices to lessen any impact from agricultural activities such as sediment or chemical runoff. Habitat improvements to backwaters at Snag Boat Bend could benefit federally listed fish, including juvenile spring Chinook.

Objective 8b. Protect and maintain smaller rivers and streams that have intermittent flow.

Protect and maintain 8.9 miles of intermittent streams (e.g., Gray Creek, Brown Creek, Hull Creek on W.L. Finley NWR and Bashaw Creek and Sidney Ditch on Ankeny NWR) to benefit native fish, including salmonids (seasonal use by steelhead in Sidney Ditch and coastal cutthroat trout in Gray and Brown Creek) by providing suitable habitat and migratory corridors with the following conditions:

- Lack of man-made barriers or other impediments to allow fish passage to appropriate rearing, migratory, and upstream spawning habitats during seasonal flows.
- Presence of in-stream woody debris and ample recruitment from the riparian zone.
- Intact riparian zones (minimum vegetative height to completely shade the stream channel to 60-300 feet on each stream bank) consisting primarily of native woody and herbaceous vegetation sufficient for natural recruitment of large woody debris.
- Stream banks >90% stable so that <10% of banks are actively eroding on average at any point in time.
- Presence of aquatic habitats with cover and low energy areas (e.g., beaver ponds, floodplain wetlands, meandering high water channels).

Objective Applies to the Following Alternatives	**Alt 1**	**Alt 2**	**Alt 3**
	✓	✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Working with partners, investigate opportunities to improve water quality in streams originating from industrial forest lands for the benefit of native fish.		✓	✓
2. Use best management practices with respect to cropland management program, such as unfarmed buffers to ensure minimal runoff, erosion, etc., into riverine habitats.	✓	✓	✓
3. Continue to work with all involved parties in addressing identified fish passage and entrapment issues on riverine habitats on all three refuges.	✓	✓	✓
4. Protect and improve riparian habitats adjacent to riverine areas using strategies as listed under Objective 7a, 7b, and 7c.		✓	✓

Rationale: This objective describes intermittent stream habitats, which means that during some period of time (usually summer except for water delivery streams) all or some reach of the stream channel either goes dry or flow may occur subsurface. Permanent water capable of supporting fish may still exist year round, including water impounded by beaver dams. Stream habitats on the Willamette Valley NWRC include Sidney Ditch and Bashaw Creek at Ankeny NWR; and Gray, Brown, and Hull Creek flowing through W.L. Finley NWR. Sidney Ditch and Bashaw Creek are both seasonal, with summer flow controlled by diversions from the Santiam River by the Sidney Irrigation Cooperative. The Refuge has no control regarding temperature or other water quality parameters of either stream as they enter the Refuges. Gray and Brown Creek enter Finley Refuge from industrial forest lands to the west. Although the Refuge has worked cooperatively with the Oregon Department of Forestry concerning forest management practices, impacts to the water quality from off-Refuge activities are outside the control of the Refuge. Cutthroat trout can be found in areas where water is permanent or they move to and from those areas seasonally. Native minnows and sculpin are found in most streams. Non-native warm-water species are also present in upper reaches of Gray Creek, as are Oregon chub (see Goal 9, Obj. 9E). Proper management of the adjacent riparian zones can provide better water quality through temperature recovery (lower) and improved fish and aquatic habitat. The Refuge uses best management practices to lessen any impact from agricultural activities such as sediment or chemical runoff.

Goal 9. Contribute to the protection and recovery of Federally threatened and endangered species and their habitats within the Willamette Valley.

Objective 9a. Maintain, protect, and restore populations of Bradshaw's desert parsley.

Based on the Recovery Plan downlisting/delisting goals (USFWS 2010), maintain and protect:

- Two or more populations of Bradshaw's desert parsley at W.L. Finley NWR to contribute to the Recovery Plan target number of plants within the Corvallis West Recovery Zone.
- One population of >15,000 individuals of Bradshaw's desert parsley at Oak Creek to contribute to the Recovery Plan target number of plants within the Corvallis East Recovery Zone .

Populations of this species will be characterized by the following attributes:

- > 2,000 individuals per population (may be comprised of several combined small sub-populations, each of which should number > 200 individuals) at W. L. Finley NWR. The minimum target goal of individual plants for the Corvallis West Recovery Zone is 10,000. Subpopulations should be located within pollinator flight distance (2 miles) of each other.
- >15,000 individuals within the Oak Creek population. The minimum target goal of individual plants for the Corvallis East Recovery Zone is 15,000.
- Stable or increasing populations for 10 yrs (15 years for delisting) and evidence of reproduction.
- Recovery criteria of habitat quality and management will be achieved by meeting the habitat objectives as described under Goal 3.

Objective Applies to the Following Alternatives	Alt 1	Alt 2	Alt 3
	✓	✓	✓
Strategies Applied to Achieve Objective			
1. Utilize late summer/fall mowing and prescribed burning to maintain occupied or newly restored habitat of Bradshaw's desert parsley by removing thatch and undesirable woody vegetation. Mowing may be done annually in years without burning. Prescribed fire should be done on a 2-4 year rotation.	✓	✓	✓
2. Collect seed from existing Bradshaw's desert parsley and redistribute on-site to help expand existing populations or use to establish new sub-populations in suitable habitat. Seed source should be from appropriate donor sites per Recovery Plan guidelines (USFWS 2010). Seeding can be by hand or with a no-till drill. Seeding in restored sites should be conducted for 2-3 consecutive years.	✓	✓	✓
3. Mechanically remove large trees (Oregon ash, feral pear, hawthorne spp.) within occupied prairie habitat to reduce the effect of shading on Bradshaw's desert parsley.	✓	✓	
4. Implement IPM measures such as hand-removal, mowing, and/or herbicide treatment as needed to reduce, control, or eliminate invasive species or unwanted woody vegetation such that they do not threaten the integrity of the habitat or sub-populations.	✓	✓	✓
5. Evaluate the potential for developing suitable habitat for new populations of Bradshaw's desert parsley on W.L. Finley NWR.	✓	✓	✓

Rationale: Protection and maintenance of existing populations is a high priority task identified in the Recovery Plan (USFWS 2010). This species can benefit from both population and habitat-based recovery actions. Habitat attributes for this species are described in Goal 3, but vary somewhat from the prairie quality guidelines found in Appendix D of the Recovery Plan. However, progress toward recovery population goals will be attained by implementing the various strategies. For this species, the

Complex approach is to support the Recovery Zone target populations for each applicable zone with on-refuge populations.

Bradshaw's desert parsley is an endangered forb found in wet prairie habitats. Populations on W.L. Finley NWR are currently below the minimum number of individuals as specified in the Recovery Plan. Oak Creek supports the largest population within the Willamette Valley and exceeds the minimum population target for the entire zone by greater than 10-fold. Non-natives of particular concern as threats to listed plants are found within Appendix C of the Recovery Plan. Establishment and maintenance of new populations in suitable habitat will help cumulatively meet population goals within each Recovery Zone, and is a recommended recovery action identified in the Recovery Plan (USFWS 2010).

Objective 9b. Maintain and protect existing populations of Nelson's checkermallow.

Based on the Recovery Plan downlisting goals (USFWS 2010), maintain and protect:

- Up to four populations of Nelson's checkermallow at W.L. Finley NWR (Corvallis West Recovery Zone).
- Two populations at Ankeny NWR (Salem East Recovery Zone).
- Up to four populations at Baskett Slough (Salem West Recovery Zone).

Populations of this species should attain the following attributes:

- New and existing populations >2,000 individuals (may be comprised of several combined small sub-populations, each of which should number > 200 individuals). The minimum target goals of individual plants for the Recovery Zones are 20,000 (Corvallis West), 10,000 (Salem East), and 20,000 (Salem West). Subpopulations should be located within pollinator flight distance (2 miles) of each other.
- Stable or increasing populations for 15 years and evidence of reproduction.
- Recovery criteria of habitat quality and management will be achieved by meeting the habitat objectives as described under Goal 3.

Objective Applies to the Following Alternatives	Alt 1	Alt 2	Alt 3
	✓	✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Utilize late summer/fall mowing and prescribed burning to maintain occupied habitat of Nelson's checkermallow by removing thatch and undesirable woody vegetation. Mowing should be done annually in years without burning. Prescribed burning should be done on a 2-4 year rotation.	✓	✓	✓
2. Collect seed from Nelson's checkermallow populations to continue genetic interchange in existing populations, either with plants grown for out-planting or direct seeding.	✓	✓	✓
3. Use out-planting of nursery grown plugs or tubers and direct seeding to supplement existing populations, with a goal of reaching the Recovery Zone target populations at each Refuge.	✓	✓	✓
4. Mechanically or by hand, remove large trees (Oregon ash, feral pear, hawthorne spp.) within occupied habitat to reduce the effect of shading on Nelson's checkermallow.	✓	✓	
5. Implement IPM measures such as hand-removal, mowing, and/or herbicide treatment as needed to reduce, control, or eliminate invasive species such that they do not threaten the integrity of the habitat or sub-populations.	✓	✓	✓
6. Evaluate the potential for developing suitable habitat for new populations of Nelson's checkermallow on all three Refuges.			

Rationale: Protection and maintenance of existing populations is a high priority task identified in the Recovery Plan (USFWS 2010). This species can benefit from both population and habitat-based recovery actions. Habitat attributes for this species are described in Goal 3, but vary somewhat from the prairie quality guidelines found in Appendix D of the Recovery Plan. However, progress toward recovery population goals will be attained by implementing the various strategies. For this species, the Complex approach is to support the Recovery Zone target populations for each applicable Zone with on-refuge populations.

Nelson's checkermallow, listed as threatened, may be found in riparian floodplain openings, wet prairies, dike edges, drainages, and other suitable edge and/or seasonally flooded or saturated habitat. Establishment or supplementation of new sub-populations on W.L. Finley NWR, Ankeny NWR, and Baskett Slough NWR will help meet the population targets for each Recovery Zone.

Objective 9c. Protect, maintain, and restore Fender's blue butterfly populations.

Protect and maintain that portion of the Baskett Fender's blue butterfly Functioning Network (FN) found on Refuge Areas 1-10 (Hammond 2009). This FN will have ≥200 adult butterflies for at least 10 consecutive years, distributed in 3 or more sub-populations (per Recovery Plan downlisting goal, USFWS 2010).

In addition, establish an Independent Population (IP) at W. L. Finley NWR to help meet the requirements for recovery within the Corvallis Recovery Zone. The IP has no minimum population size, but butterflies must be present for 10 consecutive years (USFWS 2010).

Criteria for the FN and IP will be met by the following attributes:

- Each sub-population and IP must be maintained on a minimum patch size of 15 acres. Sub-populations should be ≤ 1.2 miles apart or connected by "stepping stone" habitat.
- Population sites must be managed for high quality prairie habitat (Goal 4).

Objective Applies to the Following Alternatives	**Alt 1**	**Alt 2**	**Alt 3**
	✓	✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Utilize late summer/fall mowing and prescribed burning to maintain occupied habitat of Fender's blue butterflies by removing thatch and undesirable woody vegetation and stimulating forb production. Mowing should be done annually in years without burning. Burning should be limited to 1/3 of the occupied habitat of any site because it may result in 100% larval mortality. Prescribed burning should be conducted on a 3-5 year rotation.	✓	✓	✓
2. Implement strategies under Objective 4a for treatment of oak trees.	✓	✓	
3. Implement IPM measures such as hand-removal, mowing, and/or herbicide treatment as needed to reduce, control, or eliminate invasive plants so that they do not threaten the integrity of FBB habitat.	✓	✓	✓
4. Evaluate the need and implement as appropriate supplemental out-planting and/or seeding of nectar sources and FBB host plants.	✓	✓	✓
5. Prepare a management and monitoring plan for each FBB population per Recovery Plan guidelines (USFWS 2010).	✓	✓	✓

Rationale: The endangered Fender's blue butterfly (FBB) inhabits native upland prairies containing specific lupine species in the Willamette Valley of Oregon. Baskett Butte on Baskett Slough NWR supports the largest population of FBB within its range. Habitat attributes for this species are described in Goal 4, but vary somewhat from the suggested prairie quality guidelines found in Appendix D of the Recovery Plan. However, progress toward recovery population goals will be attained by implementing the various strategies. For this species, the Complex approach is to support the Recovery Zone target populations for each applicable Zone with on-refuge populations. Protection and maintenance of existing populations is a high priority task identified in the Recovery Plan. However, annual population counts are known to be highly variable because of weather conditions during the flight season, reflecting both population changes and the ability to accurately survey the butterflies.

Baskett Butte, in conjunction with recovery populations Baskett Butte North and Baskett Butte East 1 and 2(off-refuge), is an identified Fender's blue butterfly Functioning Network (FN) within the Salem Recovery Zone (USFWS 2010). Under current conditions, the refuge Areas 1-10 on Baskett Slough NWR exceed the criteria for the FN with at least 3 subpopulations totaling > 200 adult butterflies for 10 consecutive years. Additional population gains and habitat improvements will contribute to the criteria needed for downlisting.

W.L. Finley NWR is identified as an Independent Population within the Corvallis Recovery Zone. Upland prairie habitat on Pigeon Butte appears to have existing suitable habitat for FBB, including abundant spurred lupine and out-planted Kincaid's lupine. However, at present it is does not support an existing population of FBB. Habitat restoration work has been ongoing since 2005 on Pigeon Butte and other upland prairie restoration sites in order to provide suitable FBB habitat. Reintroduction would likely be needed to establish a population of FBB on W.L. Finley NWR.

Objective 9d. Maintain, protect, and restore populations of federally listed prairie plant species including Willamette daisy, Kincaid's lupine, and golden paintbrush .

Maintain, protect, and/or restore populations of Willamette daisy, Kincaid's lupine, and golden paintbrush with the following attributes:

- ***Willamette daisy***: For downlisting, up to 2 populations each on W. L. Finley NWR (Corvallis West Recovery Zone) and Baskett Slough NWR (Salem West Recovery Zone), with a minimum of10,000 total plants in each recovery zone (USFWS 2010). Delisting goal is 3 populations with a minimum of 15,000 plants in each Recovery Zone.

- ***Kincaid's lupine:*** Up to 3 populations at both W.L. Finley NWR (Corvallis West Recovery Zone) and Baskett Slough NWR (Salem West Recovery Zone), with a minimum of 7,500 square meters of foliar cover in each Recovery Zone (per Recovery Plan delisting goal, USFWS 2010).

- ***Golden paintbrush:*** 1-3 populations at both W.L. Finley NWR (Corvallis West Recovery Zone) and Baskett Slough NWR (Salem West Recovery Zone). Populations of golden paintbrush will average at least 1,000 individuals for 5 years and show evidence of reproduction (per Recovery Plan goal, USFWS 2010).

Populations of these species will be characterized by the following attributes:

- Recovery criteria of habitat quality and management will be achieved by meeting the habitat objectives as described under Goal 3 and 4.
- For Willamette daisy and Kincaid's lupine, stable or increasing population over a period of 10 years (15 years for delisting) and evidence of reproduction.
- For Willamette daisy, >2,000 individuals per population (may be comprised of several combined small populations, each of which should number > 200 individuals). Subpopulations should be located within pollinator flight distance (2 miles) of each other.
- For Kincaid's lupine, > 1000 square meters of foliar cover per population (may be comprised of several combined small populations, each of which should number >60 square meters of foliar cover). Subpopulations should be located within pollinator flight distance (2 miles) of each other.

Objective Applies to the Following Alternatives	Alt 1	Alt 2	Alt 3
	✓	✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Utilize late summer/fall mowing and prescribed burning to manage habitat by removing thatch and undesirable woody vegetation and stimulating forb production. Mowing should be done annually in years without burning. Prescribed burning should be conducted on a 2-4 year rotation.		✓	✓
2. Implement strategies under Objective 4a for treatment of oak trees.	✓	✓	
3. Collect seed, grow out plugs, and out-plant Willamette daisy, Kincaid's lupine and Golden paintbrush to boost populations. Direct seeding may also be used when seed is available and where considered effective for establishment. Seed source should be from appropriate donor sites per Recovery Plan guidelines (USFWS 2010).	✓	✓	✓
4. Implement IPM measures such as hand removal, mowing, and/or herbicide treatment as needed to reduce, control, or eliminate invasive species such that they do not threaten the integrity of the habitat or sub-populations.	✓	✓	✓

Rationale: Protection and maintenance of existing populations of listed plants is a high priority task identified in the Recovery Plan (USFWS 2010). Habitat attributes for these species are described in Goal 3/4, but vary somewhat from the suggested prairie quality guidelines found in Appendix D of the Recovery Plan. However, progress toward recovery population goals will be attained by implementing the various strategies. For these species, the Complex approach is to support the Recovery Zone target populations for each applicable Zone with on-refuge populations.

Willamette daisy is an endangered forb found on both wet and upland prairies. This forb appears more sensitive to competition from non-native species than Kincaid's lupine, so habitat quality is likely critical to its recovery. Baskett Butte contains several small sub-populations of Willamette daisy scattered within the upland prairie habitat. Willamette daisy was historically present on W.L. Finley NWR, but now only exists in small research plots established by out-planting in wet and upland prairies.

Kincaid's lupine (threatened) is uncommon on the Willamette Valley refuges. Outplantings have done well on Pigeon Butte at W.L. Finley, which represents the only established sub-population on the refuge. Baskett Slough has a small population on Baskett Butte, but many plants are thought to be hybridized with spurred lupine (Kaye pers. comm.) Recovery efforts would be concentrated in upland prairies that are under or proposed for restoration.

Golden paintbrush is an endangered forb that was historically found on Oregon upland prairies before it was extirpated from the Willamette Valley. Populations are now being re-established on W.L. Finley NWR and Baskett Slough NWR following common garden studies using plants and seed from Washington State. Recovery goals are to have 5 populations distributed in at least 3 recovery zones.

Objective 9e. Maintain and protect populations of Oregon chub.

Maintain and protect populations of federally listed Oregon chub within permanent wetlands on William L. Finley and Ankeny Refuges. Permanent wetlands should have similar physical and vegetative attributes as other permanent wetlands (see Objective 2c), but would be managed consistent with the guidelines of the Oregon Chub Recovery Plan (USFWS 1998) to ensure:

- No non-native warm-water fish present (e.g., largemouth bass), excluding mosquito fish.
- Minimum depths of 36 inches at summer low water.
- 50-75% cover of open water with submergents (e.g. pondweed).
- 10-25% cover of native emergent plants (e.g., bulrushes, cattails).
- Presence of large, woody debris.

- <40% cover of undesirable plant species (e.g., reed canarygrass and knotgrass).
- <10% cover of invasive plants (e.g., purple loosestrife).

Objective Applies to the Following Number of Wetlands	**Alt 1**	**Alt 2**	**Alt 3**
	WMF-4 ANK-1	WMF-4 ANK-2	WMF-4 ANK-2
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Maintain adequate water levels in permanent wetlands managed for Oregon chub by utilizing pumps (with fish screening), water control structures, dikes, and spillways.	✓	✓	✓
2. Working with the Oregon Department of Fish and Wildlife, monitor chub populations and habitat conditions including water quality, temperature, pH, and other factors within occupied Refuge habitats.	✓	✓	✓
3. Protect existing chub areas from unwanted aquatic connections with other aquatic bodies (especially at flood stage) containing non-native warm-water fish.	✓	✓	✓
4. Prevent all unauthorized introductions of fish into Refuge waters. Utilize information and education materials to educate visitors of the negative effects of non-native fish releases.	✓	✓	✓
5. Investigate and install safeguards as necessary on water control structures or dikes to reduce the risk of catastrophic population loss due to failure.	✓	✓	✓
6. Monitor off-Refuge land management activities, e.g., logging and other forest management activities, that could affect Refuge chub populations.	✓	✓	✓
7. Working with ODFW and USFWS Oregon State Office, consider establishment of additional Oregon chub populations on the Willamette Valley NWRC as determined a priority under the Recovery Plan (USFWS 1998)	✓	✓	✓

Rationale: Oregon chub, a small floodplain minnow native to the Willamette River basin, was downlisted from endangered to threatened in May 2010. Proactive actions are still required to maintain the existing populations and work towards eventual de-listing. Key among these actions is maintaining chub-occupied permanent wetlands free from non-native predatory fish. The five Refuge wetlands that are managed as chub habitat are designated as Critical Habitat (Federal Register 2010). All sites on both W.L. Finley NWR and Ankeny NWR are considered part of the Mainstem Willamette River sub-basin unit. Chub populations in four of the five refuge wetlands support >500 individuals, the population size threshold needed to avoid genetic bottlenecks and maintain sustainable populations. One refuge wetland supports one of the two largest chub populations found at any location within its range, with estimates exceeding 20,000 fish in 2010 (Bangs et al. 2010).

Objective 9f. Protect and enhance populations of streaked horned larks.

Protect and enhance breeding populations of streaked horned larks on agricultural lands and other suitable habitats on W. L. Finley, Baskett Slough, and Ankeny NWRs. In addition, provide wintering habitat at all three refuges. As a federal Candidate species but not formally listed, the Refuge would apply strategies to benefit the streaked horned lark and help preclude the need to list.

Populations of this species are transient and habitat use is completely dependent on specific conditions and locations. At present there are no established breeding pair or wintering population goals for refuge lands, and there are no established population estimates for Oregon (USFWS 2009). However, research conducted by OSU has shown high streaked horned lark use on Finley Refuge in recent years.

Breeding and wintering streaked horned lark habitat shall be characterized by the following general attributes:

- Large open tracts of grassland, seasonal wetlands or agricultural land
- Sparsely vegetated sites dominated by low stature grasses and forbs with an abundance of bare ground, including exposed mudflats of seasonal wetlands

Objective Applies to the Following Alternatives	**Alt 1**	**Alt 2**	**Alt 3**
	✓	✓	✓
Strategies Applied to Achieve Objective			
1. Prepare a management plan for streaked horned larks on refuge lands that includes population goals, protocols for agricultural lands used by larks, and prescriptions for maintaining preferred breeding habitat.		✓	✓
2. Conduct surveys in May, June, and July and identify potential breeding streaked horned lark habitat on refuge agricultural lands.	✓	✓	✓
3. Based on surveys in Strategy 2, verify breeding activity and coordinate management activities with cooperative farmers and refuge farming to protect active nests.	✓	✓	✓
4. Continue cooperative work with Oregon State University to develop management prescriptions to create breeding and wintering habitat in an agricultural matrix, with consideration to provide wintering goose forage in the same matrix.	✓	✓	✓
5. Continue habitat selection and reproductive surveys to further refine the knowledge of the biology of the streaked horned lark.	✓	✓	✓
6. Continue active participation in the Streaked Horned Lark Working Group.	✓	✓	✓

Rationale: The streaked horned lark (*Eremophila alpestris strigata*) is a small, ground-dwelling bird listed as a Candidate for protection under the U. S. Endangered Species Act in 2002. Formerly widespread in coastal foredunes, prairies, riverine floodplains, and oak savannas, populations have declined because of habitat loss and alteration from agricultural practices, fire suppression, river channelization, and dune stabilization (USFWS 2009). Breeding streaked horned larks in the Willamette Valley are most common near Corvallis and W. L. Finley NWR. Wet prairies do not appear to provide suitable habitat as they may have historically, possibly because of encroachment of woody vegetation and a lack of bare ground due to non-native grasses. Streaked horned larks use habitats that have sparse vegetation, most frequently managed agricultural fields. However, these agricultural lands are subject to disturbance (plowing, mowing, herbicide applications) or succession of the agricultural crop which reduces the habitat suitability. Streaked horned lark populations are vulnerable to nest destruction and predation. The main wintering area is among grass seed farms in the Willamette Valley.

In cooperation with the Oregon State Office and Oregon State University, research of streaked horned larks has been ongoing since 2005. Specific areas of the Refuge Complex have been identified as preferred habitat, particularly the southern end of W.L. Finley NWR. Ongoing studies have included monitoring nest success, predation, habitat manipulation, and monitoring of normal agricultural practices related to breeding streaked horned larks. Work has also included specific vegetation treatments including herbicide applications in order to create preferred lark breeding habitat. Most of the refuge agricultural fields preferred by streaked horned larks are also high use wintering Canada goose areas. Normal agricultural practices used by the cooperative farmers may often be in conflict with breeding lark populations, hence the need for developing protocols and prescriptions.

Goal 10. Provide compatible, wildlife-dependent recreation opportunities for visitors, fostering appreciation and understanding of the Refuges' fish, wildlife, plants, and their habitats.

The following objectives cover facilities and programs associated with the "Big-Six" wildlife dependent uses: wildlife observation and photography, interpretation, environmental education, hunting, and fishing. Although all of the Big Six uses would be provided to some degree on the Complex, the primary emphasis for the Willamette Valley Refuges' public use program would continue to be on providing high quality wildlife observation and interpretation opportunities. Other Big Six uses would be provided to a lesser degree and would not necessarily be available at each Refuge. Non-priority recreational uses such as horseback riding, jogging, dog trials, berry and mushroom picking, off-road vehicle use, etc., would not be allowed on the Refuges.
All of the Big Six uses would be managed in such a way to promote an experience that:

- Is safe, accessible, promotes visitor understanding, and increases visitor appreciation for America's natural resources.
- Minimizes conflicts with visitors participating in other wildlife-dependent recreation activities.
- Minimizes conflicts with wildlife/habitat related goals and objectives.
- Utilizes an outdoor setting and experience-based activities as much as possible.

Objective 10a. Provide high quality wildlife observation and wildlife/nature photography opportunities.

Provide visitors at all three Refuges with a diversity of high quality wildlife observation and wildlife/nature photography opportunities. Quality wildlife observation and wildlife/nature photography programs at the Willamette Valley Refuges are defined by several elements including:

- Focusing on the major wildlife species, groups of wildlife species, and/or rare species, including wintering waterfowl (ducks, geese and swans); other migratory birds such as wading birds, raptors including bald eagles, and neotropical songbirds; elk; etc.
- Incorporating all of the unique/rare habitats found on the Refuges.
- Utilizing various types of facilities in order to view/photograph wildlife and nature.
- Emphasized on all three of the Willamette Valley Refuges on a year-round basis.
- Directly linked to the environmental education and interpretation programs.

Objective is part of the following Alternatives	Alt 1	Alt 2	Alt 3
	✓	✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
ALL REFUGES			
1. Enhance and maintain the existing 15 wildlife observation structures, 6.1 miles of auto tour routes, 24 vehicle pull-outs, 6.8 miles of year-round and 16.9 miles of seasonal trails located on the three Refuges. Refer to Table 5-1 for specifics.	✓	✓	✓
2. Maintain existing public use closures on Ankeny, Baskett Slough and W.L.Finley (see Maps 8, 9, and 11) during the November-March period in order to limit human disturbance to wintering geese (See Objective 1a and 2a) and indirectly enhance wildlife viewing opportunities.	✓	✓	✓

3. Improve habitat conditions in close proximity to all of the various wildlife observation/photography facilities. These improvements include items such as snag/log placements, island placement/maintenance, control of non-native vegetation within wetlands, etc.		✓	
4. Work with various partner groups, e.g., Friends and Audubon, and utilize the Youth Conservation Corps and volunteers to improve existing and develop new trails.	✓	✓	✓
5. Continue to provide high quality wildlife photography opportunities on the 3 Refuges.	✓	✓	✓
6. Support the development of the Willamette Valley Birding Trail with partners.		✓	✓
W.L. FINLEY			
7. Design and construct an observation structure near new headquarters building.	✓	✓	✓
8. Design and construct a potential new observation structure overlooking Field 12.		✓	
9. Establish a new year-round trail on Bald Top. Possibly connect this trail with Woodpecker Loop trail.		✓	
10. Reroute portion of Mill Hill and InterTie Trails near new headquarters building.	✓	✓	✓
11. Evaluate the potential for connecting the Beaver Pond Trail over Pigeon Butte to the interior access road at Finley.		✓	
12. Upgrade restroom facility at McFadden's Marsh Observation Blind parking lot off Bruce Road.		✓	✓
13. Evaluate potential to modify the Cabell Lodge building to allow pubic use of the restrooms or develop new restroom facility nearby.		✓	
14. Evaluate potential for developing a year-round overlook structure to the east of Fiechter Barn.		✓	
15. Evaluate potential for upgrading existing observation platform at Turtle Flats to enhance the view of the wetland within Turtle Flats itself by elevating the viewpoint slightly.		✓	
16. Evaluate potential for developing new trail segment on west side of Cabell Marsh.		✓	
17. Pursue cooperative funding opportunities for developing canoe access at Snag Boat Bend Unit.		✓	✓
18. Remove existing wildlife observation structure on Snag Boat Bend Unit at Beaver Pond.		✓	✓
19. Determine feasibility of constructing new wildlife observation structure overlooking Willamette River.		✓	
20. Evaluate restrooms at Turtle Flats and make a determination to either upgrade or remove restrooms.	✓	✓	✓
21. Eliminate seasonal public use closure during November-March period at Snag Boat Bend Unit to allow public use activities to occur throughout the year.		✓	✓
BASKETT SLOUGH			
22. Establish a Park Ranger position that would focus on maintaining and improving the public use program at Baskett Slough and Ankeny Refuges.		✓	✓

23. Design and construct two new vehicle pull-outs on Smithfield Road.		✓	
24. Establish approximately 1 mile of new hiking trails within the oak habitat east of Morgan Lake (North Butte Trail).		✓	
25. Reroute portion of Baskett Butte Intertie trail.		✓	✓
26. Develop the Dusky/Vancouver Marsh dike into a new seasonal use trail that opens on July 15 to minimize disturbance to nesting birds.		✓	
27. Connect Moffitti Marsh trail to parking lot off Smithfield Road.		✓	`
ANKENY			
28. Enhance the wildlife viewing opportunities at the Mohoff Pond vehicle pull-out along Buena Vista Road, including improving the habitat within the adjacent Field 6A and enhancing the view of the wetland within Mohoff Pond itself by elevating the viewpoint slightly.		✓	
29. Evaluate potential to extend the length of Rail Trail Boardwalk that is open year-round into riparian habitat along Bashaw Creek by approximately 1 mile (eliminate sign indicating seasonal closure) and eliminate north segment of existing seasonal trail along Field 10.		✓	
30. Develop an overlook structure with associated parking along Buena Vista Road at the Field 1 wet prairie.		✓	
31. Evaluate potential to develop a new trail within the riparian habitat along Sidney Ditch.		✓	
32. Evaluate potential to develop a new trail from the Ankeny Hill parking lot.		✓	
33. Upgrade restroom facility at the Rail Trail parking lot.		✓	✓
34. Enhance the wildlife viewing opportunities at Field 5 vehicle pull-out along Wintel Road, including improving the habitat within the adjacent Field 5.		✓	
Rationale: Wildlife observation is the primary visitor activity that occurs on the Willamette Valley Refuges. The program is designed to provide a diversity of wildlife viewing opportunities in a manner that minimizes disturbance to wildlife. High quality wildlife observation opportunities will continue to be provided on the Refuges by maintaining existing and developing new observation structures, auto tour routes, vehicle pull-outs and trails especially under Alternative 2. Considerably less development would occur within this objective under Alternative 3 due to staffing and funding resources focusing on Refuge farming activity. Habitat conditions will be maintained and enhanced in close proximity to the observation facilities in order to continue to attract wildlife. Maintaining the existing public use closures during the wintering season will help provide needed sanctuary for wintering waterfowl, in support of Refuge purposes. See Objectives 1a and 2a for more information. Major portions of the Snag Boat Bend Unit would be opened to public use activities year-round since it is not managed to provide wintering Canada goose habitat. Wildlife/nature photography promotes public understanding and appreciation for America's natural resources. The Willamette Valley Refuges will continue to provide high quality wildlife/nature photographic opportunities. Many of the various wildlife observation facilities provide excellent photo opportunities. In addition to the observation structures, the Refuge Complex has developed two photography blinds (one each at Ankeny and Finley) that can be reserved on a first-come, first -served basis. These blinds are located in what otherwise are closed portions of the Refuges and may be reserved during the winter waterfowl closure period.			

Objective 10b. Provide high quality interpretive opportunities.			
Provide a variety of high quality interpretive opportunities to Refuge visitors. Interpretive developments shall include information about the importance of the Willamette Valley Refuges to native habitats and their associated plants, fish, and wildlife species throughout the year. A high quality interpretive program for these Refuges should consist of the following features: • Incorporates state of the art technology into all of the interpretive materials. • Targeted to all users regardless of age, sex, demographics, etc. • Facilitates self-discovery of information by utilizing all five senses. • Incorporates the importance of the National Wildlife Refuge System and the purpose, goals and objectives of the Willamette Valley Refuges. • Utilizes a variety of interpretive materials including signage, exhibits, brochures, website, etc. • Explores interconnection of natural and human world. • Emphasizes non-guided activities but also includes periodic guided programs. • Emphasized on all three of the Willamette Valley Refuges on a year-round basis. • Links directly to the wildlife observation and environmental education programs.			
Objective is part of the following Alternatives	**Alt 1**	**Alt 2**	**Alt 3**
	✓	✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
ALL REFUGES			
1. Maintain all existing interpretive features on the three Refuges.	✓	✓	✓
2. Continue to provide a monthly ‘wildlife sightings list’ and make available at all three Refuges and on the website.	✓	✓	✓
3. Include kid-friendly interpretive materials and signage where appropriate.		✓	
4. Develop interpretive materials for the blind and deaf and in different languages as needed.		✓	
5. Investigate the potential for developing a radio station for at least one of the three Refuges.		✓	
6. Update the Wildlife List for the three Refuges that includes birds, mammals, fish, amphibians, and reptiles and make it available to the public.		✓	✓
7. Update the Plant List for the Refuges and make it available to the public.		✓	✓
8. Continue to improve the Refuges’ website to include expanded information on the native habitats and their associated plants, fish and wildlife species, public uses, and historical resources that are found on the Refuges throughout the year.	✓	✓	✓
9. Utilize existing websites of other appropriate organizations for linking with Refuge website.	✓	✓	✓
10. Provide major special events on the Complex at the frequency indicated. Focus on topics such as wintering waterfowl, native prairie flora and fauna, habitat restoration and management techniques, etc. These events could be linked to nationally scheduled events such as NWR Week, International Migratory Bird Day, NWR Birthday, etc.	2-3/year	3-4/year	2-3/year
11. Utilize trained volunteers and Friends to help provide interpretive	✓	✓	✓

programs on the Refuges.			
12. Working with partners, provide interpretive walks regularly as indicated.	sporadic	monthly	quarter-ly
13. Develop additional trail guides similar to the brochure developed for Woodpecker Loop Trail.		✓	
14. Coordinate with local conservation/education partners including WREN, Audubon, Corvallis Environmental Center, West Eugene Education Center, METRO, etc., to increase awareness of the Refuges, resources protected, and to convey Refuge messages.	✓	✓	✓
15. Incorporate recent issues, such as invasive species, climate change, etc., into new interpretive materials.		✓	✓
16. Increase efforts to utilize local media to promote interpretive opportunities on the Refuges.	✓	✓	✓
17. Explore the potential of developing a Goose or Waterfowl Festival with local communities.		✓	
18. Explore the feasibility of utilizing blogs, ipods, letterboxing, virtual geocaching, and other non-conventional mediums for providing interpretive opportunities on the Refuges. Physical geocaching will not be permitted.		✓	
19. Develop agreements with partners who support the interpretation and environmental education of the area's natural resources and are capable of securing funds.	✓	✓	✓
20. Evaluate interpretive signage needs associated with existing and proposed trails, overlook structures, observation blinds, parking lots, etc.	✓	✓	✓
W.L. FINLEY			
21. Develop interpretive signage in the proposed wildlife observation structure at Field 12.		✓	
22. Develop interpretive signage at the new Complex office location.	✓	✓	✓
23.When the proposed Environmental Education Center is constructed, develop interpretive exhibits including a display with mounted specimens of each subspecies of Canada goose found within the Willamette Valley.		✓	✓
24. Promote the Auto Tour Route along Finley Refuge Road, south down Bellfountain Road, east on Bruce Road, and north on Hwy 99W to Finley Road.	✓	✓	✓
25. Develop interpretive signage along proposed new trail traversing Pigeon Butte which elaborates upon the Pigeon Butte RNA purposes.		✓	
26. Develop interpretive signage along the Cabell Marsh Boardwalk and Trail.	✓	✓	✓
27. Develop interpretive signage along the River Unit Trail at Snag Boat Bend.		✓	
BASKETT SLOUGH			
28. Develop interpretive signage for trails on Baskett Butte.		✓	✓
29. Develop interpretive signage at vehicle pull-outs on Coville Road.		✓	✓
30. Develop interpretive signage at vehicle pull-outs on Smithfield Road.		✓	✓

31. Update the interpretive signage within the Highway 22 overlook structure.		✓	✓
32. Partner with ODOT to erect guide signs along I-5 to be placed at the intersection of Rt. 99W and Rt. 22.		✓	✓
ANKENY			
33. Partner with ODOT to erect guide signs along I-5 to be placed at the off ramps for Ankeny Hill interchange.		✓	✓
34. Develop interpretive signage for the proposed overlook structure at the Field 1 wet prairie.		✓	

Rationale: Interpretation is identified as one of the Big Six priority public uses of the National Wildlife Refuge System. The Willamette Valley Refuges encourages interpretation as both an educational and recreational opportunity with an objective of facilitating self-discovery, examining systems, and exploring how the natural world and human activities are interconnected. Participants of all ages can engage in stimulating and enjoyable activities as they learn about the Refuges and issues confronting fish and wildlife resource management. First-hand experiences with the environment will be emphasized, although presentations, audiovisual media, and exhibits will be necessary components of the Refuges interpretive program.

Recreational use within RNAs that threaten serious impairment of research or education values are discouraged under Refuge policy 8 RM 10. The trail envisioned for the Pigeon Butte RNA is not likely to seriously impair research or education values and will be unlikely to contribute to substantial vegetation changes within the RNA itself.

Objective 10c. Develop a high quality environmental education program.

Develop,a high quality environmental education program that promotes enjoyable, hands-on learning of the natural, cultural, and historical resources found on the Willamette Valley Refuges. Initially, the focus would emphasize defining the program, building staff capacity, developing support facilities such as an environmental education center, and offering opportunities initially at W.L. Finley. Later, the efforts would then focus on developing the basic features of the program, including curricula, teacher training programs, and expanding the program to a greater range of students, including those attending schools in range of the Ankeny and Baskett Slough Refuges.

The primary focus of the program would be to work with grades K-12 within local communities such as Corvallis, Philomath, Albany, and Monroe at W.L. Finley Refuge, serving nearly 18,000 students; Dallas, Salem, and Monmouth at Baskett Slough Refuge, serving over 4,000 students; and Jefferson, Salem, and Independence at Ankeny Refuge, serving nearly 3,000 students, altogether serving approximately 25,000 students. By partnering with schools in these communities, the Refuge Complex proposes to be able to offer environmental education opportunities to 10 to 20 per cent of these students. Ultimately, a high quality environmental education program on the Refuges should include the following attributes:

- Meets State of Oregon and local school district instructional goals and standards.
- Provides interdisciplinary opportunities that link natural resources through all subject areas.
- Involves local communities, Friends, volunteers, and other partners.
- Incorporates the importance of the National Wildlife Refuge System and the purpose, goals, and objectives of the Willamette Valley Refuges.
- Incorporates current conservation issues and concerns.
- Experiences are hands-on and integrate the habitats and associated plants, fish, and wildlife species found on the Refuges.
- Utilizes various types of facilities including wildlife observation structures, interpretive

exhibits, trails, outdoor classroom shelters, etc.
- Located both on and off Refuges.
- Involves all three of the Willamette Valley Refuges possibly at varying levels.
- Directly linked to wildlife observation and interpretation programs and balanced within overall public use program.

Objective is part of the following Alternatives	Alt 1	Alt 2	Alt 3
	✓	✓	✓
Initial strategies applied to achieve objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Work with other Federal, state, and county natural resource agencies, Tribes, non-profit conservation organizations, and selected school districts within the local area to help define the specific roles and responsibilities for providing environmental education opportunities on the Willamette Valley Refuges.		✓	✓
2. Establish an Environmental Education Specialist position that would focus specifically on improving the Refuges' environmental education program.		✓	✓
3. Establish a Volunteer Coordinator position that would focus on improving the Refuges' volunteer program, including coordinating with the Refuge Friends Group.		✓	✓
4. Increase staff assistance with interns from AmeriCorps, the Student Conservation Association, local universities, and other organizations to assist with the Refuges' environmental education program.		✓	✓
5. Encourage the Friends of the Willamette Valley Refuges and volunteers to assist with the Refuges' environmental education program.	✓	✓	✓
6. Develop partnerships with environmental education organizations to promote assistance with programs, activities, and exhibits on the ecosystem's resources.		✓	✓
7. Continue to plan and design an Environmental Education Center near the existing Complex Headquarters. Refer to Appendix K to learn more about the site location selection process for the education facility.	✓	✓	✓
Long-term strategies applied to achieve objective (throughout the CCP term)	**Alt 1**	**Alt 2**	**Alt 3**
8. Continue ongoing collaboration with partners to provide environmental education opportunities.	✓	✓	✓
9. Integrate environmental education efforts with other national wildlife refuges and Service programs in Oregon.		✓	✓
10. Develop up to 10 outdoor classroom shelters at specific locations (to be determined) on the Refuges where educators and students can conduct activities during periods of inclement weather.		✓	✓
11. Continue to provide environmental education emphasis within the Youth Conservation Corps programs.	✓	✓	✓
12. Develop and provide site-specific materials and tools for educators' use both on and offsite. These materials should include information about the National Wildlife Refuge System and the unique and rare habitats and associated fish and wildlife species and		✓	✓

management programs found on the Willamette Valley Refuges.			
13. Continue to work with Salem Audubon Society to develop potential environmental education opportunities at Ankeny and/or Baskett Slough Refuges.	✓	✓	✓
14. Facilitate two annual resource-training workshops to provide educators and tour guides (Friends, volunteers, etc.) with consistent and current information about the management programs, habitats, fish and wildlife species, and other activities found on the Refuges.		✓	✓
15. Construct Environmental Education Center facilities at W.L. Finley Refuge at the current Headquarters site (see Appendix K). At a minimum, the facilities will include space for the Refuge Friends group's Nature Store, interpretive exhibits, office space, and an education/conference room.		✓	✓
16. Implement a reservation system for groups consisting of 10 or more people using the Refuges. Utilize Special Use Permits for these groups, when appropriate.		✓	✓
Rationale: Environmental education activities can foster an understanding and appreciation for our natural resources. As such, environmental education is identified as one of the priority public uses of the National Wildlife Refuge System. The Willamette Valley Refuges have an opportunity to provide expanded environmental education programs for local schools. The environmental education program would focus on integrating environmental concepts and concerns into structured activities on the Refuges, involving educators, students, and others in first-hand activities that promote discovery and fact-finding, developing problem solving skills, and helping students develop their own ways of personal involvement and action.			

Objective 10d. Provide expanded opportunities for quality deer hunting.

Maintain existing and provide expanded opportunities for the public to participate in a quality deer hunt on William L. Finley Refuge that:

- Places a priority on safety (> 95% of all hunters and other Refuge visitors report feeling safe during hunting season).
- Includes clear and concise regulations readily available at the Refuge website and posted clearly in the field.
- Poses minimal conflict with wildlife/habitat objectives.
- Poses minimal conflict with other Big Six activities.
- Poses minimal conflict with neighboring lands.
- Accessible to a broad spectrum of visitors.
- Promotes stewardship & conservation.
- Promotes understanding and appreciation of natural resources and the Service's role.
- Provides reliable/reasonable opportunity to experience wildlife.
- Uses accessible facilities that blend into landscape.
- Uses visitor satisfaction to define and evaluate programs.

Objective is part of the following Alternatives	Alt 1	Alt 2	Alt 3
	✓	✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
W.L. FINLEY MAIN UNIT			
1. Continue to allow archery deer hunting at Finley main unit during early fall season (approximately the last weekend in August until	✓	✓	✓

approximately September 30). (See Map 14).			
2. Continue existing 1 month restricted firearms deer hunt at Finley main refuge (approximately Oct 1-Oct.31). (See Map 14).	✓		
4. Modify restricted firearms deer season available at Finley by scheduling the hunt from approximately last week of October through approximately the first week of November. During the first week, this hunt would be located within the same location as it is under Alternative 1. During the second week of this hunt, Bald Top and Mill Hill trail areas would be the only areas open to hunting, and would be closed to all other public use activities. Beginning November 1, all trails and management roads in close proximity to wintering goose areas would be closed to all public use, including hunters. See Map 14.		✓	✓
5. Allow either sex harvest at Finley for the deer hunt period open at the Refuge.		✓	✓
6. Develop hunt modification package and publish Federal Register notice revising hunting areas and seasons.		✓	✓
7. Modify hunt maps, regulations, signing, etc., and construct additional hunt check stations as needed.		✓	✓
8. Consider deer hunt on additional areas as more area is protected under the Refuge System.		✓	✓

Rationale: Currently, the W.L. Finley deer hunt provides a recreational opportunity for hunting that is uncrowded and used by families. However, the hunt is characterized by a low success rate. Deer hunting is not currently offered at the other Refuges, or at Snag Boat Bend Unit of W.L. Finley Refuge.

The strategies provide additional deer hunting opportunity by opening new areas at W.L. Finley. The strategies also address the success rates through providing the either sex option, which is not currently available at the Refuge.

An option to provide deer hunting was considered at both Snag Boat Bend and Baskett Slough Refuge. Adding this use would have allowed another opportunity for a Big Six use. However, such hunts would create conflicts with the existing wildlife observation and photography programs, especially considering the small size of the areas, and would create other management commitments, including sign posting and law enforcement. At this time there is no identified need to reduce the deer population at Snag Boat Bend or Baskett Butte for biological reasons. In addition, there is an abundance of deer hunting opportunities on public lands in western Oregon in the Cascade and Coast ranges.

The shotgun deer hunt at Finley is being changed to a restricted firearms hunt in order to allow the use of muzzleloaders. The basis for changing the dates of the restricted firearms deer hunt at Finley were to: 1) Reduce the potential conflict between hunters and non-consumptive users being in the same area at the same time, and 2) Potentially improve hunter success by concentrating hunter use within a shorter season and thus increasing deer movement during hunt days.

The timing and locations of the hunts were designed so as to avoid disturbance to waterfowl, especially geese. Existing sanctuary areas on Ankeny, Baskett Slough and W.L. Finley will be honored for the full wintering period under all alternatives.

The hunt units designated on Maps 14 include designated Research Natural Areas. Recreational use within RNAs that threaten serious impairment of research or education values are discouraged under Refuge policy 8 RM 10. Deer hunting is not likely to seriously impair research or education values and will be unlikely to contribute to substantial vegetation changes within the RNA itself.

Objective 10e. Address elk population management issues on lands managed by the National Wildlife Refuge System in the Willamette Valley, working with the Oregon Department of Fish and Wildlife

The Service will initiate work with the ODFW to develop an elk management plan upon completion of the CCP (within 1-2 years of CCP implementation). The elk management plan will:

- Establish target elk herd sizes within/adjacent to each refuge.
- Consider adjacent land owner concerns, i.e., damage.
- Consider recreational value of elk (such as watchable wildlife, hunting, etc.) to Refuge users and nearby land owners.
- Be consistent with other wildlife, habitat, and public use objectives of the Refuges.
- Include sound monitoring strategies for measuring population trends, herd ratios, and hunting success.
- Consider implementing elk hunts on the Refuges to meet objectives in the elk management plan.

Objective is part of the following Alternatives	Alt 1	Alt 2	Alt 3
		✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Assemble team from the Service and ODFW to develop an elk management plan.		✓	✓

Rationale: The elk population using W.L. Finley and adjacent private lands has grown over the last ten years to an estimated 140-160 animals. There have been complaints of fence and agricultural damage from adjacent private landowners. Over the last several years, ongoing discussions between ODFW and the Service resulted in more liberal off-refuge hunting regulations, including antlerless-only tags, and better monitoring of both population and hunting success. Because some of these changes are quite recent, it is still premature to draw conclusions about their success. In addition, to date, no population objective has been set – this has been problematic because of the Elk De-emphasis Area (EDA) status of the Willamette Valley. The plan will include all three refuges in the Willamette Valley NWR Complex, the Oak Creek lands managed by the Complex, and Tualatin NWR.

Objective 10f: Provide opportunities for quality waterfowl hunting.

Provide new opportunities for the public to participate in quality waterfowl hunting at Baskett Slough Refuge while minimizing impacts to wintering geese, other wildlife and other recreational users. Provide a quality hunting experience that:

- Places a priority on safety (hunters are spaced appropriately, spatial separation exists between hunt areas and areas open to other recreational use, having adequate law enforcement presence, etc.).
- Includes clear and concise regulations readily available at the Refuge website and posted clearly in the field.
- Poses minimal conflict with wildlife/habitat objectives.
- Poses minimal conflict with other Big Six activities.
- Poses minimal conflict with neighboring lands.
- Is accessible to a broad spectrum of visitors.
- Promotes stewardship & conservation.
- Promotes understanding and appreciation of natural resources and the Service’s role.
- Provides reliable/reasonable opportunity to experience wildlife.
- Uses accessible facilities that blend into landscape.
- Uses visitor satisfaction to define and evaluate programs.

Objective is part of the following Alternatives	**Alt 1**	**Alt 2**	**Alt 3**
		✓	
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Complete all administrative requirements for developing hunt opening package and publish Federal Register notice revising hunting areas and seasons.		✓	
2. Open Baskett Slough Refuge for the September goose hunt (See Map 10). Based on periodic evaluation of the program, consider adding other September goose hunts at the other stations in subsequent years.		✓	
3. Open Baskett Slough Refuge to a Youth Waterfowl Hunt on one weekend in September (See Map 10). Based on periodic evaluation of the program, consider adding other youth hunts at the other stations in subsequent years.		✓	
Rationale: Providing waterfowl hunting opportunity at Baskett Slough Refuge helps to better provide a Big Six use, which is currently not provided at any of the Willamette Valley Refuges. Providing opportunities for youth is an important initiative in the Fish and Wildlife Service and helps address a public desire to see more hunting opportunities for youth. The September goose hunt would focus harvest on Western Canada geese, which are currently above population objectives in the Flyway. Duskys would not be impacted as they arrive later in the fall. These hunts are proposed at Baskett Slough because this Refuge has a fairly reliable supply of water at that time of year and a history of Western Canada goose presence in September. Neither the youth hunt nor the September goose hunt is proposed for W.L. Finley or Ankeny because of minimal habitat, minimal September populations of Western Canada geese, potential conflicts with non-consumptive uses, and/or conflicts with other wildlife. A hunt is not proposed on the Refuges during the winter season because of the potential to impact duskys and other wintering geese and conflicts with the Refuges' purposes. A duck hunting season short of the full season was considered (i.e., during October) but due to limited habitat in the early fall and the fact that duck populations are low until precipitation increases in November, a hunt is not feasible at this time. Once adequate precipitation occurs and viable duck populations are present, duskys and other wintering geese are present in high numbers and concern with disturbance then outweighs other considerations.			

Objective 10g. Expand opportunities for quality fishing.

Expand opportunity for quality fishing on W.L. Finley Refuge (Snag Boat Bend Unit), with safe bank access, while minimizing impacts to other resources. Within five years of CCP completion, provide a quality fishing experience that:

- Includes clear and concise regulations readily available at the Refuge website and posted clearly in the field.
- Poses minimal conflict with wildlife/habitat objectives.
- Poses minimal conflict with other Big Six activities.
- Is accessible to a broad spectrum of visitors.
- Promotes stewardship & conservation.
- Promotes understanding and appreciation of natural resources and the Service's role.
- Provides reliable/reasonable opportunity to experience fish and wildlife.
- Provides accessible facilities that blend into landscape.
- Uses visitor satisfaction to define and evaluate programs.

Objective is part of the following Alternatives	**Alt 1**	**Alt 2**	**Alt 3**
		✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Develop fishing step-down plan and complete fishing opening package to open fishing along the Willamette River and backwaters adjacent to and on the Snag Boat Bend Unit within five years of the completion of the CCP.		✓	
2. Open fishing season year-round (consistent with State regulations) at Snag Boat Bend Unit.		✓	
3. Before opening the use, develop safe bank access to the site.		✓	
4. Explore opportunities to provide access for non-motorized boats by pursuing cooperative funding opportunities to develop a canoe ramp on Snag Boat Bend (See Objective 10a).		✓	✓
5. Continue to prohibit fishing on all wetlands on the Refuge Complex. There is a potential for warm water fish contamination which could be dangerous for Oregon chub. In addition, most of the wetlands are seasonal and dry up during the summer period.	✓	✓	✓
6. Eliminate fishing at Muddy Creek on W.L. Finley Refuge.		✓	✓

Rationale: Providing improved access to a higher quality fishing experience at Snag Boat Bend Unit along the Willamette River will allow the Refuges to promote this "Big Six" use. Fishing could occur within the Willamette River near Snag Boat Bend Unit which has an abundant anadromous fishery as well as warmwater fish. A canoe launch facility is proposed to be constructed at Snag Boat Bend that would promote nearby fishing opportunities. After developing safe access to the river bank, the Refuge would open Snag Boat Bend year-round consistent with State regulations.

Currently, fishing is allowed at Muddy Creek on W.L. Finley Refuge, but is rarely used due to the following reasons: poor water quality, no existing facilities, lack of a quality fishery, and the inaccessibility to boats. Under Alternative 2, the Muddy Creek area would be closed to fishing and the Complex would shift its focus to a higher quality area at Snag Boat Bend Unit. Fishing will continue to be prohibited on all wetlands on the Refuges. Because most wetlands are drained regularly for habitat management, they do not support abundant fisheries. There also is a potential for unauthorized/unintentional introductions of warmwater or non-native fish to wetlands, which could pose a high threat (predation) to the federally listed Oregon chub.

Objective 10h. Address transportation issues and concerns related to the three Willamette Valley Refuges.			
Develop a transportation plan for existing and needed roads, bridges, pulloffs, access points, parking lots, and trails that support public uses and Refuge management needs as identified within other CCP objectives. The transportation plan will: • Consider provisions for automobiles, farming equipment, bicycles, school buses, or other larger vehicles, and pedestrians. • Include ancillary facilities such as interpretive signage, environmental education shelters, restrooms, etc. • Address potential impacts to wildlife and associated habitats. • Include a safety audit of all transportation facilities identified above. • Include a prioritized list of construction and improvement items. • Be implemented as funds are available to bring all public roads and parking facilities up to approved Service standards.			
Objective is Part of the Following Alternatives	**Alt 1**	**Alt 2**	**Alt 3**
	✓	✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Prepare appropriate environmental analysis and improve access and visitor safety along Finley Refuge Road, working with Federal Highway Administration (FHA), Oregon Department of Transportation (ODOT), Benton County, Refuge visitors and neighbors, and other interested parties. Any improvement to Finley Refuge Road should utilize 'environmentally friendly' surface materials.	✓	✓	✓
2. Partner with FHA, ODOT, local county road departments, and others to develop transportation plans and safety audits for the refuges.		✓	✓
3. Work with local and state governments to identify alternative funding sources and cost sharing opportunities for maintenance of and improvements to the transportation system to and through the Refuges.	✓	✓	✓
4. Work with FHA, ODOT, Polk County and other interested parties on improving access into and out of the Highway 22 parking lot at Baskett Slough Refuge.		✓	✓
5. Work with FHA, ODOT, Polk County and other interested parties on improving ingress/egress to the access road to the office at Baskett Slough Refuge.		✓	✓
6. Work with Marion County, Oregon State Police, and other interested parties to address on-going public use/law enforcement problems within the vehicle pull-outs along County Roads at Ankeny Refuge.	✓	✓	✓
Rationale: Increased population and visitation anticipated over the next 15 years triggers the need to address transportation issues and concerns. A comprehensive transportation plan and safety audit is needed to ensure the safest and most efficient access for staff, visitors, cooperative farmers, and others needing to access the Refuges. A transportation plan will also assist the Refuges in obtaining funds available under federal and state transportation authorities for project implementation.			

Goal 11. Protect, preserve, evaluate and interpret the cultural heritage and resources of the Refuges while consulting with appropriate Native American groups and preservation organizations, and complying with historic preservation legislation.

Objective 11a. Improve proactive cultural resource management.			
Continue and improve proactive cultural resource management that meets the requirements of the National Historic Preservation Act, including consultation, identification, inventory, evaluation, and protection of cultural resources.			
Objective is Part of the Following Alternatives	**Alt 1**	**Alt 2**	**Alt 3**
	limited	✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Continue to identify archaeological sites and historic structures that coincide with existing and planned roads, facilities, public use areas, habitat, and research projects. Prepare and implement activities to address impacts to sites as necessary.	✓	✓	✓
2. Implement a program to evaluate eligibility to the National Register of Historic Places for those archaeological sites and historic structures that may be impacted by Service undertakings, management activities, erosion, or neglect.	✓	✓	✓
3. Implement priority items included in the Historic Buildings Assessment (in progress) for W.L. Finley Refuge. With the assistance of the regional cultural resources team, actively recruit funding and develop partnerships to maintain and protect buildings.		✓	✓
4. Coordinate with the Complex's YCC and other youth and volunteer programs to provide opportunities to maintain and preserve historic properties.	✓	✓	✓
5. Develop a GIS layer for cultural resources that can be used with other GIS layers for the Refuges with appropriate locks to protect sensitive information.		✓	✓
6. Develop partnership with the tribe(s) for cultural resources inventory, evaluation, and project monitoring, consistent with the regulations of the National Historic Preservation Act. Protect all identifiable archaeological sites by avoiding disturbance within the area.		✓	✓
7. Develop and strengthen partnerships with educational and historic institutions for the interpretation and protection of cultural resources at the Refuges.	✓	✓	✓
8. Facilitate partnerships with other appropriate Federal and state agencies, professional archaeologists, descendants of early settlers, and the general public to aid in the management of cultural resources.		✓	✓
Rationale: Various federal historic preservation laws and regulations require the Service to implement the kind of program described under this objective. Providing adequate attention and resources to these responsibilities would enable the Refuges to focus on other land, habitat, and wildlife management efforts. The Historic Buildings Assessment (Quatrefoil, in progress) identified approximately $1.2 million worth of repair and maintenance items to complete on the historic structures located on W.L. Finley Refuge. If funding does not materialize to repair and maintain historic buildings, they may become unsafe. An option to remove unsafe structures was considered but rejected, partly due to the historic value of these			

buildings, and partly due to the cost of building removal. As needed, the Refuge would close public and staff access, if necessary, to prevent the risk of unsafe incidents.

Objective 11b. Expand cultural resources education and interpretation.

In partnership with the interested tribe(s) and other preservation partners, expand cultural resources education and interpretation as follows:

- Translate the results of cultural research into media that can be understood and appreciated by a variety of publics.
- Engender an appreciation for the Native American culture and perspective on cultural resources.
- Relate the connection between cultural resources and natural resources and the role of humans in the environment.
- Instill an ethic for the conservation of our cultural heritage.

Objective is Part of the Following Alternatives	Alt 1	Alt 2	Alt 3
		✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Prepare interpretive media (e.g., pamphlets, signs, exhibits) that relate the cultural resources and Native American perspective for visitors.		✓	✓
2. Develop interpretive media (e.g., pamphlets, signs, exhibits) that relate the Euroamerican settlement and use history of the Refuges.		✓	✓
3. Prepare environmental/cultural education materials for use by local schools concerning cultural resources, the discipline of archaeology, the perspective of Native Americans, the history of the area, and conservation of natural and cultural resources. These materials could include an artifact replica kit with hands-on activities and curriculum prepared in consultation with the local school district, historical societies, and the Tribe(s).		✓	✓
4. Consult with the Tribe(s) and other preservation partners to identify the type of cultural resources information appropriate for public interpretation.		✓	✓
5. Develop an outreach program and materials so that the cultural resource messages become part of cultural events in the area, including the State's Archaeology Month, National Wildlife Refuge Week, and appropriate local festivals.		✓	✓
6. Develop Museum Property Inventory. Create storage and use plans for museum property as part of the outreach program.		✓	✓
7. Promote reuse of existing historic structures (e.g., for EE, interpretive programs, storage), unless it has been determined that the structure is low priority and/or unsafe.		✓	
8. Work with Confederated Tribes of the Grand Ronde to permit tribal collections of native plant materials where compatible.		✓	✓
9. Develop new interpretive signage about all of the historical structures (Cabell Lodge, Fiechter House, Carriage House, Fiechter Barn, Granary Building) near the old Headquarters area and evaluate the potential for developing an interpretive trail linking all of them.		✓	
10. Evaluate potential for utilizing and promoting the historic area, which may include native plants, cultural interpretation, heritage		✓	

gardens and orchards. Area will be centered around Fiechter House, Carriage House, Cabell Lodge, Granary, and Cabell Barn.			
Rationale: Cultural resources are not renewable. Interpretation of cultural resources (besides being mandated by law) can raise public interest and appreciation for the peoples who lived in earlier times. Ultimately, such appreciation can result in public support for conservation, maintenance, and protection of archaeological and historic sites.			

Goal 12. Protect, restore and maintain off-Refuge habitats to achieve conservation goals at the landscape level throughout the Willamette Valley.

Objective 12a. Work in partnership with other landowners utilizing the Service's Partners for Fish and Wildlife program.

Continue to work in partnership with private landowners, non-governmental organizations, and other agencies for voluntary protection, enhancement, and restoration of native habitats and associated fish, wildlife, and plants. The Service's Partners for Fish and Wildlife program provides relatively short-term conservation benefits as most landowner agreements are for 10 to 25 years. Although these agreements are short-term, they do provide extremely valuable conservation benefits.

Objective is Part of the Following Alternatives	Alt 1	Alt 2	Alt 3
	✓	✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Continue and expand implementation of the Service's Partners for Fish and Wildlife Program Strategic Plan within the Willamette Valley Focus Area, including providing technical and financial assistance to landowners and organizations.	✓	✓	✓
2. Continue to develop and maintain Memorandums of Understanding, Cooperative Agreements, and other agreements with Federal and state agencies and private stakeholders to share equipment, staff, funds, and services.	✓	✓	✓
3. Continue to leverage non-Service conservation resources to further the conservation of Willamette Valley biodiversity.	✓	✓	✓
4. Support and continue implementation of existing conservation plans and initiatives such as Oregon Conservation Strategy, The Nature Conservancy's Willamette Synthesis Project, the Willamette Valley Recovery Plan, and the Pacific Coast Joint Venture Willamette Valley Implementation Plan.	✓	✓	✓
5. Focus Partners Program efforts on protection and restoration of unique and rare habitats, recovery of listed species, migratory bird conservation, and other important fish, wildlife, and plant resources throughout the Willamette Valley.	✓	✓	✓
Rationale: The Willamette Valley is approximately 95% privately owned; therefore effective conservation of native Willamette Valley species and habitats on a landscape scale requires engaging private landowners in voluntary conservation. Many conservation practices can be implemented on lands dedicated to conservation as well as other types of lands such as agricultural, forestry, etc. The Service's Partners program enables conservation to be delivered more effectively by leveraging financial and technical resources from other conservation entities (other governmental organizations, non-governmental organizations, and private landowners). Supporting implementation of the conservation plans mentioned in the strategies (see Chapter 1 for more discussion of these) will enable work to proceed in a coordinated fashion together with partners.			

Objective 12b. Work in partnership with other landowners utilizing the Service's land protection program.

Working with partners and in collaboration with local communities, the Service proposes to develop a Land Protection Plan (LPP) to protect, restore, and maintain additional lands in the Willamette Valley to expand the base of existing protected habitat and establish greater connectivity among sites. The LPP would:

- Identify the Service role in conservation efforts in the Willamette Valley.
- Focus on priority habitats, including wet prairie, upland prairie/oak savanna, oak woodland, riparian, wetland, and riverine.
- Fully utilize existing ecoregional plans and priorities.
- Assist in further recovery of threatened and endangered species.
- Assist in preventing future endangered species listings.
- Assist in achievement of Canada goose flyway objectives and reducing crop depredation on private lands.
- Identify areas where additional opportunities for wildlife-dependent recreation may be suitable.
- Consider climate change.
- Involve local communities, landowners, non-governmental organizations, agencies, and other interested parties.
- Identify mechanisms for appropriate and long-term land protection, including acquisition, easements, cooperative agreements, etc.

Objective is Part of the Following Alternatives	Alt 1	Alt 2	Alt 3
		✓	✓

Strategies Applied to Achieve Objective	Alt 1	Alt 2	Alt 3
1. Utilizing a collaborative process, convene interested parties and develop the Preliminary Project Proposal (PPP).	✓	✓	✓
2. Continue to engage landowners and conservation partners within the Willamette Valley Focus Area to foster the concept of community-oriented conservation and the value of a Service land protection program within this area.		✓	✓
3.The Service would develop a Land Protection Plan (LPP) to focus land protection on the desired outcomes identified in the objective.		✓	✓
4. Upon approval of the LPP, the Service would begin to secure necessary funding and work with willing sellers to either acquire easements or lands in fee title or work with interested parties to provide assistance with their long-term management through the development of cooperative agreements.		✓	✓
5. Establish a Wildlife Refuge Manager or Wildlife Biologist position that would focus on maintaining and protecting lands and wildlife that are located off the three national wildlife refuges under administration of the Service through agreements, easements and fee titles.		✓	✓

Rationale: The Willamette Valley contains altered and declining habitat types that support unique and significant biological diversity, yet approximately 95% of potential and existing habitats are unprotected and in private ownership. Population growth and agricultural and urban development will continue to put rare and declining habitats and species at increasing risk in the Willamette Valley.

The Service recognizes that it will not be able to achieve many of the major conservation goals within the Willamette Valley by just working on existing Refuge lands. The three existing Refuges are key habitats within this geographical area and each of them provides substantial conservation benefits. However, endangered species will not be adequately recovered, migratory birds would not be adequately protected, climate change could not be adequately addressed, etc., by the Service focusing its efforts solely on the existing Refuge lands or by just utilizing the Service's Partners program.

The development of a Service LPP could both complement and fill in biological and geographical gaps within existing land protection schemes within the Willamette Valley. Any efforts at land protection would contribute to implementing numerous landscape scale conservation plans such as the Oregon Conservation Strategy, Willamette Valley/Puget Trough/Georgia Strait Ecoregional Assessment, Recovery Plan for Prairie Species of Northwest Oregon and Southwest Washington, etc. Collaborative development of a Service LPP would allow for greater landowner and community ownership for these efforts. Other examples of this collaborative community-oriented approach to landscape conservation between the Service and partners are occurring in Montana and Kansas.

Goal 13. Collect scientific information (inventories, monitoring, research, or scientific assessments) necessary to support refuge management.

Objective 13a. Monitor populations.

Throughout the life of the CCP, conduct high-priority inventory and monitoring (survey) activities (species and species groups identified below) that evaluate resource management and public-use activities to facilitate adaptive management. These surveys have the following attributes:

- Data collection techniques should have minimal animal mortality or disturbance and minimal habitat destruction.
- Minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, vertebrates) to meet statistical analysis requirements would be collected for identification and/or experimentation in order to minimize long-term or cumulative impacts.
- Proper cleaning of investigator equipment and clothing as well as quarantine methods, where necessary, to minimize the potential spread or introduction of invasive species.
- Projects will adhere to scientifically defensible protocols for data collection, where available and applicable.

Alternatives	Alt 1	Alt 2	Alt 3
	some	✓	✓

Strategies Applied to Achieve Objective	Alt 1	Alt 2	Alt 3
1. Prepare an Inventory and Monitoring Plan as a step-down plan to this CCP.		✓	✓
2. Monitor the resources identified in the table below, utilizing the indicators and methods specified, at the specified frequency and intensity, with the partners identified.		✓	✓
3. Establish a Wildlife Biologist position that would focus on protecting, monitoring, and restoring populations of threatened and endangered species.		✓	✓
4. Establish a Biological Technician position at Ankeny and a Biological Technician position at Baskett Slough to focus on wildlife and habitat surveys and monitoring of trends and changes in plant and wildlife populations.		✓	✓

Rationale: Population data is critical to evaluate population status and measure progress towards regional goals from Pacific Flyway Management Plans, Recovery Plan, etc. In addition, population trends can be used to evaluate habitat effectiveness and guide management actions. These surveys contribute to the enhancement, protection, use, preservation, and management of wildlife populations and their habitats on- and off-refuge lands. Specifically, they can be used to evaluate achievement of resource management objectives identified under Goals 1-12 in the CCP.

Resource	Indicator	Method	Frequency	Intensity	Partners
Canada goose (dusky and other subspecies)	Populations	Mid-winter Waterfowl survey	Each year	Willamette Valley-wide	FWS Migratory Birds, ODFW
Canada goose (dusky and other subspecies)	Populations	Refuge field use survey; Refuge night-time roost survey	Weekly during wintering period; Monthly Nov-Mar	All three refuges	FWS Migratory Birds, ODFW
Wintering Ducks and Swans	Populations	Mid-winter Waterfowl survey	Each year	Willamette Valley-wide	FWS Migratory Birds, ODFW
Chub	Populations	Standard trapping method	1X-2X annually	Each occupied wetland	ODFW
Willamette Daisy	Population	Count of blooming plants	Each 1-3 years	All known locations	Oregon State Office of FWS; Institute for Applied Ecology
Nelson's checkermallow	Population	Count of blooming plants	Each 1-3 years	All known locations	USFWS; Institute for Applied Ecology
Resource	**Indicator**	**Method**	**Frequency**	**Intensity**	**Partners**
Bradshaw's desert parsley	Population	Area index at Oak Creek site. Count of blooming plants at other locations	Each 1-3 years	All known locations	Oregon State Office of FWS; Institute for Applied Ecology
Golden paintbrush	Population	Count of blooming plants	Annually	All known locations	Institute for Applied Ecology
Fender's blue butterfly	Population	Walking transect count of adults	Annually	Baskett Butte	Oregon State Office of FWS
Grassland birds	Grassland birds number breeding pairs/unit (presence/absence)	Point counts	Annually	Finley wet prairies	ODFW
Nesting Raptors/ Colonial Waterbirds	Great blue heron colonies, bald eagle nests, and osprey nests (occupancy)	Ocular	Annually	All known locations	Refuge Volunteers
Passerine birds	Breeding bird survey (MAPS)	Mist netting and point counts	Annually	Pigeon Butte; Other treated units	USGS
Invasive species	Population or	Early	Pre- and post-	All occupied	State

(especially state-listed noxious weeds)	percent cover, (depending on threat)	detection and rapid response (EDRR); Mapping of occurence	treatment as often as needed for control /eradication	habitat	agencies; refuge support groups; school groups, YCC, and volunteers.

Objective 13b. Monitor habitats

Throughout the life of the CCP, conduct high-priority inventory and monitoring (survey) activities (habitat conditions identified below) that evaluate resource management and public-use activities to facilitate adaptive management. These surveys have the following attributes:

- Data collection techniques should have minimal animal mortality or disturbance and minimal habitat destruction.
- Minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, vertebrates) to meet statistical analysis requirements would be collected for identification and/or experimentation in order to minimize long-term or cumulative impacts.
- Proper cleaning of investigator equipment and clothing as well as quarantine methods, where necessary, to minimize the potential spread or introduction of invasive species.
- Projects will adhere to scientifically defensible protocols for data collection, where available and applicable.

Alternatives	**Alt 1**	**Alt 2**	**Alt 3**
	Some occurs	✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Prepare an Inventory and Monitoring Plan as a step-down plan to this CCP.		✓	✓
2. Monitor the resources identified in the table below, utilizing the indicators and methods specified, at the specified frequency and intensity, with the partners identified.		✓	✓
3. Establish a Botanist position to focus on managing, restoring, and enhancing rare and unique habitats; and monitor threatened and endangered plant species and locates and monitors invasive plant species.		✓	✓
4. Establish a GIS Program Manager position that would focus on developing layers of data for tracking, mapping, and planning to protect, manage, and restore wildlife populations.		✓	✓
5. Establish a Biological Planner to focus on developing wildlife and habitat plans to protect, manage, and restore wildlife populations.		✓	✓
6. Establish a Biological Technician position to focus on coordinating, mapping, monitoring, and eradicating invasive species at all three Refuges and easements.		✓	✓

Rationale: Monitoring habitat conditions provides critical support and sound decision-making as applied to Refuge resource management and also contributes to the Service's ability to modify management practices (adaptive management). Encouragement and support of applied research on the refuges will help address management issues and questions, with the results hopefully improving management decisions on both the Refuge and on a regional basis. The Refuges have always maintained a close working relationship with several departments at Oregon State University to advance the knowledge base of a variety of habitats and plant and wildlife species.

Habitat	Monitoring Indicator	Method	Frequency	Spatial Intensity	Partners/ Ties to Regional Monitoring
Agricultural fields	Condition assessments of agricultural fields combined with Canada goose use	Ocular	Annually (Spring)	Each unit	FWS Migratory Birds
All native habitats	Presence of noxious weeds (also see Objective 13a)	Ocular	Annually	Each unit	State agencies; refuge support groups; school groups, YCC, and volunteers.
All native habitats	Presence of listed species	Ocular	As appropriate seasonally for detection	Sites with suitable habitats/ potential effects to listed species	Oregon State Office of FWS
Wetlands	Plant community composition and structure per objective attributes	Ocular	Each 3-5 years	Selected wetlands	Researchers
Habitat	**Monitoring Indicator**	**Method**	**Frequency**	**Spatial Intensity**	**Partners/ Ties to Regional Monitoring**
Wetlands	Temperature, dissolved oxygen, pH, turbidity	Sampling; lab	Each 3-5 years	Selected wetlands	FWS Water Resources Branch; Ecological Services; Irrigation Districts
Wetlands	Water levels	Staff gauge levels	Monthly	All	FWS Water Resources Branch; OWRD, Irrigation Districts
Wet prairie habitats	Plant community composition and structure per objective attributes	Line transect or plots	Each 3-5 years	W.L. Finley wet prairies	Oregon State Office of FWS
Wet prairie habitats	Woody vegetation	Ocular	Annually	Willamette Floodplain RNA	Oregon State Office of FWS
Upland prairie/oak savanna	Plant community composition and structure per objectives	Line transect or plots	Each 3-5 years	Baskett Butte	Regional Fire Management Office

Upland prairie/oak savanna	Woody vegetation	Ocular	Annually		Regional Fire Management Office
Oak woodlands	Levels of Douglas-fir within dominant oak stands	Ocular	Annually	All locations	Regional Fire Management Office
Mixed deciduous-coniferous forests	Levels of Douglas-fir within stands dominated by big-leaf maple	Ocular	Each 3-5 years	Maple Knoll RNA	Regional Fire Management Office
Riparian	Frequency and duration of flood events to demonstrate the value of these bottomland forests in retaining floodwater, and to track habitat changes due to hydrologic alterations	Ocular Photo point	As needed Nov-April (water) Annually (vegetation)	Muddy Creek floodplain	Researchers
Habitat	**Monitoring Indicator**	**Method**	**Frequency**	**Spatial Intensity**	**Partners/ Ties to Regional Monitoring**
Riparian	Survival levels of planted trees	Ocular	1 year and 5 years after planting	All restored sites	Refuge volunteers
Riverine	Water quality (temperature, turbidity, dissolved oxygen, fecal coliform, contaminants, etc.)	Sampling; lab	Each 3-5 years	Selected locations	FWS Water Resources Branch; Ecological Services; Irrigation Districts
All restored units	Time series photos	Photo point	Twice per year	Minimum of 1 photo point per 10/acres	FWS Migratory Birds
All restored units	Aerial photos	500-1000 feet Above Ground Level (AGL)	Pre- and post-treatment		

Objective 13c. Monitor public use programs.			
Monitor public use programs as indicated in the table below.			
Alternatives	**Alt 1**	**Alt 2**	**Alt 3**
	Some occurs	✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Monitor the resources identified in the table below, utilizing the indicators and methods specified, at the specified frequency and intensity, with the partners identified.		✓	✓

Resource	Indicator	Method	Frequency	Intensity	Partners
Overall use	Visitation	Public entrance road traffic counters	Continuous (checked monthly)	2 entrances to Finley, 1 entrance at Snag Boat Bend Unit	
Site Visits	Number of visitors to key sites	Parking lot counters	Continuous (checked monthly)	Woodpecker Loop (Finley), Baskett Butte lot and Hwy 22 (Baskett Slough), Rail Trail and Ankeny Hill (Ankeny)	
Facility Condition	Trail/Kiosk/ Interpretive Sign/Boundary & Entrance Sign Conditions	Visual/site condition form	Monthly or as needed	All trails	Volunteers
Resource	**Indicator**	**Method**	**Frequency**	**Intensity**	**Partners**
Success and visitor experience for hunting	Number of users and user satisfaction	Verbal communication	1X/year	Permits at both kiosks	
Success and visitor experience for fishing	Number of users and user satisfaction	Verbal communication	Sporadically throughout the year	Snag Boat Bend Unit	Volunteers
Success and visitor experience for interpretation and environmental education	Number of users and user satisfaction	Number of users recorded by staff and user satisfaction obtained through verbal communication	As occurs throughout the year	All Refuges	
Success and visitor experience for wildlife observation	Number of users and user satisfaction	Number of users recorded by staff and user satisfaction obtained	As occurs throughout the year	All Refuges	

		through verbal communication			
Success and visitor experience for photography	Number of users and user satisfaction	Number of users recorded by staff and user satisfaction obtained through verbal communication	As occurs throughout the year	All Refuges	
Rationale: Monitoring public use, including the level of visitation, facility condition, and visitor experience, assists in maintaining a quality public use program.					

Objective 13d. Monitor Administrative Programs.			
Provide and monitor administrative support for Refuge programs, which includes but is not limited to, budget tracking, human resource actions, data requirements, etc.			
Alternatives	**Alt 1**	**Alt 2**	**Alt 3**
	✓	✓	✓
Strategies Applied to Achieve Objective	**Alt 1**	**Alt 2**	**Alt 3**
1. Establish an IT Specialist position to focus on training personnel and maintaining and/or replacing all electronic hardware and software.		✓	✓
2. Establish an Office Automation Clerk to focus on customer service.		✓	✓
Rationale: Providing and monitoring administrative supports helps ensure government accountability, assists managers in efficient allocation of resources, and increases the quality of customer service.			

2.8 References

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Chapter 3

W.L. Finley Refuge. Photo by Joe Staff

Physical Environment

- Topography
- Geology
- Soils
- Climate
- Climate Change
- Hydrology
- Water Quality and Environmental Contaminants
- References

3.1 Topography

Ankeny, Baskett Slough, and W.L. Finley Refuges are located within the Willamette Valley Basin. The Willamette Valley is surrounded by the Coast Range to the west, the Cascade Range to the east, and the Calapooya Mountains to the south. The Valley measures roughly 180 miles long and 60 miles wide and encompasses 11,000 square miles. It varies in elevation from near sea level to 400 feet above sea level near Eugene, Oregon.

The Willamette River, a tributary of the Columbia River, originates from three forks. The Middle Fork and the North Fork arise from the western side of the Cascades, joining near the Three Sisters and flowing northwest through the mountains to the southern end of the Valley. The Coast Fork arises in the lower mountains south of Cottage Grove flowing north to join the middle Fork just south of Eugene. From Eugene, the combined river flows north-northwest through the Valley, passing through the cities of Corvallis, Albany, and Salem, before eventually joining the Columbia River. The river's many tributaries drain the surrounding valley as well as portions of the Cascades and the Coastal Range. Some of its better known tributaries are the Santiam and the McKenzie which drain from the western Cascades, and the Marys, Luckiamute, and Tualatin which help drain the Coast Range. The Willamette's average annual discharge is 38,816 cubic feet/second, with a peak monthly average of 67,800 cubic feet/second in December and a low monthly average of 8,480 cubic feet/second in August.

3.2 Geology

3.2.1 Origins and development

About 50 million years ago the Siletzia Island Chain formed when a hotspot deep beneath the Pacific Ocean generated a string of shield volcanoes, some as wide as 30 miles at the base. Some 38 million years ago, the plate upon which they rest subducted beneath the North American Plate, collided with our continent and attached to our coastline. Oregon's Coast Mountain Range is a mixture of ancient volcanoes and folded rock that were pushed up during this collision. As this plate descended under the continent, partial melting of the rocks deep beneath the surface forced magma upwards and created a secondary mountain range in Oregon known as the Cascades. This plate, or slab of subducting sea floor, still covered by shallow seas, eventually became the Willamette Valley River Basin. As the mountain building process continued, the area of the future Willamette Valley also arose, becoming dry land by about 20 million years ago (Branscomb 2002).

The Coast Range is a combination of ancient volcanic rocks and rocks like sandstone, siltstone, and clay. These materials are highly susceptible to erosion, which is why the Coast Range is not as high as the Cascades. The erosion of these mineral-rich rocks is also one reason that the Willamette Valley has such lush farmland.

Bedrock and Sedimentation: The Willamette Valley is a strike valley composed of multiple fault blocks. It is underlain by erosionally weak late Eocene fine grained strata (Eugene Formation), overlain on the east by more resistant Western Cascade volcanic rocks and underlain on the west by more resistant Spencer and Tyee (Eocene) sandstones of the Coast Range.
There are four major depositional basins. Three of the basins, the Portland Basin, the Tualatin Basin, and the central Willamette Valley, occur on the down warped surface of the mid-Miocene Columbia River Basalt Group lava. A fourth basin, the Southern Willamette Valley, is largely erosional. The

basin-fill sediment thickness exceeds 400 meters (Gannett 2002). The majority of basin-fill deposits are clay and silt with minor sand, but sand and gravel predominate where major drainages emerge into the basin forming broad alluvial fans. Deposits in the southern and central Willamette Valley include multiple large alluvial fans and appear to be primarily, but not exclusively, of Cascade Range origin (Gannett 2002).

3.2.2 Recent Geologic Events

Between 17 and 5.5 million years ago, a series of basalt floods generated by a series of massive shield volcano eruptions in northeast Oregon flowed down the Columbia channel all the way to the river's mouth and into the Willamette Valley. They formed impressive layers of rock as much as 6,000 feet thick and covering an estimated area of 63,000 square miles. In the Pliocene (3-11million years ago), western Oregon was a desert, and gravels produced during that time eroded into and covered the valley floor (Branscomb 2002).

More recently, a series of cataclysmic floods, popularly called the Spokane Floods or Missoula Floods, inundated large portions of the Pacific Northwest. There may have been upwards of 100 massive floods caused by the repeated formation and bursting of ice dams near Missoula, Montana. Starting approximately 19,000 years ago and ending about 6,000 years later, glaciers periodically dammed the Clark Fork River canyon, forming a 3,000-square-mile lake. When the ice dams gave way, with a release typically lasting less than two weeks, 500 cubic miles of water blew out - a quantity of water more than the modern annual volume of all the world's rivers. The resulting floods swept across Idaho, through southeast Washington, down the Columbia, and rushed into the Willamette Valley, creating a Willamette lake 100 miles long, 60 miles wide, and 300 feet deep. The flood waters carried rich volcanic and glacial soil from eastern Washington, which was deposited across the valley floor when the waters receded. The sediments left behind form much of the present-day valley floor and can be as much as a half-mile deep in some areas (Bishop 2003).

3.3 Soils

Soils in this region are characterized by a mesic temperature regime and xeric moisture regime. On the floor of the Willamette Valley, soils formed in the Willamette silts, which were deposited by the great Pleistocene Missoula floods, and in alluvium from the Coast Range and Cascade mountain drainages. Soil development, texture, and drainage are specific to geomorphic surfaces expressed in the Valley. The youngest soils, on flood plains represented by the Ingram and Horseshoe surfaces, are well drained to excessively well drained, coarse textured, and have dark, base-rich surface horizons (Fluventic Haploxerolls and Cummulic Ultic Haploxerolls). On the Winkle surface are well drained and moderately well drained soils with clay-enriched subsoils and thick, dark, base-rich surface horizons (Pachic Ultic Argixerolls). The Champoeg and Senacal surfaces are represented by silty, somewhat poorly drained soils with medium base saturation (Aquultic Argixerolls). Poorly drained, fine textured soils with light-colored surface horizons are on the Calapooyia surface (Typic Albaqualfs and Typic Endoaqualfs) (USDA 2008).

On forested foothills and uplands, south of the terminus of continental glaciation, well weathered soils have developed on old erosional surfaces (Eola and Dolph surfaces in the Willamette Valley). These well developed soils have clay-enriched subsoils and dark, organic matter-rich topsoils that are low in base cations (Xeric Palehumults and Haplohumults, and Ultic Palexeralfs and Haploxeralfs). Soils on upland terraces, formed in early to mid-Pleistocene alluvium, have mostly base-rich dark topsoil and are well drained to poorly drained (Ultic Argixerolls, Mollic Haploxeralfs and Fragixeralfs, Aquic Haploxerolls, and Typic Fragiumbrepts) (USDA 2008).

3.4 Climate

The region's climate is greatly influenced by the Pacific Ocean, which moderates temperatures as air masses move west to east across the Pacific Northwest. The Willamette Valley climate is relatively mild throughout the year, and generally free of extremes in temperatures, with cool, wet winters and warm, dry summers. While moisture is abundant, most of the rainfall occurs in the winter, not during the summer.

Pacific Northwest (PNW) climate variability is strongly shaped by two large-scale patterns: the El Niño/Southern Oscillation (ENSO) and the Pacific Decadal Oscillation (PDO). Each ENSO phase typically lasts 6-18 months, while, during the 20th century, each PDO phase typically lasted for 20-30 years. These climate drivers can act separately and in concert in creating patterns of warm/dry or cool/wet winters. Via their influence over both winter temperature and winter precipitation, these natural climate patterns exert significant influence on snowpack and hydrology. Still, ENSO and PDO are not the sole drivers of PNW climate. Even with perfect predictions of ENSO and PDO, about 70 percent of the region's winter climate variability remains unexplained (Climate Impacts Group, University of Washington).

Climate change is a large issue being debated and explored in the scientific and policy world. Trends and projections related to climate change are discussed in section 3.5.

3.4.1 Temperature

Based on weather data collected by the Corvallis State University Station from 1971 through 2000, average mean monthly temperatures ranged from 39 degrees F in January to 66 degrees F in August. The highest winter monthly average temperature during this period was 51 degrees F in February and the lowest average monthly temperature was 33 degrees F in January. The highest summer monthly average temperature was 82 degrees F in August and the lowest monthly summer average was 47 degrees F in June.

Average daily maximum temperatures vary from 45 degrees F in December to 82 degrees F in August, and the average maximum temperature was 63 degrees F. On average, there are 16 days per year with temperatures of 90 degrees F or above. The average minimal temperature was 41 degrees F. An average of 59 days each year see temperatures below 32 degrees F. Temperatures below zero are rare, occurring only once in five years on average.

Long term data from the Corvallis State University weather station show increasing temperature trends for some indicators, including average annual temperature (see Figures 3-1) and March maximum temperatures (see Figure 3-2). The red lines on both graphs show a linear trend of increasing temperature over the time interval. March maximum temperatures show a much stronger trend than average annual temperature.

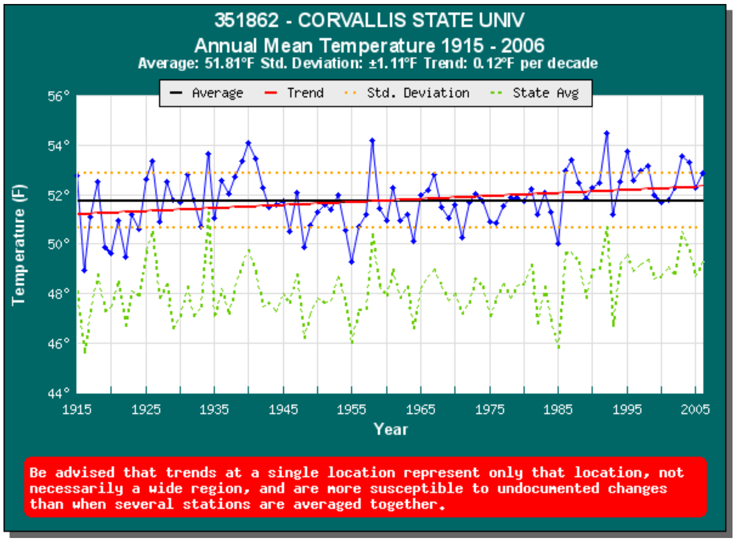
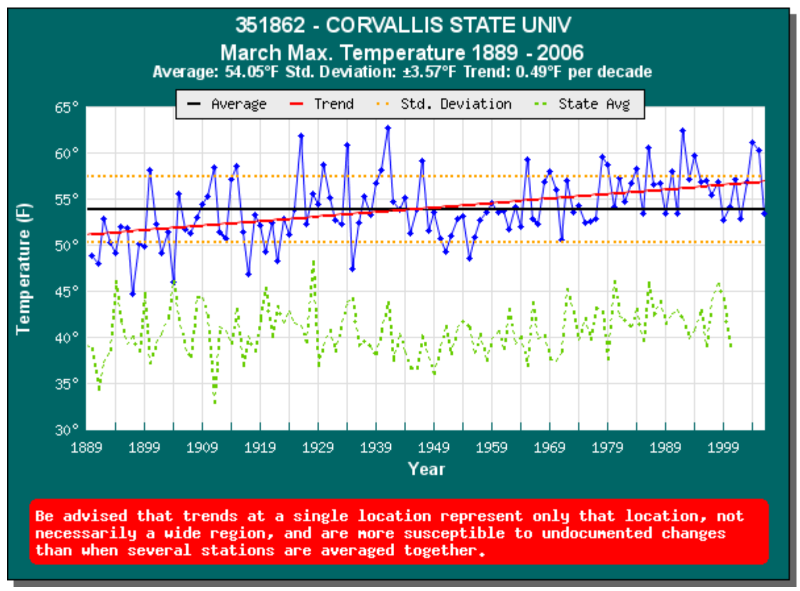


Figure 3-1 Annual Mean Temperature at Oregon State University, Corvallis, 1915-2006

Source: http://www.climate.washington.edu/trendanalysis/

Figure 3-2 March Maximum Temperatures at Oregon State University, Corvallis, 1889-2006

Source: http://www.climate.washington.edu/trendanalysis/



3.4.2 Precipitation

Air masses moving from the Pacific Ocean over the coastline and inland pick up unlimited moisture from the ocean and supply abundant rainfall to western Oregon and higher elevations to the east. The Coast Range forces the moisture-laden marine air from the Pacific Ocean to rise as it moves eastward. The resultant cooling and condensation produces some of the heaviest annual rainfalls in the United States in the Coast Range, Valley, and Cascade Range. West of the Cascades and in the Willamette Valley, about half of annual precipitation falls from December through February with most of the remainder falling during spring and fall.

Rainfall in the Willamette Valley varies from 40-60 inches per year. On average, the Valley receives measurable precipitation on 267 days per year. In 1996, the wettest year on record, precipitation measured 81 inches. 1944 was the driest year at 34 inches. Annual snowfall in the Valley averages nearly 6 inches each year.

3.4.3 Wind

Monthly average wind speeds in the Valley vary little throughout the year, with an annual average of 7.0 – 8.0 knots. Prevailing wind directions are aligned north-south with the Valley, with a majority generating from the south due to winds moving in from the coast over the coast range. Several times each year winds of hurricane force (≥ 74 mph) strike the Oregon coast, sometimes moving inland to the Valley and up the Columbia Gorge. Gusts with wind speeds of 75-80 miles per hour are occasionally observed. Light winds greatly outnumber the strong storm winds, and mountain slopes and other topographic features influence their direction.

3.5 Climate Change

3.5.1 Introduction

As required by DOI Secretarial Order 3226, issued in 2001, the Service requires consideration and analysis of climate change in long-range planning.

Although climate alterations are well documented in the Earth's history, even in relatively recent geologic time (for example, the Ice Age of 10,000 years past), the current warming trend differs from shifts earlier in geologic time in two ways. First, this climate change appears to be driven primarily by human activity, particularly the burning of fossil fuels, which results in a higher concentration of atmospheric "greenhouse gases" (GHG) that absorb heat from sunlight. Second, atmospheric carbon dioxide, levels of which are strongly correlated with Earth temperature (see Figure 3-3), is now higher than at any time in at least the last 420,000 years (NOAA 2008).

Figure 3-3 shows the relationship between carbon dioxide concentrations and global temperatures over the last half million years. The blue and red line indicates the variation in average global temperature compared with the 1961–1990 average. The green line shows the concentration of CO2 in the atmosphere, which has risen dramatically in recent years. The figure shows four eras when the world was cooler than it is today. These are separated by brief warm periods, like the one being experienced today.

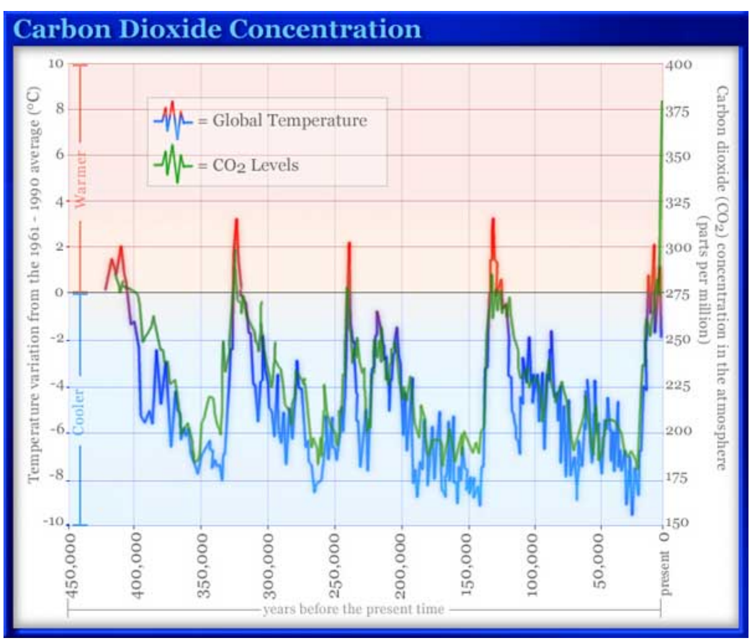


Figure 3-3. Carbon Dioxide Concentration and Global Temperature over Last 450,000 Years

Source: http://www.seed.slb.com/en/scictr/watch/climate_change/causes_co2.htm or use NOAA graph from http://www.ncdc.noaa.gov/paleo/globalwarming/temperature-change.html

Though some continue to point to uncertainties, there exists an emerging scientific consensus that the earth is indeed warming due to human activity, particularly the burning of fossil fuels. The American Meteorological Society, the American Geophysical Union, the American Association for the Advancement of Science, and the National Academy of Sciences all have issued statements in recent years concluding that the evidence for human modification of climate is compelling. In addition, National Academy of Science heads from eleven countries have jointly signed a statement agreeing that human activities have contributed to most of the observed recent warming (http://www.nationalacademies.org/onpi/06072005.pdf). An analysis of 928 climate change studies, published in refereed scientific journals between 1993 and 2003, found that 75 percent either explicitly or implicitly accepted the consensus view; 25 percent dealt with methods or paleoclimate, taking no position on current anthropogenic climate change, and 0 percent disagreed with the consensus position (Oreskes 2006).

The scientific consensus is grounded in the fact that observational data available through empirical studies converges with global circulation models that predict temperatures on the basis of geophysical data. Past temperature measurements accord most closely with models that incorporate both natural factors that influence climate variability (such as the sun's energy output, aerosols from volcanic activity, and changes in snow and ice cover) as well as anthropomorphic drivers such as greenhouse gas emissions, aerosols from pollution, and soot particles. The IPCC Fourth Assessment report summary for policymakers concluded that most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations (Solomon et al. 2007).

Assessment reports prepared by the Intergovernmental Panel on Climate Change (IPCC), a scientific intergovernmental body set up by the World Meteorological Organization (WMO) and by the United Nations Environment Programme (UNEP), are generally considered the most authoritative source for data on the subject. IPCC reports are the product of the work of hundreds of scientists and are reviewed by member governments before release. More local attempts have been made to project local climate shifts by the Climate Impacts Group at the University of Washington. In Oregon, the Climate Leadership Initiative is one of the state’s initiatives (the state also has an Oregon Global Warming Commission). Data and preliminary conclusions and recommendations have been drawn from all these sources in the preparation of this section of the CCP.

Carbon dioxide levels, which have already increased to 380 ppm from preindustrial levels of 280 ppm, are projected to potentially double or triple again over the next century (Nakicenovic and Swart 2000). The recent increase matches the increase calculated from the fossil fuel emissions and is well outside the range of natural variations.

Numerous indicators point to a warming trend world-wide and are summarized in the IPCC Fourth Assessment Report (Solomon et al. 2007). The 2007 IPCC summary states that “Of the more than 29,000 observational data series, from 75 studies, that show significant change in many physical and biological systems, more than 89 percent are consistent with the direction of change expected as a response to warming.”

Since the global trends have been widely reported and are available at the IPCC website, the remainder of this section deals only with climate trends in the Pacific Northwest.

3.5.2 Trends in Pacific Northwest Climate Indicators and Factors over the last 50-100 years

Temperature: Temperatures have generally increased in Oregon over the last 100 years by about 1.5 degrees F (Mote 2003). Warming trends generally have been strongest in the winter months. Warming has escalated since 1970, with some areas increasing at rates over 1.3 degrees F per decade (Lawler et al. 2008). Figure 3-4 shows the warming trend over the Pacific Northwest during the last century. Increases are indicated with red dots, decreases with blue dots. The size of the dot corresponds to the magnitude of change. The warming trend in the Willamette Valley has been less marked than in many other parts of the region.

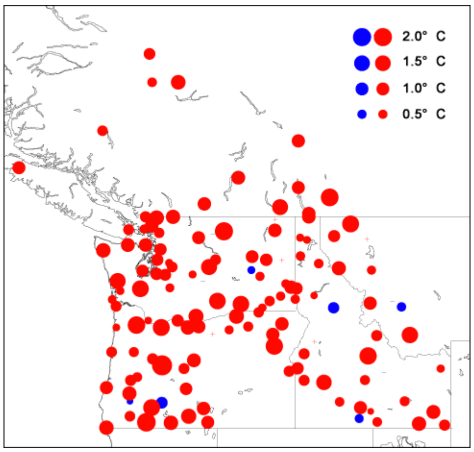


Figure 3-4. Trends in Average Annual Temperature (1920-2000)

Source: Climate Impacts Group, University of Washington

Data from the Corvallis weather station from 1915-2006 was presented above in section 3.4. Figure 3-1 shows the fluctuations and trends in annual mean temperature, while Figure 3-2 shows the fluctuations and trends in spring maximum temperatures over the same time interval. While both datasets show an increasing trend, trends in maximum temperatures at the Corvallis weather station are far more pronounced than the average temperature trend. Similarly, the trend for springtime (March) maximal temperatures is much higher than the trend for summer (August) maximal temperatures. In other words, consistent with other regional observations, local maximum temperatures have increased less during summer months than in winter/spring/autumn months.

Precipitation: The precipitation trend data shows a moderate increase over the last 100 years. Increases are indicated with blue dots, decreases with red dots. The size of the dot corresponds to the magnitude of change.

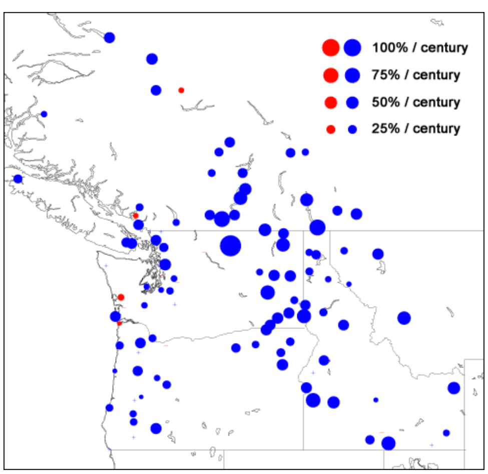


Figure 3-5. Average Annual Precipitation (1920-2000)

Source: Climate Impacts Group, University of Washington

Snowpack: Pacific Northwest snowpack records reveal a substantial elevation-dependent declining trend. Between 1950-2000, April 1 snowpack as expressed in Snow Water Equivalents (SWE) has shown a substantial decreasing trend, with many measurement sites in the Oregon Cascades and Coast Range declining by 30-80 percent (Mote 2003, Mote et al. 2005).

Timing of peak runoff has shifted. To compare interannual timing in snowmelt, hydrologists use a measurement called the "center of mass." Timing of the center of mass in annual river runoff in snowmelt basins shifted 0-20 days earlier in much of the PNW between 1948 and 2002 (Stewart et al. 2005). The greatest trends occurred in the PNW, including the mountain plateaus of Washington, Oregon, and western Idaho. These findings are corroborated by modeling studies which show similar changes in runoff timing (Hamlet et al. 2007).

3.5.3 Projections Next 50-100 years in Temperature and Precipitation

Regional Temperature Projections: As displayed in Figure 3-6, the Pacific Northwest region is expected to experience an additional 1-5 degrees F of warming by 2050 (Mote 2005). At the upper end, this represents a rate three times higher than the warming rate observed during the twentieth century. More severe increases are associated with models that reflect higher levels of GHG emissions in the future.

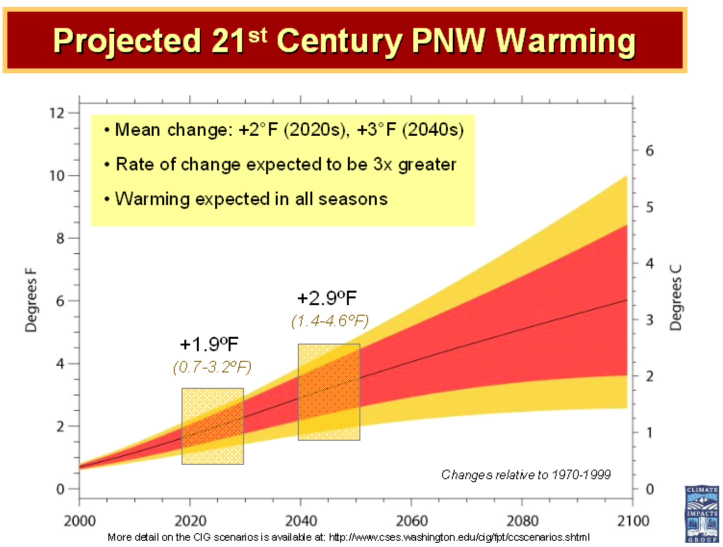


Figure 3-6. Projected Warming in the Pacific Northwest, 2000-2100

Source: Climate Impacts Group, University of Washington

Temperature predictions beyond 2050 are less certain because they depend largely on future trends in emissions. One of the important points made by climate scientists is that past GHG emissions have already "committed" the planet to a certain degree of warming (which is why certainty is higher to about year 2050). This is due to the long life of CO2 in the atmosphere.

Precipitation Projections: Precipitation projections are less certain, but most researchers expect a modest increase in winter precipitation and a modest decrease in summer precipitation, with overall annual precipitation expected to remain within the range of natural variability (Mote 2005). Projected precipitation changes over the next century are small compared to the interannual and decadal variability observed during the 20th century.

3.5.4 Use in the CCP

Ideally, the CCP would lay the groundwork for increasing the refuges' resilience to climate change by outlining the management steps that will proactively reduce the risks associated with climate change. Lawler (2008) recommends seven steps for beginning to plan for climate change. These have been modified slightly and identified here.

1. Conduct a vulnerability assessment to determine which species and systems will likely be most susceptible to projected climatic changes.
2. Conduct a connectivity assessment.
3. Assess the current level of protection for the "ecological stage."
4. Share results regionally.
5. Set priorities.
6. Select monitoring targets and initiate monitoring.
7. Repeat.

In September 2010, the U.S. Fish and Wildlife Service released "Rising to the Urgent Challenge, Strategic Plan for Responding to Accelerating Climate Change" (USFWS 2010). The Service is committed to examining everything we do, every decision we make, and every dollar we spend through the lens of climate change, fully confident in our workforce to rise to this challenge and to lead from in front and from behind. We recognize the efforts that are already underway, and we look to our employees for their on-the-ground knowledge and expertise in focusing our energies and recalibrating our activities. This Strategic Plan acknowledges that no single organization or agency can address an environmental challenge of such global proportions without allying itself with others in partnership across the nation and around the world.

The Strategic Plan's goals, objectives, and actions are positioned under three major strategies that correspond with the Service's mission. These strategies are:

- ***Adaptation:*** Minimizing the impact of climate change on fish and wildlife through the application of cutting-edge science in managing these species and habitats.

- ***Mitigation:*** Reducing levels of greenhouse gases in the Earth's atmosphere.

- ***Engagement:*** Joining forces with others to seek solutions to the challenges and threats to fish and wildlife conservation posed by climate change.

The Service's Northwest/Pacific Region is preparing a 5-Year Action Plan for implementing the Climate Change Strategic Plan. This plan will provide guidance and direction in assisting managers to manage for climate change at all national wildlife refuges and fish hatcheries within the Region.

This CCP contains several examples of specific strategies that show how the Willamette Valley Refuges are addressing climate change. These examples include such items as restoring and maintaining extensive riparian habitat along the Willamette River and tributaries to provide wildlife corridors and assist in lowering water temperatures; increasing efforts to inventory and monitor plants and animals as they relate to climate change; all refuge employees and contractors are encouraged to purchase "green" products and recycle all materials; refuge staff is encouraged to participate at meetings and training associated with climate change; etc. (see Section 6.19.2, Potential Effects from Climate Change for additional information).

3.6 Hydrology

3.6.1 Regional Hydrology

The Willamette River is the 13th largest river in the conterminous United States in streamflow and produces more runoff per square mile than any of the larger rivers in the entire U.S. (Kammerer 1990).

Several regional hydrogeologic units have been identified within the Willamette Basin. The High Cascades unit consists of young, highly permeable volcanic rock found at the surface along the crest of the range. Rain and snow melt filter easily through the rock, making the Cascades a sort of vast hydrologic sponge, storing many decades of water as deep ground water. Because of this, most discharge from the High Cascades is from very large regional aquifers that feed springs, creeks, and streams along the east and west flanks of the Cascade crest. So even in dry years, creeks and streams emanating from the Cascades receive a fairly constant flow. The Willamette River mainstem is characterized by such a regime.

Other hydrogeologic units fill the lowlands between the Coast and Cascade ranges and consist of a mixture of highly to moderately permeable coarse-grained sediments on the upper reaches of the floodplain to Willamette silts in the lowlands. As a result, in these areas, streamflow is dominated by runoff of precipitation rather than lateral ground water flow. This regime characterizes the creeks and watersheds of Finley, Ankeny, and Baskett Slough main units.

In general, streamflow in the Willamette Basin reflects the seasonal distribution of precipitation, with 60-85 percent of runoff occurring from October through March, but less than 10 percent occurring during July and August (U.S. Army Corps of Engineers 1989). Basin-wide annual mean recharge is estimated to be 22 inches. Within the lowlands, annual mean recharge is 16 inches, and most recharge occurs from November to April, when rainfall is large and evapotranspiration is small (Conlon 2005).

Water Control: Eleven multi-purpose and two re-regulation reservoirs (1.88 million acre-feet of usable storage) are operated in the Willamette Basin by the U.S. Army Corps of Engineers (Shearman 1976). Measurements of suspended sediment in streams downstream from dam sites indicate that sediment sources have changed and that erosion has increased since completion of 10 reservoirs after 1949 (Wentz et al. 1998).

Flooding: Flooding in the Willamette Basin and the coastal streams usually results from several days of moderate to heavy rain extending over the entire Basin. When combined with sharply rising air temperatures and a warm southerly wind, the melting of a heavy snow pack on the middle and upper slopes of the Coast Range and/or the Cascades greatly increases the flood potential. The construction of a number of large multiple-purpose dams in recent years on many of the larger tributaries of the Willamette has significantly reduced flooding.

Notable floods include events in 1899, 1964, and the Willamette Valley Flood of 1996. During the 1996 flooding event, floodwaters from the Willamette River reached all the way to Finley's Willamette Floodplain RNA.

Mean annual discharge of the Willamette River near its mouth at Portland was 32,400 ft^3/s during years 1972-90. Typical monthly flows at Portland ranged from about 8,000 ft^3/s in August to about 70,000 ft^3/s in December. Recorded extreme flows were 4,200 ft^3/s in July 1978 and 283,000 ft^3/s in January 1974, although the river reached an estimated peak flow of 460,000 ft^3/s during the flood of February 1996.

3.6.2 Refuge-specific Hydrology

Ankeny/Baskett Slough NWRs: Both Ankeny and Baskett Slough NWRs are included within the Rickreall Creek Watershed. Baskett Slough NWR is located on Baskett Slough, a small tributary of Rickreall Creek. Ankeny is located on Bashaw Creek and the Sidney Ditch, both tributaries to the Willamette River. Bashaw Creek is classified as part of the Rickreall Creek Watershed although it is on the opposite side of the Willamette River from Rickreall Creek and is not a tributary of Rickreall Creek. See Section 3.9 for more information on the rivers and creeks of these refuges.

William Finley NWR: Muddy Creek flows through the main unit of W.L. Finley NWR, which is located in the Mary's River watershed. The stream is designated for salmon and trout rearing and migration, but not spawning habitat. The mainstem of the Willamette River borders the Snag Boat Bend Unit of W.L. Finley Refuge. See Section 3.9 for more information on the rivers and creeks of these refuges.

3.7 Water Quality and Environmental Contaminants

3.7.1 Overview - Willamette River and Basin

The Willamette River has long suffered from pollution problems. These problems started in the early 1900s, a result of urbanization, damming, and large scale agriculture and industry. The pollutants that plague the river today include nutrients, pesticides, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), temperature, bacteria, dioxins, and metals. Over the years there have been many efforts to clean up the river, but these pollutants still pose a threat to many kinds of aquatic life and humans.

A study conducted by the U.S. Geological Survey from 1991-1995 found various levels of all these compounds in the river and other watersheds throughout the Basin (Wentz et al. 1998). According to this report, in 1991 nearly 63,000 tons of nitrogen and 20,000 tons of phosphorous fertilizer were applied in the Willamette Basin, and nearly 4.5 million pounds of pesticides are used each year. The USGS study also found that the basin showed evidence that 10 different pesticides exceeded levels set to protect aquatic life from chronic toxicity. Atrazine, simazine, metachlor, diuron, and diazinon were the more commonly detected pesticides, all commonly used in agricultural practices.

Polychlorinated biphenyls (PCBs) and volatile organic compounds (VOCs) are pollutants more common to the urban industrial areas of the Willamette. Both PCBs and VOCs are highly toxic and the use and manufacture of PCBs in the United States has been banned or restricted since the late 1980's. However, these pollutants still find their way into the river and ground water through old equipment in industrial areas and mines. Their dangers are in their persistence in ground water and aquatic systems, and both have been shown to cause cancer as well as multiple nervous, endrocrine, and immune system effects in animals and humans. As recent as 2004, a fish advisory was listed warning against the consumption of fish in the Portland Harbor due to high levels of PCBs.

Mercury is another pollutant that at its current levels in the Willamette is in violation of water quality standards. Mercury is a highly toxic metal that is also persistent and bioaccumulative in the environment. It has been linked to severe health problems in humans such as brain damage, kidney damage, birth defects and developmental problems.

Dioxins and furans are some of the most toxic chemicals known to humans. They are generally produced as by-products of industrial processes such as waste incineration, sewage treatment plants, and pulp and paper mills. They are persistent and bioaccumulative in the environment and can lead to cancer, hormone disruption, and reproductive and developmental complications in humans and animals. The USGS 1991-1995 study found dioxins in all of their sediment samples taken throughout the Willamette Basin.

To what extent these compounds exist on Ankeny, Baskett Slough, or W.L. Finley Refuges lands is unclear. No studies have been undertaken to search for VOCs, PCBs, dioxins, furans, or mercury on the refuges. Flooding, atmospheric transport, and subsequent deposition via precipitation may have deposited pollutants on refuge lands even if never applied on the refuge deliberately.

3.7.2 Pesticides on Refuges

Providing high quality forage for wintering Canada geese is a primary habitat management objective for the Willamette Valley Complex. In order to accomplish this, much of the land within the refuge is managed for grass production which involves applications of herbicides, fungicides, and fertilizers.

Many agrochemicals, including insecticides and some herbicides (atrizine, for example) are not permitted for application on refuge lands; however, when applied by private landowners to lands outside of refuge boundaries, these chemicals have the potential to enter aquatic habitats, flow into the refuge, and impact species such as amphibians, turtles, and fish.

A number of fungicides and herbicides used on or around the refuge currently or in the past are suspected or documented endocrine disrupters. Endocrine disrupters interfere with both the production and conversion of hormones and could potentially negatively affect the reproductive potential in certain aquatic species. Two known endocrine disrupters (2,4-D and Diuron) are approved for use on refuges.

A 2007 study conducted on the W.L. Finley Refuge assessed the impacts to aquatic organisms of pesticide and fertilizers in refuge aquatic habitats (Materna and Buck 2007). The objective of the study was to determine if chemicals used in agriculture on or around the refuge, and transported to refuge aquatic habitats, pose a risk to aquatic species. Selected sampling sites included five refuge stream segments directly influenced by agricultural runoff and one reference site not influenced by agricultural runoff. The pesticide monitoring component of the study indicated that of the 83 pesticides investigated during the study, 17 were detected at least once in collected water samples. Atrazine and its degradation product, deethylatrazine, were the most frequently detected compounds, found in 76 percent and 67 percent of samples, respectively.

The study also found the following:
- Concentrations of pesticides generally increased from Gray Creek to Brown Creek with the highest concentrations in Muddy Creek.
- Concentrations of many of the most frequently detected pesticides were similar at Muddy Creek sites, indicating sources upstream of the refuge.

- 2,4-D concentrations indicated that the source for this compound is primarily the refuge.
- Atrazine concentrations exceed those found in one study to elicit endocrine disruption responses (gonadal abnormalities). More recent studies have not been able to replicate these gonadal abnormalities. Because atrazine is not known to be applied upstream of the reference site, its presence is likely due to atmospheric transport and subsequent deposition by precipitation.
- Hormone values measured in biotic samples from refuge sites were within normal ranges except for western pond turtles at Finley NWR. Compared to reference samples, higher testosterone levels were observed in females and the female hormone ratio was atypically low. This could indicate exposure to some type of antiestrogenic compound that blocks the conversion of testosterone to estrogen. All other health parameters measured were similar to reference values or considered within normal range.
- Analytical results show that the concentration of any single pesticide at Finley NWR is relatively low and not likely to cause any direct effect on aquatic organisms, with the exception of subtle endocrine effects. However, the effects of any combination of these compounds on the ecosystem are essentially unknown. If pesticide use increases, then the threat may also increase.

3.7.3 Nutrients in Water on Refuge

Materna and Buck (2007) also measured conventional water quality parameters (temperature, pH, dissolved oxygen (DO), and conductivity). Nitrogen and phosphorus compounds were found to be distributed similarly to pesticides, which indicates their occurrence in streams is associated partially with agricultural practices. Key other study findings included:

- Similar concentrations at both Muddy Creek sites suggest that nitrogen concentrations are attributable to sources upstream of refuge.
- Phosphorus concentrations in Brown and Muddy Creeks exceed EPA recommended criteria.
- Nitrogen compounds exceed recommended criteria at all 3 refuge creeks.
- Concentrations in the study area were lower than concentrations reported elsewhere in Willamette Valley.
- Nitrogen compounds were found at concentrations lower than those found to affect northwest amphibians.

3.7.4 Other Water Quality Pollutants on the Refuges

The Willamette River and many of its numerous tributaries do not meet several water quality standards, including bacteria, mercury, and temperature. Water quality standards assure that beneficial uses such as swimming, fish consumption, and fish spawning and rearing are protected. When water quality standards are not met, the Federal Clean Water Act requires a Total Maximum Daily Load (TMDL) to be established. A TMDL determines how much pollution can be added to a river without exceeding water quality standards.

In 2006, the Oregon Department of Environmental Quality (DEQ) issued the Willamette Valley TMDL. As part of the Willamette TMDL, DEQ developed a Water Quality Management Plan (WQMP) that describes the framework for implementing the TMDL. Since the Service manages and has legal authority over four national wildlife refuges within the Willamette Basin and its tributaries, it has been named by DEQ as a Designated Management Agency in the TMDL, and as such, is required to develop a TMDL Implementation Plan for review and approval by DEQ. This plan was completed by the Service in 2008 and approved by the Oregon Department of Environmental Quality in October of the same year (USFWS 2008).

The U.S. Fish and Wildlife Service TMDL Implementation Plan identifies specific strategies and timelines to be used by the Service for attaining water quality improvements on refuge lands. Strategies include wetland enhancement/restoration; riparian enhancement/restoration; reconnection of sloughs and rivers; reestablishment of native vegetation; minimization of soil erosion; establishment of streamside buffers of vegetation; fertilizer, herbicide, and pesticide management through minimization, environmentally safe selection, proper use, and storage; and water quality and vegetation monitoring to monitor progress in attaining water quality standards.

Although the entire mainstem of the Willamette River is listed as a 303(d) water body for exceeding mercury standards, none of the three refuges includes any water bodies that are 303(d) listed for mercury. The majority of the mercury in the Willamette comes from non-point sources such as erosion of native soils containing mercury and the runoff of atmospherically-deposited mercury from urban, agricultural, and forested landscapes. Mercury has not been studied on any of the refuges. The focus of actions to address mercury is on reduction of soil erosion and surface runoff from roads, construction sites, and agricultural fields.

The Willamette Basin Bacteria TMDL states that "water quality impairments due to bacteria vary in scale throughout the Willamette Basin. Violations are common in creeks that drain urban and agricultural land and discharge to the Willamette River." Most commonly, the bacteria comes from untreated sewage, urban and rural residential runoff, failing septic systems, pet waste, wildlife waste, or livestock waste. Failing septic systems are normally associated with rural residential areas and pet wastes with urban areas. Bacteria can originate from wildlife, including ducks and geese, although less is known about the human health threat of bacteria from birds. The most common human health hazard associated with ducks is swimmer's itch. Graczyk et al. (1998) showed that geese can also contaminate waterways with *Giardia* and *Cryptosporidium*.

Management activities on the refuges will tend to mitigate for bacteria and mercury in stream systems by collecting and retaining storm water runoff. Because precipitation is a major component of the water supply on all three refuges, the refuges utilize it rather than shunting it to stream channels and off the refuges. By design, rainfall runoff is collected in refuge wetlands and riparian floodplains. The refuges tend to buffer the hydrologic response to precipitation and reestablish natural hydrology in the basin.

Ankeny/Baskett Slough NWRs: Rickreall Creek and the mainstem of the middle Willamette are listed as 303(d) water bodies for exceeding water temperature standards. The most sensitive beneficial uses to water temperatures are fish spawning, rearing, and migration. Peak temperatures typically occur in July and August. Bashaw Creek on Ankeny NWR and the mainstem of the middle Willamette are listed as 303(d) water bodies for exceeding water quality standards for fecal coliform bacteria.

William Finley NWR: Muddy Creek is listed as a 303(d) water body for exceeding water temperature standards. Similar to the other two refuges, peak temperatures typically occur in July and August.

During a water quality study conducted by Materna and Buck (2007), temperature measurements were recorded at various sites on W.L. Finley Refuge. From February to April 1998, the maximum temperature recorded for all sites except Gray Creek at Cattail Pond was 16 degrees C; Gray Creek at Cattail Pond had temperatures up to 23 degrees C . Based on the seven-day moving average for the sampled time period, only Gray Creek at the Cattail Pond violated the statewide temperature standard of 64 degrees F/17.8 degrees C. Gray Creek at the Cattail Pond also had the largest seven-day moving average maximum change in temperature.

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Chapter 4

Photo by George Gentry/USFWS

Biological Environment

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- Wetlands
- Wet Prairie
- Upland Prairie/Oak Savanna
- Oak Woodlands
- Mixed Deciduous/Coniferous Forests
- Riparian
- Riverine
- Canada Geese and Other Waterfowl
- Waterbirds and Shorebirds
- Threatened, Endangered, and Rare Species
- Fisheries
- Other Wildlife and Plants
- Exotic, Invasive, and Nuisance Species
- References

4.1 Overview

The Willamette Valley Refuges include a diversity of native habitats and agricultural lands. Approximately 40 percent of the land is managed in cultivated croplands to provide forage for wintering Canada geese. The other 60 percent of the land base is occupied by wetlands, wet prairie, upland prairie/oak savanna, oak woodlands, mixed deciduous/coniferous forests, riparian, and riverine habitats. Each of these habitats and species groups is explored in further detail in this chapter.

The refuges support some of the largest and most ecologically significant blocks of native habitat in the Willamette Valley. The refuge's seasonal wetlands and farmed agricultural fields provide important resting and feeding areas for migrating waterfowl and shorebirds within the Pacific Flyway and they support the core populations of wintering geese in the Valley. In particular, the refuges hold the largest number of wintering dusky Canada geese within their range. At peak numbers, the refuges also hold more wintering ducks than any location in western Oregon south of the Columbia River (USFWS 2010b).

At W.L. Finley NWR, the Muddy Creek floodplain and tributaries cover one of the most intact riparian floodplain woodlands remaining. The 366-acre tract of mature wet prairie found in the Willamette Valley Floodplain RNA is the largest remaining example of this habitat found in the state, and supports some of the largest concentrations of declining grassland birds. The prairies of Baskett Slough NWR support the largest population of the endangered Fender's blue butterfly within its range, as well as several species of listed and rare plant species. Oak woodlands are another important habitat found on the refuges, and are managed to support a diversity of wildlife species, especially migratory songbirds.

The combination of native and agricultural habitats on the Willamette Valley refuges results in a diversity of lands which support more than 300 species of birds, mammals, fish, reptiles, and amphibians, 9 of which are federally listed as threatened or endangered. Overall, the refuge lands are key to healthy populations of wildlife dependent on these rare habitats, as well as the opportunity to recover listed species.

Table 4-1 shows the number of acres of each habitat type currently present on each of the three refuges, and as a whole for the Refuge Complex. All acreage figures are based on GIS maps. All of the habitat types are subsequently described in this chapter, except non-agricultural grasslands. This is a catchall category created to describe lands that may have been farmed in prior years or do not fit under a specific habitat category. Most sites are presently in a non-managed, usually non-native and weedy condition. Some of the areas are under consideration for restoration to an appropriate native habitat, while others may be annually mowed to control invasives or to provide short grass forage for geese.

Table 4-1. Existing Habitats – Willamette Valley Refuges (Acres*)

Habitat Type	ANK	BKS	WMF	SBB	TOTAL
Agricultural-Cooperative Farming	576	1141	1736	17	**3470**
Agricultural- Refuge Farming	932	0	169	0	**1101**
Subtotal in Farming	**1508**	**1141**	**1905**	**17**	**4570**
Seasonal or Permanent Wetland	186	0	0	0	**186**
Seasonal Wetland	302	536	474	30	**1343**
Permanent Wetland	42	61	62	3	168
Subtotal in Wetland	**530**	**597**	**536**	**34**	**1697**
Administrative/Developed	9	13	14	1	**38**
Non-agricultural Grassland	276	165	138	37	**616**
Riparian	414	4	1100	288	**1807**
Wet Prairie	78	59	515	0	**652**
Mixed Deciduous-Coniferous Forest	0	34	337	0	**371**
Oak Woodland	0	270	481	7	**758**
Upland Prairie/Oak Savanna	0	238	334	0	**572**
Total	**2815**	**2522**	**5360**	**385**	**11081**

*GIS acres. May differ by one acre from acres presented in Table 2-2 due to rounding errors.

Appendix D includes a Comprehensive Resources of Concern table, which lists the species, habitats, or communities which have been highlighted for conservation in a variety of other planning efforts or assessments. Appendix D also includes the selected Priority Resources of Concern, which were selected from the former list as particular indicators by which to gauge habitat condition. The Priority Resources of Concern Table D-2 includes 23 focal species, including birds, fish, reptiles, amphibians, a butterfly, and two rare plants, that were selected as representatives or indicators for the overall condition of important refuge habitats. Several different conservation focal species may be listed for specific habitats to cover the variety of habitat structures and plant associations. In addition, species with specific "niche" ecological requirements may be listed as a focal species. Other species utilizing the habitat will generally be expected to benefit as a result of management for the focal species.

4.2 Croplands

4.2.1 Overview

The primary agricultural crops grown on the refuges are grass seed (annual ryegrass, perennial ryegrass, and fescue) grown as green forage for wintering Canada geese. A small area on W. L. Finley NWR is maintained in pasture, and small acreages of wheat, corn, beans, or clover are occasionally also grown. The total area of agricultural lands on W.L. Finley, Ankeny, and Baskett Slough are 1,922 acres, 1,508 acres, and 1,141 acres, respectively. (This does not include areas termed non-agricultural grassland, which are areas that may have been farmed in the past that have not yet been restored.)

4.2.2 Historic and Current Distribution in the Willamette Valley

Prior to Euroamerican settlement, there were no croplands in the Willamette Valley.

4.2.3 Key Species Supported

Cultivated grass fields or seed crops such as corn are maintained to provide food for wintering Canada geese. See Section 4-10 for more information.

4.2.4 Refuge Management Activities

Current farming practices include cooperative farming, which is undertaken on the majority of the refuge fields. In addition to cooperative farming, approximately 1,101 acres of grass fields are currently farmed directly by refuge staff, primarily at Ankeny Refuge.

Cooperative agreement farming involves a signed agreement between the refuge and a local area farmer with benefits expected to accrue to both parties. The cooperator is responsible for the majority of the costs of production. The farmer is allowed to retain 100 percent of the agricultural yield of the crop when harvested. The farmer is given use of the land without charge. The refuges receive a forage supply for wintering geese in return.

Cooperative farming is set up in a crop-share arrangement, such that the crop yield decline as a result of wildlife use is the refuge's share. Crop yields are disproportionate across each refuge because on some fields goose grazing pressure is so intense that yields are not economic to harvest. On the contrary, those fields with little to no goose use have yields comparable to private agricultural land without wildlife impacts.

All crop selections are agreed to by the Refuge Manager, and special conditions are documented in the cooperative agreement. In some cases, a row crop (beans for example) that have no value for geese may be grown and harvested during the summer. In these cases the cooperative farmer is required to plant a green forage crop (usually grass) after harvest that will provide for the geese during the winter months. The cooperative farming agreements do not allow the use of genetically modified seed on refuge lands.

4.3 Wetlands

4.3.1 Overview

Managed wetlands cover 1,697 acres across the three refuges, and serve as key habitat for thousands of migratory waterfowl, shorebirds, and other waterbirds wintering in the Valley.

Seasonal Wetlands: A majority of the refuge wetlands are seasonal, filling via fall and winter precipitation and drying or being drained in the late spring and summer. Vegetation in seasonal wetlands varies from annual moist soil plants such as smartweed and millet to a combination of sedges, rushes, water plantain, cattail, burreed, and spikerush. Reed canary grass is present in most seasonal wetlands, often around the wetland fringes, but is more dominant where precise water level control in the spring is not available.

Most of the seasonal wetlands are managed using a combination of dikes, spillways, and water control structures (WCS). Seasonal wetlands without delivered water are allowed to slowly dry up throughout the growing season. Water typically begins to pond up again in November with fall rains. As much as possible, wetlands are stage-flooded, meaning staff allows a gradual increase in water levels through management of the water control structures (largely half-round standpipe culverts with stoplogs). This is done to maximize the shallow flooded edge and availability of wetland seeds for waterfowl. In some years this is not possible because of large storm events and localized flooding precludes gradual increases.

Permanent wetlands: Approximately 168 acres of wetland impoundments are permanent (not drained in summer). Permanent wetlands have similar vegetative composition to seasonal wetlands around the perimeter, with deeper water occupied by submergent wetland plants such as pondweeds.

4.3.2 Key Species Supported

Wetland habitats are used heavily by a diversity of wildlife including migratory waterfowl, shorebirds, wading birds, raptors, fish and amphibians. Wetlands are the primary focus of the public wildlife viewing areas on the Refuge Complex.

4.3.3 Historic and Current Distribution in the Willamette Valley

Historically, the Willamette Valley contained extensive wetlands, but as settlement occurred they were drained and cleared to make way for agriculture. It is estimated that more than one million acres of wetland and riparian habitat have been lost in the Willamette Valley since 1850 (Defenders of Wildlife 1998). Virtually all remaining wetlands have been impacted by human activities and most are dominated by invasive, non-native plants.

4.3.4 Refuge-specific Sites

Ankeny NWR has 530 acres of wetlands (Eagle Marsh, Pintail Marsh, etc.) with a majority being seasonal in nature. Most of these wetlands were restored in the mid-late 1990s. At Ankeny NWR, delivered water is available from a local irrigation district, and this is used to maintain permanent wetlands as well as to flood irrigate seasonal “moist soil” units. Managed seasonal wetlands are de-watered usually in late May-early June, with an irrigation (shallow flooding) occurring usually a month later as plants germinate from the moist soil mudflat conditions.

Baskett Slough NWR has 597 acres of wetlands (Cackler Marsh, Dusky Marsh, etc.) consisting of a series of managed impoundments extending from Morgan Reservoir down along Baskett Slough to the eastern boundary. These wetlands were restored in the mid-late 1990s by capturing seasonal flows using dikes and water control structures (WCS) in Baskett Slough, which formerly had been channelized to allow farming throughout the entire basin. Stored water is available in the summer and fall from Morgan Reservoir, an impoundment on the upper end of Baskett Slough that was present prior to refuge acquisition. This water can be released into various wetlands to provide some water for early fall migratory birds, but is only adequate to partially flood one or two impoundments downstream of the reservoir.

Wetlands on W.L. Finley NWR cover approximately 570 acres, associated with the low lying areas within the floodplains of Gray Creek, Brown Creek, and Muddy Creek. Many of the wetlands on W.L. Finley NWR are permanent and managed with dikes and WCS. Cabell Marsh is the second largest and oldest impoundment, with the dike originally constructed in the mid-1960s. McFadden Marsh is the largest wetland on Finley Refuge and is managed as a seasonal wetland. McFadden Marsh is located within the Muddy Creek floodplain and was specifically designed to allow fish passage between the impoundment and floodplain of Muddy Creek. The premise is that cutthroat trout will sense when water levels are dropping and instinct will direct them back to the main creek channel before they would be entrapped behind the low-head dike. Cabell Marsh and McFadden Marsh traditionally hold the largest concentrations of wintering waterfowl on the refuge. Several seasonal wetlands are located within agricultural fields as a lure to increase use of the fields by wintering Canada geese.

4.3.5 Refuge Management Activities

Most of the historic wetlands on the refuge lands were drained and farmed in the early Euroamerican settlement period. For about 30 years after Service acquisition, farming continued to dominate the land use on the refuges, even in areas that often produced poor crops because of wet conditions. The low crop yields resulted in minimal wildlife use. The Refuge Complex started a broad restoration program in 1994, converting some farm fields to wetlands, including wet prairie.

Key management activities include water management, using dikes and water control structures, as described above. In addition to natural precipitation, water delivery is available at Ankeny. Other key activities involve the management of species composition and weeds. Over time reed canary grass often becomes dominant in the shallow emergent zones of seasonal wetlands. Typical rehabilitation involves dewatering in late spring and multiple disking treatments of the infested areas. Similar to farm fields where summer fallow is used to reduce unwanted weeds, the wetland is summer fallowed to dry out and kill the reed canary grass. Water level management is used in the late winter and spring to reduce the opportunity for reed canary grass seedlings to become re-established. Other management actions within wetland habitats include spot spraying of undesirable plants with herbicides, bio-controls of noxious weeds (purple loosestrife), and mowing to create interspersion in the wetland vegetation.

4.4 Wet Prairie

4.4.1 Overview

Wet prairies are characterized by saturated soil and shallow ponding of water (< 6” deep) throughout the winter and early spring. The prairies have a bunchgrass-forb matrix, with the dominant vegetation as tufted hairgrass and with a large diversity of other grasses, sedges, and forbs distributed throughout. Wet prairies are known for mounded topography, with interstitial spaces that support many of the plant species. Ant hills are common in undisturbed prairie and are good indicators of the hydrology needed to support wet prairie species, as the elevated ant hills are built to stay above the water level. Oregon ash is the most common tree, and nootka rose is the most abundant shrub, but both are held in check with periodic fire. The refuges contained a total of 752 acres of wet prairie in 2011.

In this plan, wet prairie habitats are divided into 4 subcategories:

- Mature/historic (Objective 3a). These habitats, found only on W.L. Finley NWR, are original unplowed wet prairie with a high diversity of native species, unaltered hydrology, and topography with mounds, hummocks, and vernal pools.
- Remnant disturbed (Objective 3b). These habitats, found on all three refuges, are generally smaller and isolated tracts, with a lower diversity of natives and a higher proportion of exotic species. Hydrology and topography have been altered at some point, although the prairies still support native wetland species and wildlife typically found in prairie habitats.

- Restoration in progress (Objective 3c). These habitats, found on Finley and Baskett Slough, are former agricultural fields where the original hydrology has been restored as feasible, and the dominant vegetation is a suite of native species as a result of direct seeding or natural regeneration. Most sites still have incursions of non-native species such that active on-going management is required. The topography is often flat with few mounds and hummocks, and vernal pools present have been created with grading.

- Restore (Objective 3d). These are agricultural fields or retired agricultural fields that have potential to be restored as wet prairie with hydrology alterations, treatment of exotic species and introduction of natives, and grading to alter topography.

4.4.2 Historic and Current Distribution in the Willamette Valley

The prairies of Oregon's Willamette Valley were once widespread in the poorly-drained soils of the Valley bottom. They remained grassy and predominantly treeless because of prairie burning by the native Kalapuya prior to Euroamerican settlement. As Euroamerican settlers arrived, Kalapuya ceased burning by the 1830s, at which time the prairies were invaded by woody species and non-native weeds brought in by settlers. Many areas were developed for agriculture and urban uses. Today wet prairie occupies much less than one percent of its historic acreage (Floberg et al. 2004). The loss in prairies and the increase in fragmentation have led to the decline of many native prairie plants and animals, including grassland birds.

4.4.3 Key Species Supported

Wet prairies are important habitats for grassland birds and several rare plant species, including Bradshaw's desert parsley and peacock larkspur. The large Willamette Floodplain RNA tract supports populations of grassland bird species, many of whose populations have severely declined. Surveys for grassland birds in the late 1990s found no nesting meadowlarks on Finley Refuge (Altman 1999). Since that time, meadowlarks have responded so well to prairie management over the past 10 years that Finley now supports one of the largest breeding populations found in the Valley (B. Altman pers. comm.)

4.4.4 Refuge-specific Sites

William L. Finley: William L. Finley NWR contains a 366-acre block of wet prairie, contained within the 487-acre Willamette Floodplain Research Natural Area (RNA - see RNA section, Chapter 5). This is the largest contiguous tracts of historic (remnant) wet prairie habitat left within the Willamette Valley. Grazing of this area occurred until it was established as an RNA in 1966, at which time prescribed burning became the preferred management treatment. Prescribed fire within the RNA was used sparingly until 1990, when a structured prescribed fire plan was implemented to set back succession and maintain the prairie habitat structure. In addition, woody vegetation has been cut with chain saws, particularly in Middle Prairie, to promote herbaceous growth and help carry prescribed fire through the unit. This treatment was necessary because Middle Prairie had been retained as an unburned "control" site for approximately 20 years in the 1980s-90s, which lead to the woody vegetation encroachment. Selective mowing has also been used to help carry fire through rose thickets. All mechanical work, including mowing and removal of felled trees/shrubs, is done using a low ground pressure (LPG) skid-steer tractor. This has less ground disturbing effects than a traditional wheel tractor and significantly less compaction. Felled woody vegetation is removed from the prairie, as burning it in-place risks scorching the soils and damaging plant communities. Historically, fires would not have had such large quantities of woody vegetation because of the fire frequency. Although fires occurred annually prior to Euroamerican settlement, the preferred fire interval on prairie management units is 2-4 years.

Small areas of wet prairie, some with significant native plant communities, can be found throughout the Muddy Creek floodplain. These areas are gradually being overtaken by woody vegetation and riparian woodland. These areas have not been well inventoried and are in need of release using extensive mowing to avoid complete loss to succession.

Active wet prairie restoration in some retired agricultural fields has been on-going since 1999. Field 1 (50 acres) and Field 31 (80 acres) are in active restoration. These fields are located adjacent to the Willamette Valley RNA on the north and west sides. Typical restoration involves herbicide treatments for two successive growing seasons (often with prescribed fire in one or both seasons depending on herbaceous cover) and no-till drilling native wet prairie grasses and forbs in the second fall. First year follow-up treatment may involve late spring mowing to reduce seed set of non-native annuals, spot herbicide treatment of invasive plants that may impact native establishment, and supplemental seeding to increase species diversity.

Ankeny: Ankeny has one primary wetland prairie site. Field 1 is a 40-acre, poorly drained area on the northeast boundary. Surveys by The Nature Conservancy in 2001 indicated that it supported a low diversity of native wet prairie species. However, the habitat has been degraded by a history of grazing, cultivation, and hydrologic alterations making it wetter than historical conditions. A majority of the large woody vegetation was cleared and removed in 2002-05, and the site was burned in 2007 (refuge records indicate it was also burned in 1983). Herbacous cover increased significantly following the removal of the trees and subsequent use of prescribed fire. Management applications include late summer mowing and prescribed fire on a 3-4 year interval.

Ankeny has three other small parcels containing wet prairie plant species, but they are too small and isolated to function as true wet prairie. A two-acre block of wet prairie vegetation adjacent to Dunlin Marsh is well established from restoration efforts in 2002. Two other small acreages on Ankeny have ant mounds indicative of native prairies and may hold small populations of native prairie species. Small remnant populations of peacock larkspur (USFWS SOC) exist at Ankeny, indicating historic prairie conditions, but these plant populations are now confined to hedgerows and ditchbanks and are managed with fall mowing. In 2001, several sites covering approximately 12 acres and adjacent to managed wetlands were seeded to wet prairie plant species in an attempt to shift formerly weedy sites along the fringes of seasonal wetlands to native grassland species. However, these sites are not classified as wet prairie habitat because they are small isolated strips and are primarily dominated by tufted hairgrass with minimal diversity. An additional site, Eagle Marsh Prairie, is currently under restoration, but the emphasis is on establishing a viable population of Nelson's checkermallow (threatened species) prior to adding a diversity of wet prairie species.

Baskett Slough: Baskett Slough has several small tracts of wet prairie, including one small six-acre tract of wet prairie on the north end (Field 1), the slopes below Baskett Butte Area 1, and a two-acre patch east of Morgan Reservoir. These sites have adequate hydrology but have low native plant diversity and have likely had past disturbances such as agricultural use. However, some sites still have ant mound topography and a significant tufted hairgrass plant community. An additional nine acres adjacent to Field 1 was planted with wet prairie species in 2001. Further restoration efforts to expand the size of these tracts would be needed to allow them to function as a true wet prairie. Existing management of wet prairie habitat at Baskett Slough includes mowing and prescribed fire.

Oak Creek: Oak Creek has approximately 30 acres of wet prairie habitat, although most is low diversity and has a significant non-native grass component. The largest known populations of Bradshaw's desert parsley (federally and state listed as endangered) grows at this site. About half of the wet prairie was dominated by ash, hawthorn, and pear trees, but many pear trees were removed from the prairie in 2003-05. Cattle grazed here for years prior to Service ownership. Existing management of this site includes mowing and prescribed fire.

4.4.5 Refuge Management Activities

Threats include encroachment of woody vegetation and the invasion of non-native weeds. Periodic disturbance is necessary to retain these sites in a grassland condition. Prescribed fire at regular intervals, mowing, and removal of invasive woody species (both native and non-native) are management techniques used to maintain habitat for grassland birds such as the western meadowlark, grasshopper sparrow, and lazuli bunting. The primary management concerns for wet prairie habitats are 1) maintaining prairies in a grassland condition by reducing densities of woody shrubs and trees and preventing encroachment/establishment of such; 2) maintaining and/or increasing native plant species diversity; 3) reducing levels of non-native herbaceous species, especially those that threaten the integrity or function of wet prairies; and 4) maximize parcel size on the landscape to provide greatest benefits for grassland birds and other wildlife.

Prairie size is important for a number of reasons. For species like the western meadowlark with large territories (15-20 acres per pair), larger tracts are the only way to maintain a breeding population. They also tend to select for breeding sites that are large rather than small fragments (Altman 1999). Large tracts provide room for expanding populations or returning offspring. Although grasshopper sparrows have much smaller territory size, densities of nesting birds tend to be higher with larger tracts of habitat. Tract size is also important for other wildlife such as pollinators, because large tracts could better support sustainable populations without genetic implications even if isolated.

4.5 Upland Prairie/Oak Savanna

4.5.1 Overview

Oak savanna is characterized by widely spaced Oregon white oak trees with grassland habitats (upland prairie) residing between them. Native grasses commonly found in upland prairies include Roemer's fescue, blue wildrye, California oatgrass, and prairie junegrass. Common forbs include camas, spurred lupine, rose checkermallow, and cat's ear lily. The refuges contained a total of approximately 572 acres of this habitat in 2011.

In this plan, upland prairie/oak savanna is divided into four categories:

- Mid-late successional (Objective 4a): These habitats, found only on Baskett Slough, are characterized by large diameter, well-spaced savanna-form Oregon white oaks and a diverse suite of native upland grasses and forbs. The habitat quality is suitable to support Fender's blue butterflies.

- Early successional (Objective 4b): These habitats are similar to mid-late successional as described above but lack the large diameter savanna-form oaks. Smaller oaks are present and the prairie habitat is suitable quality to support Fender's blue butterflies. These habitats are present on Finley and Baskett Slough, although the butterflies are only found on the latter.

- Remnant disturbed (Objective 4c): These habitats are found on both Baskett and Finley, but the upland prairies lack native species diversity and are dominated by non-native grasses. Oaks on these sites are of varying age and structure, so many sites can function for oak-dependent birds despite the poor quality prairie understory.

- Restore (Objective 4d): These habitats, on all three refuges, include agricultural fields currently under or considered for restoration, or non-agricultural grasslands in a weedy condition that have restoration potential. There are no oaks present on these areas with the exception of small planted saplings. Native species have either been seeded or would be following clean-up of exotic vegetation. Some of this habitat could be suitable for Fender's blue butterfly within 15 years depending upon the success of establishing upland prairie forbs needed to support the butterfly.

At present, much of the oak savanna habitat has been degraded by non-native grasses and forbs, as well as invasive woody vegetation such as Himalayan blackberry. Poison oak, although native, is also more abundant today in most oak habitats because of the lack of fire. Management and restoration focuses on improving the quality of existing habitat and reducing the threats to those areas from invasive species.

Tall oatgrass is the most significant problem on the native upland prairie habitat at Baskett Butte, as it spreads in bands from existing plants and crowds out native prairie species, creating tall layers over the generally short statured native species. Recently established noxious weeds such as milk thistle are a threat to the native prairie if left untreated. Woody vegetation threats in native habitats include Himalayan blackberry and poison oak. Over time, native Oregon white oak regeneration and serviceberry can detrimentally change the character of the oak savanna, as it becomes more shrub-dominated and reduces sunlight to the former grassland understory.

4.5.2 Historic and Current Distribution in the Willamette Valley

Less than one percent of upland prairie/oak savanna habitat remains today compared to pre-Euroamerican settlement. This habitat once dominated the upland edges of the Willamette Valley, maintained by wildfire or fires set by Native Americans. Fire prevented the establishment of dense groves of oak and invasion of Douglas-fir trees. Fire also promoted a rich diversity of plant species within the prairies, especially forbs.

4.5.3 Key Species Supported

Two federally listed plants, Kincaid's lupine and Willamette daisy, are native to upland prairies along with the endangered Fender's blue butterfly. These species are only located on the upland prairie/oak savanna habitat found on the Baskett Slough NWR. This habitat also supports obligate or semi-obligate oak/prairie species (acorn woodpecker, white-breasted nuthatch, etc.).

4.5.4 Refuge-specific Sites

W.L. Finley NWR has several tracts of low diversity upland prairie under mature oak savanna (remnant disturbed). The Baldtop and Woodpecker Loop area contain a large number of savanna form trees, many well over 100 years old. The best remnant upland prairie is located on the west slopes of Pigeon Butte. This area has a significant population of spurred lupine and is identified in the Recovery Plan as a re-introduction site for Fender's blue butterfly (USFWS 2010a). One 20-acre site (Field 29) has been undergoing restoration efforts since 2005 with moderate success.

Ankeny NWR has no existing tracts of upland prairie, although there are a number of large savanna form oaks present on the east side in an agricultural setting.

Baskett Butte on Baskett Slough NWR contains the best quality native upland prairie found on the Refuge Complex. Although a number of invasive species have resulted in management issues and degradation of the prairie, the area still supports the largest population of Fender's blue butterflies within its range and two listed plant species (Kincaid's lupine and Willamette daisy). A number of former agricultural fields surrounding Baskett Butte have been retired from farming and are under various stages of restoration.

4.5.5 Refuge Management Activities

A variety of management actions have been employed across upland prairie, in large part to set back succession of woody plant communities and control invasive and non-native species. Invasive plant species, including some native ones, are by far the greatest threat to upland prairie habitat. Late summer mowing, using rotary mowers pulled by wheeled or skid-steer tractors, is the most widespread technique to control plants such as poison oak and Himalayan blackberry. Skid steer tractors with low ground pressure tracks are exclusively used on high quality prairie sites, especially those occupied by Fender's blue butterflies. Studies have shown mowing to be beneficial to the plant community and have negligible impact on butterfly larvae in the duff layer (Fitzpatrick 2004). Mowing of tall oatgrass in early June, successively for at least 3 years, was considered as a potential control treatment (Wilson and Clark 1998). Extensive large scale spring mowing on Baskett Butte was conducted from 2006-08, but showed mixed results.

Thinning of young oaks trees where they are considered overstocked in prairie habitats has been conducted on Baskett Slough and W.L. Finley since 2004. Trees were marked for removal (maximum 12"DBH) and cut with tree shears or chain saw. Cut trees were then removed and piled for disposal, most often burning. Removal from the prairie is considered necessary because burning results in spot sterilization of the soil.

Herbicide treatments on undesirable vegetation on prairie habitats have evolved with a variety of new chemicals and application techniques. The refuge has used a weed wiper on tall oatgrass, which applies an herbicide foam from the carpet drum roller on to the plants. Tall oatgrass extends above most prairie grasses and forbs, so the native vegetation is unaffected by the herbicide. In areas accessible with the weed wiper, tall oatgrass has been reduced by 90 percent in the first year. Spot follow-up treatments are necessary to avoid re-infestation over time. Cooperative studies are on-going with Washington State University to assess any potential effects on Fender's blue butterflies from the grass-specific herbicides that are most effective at controlling invasive grasses. Other herbicide applications include treatment of poison oak and blackberry in the late summer when native prairie species are dormant.

Prescribed fire has been used extensively on the Refuge Complex to maintain and improve the habitat quality of prairies and oak savanna for the past two decades. Burns in occupied Fender's blue butterfly habitat are restricted to small acreages, as the larvae are killed by the fire. However, the burn areas are highly attractive the following year and colonized by butterflies from adjacent unburned habitat. Late summer and early fall burns set back poison oak and blackberries, but do not kill the plants, so that re-sprouting occurs the following year. Monitoring data has shown that in general, flowering of native forbs on burned sites increased by 50 percent the next year. Other studies have shown that when burning in grasslands dominated by non-native species, those species benefit as much from the burn as native species (Maret and Wilson 2000). Mature Oregon white oak is generally resistant to fire, although small seedling oaks are often killed.

Although there are no records of wildfires on Baskett Butte since the refuge was established, uncontrolled fire remains a threat, primarily because of the likely high mortality of Fender's blue butterfly. Fire kills most of the butterfly larvae as they reside in the duff layer below the lupine plants. A large uncontrolled fire has the potential to wipe out a majority of the Fender's population, from which it may take several years to recover to pre-wildfire populations. Fire starts would most likely occur from visitor use, nearby farming operations, or equipment use during management activities. Late summer would be the season with the highest potential wildfire risk.

Restoration of upland prairies on former agricultural lands has had mixed success and has evolved over the past decade. Non-native grasses and forbs pose the greatest impediment to restoration of prairie habitat on retired agricultural lands. Native seed, both grasses and forbs, are still somewhat expensive but readily available from commercial sources. Typical restoration strategies are two seasons of no-till cleanup with herbicides, followed by fall no-till seeding. Depending on the suite of species initially planted, selective herbicides can be broadcast after the first year to control weedy species. Otherwise spot herbicide treatments and early season mowing prior to seed set can be used separately or in combination. Native seed germination remains a problem with some species, and control of non-natives remains the largest management issue. Priority restoration sites are those adjacent to existing native prairies to provide the most benefit to grassland birds and potential for butterfly expansion. Planting of seedling (container stock) oak has occurred on a limited basis, but the trees are slow-growing and present management challenges to work around with herbicide treatments, prescribed fire, and mowing. Oak habitat restoration efforts have been shown to be correlated with population increases in a number of bird species (Altman and Stockenberg 2008). Avian species that are obligate or semi-obligate to oak respond especially well to oak restoration, showing population gains of over 200 percent.

4.6 Oak Woodlands

4.6.1 Overview

Oak woodlands differ from oak savannas in that there are more oak trees per acre and the understory may be shrub-dominated rather than completely herbaceous. Although there are savanna-form trees present in the oak woodlands on the refuges, they matured when the site was more open. The greatest threat to oak habitats in a natural environment is the encroachment of Douglas-fir. Oak woodlands are at risk of being shaded out and with succession changing to a predominantly fir forest. Removal of fir and either mowing or burning the encroaching shrub and tree seedling understory is necessary to maintain oak habitat for the wildlife and plants dependent on them. In 2011, the refuges contained approximately 758 acres of oak woodlands.

4.6.2 Historic and Current Distribution in the Willamette Valley

Over the last 150 years, due to the decreasing frequency of disturbance like fire, some areas that were formally oak savanna have transitioned into oak woodlands. Additional trees have filled in the spaces formerly occupied by grasslands. The younger oaks are usually smaller diameter and have more uniform growth patterns, being straight with few large lateral branches because of the reduced sunlight (Pacific Northwest Research Station 2007). Oak woodlands on the refuges are often mixed with Douglas-fir, resulting in site competition where the firs gradually overtop the oaks.

Stands encroached by Douglas-fir also are characterized by a reduced amount of light reaching the woodland floor, which can reduce the percent cover and diversity of understory plants (Willamette Restoration Initiative 2004). This trend toward structural simplification and smaller-diameter trees has been documented as having adverse effects on at least 12 bird species (Hagar & Stern 2001). In addition, where oaks are stunted due to overcrowding, production of mast (acorn) may consequently decline.

4.6.3 Key Species Supported

Oak woodland has been identified explicitly as a priority for protection and restoration in nearby regions and specifically in the Willamette Basin. Although no federally listed species use oak woodland predominantly, several may use it periodically or as part of an overall mosaic of natural habitats. Kincaid’s lupine and Fender’s blue butterfly (both federally listed) occur along oak woodland edges. Wildlife species that may have used oak woodland regularly before vanishing (as breeders) from the Willamette Basin include Lewis’s woodpecker, black-billed magpie, and lark sparrow. Thirteen of 27 plant associations listed as occurring in oak woodlands in the National Vegetation Classification are considered globally imperiled or critically imperiled by the Oregon Natural Heritage Program. The Service’s Species of Concern that use oak habitats on refuges include the western bluebird, Lewis’ (non-breeding) and acorn woodpeckers, white-breasted nuthatch, bandtail pigeon, and several species of bats.

4.6.4 Refuge-specific Sites

Large tracts of oak woodlands (50-300 acres) are found on both W.L. Finley NWR (Pigeon Butte) and Baskett Slough NWR (Baskett Butte).

4.6.5 Refuge Management Activities

Recent management activity in oak woodlands has focused on the removal of Douglas-fir. Traditional logging methods have been employed with some more stringent requirements, including directional falling to avoid damage to reserve oak trees, dry season extraction using LGP equipment or horses, and debris clean-up/stump grinding to facilitate future management of the understory vegetation as needed. Logs have been used by conservation partners for in-stream habitat, as well as donated to local schools and charities. Debris disposal has been through pile burning, although chipping has been used on a limited basis and may expand with new opportunities for wood chips. Thinning of numerous small diameter oaks has not been done in most areas in conjunction with fir removal, but may be considered in the future. Tree-topping to create wildlife snags has also been employed. Supplemental planting of oaks has not been considered necessary in oak woodlands. Prescribed fire through the understory may be considered on a site-by-site basis after mechanical activity is completed.

Similar to oak savanna, management activities have been shown to be correlated with higher bird abundances of a number of species, especially oak obligates such as the acorn woodpecker and chipping sparrow (Altman and Stockenberg 2008). Cavity nesters, such as the white-breasted nuthatch, also occur in higher densities where removal of fir and small oaks has occurred, presumably because of the increased availability of nesting sites and foraging surface areas (Viste-Sparkman 2005).

4.7 Mixed Deciduous/Coniferous Forests

4.7.1 Overview

These forested stands have a mix of Douglas-fir, oak, and maple, with a shrub understory occupied by hazelnut, snowberry, and sword fern. For the most part these habitats are a result of Douglas-fir encroachment in historic oak habitat to the extent that the oaks are suppressed or have died out completely. In 2011, the refuges contained a total of approximately 371 acres of these stands.

4.7.2 Historic and Current Distribution in the Willamette Valley

Much of the mixed deciduous/coniferous forests, especially those found on the Valley refuges, occupy what was formerly prairie-savanna habitat. These forests have become largely dominated by Douglas-fir, with the understory supporting more shade tolerant species. In some cases shade-tolerant big-leaf maple has encroached into oak woodlands, resulting in a more diverse woodland environment. Historically, fire prevented most coniferous forests from establishing close to the Valley floor. Since Euroamerican settlement, periodic timber harvest likely reduced conifer dominance even with the lack of fire.

4.7.3 Key Species Supported

Three key species supported by mixed deciduous forests are Swainson’s thrush, pileated woodpecker, and western gray squirrel. There is overlap for these species in coniferous and oak habitats. Big-leaf maples are a favorite habitat of early migrating warblers for foraging on small caterpillars. These habitats are also frequently used by large mammals including blacktail deer, elk, and black bear.

4.7.4 Refuge-specific Sites

Woodlands with a significant conifer and/or big-leaf maple component are found on W.L. Finley NWR (Mill Hill area) and Basket Slough NWR (north and south Baskett Butte). On W.L. Finley NWR the fir stands are generally between 40-65 years old, representing regeneration after the last logging that occurred prior to refuge acquisition. At that time a majority of the oaks were retained, some being savanna-form trees in excess of 100-150 years old. On Baskett Butte, Douglas-fir has encroached into the oak woodland on the North Butte, such that the mixed hardwood-conifer forest covers approximately 80 acres (Salix 2005). Woodlands as a whole (including oak) cover 300 acres on Baskett Butte, which contrasts with no woodlands identified from the 1851 vegetation mapping (Floberg et al. 2004). In a few locations on Baskett Butte, non-native cherry has invaded the woodland habitats, and without management threatens the integrity of oak woodlands similar to Douglas-fir invasions.

4.7.5 Refuge Management Activities

Management practices within mixed deciduous and conifer woodlands are dependent upon site objectives, and whether or not the oak component is healthy enough to warrant release. Conifer and maple or cherry removal using traditional logging practices within the proximity of the mature oaks can extend their longevity and survival. In stands where oak management is not a priority, management activities may include treatment of invasive understory species and snag creation to improve habitat for cavity excavators (woodpeckers). Over time, development of conifer stands with old growth characteristics would increase diversity of wildlife species and habitats available on refuge lands. At present, one conifer stand on Baskett Butte serves as a heron rookery, so areas such as this would receive special protection during any restoration prescriptions. On specific areas such as Maple Knoll Research Natural Area, removal of conifers (maple retention) is necessary for the long-term maintenance of the maple and oak community.

4.8 Riparian

4.8.1 Overview

Riparian vegetative communities in the Willamette Valley are hardwood forest, dominated by species such as black cottonwood, Oregon ash, and willow. Many other trees and shrubs make up riparian forests, including big-leaf maple, red-osier dogwood, blue elderberry, Douglas spirea, nootka rose, and Oregon white oak. Plant community composition is dependent on soil type, deposition, hydrology, duration and depth of flooding, and seed source. The riparian vegetation found along the slow moving valley streams are dominated by Oregon ash, with Oregon white oak on streambank edges that are slightly higher and better drained. In contrast, the riparian zones adjacent to the Willamette River in well drained gravelly soils are primarily composed of black cottonwood and willow. In 2011, the refuges contained approximately 1,807 acres of riparian habitat.

4.8.2 Historic and Current Distribution in the Willamette Valley

Historically, bottomland hardwood and riparian forests dominated the floodplains of the Willamette River and lower reaches of the tributaries. At the arrival of Euroamerican settlers, these forests made up about 10 percent of the vegetative cover of the Valley. Since the 1850s, bottomland forests and riparian areas have declined by over 70 percent in the Willamette Valley (Defenders of Wildlife 1998).

4.8.3 Refuge-specific Sites

At this time the Complex contains approximately 414 acres of riparian forest on Ankeny, 4 acres of riparian on Baskett Slough, and 1,388 acres of riparian on W.L. Finley Refuge. Riparian forest exists on Ankeny NWR in small pockets and narrow strips along the Sidney Irrigation Ditch and Bashaw Creek. A small stand of mature cottonwoods is present on the west side of Cottonwood Marsh. Areas of new riparian communities are becoming established on the edges of seasonal wetlands and are primarily made up of willow and black cottonwood. The east side of Eagle Marsh is the largest developing riparian community on Ankeny. Riparian plantings have occurred in retired farm fields in the vicinity of Rail Trail.

Baskett Slough supports relatively little riparian forest due to its agricultural history. Baskett Slough was ditched and cleared for agriculture prior to its inception as a refuge. Very few black cottonwood and Oregon ash exist on the refuge. A well-established willow community exists on the north end of Parvipes Marsh. However, new riparian communities are appearing near the edges of established seasonal wetlands. These areas are comprised mostly of willow and Oregon ash.

Riparian habitats at William L. Finley NWR are present along Muddy Creek and its tributaries throughout the refuge. Some of these riparian zones represent some of the best remaining riparian habitat in the mid-Valley. These plant communities are predominantly Oregon ash woodlands, with small pockets of Douglas spirea, willows, red-osier dogwood, black cottonwood, and Oregon white oak interspersed throughout. Edges and openings adjacent to the riparian woodlands are slowly succeeding to riparian vegetation through natural volunteer seeding, dominated by Oregon ash. A number of small fields and wetland sites on Finley NWR have been planted with riparian species with moderate success.

Some of the best examples of cottonwood gallery forests, although remnant in size compared to historic acreages on the Willamette River, are present at the Snag Boat Bend Unit of W. L. Finley NWR. These riparian areas are heavily influenced by seasonal flooding of the river. The understory is largely dominated by reed canary grass. Young willow and cottonwood plant communities are expanding on to accreting river gravel bars as the main river channel moves west and north. Much of the Snag Boat Bend unit that was formerly in agricultural use has been gradually converted to riparian species with plantings since 2003. Tree survival has been mixed, but those planted where better soils exist and summer watering occurred the first year after planting are well established. Both bare-root and container stock trees have been used, with planting either by hand crews or with a tractor-pulled tree planter.

4.8.4 Key Species Supported

Species closely associated with riparian habitats on the Valley refuges include yellow and Wilson's warbler, willow flycatcher, wood duck, great blue heron, western pond turtle, red-legged frog, and cutthroat trout. In addition, the riparian zones are favored habitat for elk, especially the Muddy Creek floodplain on Finley.

4.8.5 Refuge Management Activities

Management of riparian forests, once established, is largely passive. Understory habitats are influenced by floodwater, so are subject to seeds dropping out of the water column. Beaver activity also has an influence in most riparian zones. An uncommon storm event with ice and snow in 2005 resulted in large numbers of down trees in the Muddy Creek drainage, which filled much of the channel with large woody debris. Events such as this influence the channel morphology and flow, but are considered a natural thinning process within the riparian plant community.

The refuges have been restoring riparian habitats since the mid-1990s. Establishment of new riparian habitats through planting has the most success when watered the first year. In addition, mowing or spraying of competing grass surrounding the new plantings has been used to boost survival. Tree tubes to protect young saplings from rodent damage have been used in select locations. Tree planting efforts through 2005 emphasized species diversity, however, poor survival of many species has resulted in scaling back to fewer species. Oregon ash and black cottonwood are the primary species used to establish new riparian habitats.

4.9 Riverine

4.9.1 Overview

The refuges include or border approximately 20 miles of streams and rivers. Their characteristics vary depending on the annual hydrograph, including the annual quantity and permanence of water flowing through the channel, the velocity of stream flow, etc. These sites vary from large, dynamic river channels with extreme seasonal flow variation, to backwater channels often separated from the river mainstem, to slow-moving Valley bottom streams with meandering channels, to altered drainage channels dependent on diverted irrigation water flow.

4.9.2 Key Species Supported

Within riverine habitats, several listed fish species, including chinook salmon and steelhead, inhabit the Willamette River and Lake Creek on Snag Boat Bend. Sea-run cutthroat are a "Candidate" species, also occupying the Willamette and Lake Creek. Juvenile steelhead are found in the Sidney Ditch on Ankeny NWR. Muddy Creek at Finley Refuge supports a small population of resident cutthroat trout. Beaver and river otter are two important mammals that depend on riverine habitats. Western pond turtles depend on riverine habitats for dispersal and as seasonal movement corridors.

4.9.3 Refuge-specific Sites

William L. Finley: Although the area below the ordinary high water mark is not considered refuge property, the main stem of the Willamette River flows along the west border of the Snag Boat Bend

Unit of W.L. Finley NWR. Lake Creek, a small tributary, enters the Willamette on the eastern edge of the unit. These open water areas include unconsolidated shore and bottom, and emergent non-persistent wetland habitats. Their total area and surface configuration depends upon water levels, but averages about 20 acres. Up to six acres of gravel and sand may be exposed along the Willamette River during dry periods.

Muddy Creek flows north-south through W.L. Finley NWR for approximately 3.5 miles. It is a slow moving valley stream, dominated by a low gradient pool structure with abundant in-stream woody debris. Flood events occur regularly in the winter months such that the flow tops the bank height and spreads across the riparian floodplain. This periodic flooding helps maintain the plant communities found within the floodplain. While Muddy Creek does not support anadromous fish within the confines of the refuge, resident cutthroat trout occupy the creek and its tributaries.

W.L. Finley Refuge has several small creeks that flow from the western slopes off private land, eventually emptying in to Muddy Creek. Brown Creek and Gray Creek have seasonally variable but year-round flow. Several other small drainages are intermittent.

Ankeny: Ankeny NWR has two small perennial streams that flow through the refuge, although both are dependent on diversion flows from the local irrigation district in the spring and summer. Sidney Ditch is the main water delivery system diverting water from the Santiam River. It traverses the refuge in a managed drainage on the west side of Willow and Eagle Marsh. The diversion ends in the early fall and the water flow is significantly diminished. Bashaw Creek begins on the south end of Sidney Ditch and flows westerly across the refuge in a meandering channel until it exits the refuge on Marlett Road. It supplies irrigation water to areas downstream of the refuge.

Baskett Slough: There is no habitat classified as riverine on Baskett Slough NWR.

4.9.4 Refuge Management Activities

The management of these habitats on the refuges is generally passive or involves management of the watershed as opposed to the actual stream itself. Despite this, there are a number of management concerns regarding riverine habitats which include maintaining adequate in-stream flow to sustain native aquatic communities; exceeding temperature thresholds for cold-water fish; contamination from agricultural runoff, including herbicides, fertilizer, and sediment; and potential entrapment of native fish in man-made impoundments following flood events. Where fish entrapment may occur, the refuge water management includes impoundment drainage/refilling following flood events, steady water outflow through the spring, and alterations to spillways and water control structures. The refuge has taken steps to reduce sediment and chemical runoff by establishing riparian/ vegetative buffers, restricting pesticide use, and adjusting cropping practices.

4.10 Canada Geese and Other Waterfowl

4.10.1 Geese

The three Willamette Valley refuges were initially established in the mid-1960s to provide winter foraging and roosting areas for dusky Canada geese. Only about 15,000 geese wintered in the Willamette Valley area at that time. Changes in migration patterns, especially with cackling geese, have resulted in a current estimate of total wintering geese of over 200,000 for this same area.

Dusky Canada geese have declined significantly in recent years, largely attributed to changes to their breeding grounds on the Cooper River Delta in Alaska as a result of uplifting from the 1964 earthquake. Their population fluctuated between 10-20,000 birds, but has recently fallen below 10,000 birds (2009 estimate was 6,709). They make up less than 10 percent of the winter flock in the Valley and are below Pacific Flyway objectives. Duskies generally arrive in the Willamette Valley in late October-early November, and remain until they migrate back north in early April. Of the three refuges, Finley supports the largest concentration of dusky Canada geese.

The cackling goose (cackler) is now the most abundant goose on all three refuges. In addition to the cacklers and duskies, other species of Canada geese that regularly winter on the refuges in large numbers include Taverner's, lesser, and western (great basin). Other geese found mixed in with flocks of Canada geese include white-fronted, snow, Ross' geese, and an occasional black brant. White-fronted geese are more common on the spring migration in late April and early May. Most migratory geese leave the Willamette Valley for nesting grounds by early May. Non-migratory western Canada geese are present year-round and nest at each of the three refuges. All of the geese forage on agricultural crops grown through the farming program and roost on refuge wetlands.
The mid-winter waterfowl survey, conducted since the 1950s, is a nationwide coordinated survey conducted in early January of each year. In the Pacific Flyway, waterfowl surveyors cover all important waterfowl habitat throughout each state targeting the first week in January. Although the numbers derived from mid-winter surveys are considered underestimates of abundance (not all areas are surveyed and large flocks of waterfowl are generally underestimated), they offer reasonable indices of change in waterfowl abundance.

Table 4-2 shows the mid-winter survey counts for geese on each of the three refuges for the last 10 years as well as the ten year average. Figure 4-1 shows the mid-winter survey counts for the last 10 years for the Willamette Valley section that stretches from Eugene to McMinnville.

It should be noted that the mid-winter survey serves as an index for comparative purposes and is not necessarily representative of the number of ducks and geese that may be present within the entire geographic area. Refuge counts for geese have generally ranged between 60,000 – 100,000 over the past several winters.

Depredation Concerns: Due to increasing numbers of Canada geese in the Valley and crop depredation complaints from grass seed farmers, a Depredation Plan was prepared in 1998. Changes to the plan are being considered at present because of Alaskan tribal interests in cackler populations and the acceptance by all parties that goose migration patterns have permanently changed. Restrictions on Canada goose harvest, especially duskies, have resulted in special goose hunting regulations for the Willamette Valley.

4.10.2 Ducks

Ducks are plentiful in late fall through the winter months, utilizing refuge wetlands and flooded grass fields. The average number of ducks wintering in the Willamette Valley over the last 10 years has been about 125,000 (USFWS 2010b). Numbers vary greatly depending on habitat conditions and yearly variables such as weather and breeding production. Using the mid-winter waterfowl survey numbers as an index, the number of wintering ducks in the Willamette Valley has more than doubled when compared to the early 1990s (see Figure 4-1). Although this increase is partially attributed to increased flyway populations, it also reflects the significant wetland habitat developments on the Valley refuges in the late 1990s and additional habitat restoration efforts on both refuge and private lands over the past decade. The most abundant duck species found on the mid-winter survey are the green-wing teal, northern pintail, mallard, and American wigeon. Of the 20 duck species that can be found wintering in the Willamette Valley, 13 of those have been documented as breeders on refuge lands.

Table 4-2 shows the mid-winter survey counts for ducks on each of the three refuges for the last 11 years as well as the past ten year average. Figure 4-1 shows the mid-winter survey counts for the last 10 years for the Willamette Valley section that stretches from Eugene to McMinnville.

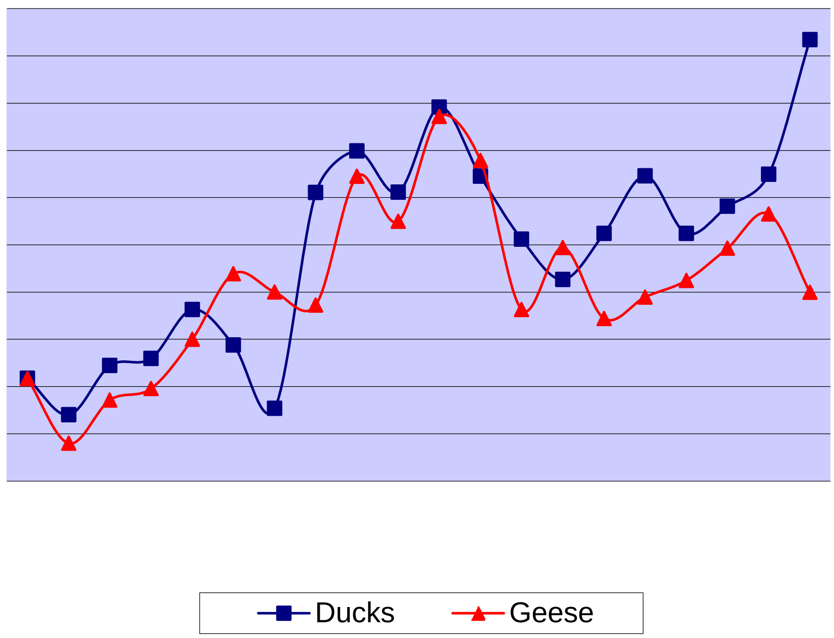
Table 4-2. Willamette Valley Refuge Complex: Mid-winter Waterfowl Counts (1999-2010)

Ducks					Geese				
	Ankeny	**Baskett**	**Finley**	**Total**		**Ankeny**	**Baskett**	**Finley**	**Total**
1999	13,288	15,895	36,840	66,023	**1999**	11,096	4,941	17,785	33,822
2000	28,620	25,319	42,889	96,828	**2000**	13,880	6,550	10,088	30,518
2001	19,510	26,000	35,330	80,840	**2001**	10,020	9,905	20,620	40,545
2002	37,240	20,486	16,649	74,375	**2002**	15,243	4,331	5,377	24,951
2003	17,567	22,350	16,281	56,198	**2003**	12,075	11,970	11,879	35,924
2005	10,454	18,253	37,349	66,056	**2005**	13,645	2,889	17,414	33,948
2006	14,979	17,310	22,324	54,613	**2006**	9,930	3,278	1,335	14,543
2007	5,595	8,435	17,644	31,674	**2007**	4,223	9,303	2,780	16,306
2008	5,394	13,392	25,879	44,665	**2008**	4,080	7,440	16,999	28,519
2009	9,841	16,790	33,128	59,759	**2009**	2,783	14,960	17,835	35,578
2010	26,267	16,561	75,173	118,001	**2010**	13,227	2,105	9,774	25,106
10 Year AVERAGE	**16,249**	**18,423**	**28,431**	**63,103**		**9,698**	**7,557**	**12,211**	**29,465**

4.10.3 Swans

Wintering tundra swans roost on the large refuge wetlands, with peak numbers at Finley NWR in December averaging around 1,000 birds. Smaller numbers of swans can be observed at Ankeny and Baskett Slough NWRs from October through the spring. They traditionally move off refuge during the day to feed on nearby agricultural lands when winter rainfall floods the fields. Occasionally, trumpeter swans may be observed mixed with tundra swans.

Figure 4.1 Mid-Winter Waterfowl Aerial Survey Results for the Willamette Valley (Eugene to McMinnville), 1990-2010



Source: Willamette Valley NWRC files
Notes: No Willamette Valley Mid-winter Survey was conducted in 2004. Significant wetland restoration on the WVNWRC began in 1995.

4.11 Waterbirds and Shorebirds

4.11.1 Waterbirds

Commonly observed waterbirds on the Willamette Valley refuges include great blue and green herons, great egrets, American bittern, American coot, Virginia rail, sora, pied-billed, horned, eared, and western grebes. Double-crested cormorants are observed in small numbers at each of the three refuges. Eleven species of gulls and terns are all generally rare visitors to the refuges. Black terns have nested on Baskett Slough in the past, but have not been observed in recent years. Heron rookeries are present adjacent to Muddy Creek at Finley and on the west side of Snag Boat Bend. However, Snag Boat Bend's heronry has not been active since 2007, possibly due to the close proximity of increasing bald eagle nests on the Willamette River. The heronry adjacent to Muddy Creek may also be influenced by the close proximity to an eagle nest. There is also a small heronry located on the northern butte at Baskett Slough.

4.11.2 Shorebirds

Of the 16 species of shorebirds either found as migrants or wintering on refuge, dunlin are the most numerous (past averages have been 10-20,000 in winter months). In 1996, wintering dunlin at Ankeny exceeded 22,000 (K. Viste-Sparkman pers. comm.). In part due to natural succession of wetland vegetation over subsequent years and a decrease in open mudflats, wintering dunlin numbers at Ankeny have declined, dropping to less than 8,000 in 2007 (M. Monroe pers. comm.). Periodic marsh rehabilitation efforts, usually spring drawdowns combined with summer discing to set back undesirable wetland vegetation, are expected to return some of the wetland margins to early successional mudflats and could result in a rebound of wintering numbers of dunlin. However, wintering dunlin are transitory and have been documented using wetlands across the Valley that have been restored under the NRCS Wetland Reserve Program and the Partners for Fish and Wildlife Program.

Shorebird species including yellowlegs, sandpipers, and dowitchers pass through the refuges in small numbers en route to wintering or nesting grounds, with concentrations in May and late summer. Nesting shorebirds include killdeer, black-necked stilt (Baskett Slough), spotted sandpiper, and Wilson's phalarope (Ankeny and Baskett Slough). Killdeer are a year-round resident to the three refuges, nesting on road sides and gravel pullouts and wintering in high numbers on grazed farm fields (Sanzenbacher and Haig 2002). Killdeer nests are subject to both predation and accidental destruction by vehicles because of their preference for open nest sites on gravel. Wilson's snipe were documented nesting at Ankeny NWR in 2007 and may nest at other refuges where suitable habitat exists.

Water management to expose mudflats during the late winter and early spring brings the risk of allowing reed canary grass to germinate and become established. Any drawdowns of managed impoundments need to be of short duration to minimize the risk, and also include the ability to re-flood the exposed area to drown any potential seedlings that germinated. Exposed areas that are disked annually in the summer could provide additional shorebird habitat. Although the Valley refuges are not significant breeding sites for shorebirds, these species provide a wildlife viewing opportunity not commonly found in the Willamette Valley. Rare breeders found at Baskett Slough include Wilson's phalarope and black-necked stilts, both species normally found east of the Cascades. Wilson's snipe have been documented breeding on Ankeny and likely are rare breeders on the other two refuges. The Refuge Complex has taken measures to protect these breeding populations from disturbance by restricting public access to wetlands on Baskett Slough during the spring and summer.

4.12 Threatened, Endangered, and Rare Species

4.12.1 Federally Listed Plants

Golden paintbrush: Golden paintbrush is a federally threatened species that had been extirpated from Oregon. The historic range included the upland prairies of the Willamette Valley. As part of a common garden experiment developed to determine appropriate seed sources and recovery sites, golden paintbrush was out-planted on several sites at Baskett Slough and W.L. Finley NWR. Although the study has been completed, experimental populations were retained on both refuges. Management has included fall mowing and in some years, prescribed fire. It appears that plants are surviving well at both refuges, and future plans include expansion of those populations with out-planting in order to work towards sustainable populations specified in the Recovery Plan (USFWS 2010a).

Bradshaw's desert parsley: Also known as Bradshaw's lomatium, this species was federally listed as endangered in 1988. It is a perennial forb that occurs in seasonally saturated or flooded prairies with dense soils. Once widespread in the Willamette Valley, Bradshaw's desert parsley populations declined due to land development for agriculture, industry, and housing. Bradshaw's desert parsley is found at both Finley NWR and Oak Creek, with the population at Oak Creek the largest in Oregon. The populations at Finley NWR occur along North Prairie Road, on the edges of the Willamette Floodplain RNA near Muddy Creek, and there is a newly established population in Field 31. Management actions to increase the distribution and abundance include prescribed fire, mowing, and supplemental seeding. Vole herbivory is one of the current management challenges, but site disturbance that reduces thatch and provides sites for seedlings has been effective.

Willamette daisy: The Willamette daisy was listed as endangered in 2000. It is a perennial forb found on both wet and upland prairies. The loss of native Willamette Valley prairie is the primary reason for the decline, and it appears to be a poor competitor with non-native grasses. A significant population of Willamette daisy is found on the native upland prairies of Baskett Slough NWR. Recent efforts have included out-planting of Willamette daisy in a common garden study to compare success in various sites. Management efforts to protect and maintain Willamette daisy populations include herbicide treatments of tall oatgrass where it threatens the plants, mechanical treatments to reduce woody vegetation, and conducting prescribed burns.

Kincaid's lupine: Kincaid's lupine, a threatened species, was also listed in 2000. It is found in native upland prairie of the Willamette Valley and is the key host species for the endangered Fender's blue butterfly. Baskett Slough NWR has a small population of Kincaid's lupine, but many appear to have hybridized with spurred lupine, a closely related species. Small out-planted populations are present on Pigeon Butte on Finley NWR. Similar to other prairie forbs, degradation of native prairie habitat from the encroachment of woody vegetation and invasive species is a significant threat to Kincaid's lupine. Management actions include mowing and prescribed burning and selected herbicide treatment of invasives that threaten lupine populations.

Nelson's checker-mallow: Nelson's checker-mallow was federally listed as threatened in 1993. Within the Willamette Valley, Nelson's checker-mallow most frequently occurs in Oregon ash swales and meadows with wet depressions or along streams. It also populates wetlands within remnant prairie grasslands and roadsides. Due to an intolerance of encroachment of woody vegetation, Nelson's checker-mallow has declined. Efforts to conserve and restore this threatened species have been undertaken at Finley, Ankeny, and Baskett Slough NWRs, including annual mowing, prescribed fire, extensive out-planting of nursery plants, protection of roadside populations, and plant relocation as needed to prevent mortality from flooding or agricultural activities.

4.12.2 Federally Listed Wildlife and Fish

Fender's Blue Butterfly: The Fender's blue butterfly is a Willamette Valley endemic species thought to be extinct until it was rediscovered in 1989 in native prairie remnants. In 2000, the butterfly, along with its required larval food plant, Kincaid's lupine, were listed as endangered under the U.S. Endangered Species Act. The population on Baskett Butte, part of Baskett Slough NWR in Polk County, remains as the single largest population within its range, estimated at 1445 in 2007 (Hammond 2007). The butterflies at Baskett Butte depend almost completely on spurred lupine, an alternate host plant. Pigeon Butte on Finley has suitable habitat for Fender's but is not currently inhabited. That site has been identified as a major re-introduction site in the Recovery Plan (USFWS 2010a).

Due to its limited dispersal abilities and the fragmented landscape, the recovery of the Fender's blue butterfly depends on protecting and restoring native prairie habitat. At Baskett Slough, this involves using mowing and prescribed fire to remove woody vegetation and control of invasive species that have encroached upon the prairie, especially tall oatgrass. The Fender's blue butterfly does not disperse linearly, therefore creating a traditional linear corridor for butterfly dispersal would not be appropriate because the species would not stay within it (Schultz 1998). Instead, "islands" of native prairie with host lupine and nectar species may be the best solution. Baskett Butte provides one of the largest of these "islands" in the Willamette Valley, helping to sustain the population of Fender's blue butterfly. The suitable habitat can be slowly expanded with the conversion of retired agricultural lands to native prairie.

Threatened and Endangered Fish: The Refuge Complex hosts several fish species listed as threatened or endangered. Chinook salmon (Upper Willamette River Ecological Significant Unit-ESU) and steelhead (Upper Willamette River ESU) both inhabit the Willamette River and Lake Creek on Snag Boat Bend. Sea-run cutthroat are a "Candidate" species, also occupying the Willamette and Lake Creek. Juvenile steelhead (Upper Willamette River ESU) also occur in the Sidney Ditch on Ankeny NWR, accessing it through the diversion structure at the Santiam River.

In addition to these anadromous species, the refuges support one resident species of fish currently listed as threatened. The Oregon chub is a small minnow endemic to the Willamette River Basin in western Oregon and was listed as endangered in 1993. Critical habitat was designated for Oregon chub in 2010 and includes portions of both Ankeny and W.L. Finley Refuges.

Oregon chub favor off-channel habitats such as beaver ponds, oxbows, side channels, backwater sloughs, low gradient tributaries, and flooded marshes (USFWS 1998). These habitats have been fragmented and/or lost through river channelization, wetland drainage, agriculture, and settlement. The introduction of non-native warm water fishes into the Willamette Valley has resulted in depredation and competition problems for Oregon chub.

The refuge has been working closely with ODFW on chub management since the mid-1990s, including population monitoring, genetic studies, and population introduction and supplementation. One natural population and two introduced populations at W.L. Finley NWR totaled an estimated 3160 chub in 2009, although counts vary annually (Oregon Department of Fish and Wildlife 2009). The one introduced population at Ankeny NWR has become one of the largest in existence, averaging over 30,000 chub (2009 estimate of 46,560). Baskett Slough NWR does not support any Oregon chub populations. All refuge populations are large enough to significantly contribute to recovery goals within the respective watersheds. Recovery efforts throughout the Willamette Valley have been successful enough to allow the Service to downlist the status of the Oregon chub in 2010 from endangered to threatened.

4.12.3 Other Rare Species

Streaked Horned Lark: The streaked horned lark, a subspecies of the horned lark, has undergone extensive range retraction and probable population decline in the previous half-century. The streaked horned lark was listed in 2008 as a Candidate for protection under the U.S. Endangered Species Act. Fewer than 1,000 individuals may remain (Stinson 2005).

The streaked horned lark prefers flat, sparsely vegetated ground on which to forage and nest. If the vegetation is above a few inches high, the lark will avoid the habitat because of a decrease in foraging and predator detection abilities. The Willamette Valley NWRC provides large tracts of suitable habitat for the streaked horned lark. Flat fields planted with grass seed crops but then intensely grazed by wintering geese, are preferred foraging grounds for the lark. During the breeding season, the three Willamette Valley Refuges provide 3 of only 5 known geographically consistent breeding sites for the streaked horned larks (Moore 2008).

The Willamette Valley NWRC, specifically Finley and Baskett Slough NWRs, have the potential to increase the abundance of streaked horned larks with selective management. If Baskett Slough and Finley NWRs are considered crucial breeding sites and management activities are implemented to support these birds, this may help facilitate the removal of the lark from the Candidate list (Moore 2008). The refuge is currently working with Oregon State University and streaked horned lark researchers to monitor and assess breeding success in agricultural fields. In addition, efforts are being made to provide suitable horned lark habitat in agricultural fields where extensive grazing by geese has eliminated crop yields for cooperative farmers. These include Field 8/12 on W.L. Finley NWR and Dusky Prairie at Baskett Slough NWR.

Peacock larkspur: Peacock larkspur, though not federally listed, is considered a Service Species of Concern and is listed as endangered under the Oregon Endangered Species Act. A native, perennial forb in the buttercup family, peacock larkspur is a Willamette Valley endemic species adapted to prairie conditions. The largest population within its range is found on Finley NWR (McKernan 2004). In 2004, peacock larkspur tubers were out-planted at Finley and Ankeny NWRs with limited success. Surveys at Finley NWR have shown that prescribed fire benefits the species (Finley and Ingersoll 1994).

Extirpated Species: The Oregon spotted frog was last found on W.L. Finley NWR, but currently is considered extirpated from the Willamette Valley.

4.13 Fisheries

Anadromous Fish: The Snag Boat Bend Unit of William L. Finley Refuge is the main location on the Refuge Complex that supports anadromous fish. The Willamette River and the backwaters of Lake Creek support steelhead, chinook salmon, and sea-run cutthroat trout, seasonally for returning adults and year-round for rearing juveniles. Muddy Creek on W.L. Finley does not support chinook although juvenile fish are known to use areas downstream of the refuge in the winter for rearing (see 4.12.2 for additional information). Baskett Slough historically supported anadromous fish that migrated up Rickreall Creek from the Willamette River. Although Baskett Slough is still classified as a migratory fish-bearing stream by ODFW, only warm-water exotic species have been present on the refuge since establishment because of fish barriers downstream off-refuge.

Muddy Creek supports a small population of cutthroat trout, although most are likely resident rather than sea-run strains. The summer water temperatures are marginal for survival of cutthroat, so it is likely that most fish retreat to cooler waters of headwater streams or to the mainstem Mary's River and Willamette River. In the winter, cutthroat are known to scatter widely out of the main stream channels to feed in off-channel floodwaters.

Other Fish Species: A number of wetland impoundments and stream channels support a small number of fish species, mostly introduced. Mosquito fish, carp, and brown bullheads are the most widespread. Carp are found in the lower Gray Creek drainage on Finley and within the impoundments along Baskett Slough. Periodic de-watering of seasonal wetlands helps to control carp populations and other warm-water exotic fish. Crappie and bluegill are also located within several wetlands on Finley and Baskett Slough. A number of small native minnows can be found in the Muddy creek drainage on W.L Finley NWR and in Sidney Ditch at Ankeny. According to a survey performed by the Department of Environmental Quality in 2001, reticulate sculpin were the most abundant vertebrates in Muddy Creek (DEQ 2001). See 4.12.2 for information related to Oregon chub, a federally listed threatened species that is found on both Ankeny and Finley Refuges.

4.14 Other Wildlife and Plants

4.14.1 Landbirds

Landbirds can be found in all habitats of the refuges, including riparian woodlands, agricultural farm fields, oak savanna, and seasonal and permanent wetlands. Over 128 species of resident and migrant landbirds have been observed on the Willamette Valley refuges, including 22 species of raptors (owls, hawks, falcons, and eagles), 15 nonpasserines (woodpeckers, hummingbirds, kingfishers, doves, and pigeons), and 91 species of passerines (e.g., sparrows, finches, warblers, flycatchers, and swallows). Long-distance migrants travel between breeding grounds in temperate North America and wintering grounds in Central and South America. Resident species both breed and winter in the local area, migrating short distances.

In partnership with USGS, W. L. Finley NWR has operated three banding sites as part of the Monitoring Avian Productivity and Survivorship (MAPS) program. Trapping using mist nets is conducted following protocols established by the Institute for Bird Populations to determine breeding status of birds observed at each site. Banding started on Pigeon Butte in 1998 and in recent years has included Oregon white oak habitat where restoration was in progress. Results of pretreatment captures were compared to post-treatment results to determine changes in species composition and breeding success. Snag Boat Bend has had a MAPS site from 2001-2008. With over 3,400 captures representing 42 species in those seven seasons, it has been determined that at least 35 species of songbirds breed at Snag Boat Bend. A new Finley MAPS site was established in 2009 in oak habitat at Brown Creek Knoll. Future plans include continuing trapping and banding at that site for at least 5 years, and similar to Pigeon Butte, examining the effects of oak restoration on breeding songbird populations and composition (Hagar 2008).

Raptors: Raptors reside on the refuges year-round as well as use refuge land during migration to and from their nesting grounds. Greater species diversity and larger numbers are observed in the fall and winter months. Nesting raptors include barn, western screech and great-horned owls, osprey, northern harrier, red-tailed hawk, Cooper's hawk, American kestrel, and bald eagle. Bald eagles have nested in recent years on Finley but reside year-round on all three refuges with nests on adjacent waterways to both Ankeny and Baskett Slough. Annual bald eagle surveys are conducted each January as part of a coordinated statewide effort. Winter months draw small concentrations of eagles, and an occasional peregrine falcon, attracted to the refuge's abundant waterfowl and shorebirds. Rough-legged hawks are common winter residents on all three refuges, but numbers fluctuate depending on migration. Osprey nest on nearby Willamette and Santiam rivers, including on nest structures at Snag Boat Bend, and can often be seen fishing the larger impoundments at each of the refuges throughout the breeding season.

In recent years, observations indicate that red-shouldered hawks have expanded their range and are nesting at Finley and Ankeny. Recent sightings of juveniles also indicate that both barred owl and long-eared owl have actively nested on Finley. Barred owls are becoming more common in the foothills of the Willamette Valley and are well adapted to the habitats Finley provides. Long-eared owls are a rare sighting in the valley, so the discovery of juveniles at Snag Boat Bend in 2008 is considered rare. Short-eared owls and white-tailed kites are known to forage and roost on wet prairies and seen occasionally at each of the three refuges, usually in fall/winter months. Barn owls are known to roost in the three historic barns on W.L. Finley and consistently nest in the Cheadle Barn.

Non-passerines: Rufous and Anna's hummingbirds are fairly common in the spring and summer, as is the Vaux's swift. Woodpeckers include the northern flicker, red-breasted sapsucker, and downy, hairy, pileated, and acorn woodpeckers, with rare occurrences of Lewis' woodpeckers in the fall. The colonies of acorn woodpeckers at Finley are considered important anchor populations, potentially providing birds to pioneer to oak restoration sites across the refuge. Belted kingfishers can be seen at all refuges, but more commonly at Finley and Snag Boat Bend. Band-tailed pigeons nest at Baskett and Finley, and feed on cascara, elderberry, dogwood and madrone (Rodrick and Milner 1991). Mourning doves are commonly found at all three refuges.

Passerines: Several habitat types support 91 species of songbirds, most of which are observed during the spring and summer months. Sixty-three species have been documented nesting on one or more of the refuges. Rarities include black phoebes at Ankeny and Finley, grasshopper sparrows at Finley and streaked horned larks at all three refuges. Western meadowlarks nest and winter on remnant prairie pieces on Finley and Baskett Butte. Meadowlarks have also expanded their populations on Baskett Slough. The refuges support a diversity of warblers, most of which are migrants. Four species of swallows can be seen foraging over the many wetlands and yellow-breasted chat and wrentits can be heard on territories at Finley. Oak savanna provides critical habitat for nesting white-breasted nuthatch, black-throated gray and orange-crowned warblers, western wood-peewee, and western bluebird.

White-breasted nuthatch, acorn woodpecker, and western wood-pewee, all Service Species of Concern, depend on large, open canopy, savanna type oaks for both nesting and foraging. Restoration efforts have been shown to increase the oak obligate bird species by up to 200 percent on Finley NWR (Altman and Stockenberg 2008). Orange-crowned warblers depend on oak woodlands with a diverse native understory.

4.14.2 Other Wildlife

Land mammals: Forty-three species of land mammals have been documented on the refuges ranging from large mammals such as elk, blacktail deer, black bear, and coyotes, to small shrews and several species of bats. Native western gray squirrels can be found in oak woodlands on Baskett Slough and W.L. Finley NWR. An occasional mountain lion has been reported at both Finley and Baskett Slough. Blacktail deer are common at Baskett Slough, and less numerous at Finley and Ankeny. When Finley NWR was established in 1964, blacktail deer were abundant. The decline is attributed to overall regional declines in blacktails due to disease and low recruitment, as well as possible displacement by an increasing elk herd. Bobcats are common at Finley. River otter, mink, and beaver inhabit the wetlands and stream channels at all three refuges. Coyotes are also found at all three refuges, but are more commonly seen at Ankeny.

The interspersion of forests, grasslands, and water on Finley provide excellent habitat for Roosevelt elk. In 1989, the herd numbered around 20, with their origin thought to be from the Coast range foothills. The herd grew to approximately 100 animals over the next decade. In 2010 the population was estimated at 140-160 (J. Beall pers.comm.), depending on calf production and survival and off-refuge harvest during hunting season. During spring and summer, the herd is split up with many elk found in the prairie and riparian areas. In the winter, elk can be found in larger numbers traveling between upland forest, grass fields, and riparian areas. The prairies are a common location for calving in late May and early June.

There has been concern on behalf of ODFW and some neighboring landowners regarding the expanding elk herd and potential crop depredation, usually to row crops often grown by adjacent duck hunting clubs. ODFW currently considers the Willamette Valley to be a “zero” elk management zone. Stout electric fences are required to protect these crops from elk. ODFW expanded off-refuge hunting opportunities in 2002 by extending limited entry seasons from August-March. Although this resulted in increased harvest for the first 4-5 years, most hunters harvested large branched antlered bulls, including the world record. The herd continued to grow and is presently dominated by cows and young bulls (J. Beall pers.comm.). Attempts by ODFW to capture and radio-tag elk calves on the refuge in 2003 were unsuccessful. The refuge and ODFW are currently developing a cooperative elk management plan for the refuge herd to examine alternatives to manage the population.

Small numbers of elk can be seen occasionally on both Ankeny and Baskett Slough. Elk on Ankeny are thought to come from a herd in the nearby hills east of Interstate 5 and spend most daylight hours within the riparian areas on the east side of the refuge, venturing into the open fields under the cover of darkness. On Baskett Slough, the elk have a similar pattern of staying within the woodlands of Baskett Butte by day and using the open fields at night. The Baskett elk travel freely between the refuge and the wooded areas to the north.

Bats such as the little brown bat and Townsend’s big-eared bats are present at Finley as the historic buildings and barns provide good nesting and roosting habitat. Other bats also inhabit snags throughout the refuges.

Reptiles and Amphibians: Twenty-one species of reptiles and amphibians occur in the Willamette Valley, most of which have been observed on the Valley refuges. Northern red-legged frogs and Pacific chorus frogs inhabit riparian areas and utilize many of the seasonal and permanent wetlands as breeding habitat. Rough skinned newts, northwestern salamanders, and the introduced bullfrog are other common amphibians found on the refuges. The Oregon spotted frog was last found on W.L. Finley NWR, but is now extirpated from the Willamette Valley. Much of the native wetland habitat in the Valley has been degraded due to exotic plants like reed canary grass (McAllister and Leonard 1997), and drained or ditched for agriculture. The agricultural development and use of pesticides and fertilizers has led to elevated nutrient levels in Muddy Creek, degrading aquatic conditions for amphibians and turtles (USFWS 2007). Many reptiles found in the Willamette Valley occur more frequently in open habitats, suggesting that succession to closed canopy conditions (e.g., the loss of oak savanna) may be restricting their range and numbers (Pacific Wildlife Research Inc. 1999). Oak restoration efforts at Baskett Slough and Finley NWRs, which result in more open savanna or woodland conditions, may therefore benefit some reptile species.

Western fence lizards can be found on Pigeon Butte in the remnants of the old quarry. Other common reptiles present in the grassland habitats on the refuges include gopher snakes, garter snakes, and racers.

William L. Finley NWR, including Snag Boat Bend, provides important habitat for the western pond turtle (Service Species of Concern) and supports a small but apparently stable population. Turtles reside primarily in slow-moving streams, sloughs, wetlands, and ponds but need terrestrial habitat for nesting, dispersal, and dormancy during the heat of the summer and in winter months (Hays et al. 1999). Emergent logs or boulders on which to bask are important habitat features for the western pond turtle. Individuals have been observed at various wetlands and along Muddy Creek, and in the river backwaters at Snag Boat Bend. Studies conducted by Pitkin (1993) and Drut (1995) at W.L. Finley NWR showed that the turtles overwintered on the refuge and, though no nests were located, the telemetry data was highly suggestive of nesting behavior. The extensive wetlands and high quality nesting habitat at W.L. Finley NWR suggest that the refuge could support a larger population of western pond turtles (Rosenberg 2009).

The Willamette Valley NWRC provides vital habitat for the northern red-legged frog, also a Service Species of Concern. Red-legged frogs have declined due to a number of factors including habitat loss, hydrological alteration of wetlands, establishment of non-native predators, and widespread application of fertilizers and pesticides. Management of permanent and seasonal wetlands with adjacent riparian areas on the refuge provides quality habitat. Ankeny and Finley NWR have a number of northern red-legged frog breeding sites and have been the focus of numerous surveys and reproductive monitoring efforts. Continuing studies by the USGS at both refuges provide important biological data on the northern red-legged frog, which is especially important in light of the paucity of data available on this species. The surveys revealed that the presence of red-legged frogs was closely associated with riparian woodlands and wetlands in close proximity to riparian woodlands. Measures to protect these populations have included retaining water in seasonal wetlands through the end of June in order to avoid stranding tadpoles prior to emergence.

Invertebrates: Both terrestrial and aquatic invertebrates are an important food source for many species found on the refuges. A number of studies have been conducted over the past decade, but there is no comprehensive list of invertebrates found on the Refuge Complex. Aquatic invertebrate surveys were conducted in 2007 and 2008 by USGS researchers in refuge wetlands as part of a valley-wide study. Additional aquatic invertebrate sampling was conducted by the Xerces Society as part of an OWEB grant (Xerces Society 2008). A two-year butterfly composition study was completed in 2001 on W.L. Finley NWR. Dragonflies and damselflies were inventoried across the complex in 2005 to help with preparation of an identification guidebook (S. Gordon pers. comm.). Fender's blue butterflies are surveyed annually on Baskett Butte.

Bryophytes: The protection of natural and pre-settlement plant communities at Finley NWR has resulted in diverse substrates that facilitate a rich bryophyte flora (Merrifield 2001). Eighty-four moss and 24 liverwort species have been collected and cataloged.

4.15 Exotic, Invasive, and Nuisance Species

4.15.1 Exotic and Invasive Plant Species

The Willamette Valley NWR Complex encompasses a number of diverse habitat types, all of which are threatened by exotic and/or invasive plant species. An exotic species may be defined as any species occurring in a particular ecosystem or habitat that is not native to that ecosystem or habitat. An invasive species may be defined as an exotic species whose introduction is likely to cause economic or environmental harm or harm to human health (USFWS Executive Order 13112). The

State of Oregon Department of Agriculture maintains an official list of noxious weeds, but it is not all-inclusive for invasive species that threaten refuge habitats. The Refuge Complex strives to maintain healthy plant communities to ensure that habitat is available for native flora and fauna, and management of invasive plants is a major strategy. The management strategy utilized is Integrated Pest Management (IPM), an ecological approach that uses a number of control methods, including mechanical treatments, herbicide application, manual removal, prescribed burning, and biological control. Preferred methods are those that have the least environmental impact while effectively controlling invasive species. Early detection of new invasions is considered critical for cost-effective control and elimination.

Seventeen invasive species have been identified by refuge staff as those posing serious threats to the various habitats within the Refuge Complex, including Armenian (Himalayan) blackberry, black locust, Canada thistle, English ivy, false brome, Fuller's Teasel, harding grass, Italian prune, Japanese knotweed, meadow knapweed, milk thistle, periwinkle, purple loosestrife, reed canary grass, Scotch broom, tansy ragwort, and yellow flag iris. Efforts of varying intensity have been conducted to control or eliminate almost all of these invasive plants. However, concentrated efforts have been made towards those particularly incursive species that pose more immediate threats to habitat function or rare species population viability.

Armenian (Himalayan) blackberry, commonly spread across the upland habitats of all the Valley refuges, poses a serious threat by forming dense thickets in upland prairies and woodlands, changing the habitat characteristics. Native prairie management and restoration efforts are hindered by this highly successful competitor that tends to dominate the upland plant communities. Control efforts include mechanical treatments including mowing, prescribed burning, and selective herbicide application. False brome is a noxious weed that can quickly become the dominant plant in various habitats because it tolerates the shade of woodlands as well as open grasslands. It has become widespread in parts of the Willamette Valley, and spreads by wildlife and human activity. Though not abundant within the Refuge Complex (documented in small patches on Finley), its high potential for invasion and dominance has made false brome a priority for prevention and control efforts. Herbicide spot treatment is the main control strategy. Meadow knapweed poses a particularly serious threat at Finley, and is also found at Ankeny NWR. It was once widespread on selected oak savanna habitats, but eradication efforts have reduced it to small patches. Remnant populations still have the potential for re-infesting large acreages if control measures are not continued. The only current effective method to control meadow knapweed is herbicide application. Canadian thistle is a state-listed noxious weed that is also widespread on the refuges. Selective herbicide application is used in some areas, and biological controls have been recently introduced by the State of Oregon.

Purple loosestrife is an emergent aquatic plant of Eurasian origin and is listed as a noxious weed in Oregon. Capable of rapidly degrading wetlands, purple loosestrife will quickly choke out native vegetation and reduces the overall wetland habitat quality. This invasive plant is present at all three refuges of the Willamette Valley Complex, although it is rare at Finley. Chemical, manual, and biological control measures are all utilized for control. Beetles have been found on plants in Ankeny and are widespread on plants at Baskett Slough. Purple loosestrife was once widespread in Morgan Reservoir at Baskett Slough, but the biological controls have almost completely eliminated it from that site. In 2000, a study at Baskett Slough demonstrated that, though the number and effectiveness of the two beetle species used to control purple loosestrife varied through time, the control effects were significant (McEvoy and Marjolein 2000). In general, their recommendation is to let the beetles spread and infest the plants over time, because that will be the most efficient and cost-effective control.

Nationwide, impacts from invasive species are considered to be the most critical issue facing wildlife refuges, especially in ecosystems with native threatened and endangered species (USFWS 2010a). Management actions at the Willamette Valley NWR Complex reflect an awareness of the significant threat invasive plant species pose to natural ecosystems. Continued efforts of prevention, education, research, control, and monitoring are a necessity if native ecosystems are to be preserved. Since 2008, the Refuge Complex has secured special funding from several sources including a National Fish and Wildlife Foundation grant to put additional efforts toward control of invasive plants. Much of the effort has used volunteers to accomplish tasks related to survey, mapping, and monitoring. The additional funds allowed the Refuge Complex to hire temporary staff to implement control measures and purchase additional herbicide. See Appendix F, Integrated Pest Management Plan, for further discussion.

4.15.2 Exotic Wildlife Species

Nutria are the most abundant exotic mammal species on each of the refuges as they are wetland-dependent, using islands and dikes to dig burrows for denning. In addition to damaging water management facilities such as dikes, nutria displace the native muskrat.

Farm birds such as domestic geese, turkeys, and chickens, and feral cats can periodically be found near pullouts after being abandoned. Invasive birds such as starlings and house sparrows are resident breeders on the refuges, with their aggressive cavity nesting behavior competing with native cavity nesting birds such as wood ducks, American kestrels, white-breasted nuthatches, western bluebirds, and swallows. Eastern cottontail, Virginia opossum, and Norway rat are all non-native species that have expanded their ranges to include the refuges.

Non-native bullfrogs are widespread in permanent wetlands and may threaten populations of native frogs as well as the western pond turtle by predation. Competition between larval bullfrogs and larvae of native amphibians may also be a factor in the decline of native species. The red-eared slider is a recently established exotic species in the Valley, and preliminary studies indicate they have a detrimental impact on western pond turtle populations (K. Beal pers. comm.) The status of the red-eared slider on refuge lands is unknown at present, but if present they are not common. Non-native fish including carp and other warm-water species are discussed in Section 4.13.

The Refuge Complex periodically reduces nutria populations in order to limit the damage to water management facilities. Extended periods of ice cover in the winter appear to naturally reduce nutria populations. Domestic animals are removed as quickly as possible to avoid any detrimental impacts to native wildlife through predation or disease. The most effective control of both bullfrogs and exotic warm-water fish is seasonal dewatering of wetland impoundments. Bullfrog tadpoles require a full year to mature, so the de-watering interrupts that life cycle. Removal of bullfrog adults is not cost effective and because animals can move long distance over land, the sites are often quickly re-populated.

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Chapter 5

Photo by George Gentry/USFWS

Refuge Facilities, Public Use Programs, Cultural Resources, and the Socioeconomic Environment

5.1 Administrative Facilities

Ankeny: The Shop Building at Ankeny Refuge is located off Wintel Drive in the interior of the refuge. This facility provides office space for the Equipment Operator assigned to Ankeny and a workshop for vehicles and equipment maintenance. This area is not open to the public. Refuge housing, consisting of a single home, is provided adjacent to the shop area.

Baskett Slough: Administrative facilities for Baskett Slough are located off Highway 22. This two-story, multi-use building offers office space and a central meeting room upstairs, and a shop area for vehicles, equipment storage, and maintenance below, with a small office area adjacent to the shop. Two outbuildings serve as storage bays for heavey equipment, fire equipment and vehicles. Refuge housing, consisting of a single home, is located adjacent to the administrative building.

William L. Finley: The Refuge Complex Headquarters, completed in spring of 2009, is located off Finley Refuge Road near the west entrance from Bellfountain Road. There is a visitor contact station in the lobby area where brochures and other information are available. A portion of the office includes space for the Friends of Willamette Valley NWR Complex Wild Goose Nature Store.

The shop area complex, refuge housing and volunteer housing are located near the Headquarters. A new shop building was built in 2006. This approximately 11,000-square foot building has offices for the maintenance staff as well as storage bays for refuge equipment. There is also a second storage building that houses oil storage in one section and supply storage in the other portion.
Two mobile homes situated under a central roof provide housing for volunteers, occasional interns, researchers, and others when needed. Refuge housing, consisting of a single home, is located adjacent to the new administrative office site.

Snag Boat Bend Unit: A large metal storage building is located on the east side of the Unit across Peoria Road. Some equipment and supplies are stored within this building.

5.2 Recreation Overview

5.2.1 Entrances and Access Points

Ankeny: There are six public entrances to the refuge, as indicated on Map 8. All six of these entrances are from County Roads (Ankeny Hill, Buena Vista, Liberty, River/Sidney and Wintel) and are identified with refuge entrance signs. There are numerous vehicular pullouts along Wintel, Buena Vista, and Sidney Roads. The refuge shop access is located north of Wintel Road. However, this access is closed to the public.

Baskett Slough: There are seven public entrances to the refuge, as indicated on Map 9. These entrances are all from either State Highways 22 or county roads (Coville, Livermore, and Smithfield) and are identified with refuge entrance signs. A popular roadside kiosk is also located on the north side of Highway 22. There are numerous vehicular pullouts along Coville and Smithfield Roads.

Highway 22 provides travelers' access to and from the Oregon Coast. Fast-moving, heavy traffic creates safety concerns for vehicles turning into the refuge. The restroom facility in the kiosk area was heavily used and vandalized frequently and was therefore removed in May 2010.

William L. Finley: There are six public entrances to Finley Refuge, as indicated on Map 11. All of the refuge entrances are from county roads (Bruce, Finley, and McFarland) and are marked with refuge entrance signs. There are numerous vehicular pullouts along Finley Refuge and Bruce Roads.

Snag Boat Bend Unit: The only public entrance to the refuge is located on the west side of Peoria Road. There is an entrance sign posted at this location. An entrance point on the east side of Peoria Road leads to the refuge storage building and is closed to public access. Access is also available by river traffic from the Willamette River.

5.2.2 Roads, Trails, and Parking Areas

Table 5-1 summarizes the road and trail miles on the refuges. Many of the interior refuge roads double as public use trails during the “open season” (non-wintering season).

Table 5-1. Existing Roads and Trails, Willamette Valley Refuges

	W.L. Finley	Snag Boat	Ankeny	Baskett Slough	Total
Miles of Refuge roads, total (does not include county roads)	16.5	1.5	6.0	5.3	**29.3**
Miles of road, open to public auto access (does not include county roads)	6.1	0.1	0	0	**6.2**
Miles of road, staff access only	10.4	1.4	6.0	5.3	**23.1**
Miles of auto tour route	6.1	0	0	0	**6.1**
Trail miles- year round	5.0	0.6	0.6	0.6	**6.8**
Trail miles- seasonal	7.6	2.5	3.2	3.6	**16.9**
Trail miles- total	12.6	3.1	3.8	4.2	**23.7**

* Miles are based on GIS maps and are not 100% accurate.

Ankeny: The refuge maintains approximately 6 miles of interior refuge roads for use by staff for management of the refuge. These interior roads are open to the public as hiking routes during the open season and closed with permanent gates and/or signs during the closure periods. There are also 10 miles of county roads that either bisect or border the refuge; these roads are maintained by Marion County.

Ankeny has five primary designated parking areas. These are located at Ankeny Hill Overlook off Ankeny Hill Road, Eagle Marsh Kiosk off Buena Vista Road, Pintail Marsh Overlook/Frog Pond Photo Blind off Wintel Road, Pintail/Egret Marsh Boardwalk and Observation Blind off Wintel Road, and Rail Trail Boardwalk off Wintel Road. Vehicular pull-outs are located off Buena Vista Road, Sidney Road, and Wintel Road.

Baskett Slough: The refuge maintains 5.3 miles of interior refuge roads for use by staff for management of the refuge. About 2 miles of these interior roads are open to the public as hiking routes during the open season and closed with permanent gates and/or signs during the closure periods. There are approximately 6 miles of Polk County roads that either bisect or border the refuge; these roads are maintained by the County.

Baskett Slough has four designated parking areas. These are located at the Highway 22 Kiosk and Refuge Headquarters off Highway 22, Morgan Lake Trailhead off Smithfield Road, and Richard Guadagno Memorial Trailhead/Baskett Butte Trailhead off Coville Road. There are several vehicular pullouts along Coville and Smithfield Roads.

William L. Finley: A six-mile self-guided auto tour route provides wildlife viewing opportunities. The refuge maintains approximately 4 miles of the auto tour route on Finley Refuge Road. Benton County Roads Department maintains the other 2 miles on Bruce Road. In addition, approximately 10.4 miles of roads are maintained as interior refuge roads for use by staff for management of the refuge. These interior roads are open to the public as hiking routes during the open season and closed with permanent gates and/or signs during the closure periods. There are 6 miles of Benton County roads that either bisect or border the refuge; these roads are maintained by the County.

William L. Finley has a total of 14 parking areas. These parking areas are located at Bruce Road Overlook, Cabell Lodge, Fiechter House, Homer Campbell Memorial Trail, 2 at McFadden Marsh, McFadden Marsh Observation Blind, Mill Hill Trailhead, Pigeon Butte Trailhead, Prairie Overlook, Photo Blind Trail, Refuge Headquarters, Turtle Flats, and the Woodpecker Loop Trailhead. There are numerous vehicular pullouts along Finley Refuge Road and Bruce Road.

Snag Boat Bend Unit: The single parking area is located on the west side of the Peoria Road Bridge at the refuge entrance.

5.2.3 Open and Closed Areas

Major portions of all three refuges (approximately 87 percent of the Complex) are closed to public use during the fall, winter, and early spring period to provide undisturbed sanctuary areas for the thousands of Canada geese that utilize refuge wetlands and croplands. The closure period in this sanctuary area is October 1 through March 31 at Ankeny and Baskett Slough and November 1 through March 31 at W.L. Finley. The earlier closure at Ankeny and Baskett Slough protects geese arriving earlier at the more northern refuges of the Complex. This closure period is referred to as the “wintering period” in various parts of the document. Even during the wintering period, numerous trails, kiosks, and overlooks are available to the public for wildlife-dependent recreation at all three refuges. See Maps 8, 9, and 11.

During the rest of the year (April 1 – September 30 at Ankeny and Baskett Slough and April 1 – October 31 at W.L. Finley), refuge visitors are able to explore all parts of the refuges (unless posted closed at all times). The period when the closure is lifted is referred to as the “open season” in many portions of the document. During the open season, visitors are not required to stay on designated trails. Some administrative areas and living quarters for staff are closed at all times to public access.

At this time, no trails are closed for the purpose of limiting conflicts between recreational users, except at Snag Boat Bend. Due to the fact that waterfowl hunters are able to hunt below the ordinary high water mark at Snag Boat Bend, the refuge trails past the Beaver Pond observation blind are closed during the duck hunting season. The closure starts October 1 and continues until the duck hunting season ends near February 1. After February 1, the trails open for visitor use but are occasionally underwater and inaccessible due to the area’s proximity to the Willamette River.

5.2.4 Annual Recreation Visits

Traffic counters are placed on all refuges in the Willamette Valley Complex. These counters are located at major trails, kiosks, and along the auto tour route. The counters are checked monthly and usage recorded. These numbers are used as an estimate to record the number of visitors and visitor uses to the refuges on the Refuge Annual Performance Plan (RAPP – USFWS 2009). Visitors may participate in more than one activity while on the refuge. Each different use is tabulated and recorded in RAPP. For example, one visitor may participate in wildlife observation on both foot trails and from the auto tour route on a given day, and each use is counted individually for RAPP purposes. For this reason, the actual number of visitors participating in wildlife observation may be higher than the actual number of visitors.

Table 5-2 summarizes overall visitation at the three refuges and at the Willamette Valley Complex as according to Fiscal Year 2009 Refuge Annual Performance Plan (RAPP).

Ankeny: The smallest of the three refuges, Ankeny received 61,185 visitors. All visitors engaged in wildlife observation, while approximately 5 percent of visits are estimated to include wildlife photography. Environmental education, interpretation, and special events represented about 1 percent of visitor use.

Baskett Slough: Baskett Slough received 168,336 visitors. All visitors engaged in wildlife observation, while approximately 6 percent of visits are estimated to include wildlife photography. Environmental education, interpretation, and special events represented less than 1 percent of visitor use.

William L. Finley: William L. Finley and Snag Boat Bend combined received 119,602 visitors. All visitors engaged in wildlife observation, while approximately 25 percent of visits are estimated to include wildlife photography. Environmental education, interpretation, and special events represented just over 2 percent of visitor use. Hunting and fishing represented less than 1 percent of visitor use.

Willamette Valley National Wildlife Refuge Complex Total: The Willamette Valley Complex received 349,123 visitors. Visitation has increased by approximately 7 percent from 2005 to 2009.

Table 5-2. Number of Visits to the Refuge Complex (2005-2009)

	2005	2006	2007	2008	2009
Ankeny	56,977	60,949	57,508	59,000	61,185
Baskett Slough	144,822	164,059	148,347	150,000	168,336
William L. Finley	124,304	120,827	115,804	117,800	119,602
Willamette Valley Complex Total	326,103	345,835	321,659	326,800	349,123

5.2.5 Accessibility of Recreation Sites and Programs to Disabled Persons

Ankeny: Pintail/Egret Marsh Boardwalk and Observation Blind, Eagle Marsh Kiosk, and a section of Rail Trail are fully accessible. Ankeny Hill Overlook offers accessible restroom facilities, as well as an overlook accessed by a short earthen trail. There is also a restroom facility at the Rail Trail parking area.

Baskett Slough: The Highway 22 Overlook offers a fully accessible observation blind. In addition, the Richard Guadagno Memorial Trail/Baskett Butte Trail parking area has an accessible restroom.

William L. Finley: The 1,700 foot Homer Campbell Memorial Trail and Observation Blind, Prairie Overlook, Turtle Flats Overlook, and the administrative office are all fully accessible.

Snag Boat Bend Unit: The restroom facility and a 385-foot long boardwalk that begins at the parking lot are both fully accessible.

5.3 Wildlife Observation and Photography

The Willamette Valley National Wildlife Refuge Complex provides visitors with excellent opportunities to view wildlife via trails, automobile tour routes, observation and photography blinds, and scenic overlooks. During the fall to spring period, large concentrations of wintering waterfowl attract bird watchers, photographers, and wildlife enthusiasts. Visitors may see the dusky Canada goose, a species of concern due to habitat loss and degradation. Roosevelt elk are another popular attraction at Finley Refuge. During other months, a proliferation of wildflowers and other native plants provides a stunning backdrop for the endangered Fender’s blue butterfly, a wide variety of birds, beaver, fox, coyotes, bobcats, and numerous other wildlife species that make their home on the refuges.

Only hiking is currently allowed on the Complex trails; pets, bicycles, horses, and jogging are all prohibited. Visitors are able to explore all parts of the refuges during the open seasons on each of the refuges unless the area is specifically posted closed at all times. Visitors are not required to stay on designated trails. Interior refuge roads, fire breaks, and dikes allow visitors to view different portions of the refuges off the designated trails. This liberal access policy is congruent with the purposes of the refuges for conservation of dusky Canada Geese and other migratory waterfowl, which are only present for a portion of the year. Limited access is strictly enforced during the wintering season when the geese are present.

5.3.1 Ankeny

Trails and Other Facilities: There are 0.6 miles of year-round and 3.2 miles of seasonal-use trails established on Ankeny (GIS numbers). An estimated 14,500 visits were recorded on refuge trails in 2009.

The ¾-mile long Rail Trail was designated a National Recreation Trail in June 2006. This accessible boardwalk takes visitors through a seasonally flooded Oregon ash riparian habitat. Located south of Wintel Road, the 0.4-mile long Rail Trail follows an earthen path that leads to a boardwalk and observation blind ending at Wood Duck Pond. Wood ducks and hooded mergansers are often seen on the pond. During the open season, visitors may continue on two separate loops, varying in length from ¼ mile to ¾ miles through forest and field habitat. A portable toilet is provided near the parking area. Pintail/Egret Trail, located north of Wintel Road, offers an accessible ¼-mile boardwalk following Bashaw Creek, where red-legged frogs are often seen. The observation blind at the end overlooks Pintail and Egret Marshes, where many species of waterfowl and other wildlife may be seen.

Eagle Marsh Kiosk, conveniently located south off Buena Vista Road, has a covered shelter next to the parking lot that provides visitors with a great place to view wintering waterfowl on the marsh. It is easily accessible by bicycle or vehicle. A viewing scope was provided at one point, but was stolen and not replaced. Eagle Marsh is the largest wetland on the refuge and provides viewing opportunities for species such as cinnamon teal, Canada geese, eagles, osprey, and northern pintails.

The Ankeny Hill Overlook offers a parking area, restroom facilities, and a short path leading to a wooden deck offering a panoramic vista of the refuge. Raptors may be seen soaring over the open fields and marshes.

A photography blind overlooking Frog Pond, located north of Wintel Road, was opened during late 2008. A reservation system is in place during the refuge closed season; however, reservations are not required during the open season. Access is provided from a parking area just west of the blind and down a short path below the dike.

Additional Viewing and Photography Options: There are numerous vehicular pull-outs along county roads through the refuge that provide visitors with opportunities to view the wildlife that use the wetlands and crop fields.

Management Considerations: Wildlife viewing is the primary visitor use of Ankeny Refuge. Efforts to provide quality wildlife viewing opportunities include better signage, improved trails, and habitat management strategies that further enhance these opportunities. However, littering, vandalism, theft, and arson continue to affect efforts to improve visitor facilities at this station.

5.3.2 Baskett Slough

Trails and Other Facilities: There are 0.6 miles of year-round and 3.6 miles of seasonal-use trails established on Baskett Slough. Many of these are earthen trails through mixed forest and oak savanna/oak woodland habitats. An estimated 30,000 visits were recorded on refuge trails in 2009.

The Richard Guadagno Memorial Trail was designated as the 1000th National Recreation Trail by Deputy Secretary of the Interior Lynn Scarlett on June 2, 2007. The trail, approximately ¾ miles long, together with its associated observation platform, were dedicated to former Refuge Manager Richard Guadagno, who died on September 11, 2001, on board United Flight 93 in Pennsylvania. The observation platform is located near the top of Baskett Butte and provides panoramic views of the crop fields and wetlands below. Raptors, owls, and blacktail deer are common sights along the trail and overlook. This trail, which links to mile-long Baskett Butte Trail, is accessed from a parking area off Coville Road. A fully accessible restroom facility is available at the trailhead.

Morgan Lake Trail is located at the junction of Smithfield and Livermore Roads on the north side of the refuge. Visitors may hike approximately 3 miles of trail along Morgan Lake and up the north side of Baskett Butte. Red-winged blackbirds, marsh wrens, and western bluebirds are common. A short trail, called the Inter-tie Trail, connects the Morgan Lake Trail with Baskett Loop Trail. The Morgan Loop and Inter-tie Trail are open seasonally.

The kiosk off Highway 22 attracts the majority of visitors to Baskett Slough, primarily due to traffic passing between Salem and the Oregon Coast. Facilities include a covered shelter with a viewing scope that provides views of Cackler Marsh and surrounding crop fields. This site provides easy access for vehicles and bicyclists. Public restrooms were provided here until May 2010, when they were removed due to excessive vandalism, cost, etc. Ducks, geese, swans, raptors, and other wildlife are commonly seen here.

Additional Viewing and Photography Options: There are numerous vehicular pull-outs along the county roads throughout the refuge that provide visitors with opportunities to view wildlife.

Management Considerations: Wildlife viewing is the primary visitor use at Baskett Slough Refuge. Efforts to provide quality wildlife viewing opportunities include better signage, improved trails, and habitat management strategies that further enhance these opportunities. In May 2010, the refuge removed the restroom facility at the Highway 22 Overlook for several reasons, including cost, vandalism issues, safety, and aesthetics.

5.3.3 William L. Finley

Trails and Other Facilities: There are over 12 miles of established trails on the main section of William L. Finley Refuge, providing visitors with many options ranging from earthen paths, boardwalks, mowed dikes, or interior refuge roads. At Snag Boat Bend Unit, there are over 3 miles of established trails, including a 385-foot accessible boardwalk. There were approximately 89,700 visits on refuge trails in 2009. Together with several improved overlooks, the trail system offers excellent wildlife viewing opportunities throughout the refuge.

From the Finley Refuge Road east entrance, a raised wooden platform called Prairie Overlook offers views of wet prairie habitat where raptors and short-eared owls may be seen. Turtle Flats platform offers glimpses of the marsh, where waterfowl, red-winged blackbirds, great blue herons, and western pond turtles are commonly seen. Restrooms are located at the parking area for the platform.

Homer Campbell Memorial Trail offers a wooden boardwalk, approximately 1/3 mile in length, which travels through the Muddy Creek riparian area and ends in an observation platform overlooking Cabell Marsh. A removable extension was added in the fall of 2009 that provides access from the boardwalk to Cabell Marsh dike. The extension is closed during the fall/winter closure season.

Cabell Marsh Trail begins in the Cabell Lodge parking lot and follows a short path to a covered kiosk and a viewing scope that provides an overview of the marsh. Areas beyond this point are closed during the winter closure period. During the open season, visitors may continue down the trail, along Cabell Marsh dike, and access several other points within the refuge interior. Waterfowl, eagles, and wading birds are common along the trail.

Woodpecker Loop was designated a National Recreation Trail on June 4, 2005. This trail, open year-round, is located west and north of Cabell Lodge along Finley Refuge Road. A portable toilet is provided near the parking area. An earthen path leads up to a wooden overlook, providing scenic vistas of the refuge and surrounding area. The trail continues through oak uplands and Douglas-fir forest. Songbirds, several different species of woodpeckers, and blacktail deer are common. The trail is approximately 2 miles in length.

Mill Hill Loop Trail, open year-round, is located just west of the access road to the new Refuge Complex Headquarters. The trail begins at the Display Pond and winds through the refuge interior through oak woodland, mature maple, and Douglas-fir habitat. Wildlife seen in this area includes Roosevelt elk, blacktail deer, bobcats, and other woodland species. The Inter-tie Trail connects Mill Hill Trail with Woodpecker Loop Trail. A portion of the Mill Hill Trail is currently being re-routed to take visitors away from the shop area and off the interior refuge road. Access to Mill Hill Trail from the Refuge Headquarters area is being developed.

McFadden Marsh trailhead offers parking and a portable toilet facility and is open year-round. This trail leads to an observation platform overlooking McFadden Marsh where several species of waterfowl, eagles, and raptors are commonly observed.

The 1 ½ mile-long Cheadle Marsh Trail is open seasonally and follows Cheadle Marsh and the riparian forest of Muddy Creek. Native wetland plants are seen along the trail and great blue herons are often seen wading in the marsh. Barn owls may be observed entering and exiting Cheadle Barn.

Pigeon Butte Trail is open seasonally and is approximately 1 ½ miles in length. It culminates on Pigeon Butte, the highest point on the refuge. Band-tailed pigeons and migratory songbirds often stop at the mineral springs near the quarry. Acorn woodpeckers are common in the surrounding oak upland habitat.

Along Bruce Road, there are several pullouts or parking areas available for wildlife observation. One near Muddy Creek offers close observation of several waterfowl species and wading birds. Another on the south side of Bruce Road provides views of a crop field that generally attracts high concentrations of dusky Canada geese.

An interior road provides access to Maple Knoll and Pigeon Butte Research Natural Areas, Beaver Pond, and Cattail Pond Trails. These seasonal trails are approximately 2 ½ miles in length and offer good viewing for spring wildflowers, Roosevelt elk, and migratory birds. Wood ducks, hooded mergansers, and pied-billed grebes may be seen on the ponds.

A photography blind located east of the Cabell Barn, adjacent to Muddy Creek, overlooks a pond and crop field off Finley Road. The blind is available during the wintering period by reservation. Access is provided from a parking area off Finley Refuge Road and down a foot trail near Muddy Creek.

There are numerous vehicular pull-outs along the county and refuge roads that provide visitors with excellent wildlife viewing opportunities.

Management Considerations: Wildlife viewing is the primary visitor use of W.L. Finley Refuge. Efforts to provide quality wildlife viewing opportunities include better signage, improved trails, and habitat management strategies that further enhance these opportunities.

5.4 Interpretation

New interpretive panels were installed at Finley and Ankeny Refuges in 2003 at key entrance points, trails, trailheads, and overlooks. All refuges within the Complex offer brochures and signs at key visitor contact locations. A new brochure was completed in 2008, which includes general information and maps on all three refuges. The Refuge Complex also maintains a website (www.fws.gov/willamettevalley) where current information can be obtained at any time. Information not available in the general brochure may be found at the website, such as volunteer opportunities, special events, and species lists.

Annual events celebrating National Wildlife Refuge Week in October and International Migratory Bird Day and National Historical Preservation Month in May have proven successful in attracting numerous visitors to the refuges. Activities at these events include guided tours and bird walks with refuge staff and local Audubon chapters, presentations, activities for children and adults, and demonstrations of traditional horse logging techniques. Local Audubon chapters are very active and bring numerous groups to the three refuges, with topics like bird identification and wildflower walks.

5.4.1 Ankeny

Ankeny Refuge has an array of interpretive signs along trails, at kiosks, observation blinds, and overlooks that provide visitor information about the refuge as well as the species and habitats present. These panels are a great way for visitors to learn more about the refuge through self-guided exploration. Several of the interpretive panels have either been vandalized or have weathered enough to warrant replacement. There is no Visitor Center or contact station on Ankeny NWR.

5.4.2 Baskett Slough

At the Highway 22 kiosk, interpretive panels inform visitors about the habitat and wildlife on Baskett Slough NWR. However, these panels are somewhat outdated and need to be replaced. The Richard Guadagno Memorial Trail/Baskett Butte Trail receives heavy use by local visitors year-round. This trail does not have any interpretive panels at this time.

International Migratory Bird Day during May has been celebrated here over the past several years since the timing coincides with the flight of the endangered Fender's blue butterfly. Traditionally used to celebrate birds, this has turned into a dual event to also celebrate the Fender's blue butterfly. Activities include guided bird walks in the morning, exhibits and hikes to see the Fender's blue butterfly with refuge staff or volunteers, and presentations about upland prairie habitat restoration.

5.4.3 William L. Finley

Finley Refuge has interpretive panels along the auto tour route, Woodpecker Loop Trail, and at all observation blinds and overlooks. These panels provide visitors with information about the wildlife they might see as well as how refuge staff manages the various habitat types.

Finley Refuge hosts the majority of events and activities for the Refuge Complex. During the past few years, celebrations held here have included a Barn Tour, National Wildlife Refuge Week Open House, and a Kalapuya symposium. Activities included speakers, guided bird and management tours, demonstrations, and live music. Staff and volunteers also offer various programs throughout the year, including night time owl and bat walks.

The refuge is currently making several improvements at the administrative office area, which includes native plantings, interpretive panels, an observation structure, and an informational kiosk. A plan is also being developed for the historic area which includes the Fiechter House and Barn, the Carriage House, Cabell Lodge and the Granary. This plan will set out potential future uses for the area, which may include additional parking, interpretive media, and trails. A historic building assessment is currently being conducted, which may indicate which, if any, buildings may be usable for visitor services. Interpretive panels are also being developed for the Homer Campbell Boardwalk and a new kiosk is being built for the Mill Hill Trail near the Refuge Complex Headquarters.

5.5 Environmental Education

5.5.1 Ankeny

Program Description: The refuge staff, volunteers, and Friends members occasionally host field trips and class visits by local students, scouts, and other educational groups. Refuge assistance is provided on request for groups with special needs or interests. No formal education program currently exists.

Despite being just 10 miles south of the State's capitol, the number of students and teachers that come out to Ankeny Refuge for environmental education is less than at the other refuges in the Complex. The majority are smaller classes from local communities like Jefferson, Talbot, Scio, and Independence. Ankeny is also a popular site for home-schooled students to come to the refuge to learn about wildlife and natural resources.

Number of Visits: Based on the Fiscal Year 2009 RAPP report, 395 students and teachers participated in on-site and off-site programs in environmental education.

Facilities: There are currently no designated facilities for environmental education. The kiosk at Eagle Marsh is a location students use to gather out of the weather and listen to a speaker but this facility is small and cannot support large classes. The boardwalk trails and observation blinds are valuable resources when taking a group on a walking tour yet still present limitations. Weather, de-centralization of students on trails, and lack of facilities to use audio/visual and other equipment all present challenges to offering quality programs.

Management Considerations: Self-guided environmental education is available, due to the trails, observation blinds, and interpretive signs that are found on the refuge. These features help accommodate students and teachers to learn about habitats, wildlife, and various natural resources.

5.5.2 Baskett Slough

Program Description: Many local teachers call the refuge to request a "guide" for their students to walk around Baskett Butte and talk about the refuge, resource management, and the value of the refuge. Staff or trained volunteers try to accommodate these groups, when possible.

During May 2005, Baskett Slough was the site for a field-based environmental education program for local middle school students organized by Oregon State University and supported by Spirit Mountain Community Fund. Volunteers were able to teach 240 students about topics such as symbiosis, succession, and land management. Overall, the program was a success and the students enjoyed coming out to the refuge.

Number of Visits: Based on the Fiscal Year 2009 RAPP report, 550 students and teachers participated in on- and off-site programs in environmental education.

Facilities: The refuge headquarters has been used in the past as a meeting location when classes come out to the refuge. There are restrooms that the students can use and tables where pelts, bones, and other hands-on items can be displayed. It is minimally functional for environmental education programs and not accessible to special needs students. Programs can be disruptive to staff working adjacent to the centrally-located conference area. The only Visitor Services staff is located at Finley Refuge, approximately 45 miles away.

The Highway 22 kiosk is commonly used as a meeting place due to the fact that it has a spotting scope for classes to look through and is close to refuge croplands and wetlands where numerous wildlife species may be seen. The size and proximity to Highway 22 traffic noise makes it a difficult place to hold students' attention. The lack of restroom facilities is also a problem.

Management Considerations: Baskett Slough is a fair resource for self-guided environmental education due to the trails, observation blinds, and nominal interpretive signs that are found on the refuge. Minimal features are currently in place to help accommodate students and teachers to learn about habitats, wildlife, and various natural resources

5.5.3 William L. Finley

Program Details: This refuge receives the majority of environmental education activity. Several factors which may contribute to this are proximity to Oregon State University in Corvallis, which generates numerous research studies and field trips; accessibility and availability of refuge staff, including the Visitor Services Manager and a larger number of volunteers; and multitude of well-developed trails and interpretive signs. Staff receive numerous calls to provide both on- and off-site educational programs to school groups, community organizations, and professional societies.

Number of Visits: Based on the Fiscal Year 2009 RAPP report, 1,174 students and teachers participated in on- and off-site programs in environmental education.

Facilities: There are currently no buildings available for the dedicated purpose of providing environmental education. The Refuge Complex Headquarters is primarily used for staff offices. There is a small foyer area where visitors may obtain information about the refuges, but it is too small to support a classroom. An accessible conference room, located near the front of the building, is large enough to hold a class of about 20 students. It is equipped with audio/visual equipment, tables, and chairs. However, there is little room to set up educational tools, like microscopes and learning stations, for the students. Classes could also interfere with the primary business function of the front reception area. Weekend use of the conference room for educational workshops is minimally adequate.

The Fiechter House is a location where students have come to learn about early cultural history.

Small rooms provide obstacles to groups larger than around 10-12 students at any one time. Ongoing restoration efforts present safety concerns, as well. The Cabell Barn generates many tour requests, yet safety concerns prevent all but cursory glances from the doorways.

Management Considerations: Finley NWR has been designated as the principal focal site for future development of environmental education programs for the Refuge Complex. Strong demand exists from the community for programs; however, staff and volunteer time are limited. The Refuge Complex currently has an intern assigned to identify current and potential environmental education opportunities, both on- and off-site, and develop a refuge-specific comprehensive education program that complements existing programs being offered by various educational groups. Facilities to support the educational program, including a dedicated educational facility and shelters located in key areas on the refuge, and a dedicated full-time environmental education coordinator are also needed.

5.6 Hunting

5.6.1 Waterfowl Hunting

During the winter of 1985-86, crop depredation on adjacent private lands was significant (most significant in the William L. Finley and Baskett Slough Refuge areas), resulting in considerable media coverage. Numerous meetings with farmers, the National Farm Bureau, Oregon Farm Bureau, congressional delegations, state entities, and others were held. Local recommendations were to increase food crops on the refuges, modify the types of crops grown, and to maintain the closure of William L. Finley NWR and Baskett Slough NWR to all waterfowl hunting, thereby encouraging geese to stay on the refuges.

Ankeny NWR was opened to waterfowl hunting in 1986 under a state quota system but was closed to waterfowl hunting in 1988 due to the continued low dusky goose populations and increased crop depredation problems on adjacent private lands. All three refuges have remained closed to waterfowl hunting since that time. The waterfowl hunting closure on all of the Willamette Valley national wildlife refuges continues in order to provide undisturbed sanctuary areas for wintering Canada geese.

During the acquisition of the Snag Boat Bend Unit, it was determined that waterfowl hunting would not be allowed on the property above the ordinary high-water line of the Willamette River or from non-navigable waters. Waterfowl hunting would still continue below the ordinary high-water line of the Willamette River but would not be allowed above it in order to avoid conflicts with non-consumptive use programs that are occurring such as wildlife observation and photography.

5.6.2 Big Game Hunting

Program Details: William L. Finley Refuge is open to deer hunting under specific refuge regulations, in accordance with State regulations. There is an early archery hunt for either sex and a later shotgun hunt for buck deer under the Western Oregon General Season.

Hunting is allowed seven days per week from one-half hour before sunrise to one-half hour after sunset. Hunters must have a current State hunting license and possess a State deer tag. Hunters under 18 years old must have their hunter safety card on their person. There are currently no fees to hunt on the refuge. Possession limit is one deer for each season.

The archery hunt extends over the State-specified open season, usually lasting approximately a month from the end of August to the end of September. Archery hunt regulations reflect established State regulations. Either sex may be taken.

The shotgun season begins at the start of the Western Oregon Coast Buck Area season, generally in early October. Although in other parts of western Oregon this season usually extends through the first week of November, hunting on the refuge is prohibited after October 31st, when access is closed to all visitors over much of the refuge to provide sanctuary for wintering waterfowl. During shotgun season, only shotguns using buckshot or slugs are allowed. Bucks taken must not have less than a forked antler.

Approximately 70 percent of W.L. Finley Refuge is open to deer hunting. The portions that are currently closed include high-use public and maintenance areas, such as the Fiechter House and Cabell Lodge area, Refuge Complex Headquarters and shop area, and the western portions of the refuge near Mill Hill and Woodpecker Loop Trail (see Map 14). These closed areas are used frequently by refuge staff and visitors and are closed to hunting for safety reasons. The hunt season on William L. Finley Refuge currently occurs prior to the wintering sanctuary period, and other visitors are free to explore most refuge areas while hunting is underway.

Hunter success during the last five years is detailed in Table 5-3. Only 9 deer were harvested on Finley Refuge from 2005 to 2009.

Big game hunting is currently not permitted at Ankeny or Baskett Slough primarily due to the lack of sufficient habitat to support significant big game populations and the potential conflicts hunting could create with other public use activities.

Number of Visits: During the 2009 hunting season there were a total of 46 individuals who hunted W.L. Finley Refuge 77 times. Two deer were taken during the shotgun season in October 2009.

Table 5-3. Black-tailed Deer Hunt Summary (2005-2009)

	2005	2006	2007	2008	2009
Total Hunters	30	29	42	48	46
Total Hunt Days	62	105	100	97	77
Total Hunt Hours	168	307	291	214	257
Total Deer Harvested	0	1	3	3	2

Facilities: There are two seasonal hunter sign-in stations where Refuge Hunting Harvest Cards are obtained. The stations are located south of Turtle Flats restroom area and another at McFadden Marsh parking area. The harvest cards provide staff with information about hunt success and other statistics.

Management Considerations: A new map was created in 2009 for the deer hunt program to better indicate the hunt zone and the closed area (containing heavily used hiking trails) to reduce the potential for conflicting uses between visitors and hunters. Staff are currently updating the harvest card.

5.7 Fishing

Program Description: With the limited access to permanent wetlands, fishing opportunities on the three refuges are quite restricted.

Many of the wetland areas on both Ankeny and Baskett Slough are seasonal in nature and dry up during the summer months. Access to these areas during fall and winter months is closed to provide sanctuary for migratory waterfowl. As such, these areas do not provide high quality fishing opportunities for the public. Fishing opportunities near both Ankeny and Baskett Slough include the Santiam River, Rickreall Creek, and the Willamette River.

Fishing is currently allowed on Muddy Creek of William L. Finley NWR. Muddy Creek is a slow moving creek that flows through the refuge from roughly south to north. Navigation is difficult due to the amount of downed wood debris in the creek that limits access. Fishing is available below the ordinary high water line on navigable rivers at the Snag Boat Bend Unit. The Willamette River offers ample fishing opportunities nearby.

Number of Visits: Based on estimates from the Fiscal Year 2009 RAPP, one person came to William L. Finley to fish Muddy Creek. It is difficult to calculate the number of people that fish on Snag Boat Bend due to the fact that most fishing access is from boats entering from the Willamette River and that no staff are assigned to this Unit. During winter months, high water limits foot access to interior areas.

Facilities: No facilities are maintained or managed expressly for this program.

Management Considerations: There are currently no designated, maintained trails along Muddy Creek for bank fishing. Access from the Muddy Creek Bridge is restricted, as this is a narrow, gravel road with no shoulders. Fishing success rate is low.

A proposal to develop a non-motorized boat/canoe/kayak launch and pull-out site on the Snag Boat Bend Unit is being considered. This area already has a parking lot, restroom, and boardwalk trail. The project would involve sloping the bank of Lake Creek to create a canoe launch ramp and signage. A second part of this project would be to create a pull-out site for canoe/kayak users on the Willamette River Water Trail to access the Snag Boat Bend Unit. This pull-out could include a portable toilet facility, picnic table, and access to trails and wildlife observation.

5.8 Non-Wildlife Dependent Recreation

Bicycle Use: Bicycle use is not permitted on any trails or roads on the refuges except on Finley Refuge Road during the non-sanctuary season. Bicycle use is light on Finley Refuge Road primarily due to the road having a gravel rather than paved surface. Cycling is more common at Ankeny (off-refuge), where the county roads that surround the refuge are paved. The new Willamette Valley Scenic Bikeway, which runs from Champoeg State Heritage Area to Eugene, skirts the western side of Ankeny along Buena Vista Road. It also passes the Snag Boat Bend Unit off Peoria Road.

5.9 Illegal Uses and Law Enforcement

The primary law enforcement issues on the three refuges include vandalism, theft of or damage to refuge property, trespass, off-leash dogs, jogging, and trash dumping. Less frequent violations include arson, unauthorized overflights of aircraft, poaching, disturbance to wildlife, and horseback riding. While all three refuges and the Snag Boat Bend Unit have law enforcement issues, these problems occur most frequently at Ankeny. A full-time law enforcement officer was recently hired at the Willamette Valley Refuge Complex to address these concerns.

5.10 Area Outdoor Recreational Opportunities

Salem/Dallas area: Ankeny is located near the confluence of the Willamette and Santiam Rivers. These rivers provide access to fishing and recreational boating, canoeing, and kayaking opportunities. There are several nearby National Forests and State Parks that provide visitors with camping, boating, and hiking possibilities. Hunting opportunities are available on National Forests under regulations established by U.S. Forest Service and the Oregon Department of Fish and Wildlife. Ankeny NWR is conveniently located about 12 miles south of the state capital of Salem, where numerous recreational opportunities exist, including biking, trails, museums, arts and entertainment, water activities, golf, and seasonal special events.

Baskett Slough is located on the foothills of western Oregon’s Coastal Range. There are numerous recreational outlets nearby, including E.E. Wilson State Wildlife Area, National Forests, Tillamook State Forest, Silver Falls State Park, and Oregon Botanical Gardens which offer hiking, camping, hunting, fishing, and other recreational opportunities. The state capital of Salem is located within 10 miles of the refuge, with activities as listed above.

Corvallis Area: The Corvallis area is near lands managed by the Bureau of Land Management, U.S. Forest Service, State Parks, and County Parks. A wealth of outdoor recreational opportunities are available, including fishing, hunting, hiking, camping, water activities, improved bike trails, and wildlife watching. Some popular destinations include Alsea Falls Recreation Area and Mary’s Peak. The city of Corvallis, located about 10 miles from the refuge’s east entrance off Highway 99W, is home to Oregon State University. With a population of over 50,000, the city offers many recreational outlets, including bowling, golfing, shopping, numerous parks and hiking trails, arts and entertainment, and special events.

5.11 Recreation Trends

The 2003 – 2007 Oregon Statewide Comprehensive Outdoor Recreation Plan (SCORP) constitutes Oregon’s basic five-year plan for outdoor recreation (Oregon Parks and Recreation Department 2003). It established the framework for statewide comprehensive outdoor recreation planning and the implementation process. Included in the plan is a comprehensive overview of state recreational trends based on regions. These regional boundaries provide a cost-effective method of delivering usable recreation information to federal, state, and local units of governments for identifying key recreational issues, facility and resource deficiencies, and supply and demand information.

The findings of the SCORP show that Oregonians are actively engaged in all types of outdoor activities in the state (Table 5-4). About 73 percent of Oregon households participate in outdoor recreation. The most popular everyday activities are running and walking for exercise and walking for pleasure. According to this report these activities are generally engaged in near home and on a regular basis. Bird watching and nature/wildlife observation were the second most popular outdoor activities.

Table 5-4. Top Ten Oregon Outdoor Recreation Activities – State Residents

Activity in Order of Popularity	Estimated Annual User Days* (Millions)
1. Running/Walking for Exercise	49.2
2. Walking for Pleasure	47
3. Birdwatching	18.7
4. Nature/Wildlife Observation	17.6
5. Sightseeing/Driving for Pleasure	12.3
6. RV/Trailer Camping	11.0
7. Golf	9.6
8. Using Park Playground Equipment	8.8
9. Bicycling	7.4
10. Ocean Beach Activities	6.0

Source: Oregon Parks and Recreation Department 2003
*A user day is one instance of participation in a single outdoor recreation activity by one person.

Recreation Trends: Nationally (USFWS 2007a) and statewide (USFWS 2007b), demand for wildlife viewing is growing by double digits each decade. In addition, by 2040, an additional 1.7 million people will be living in the Willamette Valley, doubling the population that lived in the Valley in the year 2000 (Oregon State of the Environment Report 2000). According to the 2003-2007 Oregon Statewide Comprehensive Outdoor Recreation Plan (Oregon Parks and Recreation Department 2003), the Nature/Wildlife Observation activity grew by 170 percent statewide from 1987-2002. Within the region encompassing the refuges (SCORP Regions 2 and 3), participation in Nature/Wildlife Observation activity grew by 254 percent during those 15 years and was the activity with the single highest growth rate.

During the SCORP planning process, researchers identified major demographic trends that will impact recreational needs in future years. These statewide demographic trends included a rapidly increasing population, rapidly increasing diversity within the population, and a growing gap between the rich and poor. The report (Oregon Parks and Recreation Department 2003) also indicated that the state's population is growing older, more highly educated, with higher income levels, increasingly urban, and increasingly ethnic. These factors need to be considered by recreational providers when planning future recreational development and opportunities.

In addition, providers reported the following important recreation trends that relate to the national wildlife refuges within the growing Willamette Valley:

- The public is asking land managers to place an increasing emphasis on the protection of streams, fish, wildlife habitat, and threatened and endangered species. They are also asking land managers for amenities including quiet, natural places, natural appearing settings, and information and education.

- Nature study activities are rising in popularity.
- Rural communities are becoming increasingly interested in collaborating with managers and recreation providers on developing opportunities that have potential of diversifying their economies, while still maintaining their quality-of-life values.
- Managing for conflicts between recreational users (hunters/hikers) seems to be an increasing need as demand for limited space increases and supply decreases.

5.12 Cultural Resources

5.12.1 Native American Overview

This cultural history provides an overview of the known archaeological and ethnographic use of the Willamette Valley National Wildlife Refuge (WVNWR) Complex, which is comprised of three refuges: William L. Finley, Ankeny and Baskett Slough. It is excerpted primarily from cultural resource reconnaissance surveys and overviews prepared by Peterson et al. (1980) and Sekora (1989) for the Wm. L. Finley NWR, and by Kindred (1980) for the Ankeny and Baskett Slough NWRs.

General Prehistory of the Willamette Valley: Although little is known about the earliest inhabitants of the Willamette Valley, clues are emerging that suggest they may have occupied the area as early as 12,000 years ago. The first concrete archaeological evidence dates human occupation in the Willamette Valley to approximately 8,000 years ago at the Cascadia Cave site (Pettigrew 1990), whereas bulbs from a camas oven at the Hannavan Creek site near Eugene date to 7,800 and 6,880 years ago. Archaeological evidence from the Flanagan site near Eugene indicates that several changes occurred at the site during its 6,000 years of occupation (Toepel 1985). These changes may have been in response to the change from a warmer, drier climate to a cooler, moister environment with attendant alterations in vegetation (Toepel 1985:13). The warm, dry environment favored the growth of oak trees in the valley, so that acorns were probably a primary food resource. As the climate became cooler and moister, conditions promoted the growth of camas, and it began to achieve a place of importance in native diet. Associated with these climatic changes was the technological change from atlatl and dart to bow and arrow. Projectile points from the Early Archaic component at the Flanagan site were typically broad-necked points associated with the atlatl. The thick bases suggest they were most likely hafted by notching. With the introduction of the bow and arrow, point types gradually changed. By the Late Archaic period, projectile points were commonly thinner, narrow-necked points probably hafted through slotting (Toepel 1985).

Based on archaeological, ethnographical, and historical information, the Willamette Valley has most recently been occupied by the Kalapuya, *it-galapu ywi-yu-ks*, a Chinookan term for the Willamette Valley people (Zenk 1976). There is disagreement among scholars as to the names and exact territories of the groups that made up the Kalapuyans, but they are generally divided into thirteen groups. Each of these groups spoke separate but related dialects which were part of three related languages (White 1996).

The Kalapuyan territory consisted of a broad expanse of well-watered prairie and oak woodland in the Willamette Valley flanked by wooded hills in the Coast Range to the west and the Cascade Mountains to the east. Deliberate fires were frequently set by the Kalapuya on the valley floor, thus helping maintain the presence of substantial areas of open prairie that were conducive to a better harvest and to maintain the foraging grounds of the white-tailed deer (Sperlin 1931, Habeck 1961). In particular, the use of fire was a central aspect of their seasonal hunting and gathering. The immediate effect of such burning was to make seed harvesting much easier, as the fire parched the seeds and loosened them from the stalk for gathering. The fires promoted the growth of seed-bearing plants and other edible species as well (Towle 1979, Zenk 1976). The fires also provided better hunting opportunities by concentrating game animals in the unburned areas. Finally, regular burning provided the valley's soils with its high fertility and maintained the landscape's open character, and it is likely that "the practice had a significant role in frontier Oregon and the development of the American West" (Bergman 2008).

The Kalapuya were a semi-nomadic people with an economy based on hunting and gathering. Archaeological evidence suggests a bi-seasonal settlement-subsistence pattern, with "major semipermanent villages situated adjacent to major rivers and streams during the winter months, followed by a dispersed settlement system from spring to fall which centered on small upland camps. The settlement system was integrally related to the availability of a few abundant resources" (Brauner and Honey 1976). Specifically, winter settlements were centered around village sites in the higher, sheltered areas of the foothills of the valley margins and near water sources, where the Kalapuya dwelled in more permanent semi-subterranean pit houses made of wood planks, packed earth, branches and stones. Pit houses ranged from 40 to 50 feet long and had a central fire pit and smokehole, and were large enough to house up to five families (Zenk 1976). The region is traversed by the Pacific Flyway, which annually brought huge numbers of ducks, geese, swans, and other water birds to overwinter and breed in the mild climate.

In the summer, the Kalapuya occupied temporary shelters while pursuing their hunting and gathering activities. Hunting methods varied according to the animal pursued. Camas, known from ethnographic sources to have been an important resource, appears to have played an important role in the aboriginal diet for millennia. Camas grew in abundance in the moister areas of the Willamette Valley and is still found on the Willamette Valley Refuges. When the camas was fully ripe in June and through the fall, it was harvested in great quantities, roasted in pit-ovens made from rock and mud that were usually 2 to 2 1/2 feet deep, and prepared for winter storage (Zenk 1976). The Kalapuya also gathered wapato, berries, and acorns, all of which are still present within the present refuge boundaries. Fishing was accomplished by a variety of methods. Weirs, hooks and lines, nets, and harpoons were used in the Willamette River and its tributaries. Fishing line was made from "the rolled white inner bark of the willow tree" and the hooks were covered with "tufts of human hair" to disguise the hook (Jacobs 1945). Freshwater species available included cutthroat trout, whitefish, eels, suckers, chub and perch.

During the late 18th and early 19th centuries, the aboriginal culture and population of the Kalapuya were virtually destroyed through infectious diseases introduced by the early white settlers. Combined with epidemic disease, starvation claimed more lives as incoming settlers took over the prime valley lands, driving the Kalapuya off their resource base. The final blow came in 1854 and 1855 when unratified treaties between the United States and the Indians terminated their right to occupy their ancestral lands. Following the signing of the treaties, fewer than 500 Kalapuya were rounded up and moved to the Grand Ronde Reservation in Polk County (Bowen 1978, Havercroft 1985, Peterson et al. 1980).

William L. Finley NWR: The William L. Finley NWR is located in Benton County approximately ten miles south of Corvallis, Oregon. The eastern part of the refuge lies in relatively low, flat relief typical of the valley floor, while the elevation increases along the western boundary of the refuge as one moves into the foothills of the Coast Range. The elevation within the refuge varies between 255 and 560 feet above sea level. Emerging from the eastern slopes of the Coast Range, Muddy Creek flows in a northerly direction through the eastern section of the refuge. Fresh water springs are abundant in the hill country. Marshes, sloughs, and lakes often provide rich resources that would have been important for sustaining early inhabitants of the area. A 1980 overview of cultural resources notes a strong correlation between streams and rivers and archaeological site locations (Peterson et al. 1980).

Given the low elevation of the project area relative to the Willamette, it is likely to have been flooded at least annually, most commonly in winter and early spring, prior to the construction of flood control dams on the river's major tributaries. As a result, it is unlikely that the area would have been chosen as a winter village site. However, this same floodplain setting makes it very likely that the area supported abundant camas before the introduction of modern agriculture. Camas ovens in this setting are a distinct possibility given the location and the presence of abundant rock in the near surface.

The area now covered by the refuge was occupied by the Muddy Creek band of the Kalapuya. Prehistoric occupation sites were situated on the lower foothill slopes and higher levees of Muddy Creek. Associated with the bi-seasonal settlement-subsistence pattern described above, the Kalapuya normally occupied the W. L. Finley region (as well as the other two refuges) in the spring and summer months, whereas they moved to village sites in the higher, sheltered areas in the foothills of the valley margins during the winter months (Havercroft 1985). By the time the Euroamerican pioneers arrived to the Wm. L. Finley area in the late 1840s and early 1850s, few of the Muddy Creek band remained, and they offered little to no resistance to white settlement.

Ankeny NWR: Ankeny NWR is located in southwestern Marion County south of Salem, Oregon. The area now encompassed by the refuge was most likely occupied by the Pudding River (Anhan cuyuk) band of the Kalapuya, although there may have been some Santiam bands in the area as well (Kindred 1980). The Pudding River band utilized the area from French Prairie, south to the Santiam River, and east to the foothills (Berreman 1937). According to Collins (1951), "nothing of the culture of the Pudding River Indians can be located in the literature."

Native Americans used plant resources from what is now the refuge that included cattails for mat-making, camas for food, willow for fiber to make twine, acorns of Oregon oak, berries for food and pigment, and tarweed for their edible seeds. Wilkes (1852) refers to the tarweed as "sunflower" which forms a large portion of their food. Tarweed seeds were collected after the prairies had been fired.

Baskett Slough NWR: Baskett Slough NWR is located in central Polk County about two miles northwest of Rickreall, Oregon. The area now encompassed by the refuge was most likely occupied by the Luckiamute or Yamhill bands of the Kalapuya. The Yamhill territory included the area around the South Yamhill River, south to the Little Luckiamute River (Berreman 1937). The Luckiamute people occupied the area drained by the Luckiamute and Little Luckiamute rivers. The two groups hunted deer, fished, and dug roots with camas as their staple food (Collins 1951). The available resources and utilization practices at Baskett Slough follow the pattern described for the Ankeny NWR.

The refuge encompasses rolling oak-covered hills and grasslands. Low-lying areas are seasonal wetlands. The majority of these wetlands were drained by early residents through the use of drainage ditches, dikes, and other means of water control to create drier areas more suitable for cultivation. Marshy conditions prior to homesteading and cultivation encouraged the growth of oak, willow, and cottonwood stands (Speulda 1997).

5.12.2 Euroamerican Overview

General Overview of the Historic Era in the Willamette Valley: The broad prairies of the Willamette Valley floor were the sites of the earliest Euroamerican settlements in Oregon. Euroamerican settlement of the Willamette Valley began in 1812 when fur trappers and traders of the Hudson's Bay and other companies began to explore the valley for beaver. Since most of the trappers were French Canadian, the area they settled in the northern Willamette Valley became known as French Prairie. Several of these expeditions traversed the region of the Wm. L. Finley Refuge. In 1826, noted botanist David Douglas, who traveled with the McLeod party, hunted and camped on the Long Tom River, and in 1834, John Work described traversing the plain between present-day Corvallis and Monroe (Sekora 1989).

The Methodist Mission was the second major colonial effort in the Willamette Valley. In 1834, under the direction of Reverend Jason Lee, 30 Americans associated with the mission settled in the valley. Farming was the main activity of the mission, as it was "considered a vital force in civilizing and Christianizing Indians" (Bowen 1978). Although the objective of Christianizing the natives was not realized, the mission established a substantial American population in a country dominated by the British. When the mission moved to its site near present-day Salem, 80 people were involved. The mission was closed in 1844 and its improvements divided among its members. Most families stayed and formed a secular population in the Marion County area.

In 1840, word of agricultural and economic potential of the valley had spread to the East and the Willamette Valley began to experience the first waves of overland migration. In 1842, the first large wagon train came to the Pacific Northwest via the Oregon Trail. The Great Migration of 1843 brought 800 new settlers to the Willamette Valley (Bowen 1978).

In 1850, Oregon was recognized as a territory of the United States. That same year the Donation Land Act was passed, with its primary intention being to confirm existing claims. The men and women who established claims on the present refuge area lands were responsible for developing the agricultural character of the area. Farmsteads were sited with respect to a year-round water supply, good drainage, shelter from the prevailing winds of winter, and a position central to a variety of land uses.

After 1900, when flood control and irrigation were initiated, orchard crops and vegetables were introduced to floodplain soils. Grass seed became dominant after 1939. Eventually, as a result of white settlement, the more level areas of the valley floor were converted into cultivated fields and rangeland pastures, replacing much of the indigenous plant community with domestic varieties. As an example, a large percentage of the grasses that cover the region today were introduced. Although the periodic Indian-set fires were controlled, white farmers continued their own selective burning of field stubble and pasture trash.

In those areas not farmed, grazed or burned, what had been open groves of oak and fir or restricted clusters of riparian trees began to reseed themselves successfully and spread to become dense tracts of woodland large enough for small-scale logging. Woodland expansion was greatest on the hilly margins above the floodplain. Some locations on the valley fringes, especially fallow fields and pastures, were quickly invaded by trees and shrubs, such as hawthorn, poison oak, and wild rose, all of which thrive in hedgerows today (Sekora 1989).

William L. Finley NWR: The discovery of gold in 1848 in California provided an impetus to agriculture and grazing in Benton County, such that by 1850, the county was playing an integral role in the gold boom. Pack trains with meat, cheese, flour etc., were organized in Corvallis and taken to California mines and later taken to the gold fields in southern and western Oregon.

As settlement became crowded in the northern part of the valley, further settlement diffused southwards towards Benton County, including the area that is now part of the W.L. Finley NWR. The Donation Land Act of 1850 resulted in a further increase in the number of immigrants to Oregon, and this Act played a key role in the settlement of present-day refuge lands. For example, in association with the Donation Land Act, ten donation land claims were filed on lands now encompassed by the refuge. John Fiechter, an early pioneer, patented a 642-acre Donation Land Claim in 1850. Fiechter improved his land with an orchard and built the necessary farm buildings. He was known as a stockman, raising horses, cows, sheep and hogs, though he also grew wheat and oats. He and his wife constructed a two-story house now known as the Fiechter House and which is listed on the National Register of Historic Places.

From 1845-1885, the main industry of the county was cattle grazing largely due to the lack of farm implements, transportation facilities, and farm labor. Wheat eventually became the dominant crop and by 1870, it exceeded grazing in importance. Agricultural machinery became more prevalent as the railroads were developed and as the markets for farm products increased. The county was exporting wheat and flour to Europe by 1880 and by 1885, a more diversified and intensive use of farm lands had developed. Grazing lands were given over to dairy cattle with beef cattle being moved back to the hills. Cereal grains (wheat, oats, barley, corn, buckwheat and rye), hay, clover, fruits, and berries were grown. Most desirable lands were settled by 1900.

In 1905, the northern portion of the refuge, which includes the area of the Fiechter House, was purchased by three sisters of a prominent Portland family, the Failings. One of the sisters married Henry C. Cabell and eventually bought out her sisters. At the time, the Fiechter house was in a state of disrepair and the Cabell family remodeled the house for their use. Mr. Cabell initiated a cattle ranch operation but since he was more interested in hunting, the family built a club house in 1912. The first story housed the farm manager and the second story was used by Mr. Cabell's family and visitors during hunting seasons and other times (H.F. Cabell 1972). In the early 1960s, Mrs. Cabell tried to interest the Oregon Historical Society and Benton County Historical Society in acquiring the Fiechter House as a historical site without success. The house was included in the area that became the W.L. Finley Wildlife Refuge.

On the area of the present refuge itself, uplands were used primarily as rangeland for cattle and sheep from 1846 to 1964. Logging activities were kept to a minimum. In those areas not farmed, grazed, or burned, what had been open groves of oak and fir or restricted clusters of riparian trees began to reseed themselves successfully and spread to become dense tracts of woodland large enough for small-scale logging; woodland expansion was greatest on the hilly margins above the floodplain. Some locations on the valley fringes, especially fallow fields and pastures, were quickly invaded by trees and shrubs, such as hawthorn, poison oak, and wild rose, all of which thrive in hedgerows today.

Ankeny NWR: Settlement by Euroamericans began in the mid-1840s. The Ankeny area attracted many settlers because of its good farm land. One of the earliest settlers was Henry Ankeny, who came to Oregon in 1850 and purchased over 4,000 acres of farmland. By 1870, the town of Sidney was established around a grist mill built on the Willamette River. Power for the mill came from a ditch dug across what is now the Ankeny NWR.

Baskett Slough NWR: Euroamerican settlement reached the area of this refuge by the mid-1840s. Baskett Slough is the namesake of George Johnson Baskett, who settled a 640-acre Donation Land Claim in the area in 1850. Another early settler in the area, Absalom Smith, arrived in 1848. The extended Smith family acquired adjoining parcels and formed the community of Smithfield. The community had a railroad depot, two warehouses, a store, and post office. In 1961, the Smiths sold the property to the Morgan family who, in 1966, sold the parcel to the U.S. Fish and Wildlife Service.

5.12.3 Current Knowledge of Local Cultural Resources

The WVNWR Complex contains 44 recorded prehistoric and historic resources. Cultural resource overviews with inventories were completed for the Complex beginning in the late 1970s and early 1980s. Although the inventories associated with the overviews do not meet current survey standards, they still provide information on the types of prehistoric and historic resources that are, and may be, located on the Refuge Complex.

Historic Designations: The Refuge Complex contains eight historic buildings, all of them located on W.L. Finley Refuge. Two of the buildings (the John Fiechter House and the Richard S. Irwin [Cheadle] Barn) are listed on the National Register of Historic Places. A granary and smokehouse were each "Determined Eligible to the National Register" in 2008.

There are no known structures or buildings that have been determined ineligible for the National Register. If restoration or removal proceeds (see below), evaluation for the National Register will need to occur first.

William L. Finley NWR: Peterson et al. (1980) first completed a cultural resource overview including field inventory of the refuge, with several additional surveys completed since that time. These include cultural resource surveys for various refuge projects subject to Section 106 compliance review.

Sekora (1989) completed a settlement pattern study of the recorded farmsteads within the refuge, focusing on the 19th century settlers. Despite alterations to the landscape made by the refuge (i.e., creation of wetlands for waterfowl habitat), Sekora concluded that the cultural landscape still retains visible features of settlement from the pioneer period into the early 20th century, and that the general locality has maintained the agricultural setting that was first established in 1846 (Sekora 1989). For example, Sekora found that “the northern half of the refuge formerly known as the Failing-Cabell Estate is an excellent example of a large-scale ranching operation that spanned the first decades of the 20th century. Structural remains, field patterns and surviving buildings date to the period between 1906 and 1964.”

The known prehistoric sites within the W. L. Finley NWR are primarily lithic scatters. Of the 16 lithic scatter sites, one is eligible for the National Register of Historic Places. All of these sites consist almost exclusively of obsidian and cryptocrystalline silica flakes and no diagnostic tools. According to local informants, the refuge has been extensively surface collected.
Recorded historic sites include the buildings mentioned above, and several additional buildings listed on the Oregon Inventory of Historic Properties (although this is not an official designation). These

include the Carriage House, Cabell Lodge, Cabell Barn #1 (also known as the "Big Barn") and Cabell Barn #2 (sometimes referred to as the Fiechter Barn).

In addition to these, other recorded historic sites include Cabell Barn #3 (Cheadle or Irwin Barn), a purported remnant of the Applegate Trail (however, there are no visible remnants on the refuge), a gravesite, a Euroamerican settlement site (comprised of a scatter of cans, broken bottles, pottery chips, old bricks, fence, wooden shed, and fruit trees), and a fragment of an old brick road (unknown as to who built it, when it was constructed, and what route it followed).

The Fiechter House and Carriage House are representative of early Oregon architecture, lifestyle, and settlement history. The John Fiechter House, built in 1855, is a good example of Classic Greek Revival architecture. Restoration work continues on the home to preserve its unique architectural features.

The Richard S. Irwin Barn (also called the Cheadle Barn) is located at the south end of the refuge off Bruce Road. The oldest of the three barns, it is a classic example of the style of barns built during the early 1900s by agricultural architect Ernest Brimner.

Cabell Barn #1 (Big Barn) is located near the Refuge Shop and is used for equipment and sign storage.

<u>Restoration Efforts and Needs</u>: Funding to maintain the historic buildings has been inconsistent and inadequate over the years. The Fiechter House is going through restoration efforts. Most of the other historic structures have had minimal routine maintenance. An assessment of the restoration/ maintenance needs and relative priorities for the historic buildings is being prepared.

Ankeny NWR and Baskett Slough NWR: Kindred (1980) completed a cultural resource inventory and overview of the Ankeny and Baskett Slough Refuges, and other surveys have been completed since then for various Section 106 projects (Lyman 1983, Valentine 1995, Speulda 1996a, Speulda 1996b, Speulda 1997, Bourdeau 1996, Bourdeau 1997, and Clark 2003).

More prehistoric sites were found at Ankeny than at Baskett Slough, most likely because of the proximity of Ankeny NWR to the Willamette and Santiam Rivers versus the marshy, lake-like conditions once present at Baskett Slough. Cultural resource sites present on Ankeny include 7 prehistoric lithic scatter sites, 2 multi-component (historic refuse and lithic scatter), and 1 historic site associated with the Henry Ankeny house. All of the sites have experienced some disturbance from farming activities.

Three prehistoric lithic scatter sites and three historic sites occur on Baskett Slough NWR. The historic sites are primarily a scatter of glass and ceramic fragments. Two brick-lined wells determined to be ineligible to the National Register of Historic Places have been identified on the refuge. Structures associated with the farmsteads were torn down in the 1960s. The last standing structure, a seed warehouse that was built between 1936 and 1945, was evaluated by Speulda (1997), and was determined to be ineligible to the National Register of Historic Places. It was demolished in 1997.

5.12.4 Museum Property

The Benton County Historical Society (BCHS) has an agreement with the Refuge Complex to maintain the Fiechter House and some associated artifacts. An open house is held twice a year at the Fiechter House. In addition, the house stores three boxes which contain randomly collected artifacts, such as lithics, various historic items (i.e., ceramics, blacksmith tongs, andirons) and other

miscellaneous items. The BCHS also utilizes the Cabell Barn as a storage area for several horse carriages and old farm equipment.

Archaeological investigations have generated important collections. Nearly two thousand artifacts have been collected in excavations associated with the Fiechter House. Lithics, fire cracked rock, and soil samples were collected from test excavations of sites along Muddy Creek. These collections are currently being analyzed and are not curated in a formal museum setting.

The museum property inventory for Baskett Slough NWR includes three bricks collected from a decommissioned brick-lined well that was determined to be ineligible to the National Register of Historic Places.

5.13 Paleontological Resources

Paleontological resources, also known as fossils, are the remains or traces of prehistoric plant and animal life that are found in the geologic formations in which they were originally buried, typically within units of sandstone, mudstone, and shale. Paleontological resources are considered to be nonrenewable and sensitive scientific and educational resources.

There are no known paleontological resources on the Refuge Complex. In 1999, however, two fossils of ground sloths dating to 12,225 years ago were discovered in the Kings Valley area located approximately 25 miles north of W.L. Finley NWR (http://www.seattlepi.com/local/bone25.shtml). Another paleontological site dating to 12,300 years ago and comprised of over 20 species of extinct Ice Age animals was located in the town of Woodburn located approximately 30 miles north of Baskett Slough and Ankeny Refuges (http://blogs.opb.org/fieldjournal/tag/ground-sloth/).

5.14 Special Designations

The Service manages several specially-designated areas on the Refuges.

5.14.1 National Natural Landmark

A National Natural Landmark (NNL) is a nationally significant natural area that has been designated by the Secretary of the Interior. To be nationally significant, a site must be one of the best examples of a type of biotic community or geologic feature in its physiographic province. The Willamette Floodplain, a remnant example of largely unplowed native grassland and ash woodland located in Finley NWR, was designated in 1987 as a NNL (National Park Service, 2009). The bottomland grasslands of this floodplain represent the largest remnant of this native habitat in the Pacific Northwest.

5.14.2 Research Natural Areas

Research Natural Areas (RNAs) are tracts of land federally protected for research and educational purposes. Specifically, they are to provide 1) baseline areas against which effects of human activities can be measured, 2) sites for study of natural processes in undisturbed ecosystems, and 3) gene pool preserves for all types of organisms, especially rare and endangered types. According to the Standards and Policy Guidelines issued for RNAs (Pacific Northwest Forest and Range Experiment Station 1972), an RNA is a unit in which natural conditions are maintained except when deliberate manipulation maintains the unique features of the site. Research on the refuge is not limited to these areas.

Refuge policy on RNAs (8 RM 10) addresses RNA management and stresses that RNAs must be reasonably protected from any influence that could alter or disrupt the characteristic phenomena for which the area was established. RNA policy encourages discontinuing recreational uses if these uses threaten serious impairment of research or education values. Vegetation management is permitted only where necessary to preserve vegetation, and must be documented in a plan approved by the Regional Director. Natural processes are stressed for wildlife population management. Finley NWR has three RNAs, all of them designated as such in 1966 (Franklin et al. 1972).

Willamette Floodplain RNA: The Willamette Floodplain RNA provides an excellent example of the grassland-prairie community mosaic found on wet valley-bottom habitats.

Maple Knoll RNA: The Maple Knoll RNA provides an example of big-leaf maple and Oregon white oak stands typical of hilly areas in the Willamette Valley. It is 100 acres in size and includes both the north and south slopes of Maple Knoll. A narrow dike of intrusive igneous rocks runs along the ridge line.

Pigeon Butte RNA: Pigeon Butte RNA is a 70-acre tract that exemplifies Oregon white oak stands. Pigeon Butte is a relatively isolated hill rising 76 meters from the valley floor. The RNA occupies the northerly slopes of this butte.

5.14.3 Important Bird Areas

An Important Bird Area (IBA) is a site that provides essential habitat for one or more species of birds and that is recognized as being important on a global, continental, or state level. IBAs often support a significant proportion of one or more species' total population. The IBA program was developed by BirdLife International and is administered by the National Audubon Society in the United States. Ankeny, Baskett Slough, and William L. Finley NWRs are all listed as IBAs. The primary "ornithological significance," as defined by the National Audubon Society, are the large concentrations of wintering waterfowl utilizing the refuges (National Audubon Society 2011). Additionally, large flocks of dunlin in the winter and the presence of Partners in Flight focal species (bushtit, Bewick's wren, swainson's thrush, western wood peewee, willow flycatchers, and yellow warblers) during the breeding season define the refuges as IBAs.

Important Shorebird Migratory Stopovers: The U.S. Shorebird Conservation Plan, a strategy for conserving migrating shorebirds and their habitats, designates important sites for shorebirds in the United States. Ankeny, Baskett Slough, and Finley NWRs are all designated as Important Shorebird Migratory Stopovers (Brown et al. 2001, Drut and Buchanan 2000). The shorebird use is categorized as local with consistent annual use.

5.14.4 Oregon Scenic Bikeway

The nation's first established Scenic Bikeway traverses the Willamette Valley and passes directly adjacent to Ankeny Refuge and the Snag Boat Bend Unit, on county roads. The Refuge System does not have policy or direction addressing this designation.

5.15 Socioeconomic Environment

5.15.1 Overview of Regional Economic Setting

The Willamette Valley NWR Complex is located in northwestern Oregon, within the Willamette Valley. William L. Finley NWR is located on the western edge of the Willamette Valley within Benton County, while the Snag Boat Bend Unit is located in Linn County, Oregon. The principal community located near the William L. Finley Refuge is Corvallis (Benton County). Ankeny NWR is located in Marion County, a short drive from Salem. Lastly, Baskett Slough NWR is located within Polk County, near Salem and Dallas. (See refuge boundaries on Map 1).

The Willamette Valley serves as the heart of Oregon's agricultural industry; more than two thirds of the state's wineries are located within the valley (Oregon Wine Board 2008). The abundance of rivers, lakes, and waterfalls provide numerous recreation and tourism opportunities in the Willamette Valley area including kayaking, fishing, hiking, and camping (Travel Oregon,2008).

5.15.2 Regional Demographic Information

Population: Table 5-5 shows the population estimates and past trends for the counties that the refuges reside within, as well as local towns and cities. Combined, the four-county study area accounted for 15 percent of the state's total population in 2000. Oregon's population increased by 20 percent from 1990-2000, and two of the four counties in the study area exceeded that rate. Polk County experienced the greatest population growth of the four counties in the study area during that decade, increasing by 26 percent. Marion County's population increased by 25 percent just under Polk County's growth rate. Benton and Linn Counties grew at a slower rate than the state average, increasing their populations by 10 percent and 13 percent, respectively (U.S. Census Bureau 2008).

Table 5-5. Local and Regional Population Estimates and Characteristics

	Residents	Median Age	Persons per Square Mile	Land Area (Square miles)	Population Percent Change 1990-2000
State of Oregon	3,421,399	36	35	95,9967	20%
Counties Near Refuge					
Benton	78,153	31	116	676	10%
Linn	103,069	37	45	2,292	13%
Marion	284,834	34	241	1,184	25%
Polk	62,380	37	84	741	26%
Principal Towns Near Refuge					
Corvallis (Benton County)	49,322	27	3,626	14	10%
Salem (Marion County)	136,924	34	2,994	46	27%
Dallas (Polk County)	12,459	36	2,798	4	32%

Source: U.S. Census Bureau (2008). All figures rounded to nearest whole number.

Ethnicity, Ancestry, and Education: In 2000, Oregon's population consisted of 87 percent white persons not of Hispanic or Latino origin (U.S. Census Bureau 2008). The county percentages were similar to this state average. Percentages of the population consisting of white persons not of Hispanic or Latino origin across the study area ranged from 82 percent in Marion County to 93 percent in Linn County. The county averages for percentage of the population consisting of black or African Americans were lower than the state average of 1.6 percent, ranging from 0.3 percent in Linn County to 0.9 percent in Marion County. Oregon's total population consisted of 1.3 percent American Indian or Native Alaskan individuals, and all four counties were similar to this estimate. In 2000, 3 percent of the state's population consisted of individuals who were of Asian descent. Within the study area, this percentage ranged from 0.8 percent in Linn County to 4.5 percent in Benton County (U.S. Census Bureau 2008).

Ancestry patterns were also similar across the counties, with heavy English, German, and Irish influences (U.S. Census Bureau 2008). Approximately 81.5 percent of Oregon residents 25 years and older were high schools graduates. The county averages were similar to the state average, ranging from 79.3 percent in Marion County to 93.1 percent in Benton County. The percentage of state residents who held a bachelor's or advanced degree was 25.1 percent. Again, each of the four counties in the study area was similar to the state average, ranging from 13.4 percent in Linn County to 47.4 percent in Benton County (U.S. Census Bureau 2008).

Employment and Income: Employment estimates for the four-county study area are shown in Table 5-6. Manufacturing, health care, education, and government are all major employers in the study area (U.S. Department of Commerce 2008). Manufacturing employment ranged from 7 percent of total employment in Marion County to 17 percent in Linn County. Health care and education, as a percentage of total county employment, ranged from 11 percent in Linn County to 14 percent in

Marion County. Government employment (local, state and federal) comprised 13 percent of total county employment in Linn County and 27 percent of total employment in Benton County. The retail trade sector is also well represented across the study area (U.S. Department of Commerce 2008).

Major employers in the town of Corvallis (Benton County) include CH2M Hill, Good Samaritan Hospital, and the Corvallis Clinic. Oregon State University is also located in Corvallis (City of Corvallis 2008). Within the city of Salem (mainly Marion County), the largest private employer is the Salem Hospital, employing approximately 3,500 people (Salem Hospital 2008). Because of its proximity to Salem, many Dallas residents are employed in the capital.

Table 5-6. 2006 Full-time and Part-time Employment for Counties near the Refuge

	Benton	**Linn**	**Marion**	**Polk**
Total non-farm employment (jobs)	54,563	52,393	169,203	25,615
Percent of Employment by Industry				
Ag, forestry, fish & hunting	3.9%	6.3%	7.2%	15.9%
Mining & Utilities	(D)	(D)	0.4	0.6%
Construction	3.7%	6.7%	6.9%	6.0%
Manufacturing	9.7%	17.1%	7.4%	13.4%
Wholesale trade	(D)	3.2 %	2.7%	1.5%
Transportation & warehousing	(D)	5.2%	2.4%	1.8%
Retail trade	8.9%	12.2%	12.4%	8.8%
Finance, insurance, real estate, & information	8.2%	6.4%	7.2%	5.2%
Services				
Professional, management, admin., & waste	7.1%	8.7%	10.4%	3.2%
Health care, social assistance, education	12.9%	11.0%	13.8%	13.1%
Arts, entertainment, & recreation	2.6%	1.2%	1.7%	1.3%
Accommodation & food	6.0%	5.4%	6.2%	4.7%
Other services	4.6%	5.7%	5.3%%	5.6%
Government (federal, state, & local)	27.0%	13.4%	19.8%	23.9%

Source: U.S. Dept. of Commerce, Bureau of Economic Analysis, Regional Economic Information System 2008. Self-employment is not included.
(D)*: Not shown to avoid disclosure of confidential information, but the estimates for these items are included in the totals

U.S. Census Bureau (1999) data for median household income, unemployment, and percentage of persons below poverty are shown in Table 5-7 (U.S. Census Bureau 2008). The median household income for two of the four counties in the study area falls below the state and national averages. Polk County, with a median household income of $42,311, is greater than the state and national average. Three counties have unemployment rates higher than the 2000 national average of 3.7 percent. Both Linn and Marion Counties have unemployment rates of nearly 5 percent.

The percent of population below the federal poverty line is an indicator of the economic distress within a community. However, the percent of persons below poverty is higher than the state average (12%) for only two of the four counties. As shown in Table 5-7, Benton has the highest percent of persons living in poverty (15%) while Linn County has the lowest (11%).

Table 5-7. Income, Unemployment and Poverty Estimates

	Median Household Income (1999)	**Percent Unemployed (2000)**	**Percent of Persons below Poverty (1999)**
United States Average	$41,994	3.7%	12%
Oregon	$40,916	4.2%	12%
Counties Near Refuge			
Benton	$41,897	3.1%	15%
Linn	$37,518	4.9%	11%
Marion	$40,314	4.9%	14%
Polk	$42,311	4.0%	12%
Principal Towns Near Refuge			
Corvallis (Benton County)	$35,236	3.3%	20.6%
Salem (Marion County)	$38,881	5.2%	15.0%
Dallas (Polk)	$35,967	4.3%	9.8%

Source: U.S. Census Bureau (2008)

5.15.3 Local Industries

Most farms in the Willamette Valley are family-owned and operated, and comprise an average of 700 acres per farm.

Grass Seed: The Valley is a leading producer of grass seed, producing nearly two-thirds of the United States' cool-season grasses. Over 60 percent of the nation's annual ryegrass supply comes from the Willamette Valley. Grass seed farming is ideal in the region due to its wet, fertile soil.

The state of Oregon, as a whole, earns average revenue of $571.44 per harvested acre of grass seed farms. Oregon State University's Extension Service provides economic costs and returns for annual ryegrass. For a typical farm growing annual ryegrass, net earnings per acre harvested is around $154.79.

Wineries: The Valley is home to a growing wine industry. Over 200 wineries and 10,000 planted acres are located in the Valley, which is home to two-thirds of the state's vineyards and wineries.

Tourism: The travel and tourism industry continues to be a significant and growing contributor to the local economies of Oregon (Dean Runyan Assoc. 2008). Total 2007 traveler expenditures varied across the four counties from $89 million in Benton County to $356 million in Marion County.

Agriculture Revenue – Importance to local counties: Of the four counties in the study area, Benton has the smallest number of farms, 912, though this number has increased since 1997. Total agricultural production in the county was $85 million in 2002, an increase of 18 percent from 1997. Per farm, the county averaged $92,746 in 2002, well over the state's per farm average production. Benton County is the state's second largest producer of cut Christmas trees (by value sold) and the 5th largest producer of vegetables, melons, potatoes, and sweet potatoes (USDA – Benton County Profile 2008).

Polk County has the second fewest farms within the study area. In 2002, Polk County had 1,324 farms which was a 4 percent decrease from 1997. Total 2002 agricultural production in the county was $89 million, a 6 percent decrease from 1997. Each farm averaged $67,663 in 2002, which was down 3 percent from 1997. This indicates that farms within the county have become less productive since 1997. The county ranked 4th in cut Christmas tree production and 5th in the production of milk and other dairy products from cows and hay and other crops (all by value sold) in 2002 (USDA – Polk County Profile 2008).

In 2002, Linn County had 2,346 farms, a decrease of 3 percent from 1997. Total market value of production saw a decrease of 16 percent from 1997 to 2002, with total market value of production down to $151 million in 2002. Per farm, the total market value of production decreased by 13 percent (from $74,760 in 1997 to $64,713 in 2002). The county was the state's top producer of sheep, goats, and their products as well as all other crops and hay in 2002. Linn County ranked the 3rd producer of sweet corn in Oregon for 2002 (USDA – Linn County Profile 2008).

Marion County has the greatest number of farms within the study area (3,203) and is the top producing county in the state of Oregon (by value produced). Although the total number of farms has increased since 1997, the total market value of production has decreased 4 percent from $448 million in 1997 to $430 million in 2002. Accordingly, market value per farm has also decreased from $150,305 in 1997 to $134,457 in 2002, an 11 percent decrease. The county was ranked top in the state for the value of crops including nursery and greenhouse and 4th for the value of livestock, poultry, and their products. The county also had the second highest value sold for fruits, tree nuts, and berries in 2002 (USDA – Marion County Profile 2008).

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Chapter 6

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Environmental Effects

- Overview of Effects Analysis
- Effects to Canada Geese and Migratory Waterfowl
- Effects to Wetland Habitats and Associated Species
- Effects to Wet Prairie Habitats and Associated Species
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This chapter provides an analysis of the environmental consequences of implementing the alternatives described in Chapter 2. Impacts are described for the main aspects of the environments described in Chapters 3 through 5, including the effects to physical, biological, cultural, and socio-economic resources. The alternatives are compared "side by side" under each topic, and both the adverse and beneficial effects of implementing each alternative are described.

Many of the actions described under the alternatives would require additional funding or staff, none of which is guaranteed at this time. The alternatives are analyzed under the assumption that funding would be available to implement the actions as described.

The overall cumulative effect on the environment from implementing the various alternatives is summarized in section 6.19. Cumulative impacts include a) impacts to refuge resources from reasonably foreseeable events; and b) impacts resulting from interaction of refuge actions with actions taking place outside the refuge. This discussion includes a brief discussion on potential impacts of climate change to refuge resources. More detailed assessments of the refuge's cumulative effects for relevant impact topics are presented section by section.

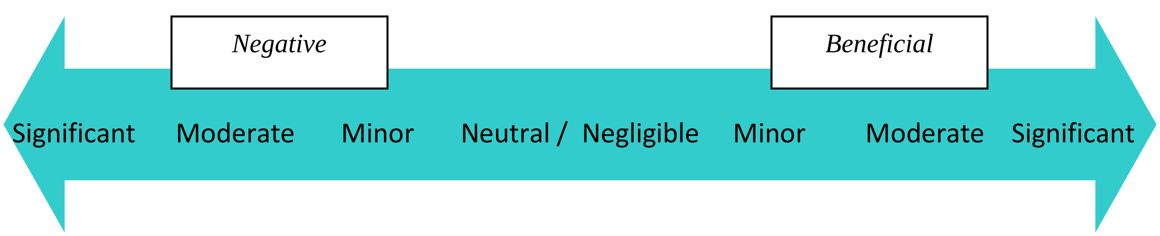
Between the Draft CCP and this Final CCP, a few changes were made to decisions about including some new public use facilities under Alternative 3. These changes were relatively minor and the effects analysis (especially the footprint analysis of facilities per habitat) was not updated in the Final CCP to reflect these changes.

6.1 Overview of Effects Analysis

The effects analysis has been developed by a) identifying the species groups, habitats, refuge users, aspects of the physical environment, and other resources of interest; and b) identifying effects to these resources that could potentially result from implementing the actions described under each alternative. Effects are described in terms of the change from current conditions. Thus, Alternative 1, the no-action alternative (current management) has a neutral effect because minimal or no changes to management programs would occur under this alternative.

More details on effects from recreational or economic uses are contained within Appendix C, Compatibility Determinations.

The information used in this Draft CCP/EA was obtained from relevant scientific literature, existing databases and inventories, consultations with other professionals, and professional knowledge of resources based on field visits, and experience.



The terms identified below were used to describe the scope, scale, and intensity of effects on natural, cultural, social, and economic (including recreational) resources. Effects may be identified further as beneficial or negative.

- **Neutral or Negligible.** Resources would not be affected, or the effects would be at or near the lowest level of detection. Resource conditions would not change or would be so slight there would not be any measurable or perceptible consequence to a population, wildlife or plant community, recreation opportunity, visitor experience, or cultural resource. If an impact is not discussed, it is assumed to be neutral.

- **Minor.** Effects would be detectable but localized, small, and of little consequence to a population, wildlife or plant community, other natural resources; social and economic values, including recreational opportunity, and visitor experience; or cultural resources. Mitigation, if needed to offset adverse effects, would be easily implemented and successful, based on knowledge and experience.

- **Moderate.** Effects would be readily detectable and localized with measurable consequences to a population, wildlife, or plant community or other natural resources; social and economic values, including recreational opportunity, and visitor experience; or cultural resources. Mitigation measures would likely be needed to offset adverse effects, and could be extensive, moderately complicated to implement, and probably successful based on knowledge and experience.

- **Significant (major).** Effects would be obvious and would result in substantial consequences to a population, wildlife or plant community or other natural resources; social and economic values including recreation opportunity and visitor experience; or cultural resources within the local area or region. Extensive mitigating measures may be needed to offset adverse effects and would be large-scale in nature, possibly complicated to implement, and may not have a high degree of probability for success. In some instances, major effects would include the irretrievable loss of the resource.

Time and duration of effects have been defined as follows:

- **Short-term or Temporary.** An effect that generally would last less than a year or season.
- **Long-term.** A change in a resource or its condition that would last longer than a single year or season.

6.2 Effects to Canada Geese and Migratory Waterfowl

6.2.1 Effects from Habitat Actions

Under Alternative 2, approximately 13 acres of wetlands and 233 acres of wet prairie would be restored across the refuges (this represents approximately a 1 percent increase in wetlands and a 36 percent increase in wet prairie on the Complex from present). Under Alternative 3, approximately 106 acres of wetlands (6 percent increase on the Complex from present) and 471 acres of wet prairie (72 percent increase from present). These wetlands (and wet prairie areas, when burned or mowed in the same year) will provide additional loafing, resting, and feeding areas for Canada geese. Ducks would primarily utilize the wetland areas.

Both Alternatives 2 and 3 recognize and address the issue of cooperative farming becoming increasingly difficult due to high goose use and fluctuating grass seed prices. Under both alternatives, but to a greater extent under Alternative 3, the Complex would focus forage production on those fields that have been receiving moderate to high goose use in recent years, with the exception of fields that have traditional dusky use (there are some exceptions to this – see Rationale under Objective 1a). Some practices that would typically be used by farmers under Alternative 1 or 2 to enhance the seed crop (such as fertilization and weed control), would potentially be employed less under Alternative 3. Under Alternative 2, approximately 395 acres of fields that receive low to moderate utilization by Canada geese would be retired from farming. Although the acres devoted to goose forage would decrease by 9 percent under Alternative 2, it is expected that the number of annual goose use days for the refuges would remain largely unchanged (between 60,000-100,000), because most of the fields being removed from farming receive low goose use, and use of the remaining farm fields would likely increase to accommodate additional geese. Other measures included under this alternative (such as growing corn) may offset the reduction in acreage. Under Alternative 3, approximately 1,105 acres of low to moderate use fields would be retired, a decrease in agricultural crops of 24 percent. Annual goose-use days may decline slightly or moderately, although wintering goose numbers would still expected to remain within the range of 60,000-100,000. The fields targeted for removal from production generally have low to moderate goose use, so their removal should not impact goose use days substantially. Under either alternative, there could be differential changes in goose use by species (e.g., cackling vs. duskys) with changes to field types.

6.2.2 Effects from Public Use Actions (not including hunting)

Although both visitation and facilities would increase under Alternatives 2 and 3, under all three alternatives, public access would remain limited during the winter season in order to provide undisturbed habitat for Canada geese and other migratory wildlife. Under each of the alternatives a sanctuary area measuring 4,430 acres at W.L. Finley, 2,037 acres at Baskett Slough, and 2,810 acres at Ankeny will continue to be in effect, with closures to public access within the sanctuary area during the wintering period as shown on Maps 8, 9, 11, 12, 13, 14, and 15. Overall, the sanctuary area covers approximately 84 percent of the Complex during the wintering period. However, edge disturbance does cause a significant reduction in the acres of effective sanctuary. This wintering sanctuary functions to protect wintering geese and migratory waterbirds from disturbance. By resting in undisturbed areas, wintering birds can replenish their energy reserves required for nesting and migrating. Providing sanctuary also has the effect of reducing the potential for crop depredation on neighboring agricultural lands.

Wildlife observation, photography, interpretation, waterfowl hunting, deer hunting, and environmental education could result in habitat trampling in field or wetland habitats or disturbance to waterfowl during the non-wintering period (see Compatibility Determinations, Appendix C). As discussed further in these compatibility determinations, these disturbance effects would be negligible to minor under all alternatives as most people stay on the trails and (except at Baskett Slough Refuge, where goose numbers peak in April), there are limited numbers of waterfowl remaining on the refuge outside of the wintering period. In addition, in the spring prior to migration, waterfowl are far more tolerant to nearby human activities than during the winter.

6.2.3 Effects from Hunting

Waterfowl hunting has not been permitted at any of the refuges for many years. Under Alternatives 1 and 3, waterfowl hunting would remain closed. Under Alternative 2, waterfowl hunting would be offered as described in Objective 10f and described in further detail in Appendix G. A detailed analysis of hunting effects to populations of geese or other migratory waterfowl is contained in the Waterfowl Hunting Compatibility Determination (Appendix C). This analysis concluded that waterfowl hunting as proposed under Alternative 2 would not have a significant impact on local, regional, or Pacific Flyway waterfowl populations because the percentage taken on the refuge, though possibly additive to existing hunting take, would be a tiny fraction of the total estimated harvest. In addition, overall populations will continue to be monitored and future harvests will be adjusted as needed under the existing flyway and state regulatory processes. As discussed in the Compatibility Determination (Appendix C), although disturbance to wintering waterfowl would occur during the hunting period, this disturbance would be minimal because of the small area available for hunting and the short time frame of the hunt. In addition, migratory geese have not yet arrived at the refuges at the time of the proposed hunts. According to national waterfowl experts who have looked at the cumulative impact of disturbance stemming from hunting on national wildlife refuges (US DOI 2009), hunting disturbance is of less impact than the direct mortality caused by hunting. Further, since the direct impacts of hunting cannot be clearly demonstrated to be detrimental at most population levels, then disturbance has not been demonstrated to result in any population level effects on waterfowl (US DOI 2009).

6.2.4 Overall Effects to Waterfowl

Based on an assessment of habitat management and public use factors, none of the three alternatives will cause any significant adverse effects to waterfowl. Overall, changes in the type of habitat (a greater quantity of wetland and wet prairie habitat to provide loafing, resting, and feeding areas, coupled with a lesser quantity of field habitat for foraging) will occur under Alternatives 2 and 3, as will minor additional mortality from hunting under Alternative 2 only.

6.3 Effects to Wetland Habitats and Associated Species

6.3.1 Effects from Habitat Actions

Acres available by alternative: Under Alternatives 2 and 3, a wetland that was historically wet prairie and is presently in poor quality at W.L. Finley (M-dikes area) would be converted to wet prairie habitat. Except for this, each of the alternatives protects and maintains all existing acres of wetland habitats. Under Alternatives 2 and 3, the Service would increase wetland habitats by 13 and 106 acres, respectively, approximately a 1 percent increase in total acres of wetlands on the Refuge Complex in Alternative 2 and a 6 percent increase in Alternative 3. More than 80 percent of the wetland acres would be managed as seasonal wetlands.

Effects of water management: Under each of the alternatives, water management in seasonal wetlands (holding seasonal precipitation through the winter and spring and draining water for growth of "moist soil" vegetation during summer) through the use of water control structures would be the primary tool used in creating and maintaining desired habitat conditions. Most of the native wetland vegetation of the Willamette Valley evolved under a similar hydrologic cycle; therefore no adverse effect from seasonal water management would be expected to native wetland biota. In addition, some wetlands would be filled via delivery of water from irrigation. Delivery of water to wetlands from irrigation diversions assists in wetland management by a) assisting the growth of annual "moist soil" vegetation, which provide important seed foods for waterfowl, and b) providing early fall floodup to support early season migrants.

In several permanent wetlands, no intentional draining would be planned, due to the presence of Oregon chub. Permanent wetlands provide habitat for other native species such as otters and kingfishers, but may also promote bullfrogs and non-native fish, which could potentially create moderate negative impacts on some native species populations, including red-legged frogs.

In addition to water management, heavy equipment may be used in wetland bottoms to set back succession; mowing may be used along the edges; structures/spillways may be installed to manage water levels; and some population control of nutria would occur. Disking results in a desirable vegetative response and is only used when the soils are reasonably dry. Mowing prevents weed seed set and helps scatter native seed, and nutria control assists in protection of dikes.

Effects of weed management: For weed species that are or become established, mechanical, cultural, biological, and chemical control methods would be evaluated (see Appendix F, section F.2 for descriptions of general weed control methods). Chemical usage will be subject to provisions of the Refuge IPM plan (Appendix F). Among other provisions, this plan provides direction that "the most efficacious pesticide available with the least potential to degrade environmental quality (soils, surface water and groundwater) as well as least potential effect to native species … would be acceptable for use on the refuge." Each approved pesticide would undergo a chemical profile analysis; active ingredients would be analyzed for their risk quotient and this value compared to a Level of Concern for surrogate species, as established by the Environmental Protection Agency (EPA). All applications of herbicides will conform to the specific pesticide label requirements.

Employment of this approach with herbicides would result in a moderate to minor risk from chemical exposure. However, unquantified risks may still occur via factors not assessed under current protocols, such as intermingling of unlike chemicals in the field; species-specific sensitivity that differs from surrogate species sensitivity; exposure through inhalation, exposure through ingestion of pesticide-contaminated soil, and other factors (see Appendix F).

A study conducted at W.L. Finley Refuge evaluated water quality in wetlands and streams. Amongst other recommendations to improve water quality and reduce impacts to sensitive biota, Materna and Buck (2007) recommended the use of IPM strategies, including incorporating use of bioswales or holding ponds for retaining sediment and increased buffer areas particularly prone to agricultural runoff; maintaining vegetative buffers around agricultural lands; and working collaboratively within the watershed to reduce pesticide and fertilizer impacts on a watershed basis; and continuing to monitor and assess sensitive species populations and habitats,

Approximately 16.3 miles of wetland perimeter are situated next to farmed fields without an adjoining riparian buffer under Alternative 1. This figure will change to 16.5 miles of perimeter under Alternative 2 and 13 miles of perimeter under Alternative 3. Locating wetlands adjacent to agricultural fields is beneficial for Canada geese, as this species will more readily utilize farm fields next to wetlands that allow access unimpeded by woody vegetation. Most of the three refuges' farmed fields do have vegetative buffers comprised of a mix of native and non-native vegetation between the fields and adjacent wetlands. Often these vegetative buffers are herbaceous vegetation or grass. Since wintering Canada geese prefer to browse in fields adjacent to wetlands, especially where tall vegetation does not block access between the wetland and field, efforts in the past to promote shrub or tree riparian vegetation to prevent field runoff have been somewhat limited. However, riparian vegetation is slowly becoming established along the edges of many wetlands and dikes, either naturally or through plantings. There may remain some potential negative impact to wetland species sensitive to fertilizers and pesticides that runoff from farm fields into wetlands (see Section 6.16).

Overall effects from habitat management: In summary, the use of the specified habitat management techniques will help maintain wetland habitat structure, plant diversity, and native plant composition. Minor, temporary, localized disturbance and damage could occur as a result of using these habitat management techniques, but these effects would be temporary and shortly eclipsed by enhanced habitat structure and composition. Overall, the actions under Alternatives 2 and 3 represent a minor positive effect to both wetland habitat quantity and quality for associated species.

6.3.2 Effects from Public Recreational Use

A variety of public use-related facilities will be developed under both Alternatives 2 and 3 (see strategies under Goal 10), some of which could result in losses of habitat. However, design and placement will be conducted in such a way that no facilities are expected to result in losses of wetland habitat. Some new trails or other facilities may cross wetland habitat under Alternatives 2 and 3, although current practice is to use elevated boardwalks over these types of areas, or to make use of existing dikes.

Over the span of 15 years, visitation is expected to increase under Alternatives 2 and 3 by over 100,000 visitors – approximately a third more than visit the refuges now (see Table 6-1). Visitation tends to be concentrated around wetland sites, due to the superior wildlife viewing opportunities. Therefore, disturbance from non-consumptive recreational activities would increase under both Alternatives 2 and 3, but is still expected to be minor partly because of seasonal restrictions limiting access during the periods that wetlands are most heavily used by wildlife. See the Compatibility Determinations (Appendix C) for Wildlife Observation, Photography, and Interpretation, Environmental Education, Fishing, and Bicycling for more detail.

In addition, the new goose and youth duck hunting program in Alternative 2 will create disturbance to wildlife at Baskett Slough on up to 716 acres during approximately six days each September. Thus a small additional amount of highly disturbing activity will likely occur. The cumulative effect of these disturbances may represent a minor negative impact to wetland wildlife. None of this additional disturbance is expected to result in significant effects to wildlife because the time of greatest wildlife use on wetland habitats is during winter. Winter sanctuary areas (limiting human access to wetlands) and time of closures will remain the same (see discussion under Effects to Canada Geese, Section 6.2) in all alternatives.

6.3.3 Overall Effects

Overall, considering all programs, implementing Alternatives 2 and 3 would represent a minor positive effect to both wetland habitat quantity and quality for associated species.

6.4 Effects to Wet Prairie Habitats and Associated Species

6.4.1 Effects from Habitat Actions

Acres available by alternative: All of the alternatives would protect and maintain existing remnant and recently restored wet prairie habitats. Under Alternatives 2 and 3, the Service would restore 233 and 471 acres, respectively, to wet prairie from currently farmed fields or from non-agricultural grasslands, approximately a 36-72 percent increase on the Refuge Complex. More acres would potentially be restored from existing farm fields under Alternative 3 than under Alternative 2. However, restoration under Alternative 3 could be delayed for a number of years, with restoration sites potentially harboring large quantities of weeds in the interim.

Effects of fire, mechanical, and weed management: Without active disturbance, wet prairie habitat succeeds to a shrubby or forested state, as woody species easily encroach upon this habitat (Bartells and Wilson 2001). Under each of the alternatives, rotational prescribed fire would be a primary tool for reducing woody vegetation and thatch and stimulating forb growth. Other methods for removing woody vegetation could include hand or mechanical treatment or selective herbicide. Of the three alternatives, Alternative 2 includes the most intensive set of other strategies, including supplemental seeding and weed control to enhance species diversity at remnant or recently restored sites.

Recent studies have shown that habitat management, such as burning and/or mowing during the fall, can reduce the cover of woody species and promote native species by restoring an ecological process that has otherwise been removed (Clark and Wilson 1996, Wilson and Clark 1997).

Clark and Wilson (2001) also undertook a comparative investigation of burning, mowing (with removal of material) and hand-removal, measuring post-treatment plant community structure and composition in wet prairies. Two years of treatments yielded the following results:

- *Woody species*: Burning and hand-removal caused the greatest reductions in cover of woody species. Mowing with removal of cut material did not reduce the cover of woody species compared to controls.
- *Native herbaceous species*: Burning had differential effects on graminoids. Burning significantly decreased the inflorescence production of *Deschampsia cespitosa*, the dominant wetland prairie grass. In contrast, burning, along with mowing, significantly increased flowering of *Juncus tenuis*. Flowering and cover of all native graminoids combined, however, showed no significant responses to treatments. Burning and hand-removal significantly promoted the cover of native forbs as a group, with *Lotus purshiana* and *Veronica scutellata* showing the greatest increases.
- *Non-native herbaceous species*: Burning and hand-removal significantly reduced the cover of non-native forbs as a group and particularly reduced the cover of *Hypericum perforatum*. The number of inflorescences of non-native grasses (*Holcus lanatus* and *Anthoxanthum odoratum*) increased with hand-removal and mowing.
- Overall, no treatment was clearly superior in fulfilling the restoration objectives. Burning was effective in reducing woody cover and did not promote abundance of non-native herbaceous species. Burning, however, reduced the flowering of the key native grass, *Deschampsia cespitosa*. Hand-removal of woody species was also effective at reducing woody cover and promoted the abundance of some native species, but it sometimes increased the cover of non-native herbaceous species. Because mowing with removal of cut material was ineffective in reducing woody cover and tended to promote non-native herbaceous species, this treatment is not recommended as a management tool.

Alverson (2006) summarized various studies examining fire effects in wet prairie habitats and concluded the following:

- tufted hairgrass (an indicator grass in wet prairie habitats) grows more vigorously after fire;
- flowering and seed production of many native plants found in wet prairie are enhanced for the first year or two after burning;

- some introduced non-native species, as well as woody species, are set back or killed following fire;
- native perennial forbs, taken as a group, show consistent increased levels in the first year following a burn, while introduced perennial forbs generally show a pattern of decreased abundance in the first year following a burn.

Minor, temporary, localized disturbance and damage could occur as a result of using burning or mowing or selective hand removal techniques, but these effects would be temporary and shortly eclipsed by enhanced habitat structure and composition. Some areas would remain unburned or unmowed each year, which would provide for habitat diversity, source populations to re-establish in burned sites, and other functions.

For invasive weeds, mechanical, cultural, chemical, and biological controls methods will be evaluated (see Appendix F, section F.2, for descriptions of general weed control methods). Chemical usage will be subject to provisions of the Refuge IPM plan (Appendix F). Among other provisions, this plan provides direction that "the most efficacious pesticide available with the least potential to degrade environmental quality (soils, surface water and groundwater) as well as least potential effect to native species … would be acceptable for use on the refuge." Each approved pesticide would undergo a chemical profile analysis; active ingredients would be analyzed for their risk quotient and this value compared to a Level of Concern for surrogate species, as established by the EPA. All applications of herbicides will conform to the specific label requirements.

Employment of this approach with herbicides would result in a moderate to minor risk from chemical exposure. However, unquantified risks may still occur via factors not assessed under current protocols, such as intermingling of unlike chemicals in the field; species-specific sensitivity that differs from surrogate species sensitivity; exposure through inhalation, exposure through ingestion of pesticide-contaminated soil, and other factors (see Appendix F).

Overall effects from habitat management: In summary, the use of the specified habitat management techniques is expected to improve the composition and structure of the wet prairie plant community. Minor, temporary, localized disturbance and damage could occur as a result of using these habitat management techniques, but these effects would be temporary and shortly eclipsed by enhanced habitat structure and composition. Considering the number of acres by alternative, together with the intensiveness of strategies proposed, Alternative 2 presents the option that may result in the highest quality of wet prairie habitat while Alternative 3 presents the option that may result in the most acres but a possible reduction in the quality of wet prairie habitat.

6.4.2 Effects from Public Recreational Use

Enhanced public use facilities and visitor service programs are expected to draw additional visitors over the course of 15 years under either Alternative 2 or Alternative 3. In general, the highest number of visitors is anticipated for Alternative 2, because this Alternative would result in the highest degree of facilities and program offerings in the recreation programs (see Table 6-1). As visitation increases, there will be the potential for a degree of additional trampling of native wet prairie habitats from off-trail usage as well as some minor additional disturbance to wet prairie species. However, (as explored in further detail in the Compatibility Determinations in Appendix C), these negative effects are considered temporary and minor under all alternatives around concentration areas such as kiosks/viewing sites or trails, and negligible elsewhere because very few people (hunters excepted) venture away from established trails or kiosks/viewing sites. Deer hunting is expected to remain a fairly low intensity use with < 100 participants per year over a period when the vegetation is not actively growing. Hunters utilizing or accessing waterfowl hunt areas would not impact any wet prairie habitat.

6.4.3 Overall Effects

Overall, considering all programs, a minor positive effect will occur for wet prairie associated species under Alternative 2 and a moderate positive effect under Alternative 3.

6.5 Effects to Upland Prairie/Oak Savanna Habitats and Associated Species

6.5.1 Effects from Habitat Actions

Acres available by alternative: Each of the alternatives protects and maintains all existing mid-late successional upland prairie/oak savanna habitat (sites with oaks >80 years old that are present within a matrix of mostly native upland prairie). Under Alternatives 2 and 3, the Service also would initiate restoration to upland prairie/oak savanna on an additional 444 and 631 acres from areas currently farmed or non-agricultural grasslands, an increase of approximately 78-110 percent on the Refuge Complex. Although Alternative 3 potentially stands to add the most acres to this habitat type (compared to the other alternatives), restoration under Alternative 3 could be delayed for a number of years, with restoration sites potentially harboring large quantities of weeds, and making restoration more difficult. For restored areas under either alternative, site preparation including mowing, burning, and multiple herbicide treatments would be employed to rid the site of unwanted vegetation and facilitate the establishment of native plants. Cultivation is rarely used because it results in bringing more weed seeds to the surface and results in increased germination.

Effects of fire, mechanical, and weed management: Each alternative utilizes a suite of strategies to attain the desired vegetative condition on either existing or restored sites. Removal of small diameter oak trees could happen to prevent succession of the sites to oak woodland. Fire, mowing, and weed control would be utilized under all alternatives. Remnant disturbed sites, which have understories heavily dominated by non-native grasses, would be managed somewhat more intensively to increase species diversity under Alternative 2 than under the other alternatives.

A study conducted by Maret and Wilson (2005) compared fire treatment on upland prairies with clipping and raking, and burning with litter reapplied. Seeds of common exotic and native prairie species were sowed into the experimental plots after treatments and seedling establishment measured. In the sites dominated by annual or perennial exotic grasses, burning significantly improved native, but not exotic, seedling establishment over those on unburned plots. Litter removal was a significant component of this burn effect, particularly on the perennial exotic grass site. Burning treatments on the native bunchgrass site significantly increased seedling establishment only of short-lived exotic species.

MacDougall and Turkington (2007) tested the impacts of fire, cutting and raking, and weeding in oak savannas, varying the season of treatment application and comparing treatments on sites with different soil depths. The study found the following:

- There was no significant difference among the treatments; all were similarly effective at suppressing exotics and increasing native plant growth. The authors hypothesized that this result was due to light being the primary limiting resource for many native species; therefore, each treatment increased its availability.
- The effectiveness of disturbance for restoration depended more on the timing of application and site factors than on the type of treatment used. Summer disturbances took place near the reproductive peak of the exotics, so their mortality approached 100%.
- Positive responses by native species were significantly greater on shallow soils because these areas had higher native diversity prior to treatment. Average cover values in the fifth year of treatment were significantly greater compared to year 2.
- Disturbance during midsummer, when exotic grasses are still in reproductive mode, was dramatically more effective at controlling their abundance in subsequent years compared to late-season burns. However, treatment at this time also negatively affected the native perennial grasses. The authors concluded that long-term fire suppression increases the dominance of grasses, regardless of their biogeographical origins, and the timing of fire has probably always been important for determining the functional composition of this savanna.
- After 4 years, each treatment significantly increased light availability and bare soil compared to the control plots but had no effect on soil nitrogen, soil organic matter, or soil moisture, despite substantial changes in species composition. The authors noted that this result, although unexpected, is consistent with other recent studies that have found no net effect of burning or other forms of biomass removal on the soil nitrogen pool.

For weed species that are or become established, mechanical, cultural, chemical, and biological controls methods will be evaluated (see Appendix F, section F.2, for descriptions of general weed control methods). Chemical usage will be subject to provisions of the Refuge IPM plan (Appendix F). Among other provisions, this plan provides direction that "the most efficacious pesticide available with the least potential to degrade environmental quality (soils, surface water and groundwater) as well as least potential effect to native species … would be acceptable for use on the refuge." Each approved pesticide would undergo a chemical profile analysis; active ingredients would be analyzed for their risk quotient and this value compared to a Level of Concern for surrogate species, as established by the EPA. All applications of herbicides will conform to the specific pesticide label requirements.

Employment of this chemical approach would result in a moderate to minor risk from chemical exposure. However, unquantified risks may still occur via factors not assessed under current protocols, such as intermingling of unlike chemicals in the field; species-specific sensitivity that differs from surrogate species sensitivity; exposure through inhalation, exposure through ingestion of pesticide-contaminated soil, and other factors (see Appendix F).

Overall effects from habitat management: In summary, the use of the specified habitat management techniques is expected to improve the composition and structure of the upland prairie/oak savanna plant community. Minor, temporary, localized disturbance and damage could occur as a result of using these habitat management techniques, but these effects would be temporary and shortly eclipsed by enhanced habitat structure and composition. Considering the total acres managed together with the intensiveness of strategies proposed, Alternative 2 presents the option that may result in the highest quality of upland prairie/oak savanna habitat while Alternative 3 presents the option that may ultimately result in the most acres but a possible reduction in the quality of upland prairie/oak savanna habitat.

6.5.2 Effects from Public Recreational Use

Under both alternatives, new trails will be built through this habitat type at W.L. Finley and a new section of the Intertie Trail on Baskett Slough will cross or run adjacent to this habitat. As a result, a minor amount of habitat degradation (vegetation removal or modification and soil compaction) from trail use and trail maintenance (mowing) may be expected in this habitat type.

Enhanced public use facilities and visitor service programs are expected to draw additional visitors over the course of 15 years under either Alternative 2 or Alternative 3. In general, the highest number of visitors is anticipated for Alternative 2, because this Alternative would result in the highest degree of facilities and program offerings in the recreation programs (see Table 6-1). As visitation increases, there will be the potential for a degree of additional trampling of native upland prairie/oak savanna habitats from off-trail usage as well as some additional disturbance to upland prairie species. However, these negative effects (explored in more detail in the Compatibility Determinations – see Appendix C) are considered relatively minor except around and near concentration areas such as kiosks/viewing sites or trails. Although oak savanna and upland prairie habitats probably experience more dispersed public use than other habitat types on the refuges, visitors (with the exception of deer hunters) typically do not venture away much from established trails or kiosks/viewing sites. Deer hunting is expected to remain a low intensity use with < 100 participants per year over a period when the vegetation is largely dormant.

6.5.3 Overall Effects

Overall, a moderate positive effect would occur for upland prairie/oak savanna associated species under both Alternatives 2 and 3.

6.6 Effects to Oak Woodland Habitats and Associated Species

6.6.1 Effects from Habitat Actions

Each of the alternatives protects and maintains all existing oak woodland habitats on the refuges. A minor increase in acres would occur, with 7 acres being added under Alternative 2 and 6 acres under Alternative 3. However, this GIS acreage difference is likely due to slight mapping errors.

Under all alternatives, removal of Douglas-fir would occur to prevent succession to stands dominated by conifers. Douglas-fir can eventually overtop deciduous species, causing death to shade-intolerant oaks, and if allowed to remain and shed seed into the stand, can result in the conversion to a stand where few, if any, oaks remain. Alternative 2 also includes the potential removal of oak trees (thinning) to allow better crown development on remaining trees. Tree removal of either Douglas-fir or oak would involve traditional logging techniques with either removal of the excess material, or piling and burning on site. Alternative 2 proposes a more aggressive set of strategies than the other two alternatives, including thinning of oaks from tightly spaced woodlands, potential use of prescribed fire, and supplemental seeding of understory native species.

Devine and Harrington (2006) studied the effect of varying levels of removal of overtopping Douglas- fir on oak woodland communities. They found the following results:

- Five years after treatment, oak trees had suffered no mortality or windthrow. Stem diameter growth was 194% greater in the full-release treatment relative to the control.
- Acorn production varied widely by year, but in years of higher production, acorn production was significantly greater in both release treatments than in the control.
- Trees with relatively less crown dieback at the time of treatment generally had greater stem growth and acorn production responses to release treatments.

Tveten and Fonda (1999) studied the effectiveness of prescribed fire in oak woodland habitat with understory cover measuring <30% and comprised mostly of exotic species at Ft. Lewis in Western Washington. Their study found the following:

- Fires burned in a patchy manner in the oak woodlands. Understory vegetation with high fuel moisture (scotch broom at Ft. Lewis) can inhibit burning.
- Fire dramatically affected oak stems <3.3 ft. tall or <.79 inches DBH. The fall fires top-killed more oaks than spring fires in these size classes. Oak mortality from fire was trivial, with only mortality showing in size classes under 3.9 inches DBH. Spring fire significantly reduced Douglas-firs < 3.3 feet tall. No Douglas-firs >9.8 feet tall or >2.0 inches diameter were killed by fire.

Effects from forest treatments are described more fully in the Forest Management Compatibility Determination (Appendix C). Minor, temporary, localized disturbance and damage from habitat management could occur as a result of using these techniques, including displacement of wildlife, ground disturbance and potential weed spread, and the possibility of uncontrolled wildfire. Small areas of scorched, sterilized soils may develop directly underneath burn piles. Negative effects would be temporary and localized and would be expected to be shortly eclipsed by enhanced stand structure and composition. Fir removal in oak woodland stands can dramatically change the suite of wildlife species inhabiting the stands (J. Beall pers.comm.).

Overall effects from habitat management: In summary, the use of the specified habitat management techniques is expected to improve the composition and structure of the oak woodland plant community. Although there are some impacts that would occur from the use of thinning and fire, if conducted prudently, Alternative 2 presents the option that would likely result in the highest quality of oak woodland habitat. Finally, under Alternative 2, a more detailed Forest Management Plan would be completed for all oak woodland habitats.

6.6.2 Effects from Public Recreational Use

Under both Alternatives 2 and 3, new trails will be built through this habitat type on Baskett Butte, and a reroute of the Mill Hill Trail may affect some of this habitat on W.L. Finley. As a result, a minor amount of habitat degradation (vegetation removal or modification and soil compaction) from trail use and trail maintenance (mowing) may be expected in this habitat type.

New trails and facilities will result in increased usage of this habitat type. However, sound and visibility dissipate rapidly away from the trail in this habitat type, so the additional disturbance is considered negligible.

Enhanced public use facilities and visitor service programs are expected to draw additional visitors over the course of 15 years under either Alternative 2 or Alternative 3. In general, the highest number of visitors is anticipated for Alternative 2, because this Alternative would result in the highest degree of facilities and program offerings in the recreation programs (see Table 6-1). As visitation increases, there will be the potential for a degree of additional trampling of oak woodland habitats from off-trail usage as well as some minor additional disturbance to oak woodland species. However, these negative effects (explored in more detail in the Compatibility Determinations – see Appendix C) are considered negligible because very few people (deer hunters excepted) venture away from established trails or kiosks/viewing sites into woodland habitats. Deer hunting is expected to remain a low intensity use with < 100 participants per year over a period when the vegetation is largely dormant.

6.6.3 Overall Effects

Overall, a moderate positive effect would occur for oak woodland associated species under both Alternatives 2 and 3.

6.7 Effects to Mixed Deciduous/Coniferous Habitats and Associated Species

6.7.1 Effects from Habitat Actions

Each of the alternatives would maintain all or most of the existing mixed deciduous/coniferous habitats on the refuges (in some areas, after a Forest Management Plan is developed, and, where ecologically appropriate, staff would consider options for conversion of mixed deciduous woodlands to oak savanna or oak woodlands). Alternative maps show a total acreage of 371 acres under Alternative 1, 361 acres under Alternative 2, and 370 acres under Alternative 3; the differences are likely due to GIS mapping slivers. Under all alternatives, weed control and snag creation would occur, both strategies recognized as valuable for maintaining or increasing the habitat value of these habitats. Alternative 2 proposes selective removal of variously sized Douglas-fir to foster retention and growth of deciduous trees within the stand, thereby maintaining stand diversity, whereas the other two alternatives do not propose this strategy. Douglas-fir can eventually outcompete deciduous species, therefore Alternative 2 presents the option that would likely result in the highest diversity of these habitats. No Douglas-fir over 80 years of age would be removed.

The techniques and effects due to forest management treatments are described more fully in the Forest Management Compatibility Determination (Appendix C). Minor, temporary, localized disturbance and damage from habitat management could occur as a result of using these techniques, including displacement of wildlife, ground disturbance and potential weed spread, and the possibility of uncontrolled wildfire. However, it is expected that these effects would be temporary and localized and shortly eclipsed by enhanced stand structure and composition.

For weed species that are or become established, mechanical, cultural, chemical, and biological controls methods will be evaluated (see Appendix F, section F.2, for descriptions of general weed control methods). Chemical usage will be subject to provisions of the Refuge IPM Plan (Appendix F). Among other provisions, this plan provides direction that "the most efficacious pesticide available with the least potential to degrade environmental quality (soils, surface water and groundwater) as well as least potential effect to native species … would be acceptable for use on the refuge." Each approved pesticide would undergo a chemical profile analysis; active ingredients would be analyzed for their risk quotient and this value compared to a Level of Concern for surrogate species, as established by the EPA. All applications of herbicides will conform to the specific pesticide label requirements.

Employment of this chemical approach would result in a moderate to minor risk from chemical exposure. However, unquantified risks may still occur via factors not assessed under current protocols, such as intermingling of unlike chemicals in the field; species-specific sensitivity that differs from surrogate species sensitivity; exposure through inhalation, exposure through ingestion of pesticide-contaminated soil, and other factors (see Appendix F).

Overall effects from habitat management: In summary, the use of the specified habitat management techniques is expected to improve the composition and structure of the mixed deciduous/coniferous plant community. Although there are some impacts that would occur from habitat management techniques, they are considered minor relative to the benefit that would be realized through the greater quantity and quality of riparian habitat available in Alternatives 2 and 3.

6.7.2 Effects from Public Recreational Use

Under both Alternatives 2 and 3, new trails on Baskett Butte and a trail reroute near Mill Hill may affect some of this habitat. Trail construction or reroute may require the removal of some trees, snags, or logs. In addition, a minor amount of habitat degradation (vegetation removal or modification and soil compaction) from trail use and trail maintenance (mowing, trail clearing) may be expected in this habitat type.

The new trails and the proximity of the new Headquarters and a potential new environmental education center at W.L. Finley may result in increased usage of this habitat type. However, sound and visibility dissipate rapidly away from the trail in this habitat type, so the additional disturbance is considered negligible.

Enhanced public use facilities and visitor service programs are expected to draw additional visitors over the course of 15 years under either Alternative 2 or Alternative 3. In general, the highest number of visitors is anticipated for Alternative 2, because this Alternative would result in the highest degree of facilities and program offerings in the recreation programs (see Table 6-1). As visitation increases, there will be the potential for a degree of additional trampling of mixed deciduous forest habitats from off-trail usage as well as some minor additional disturbance to species inhabiting this habitat. However, these negative effects (explored in more detail in the Compatibility Determinations – see Appendix C) are considered negligible because very few people (deer hunters excepted) venture away from established trails or kiosks/viewing sites into forest habitats. Deer hunting is expected to remain a low intensity use with < 100 participants per year over a period when the vegetation is largely dormant.

6.7.3 Overall Effects

Overall, a minor positive effect would occur for mixed deciduous-conifer habitats and associated species under both Alternatives 2 and 3.

6.8 Effects to Riparian Habitats and Associated Species

6.8.1 Effects from Habitat Actions

Acres available by alternative: Each of the alternatives protects and maintains all existing riparian habitats. Alternatives 2 and 3 would restore 158 and 452 acres, respectively, to riparian habitat from currently farmed fields and non-agricultural grasslands, an increase of approximately 9 -25 percent on the Refuge Complex. More acres would potentially be restored from existing farm fields under Alternative 3 than under Alternative 2. However, restoration under Alternative 3 could be delayed for a number of years, with restoration sites potentially harboring large quantities of weeds. Both alternatives include strategies to help the restored stands establish themselves, including mowing to prevent excess competition, watering new starts as needed, and invasives control. Alternative 2 may also include understory plantings.

Effects from management practices: In mature Oregon ash forest habitats, protection would be largely passive under all alternatives, with the only management being weed control. Mature black cottonwood forests would receive weed control under Alternative 2 only.

For weed control, mechanical, cultural, chemical, and biological control methods will be evaluated (see Appendix F, section F.2, for descriptions of general weed control methods). Chemical usage will be subject to provisions of the Refuge IPM Plan (Appendix F). Among other provisions, this plan provides direction that "the most efficacious pesticide available with the least potential to degrade environmental quality (soils, surface water and groundwater) as well as least potential effect to native species … would be acceptable for use on the refuge." Each approved pesticide would undergo a chemical profile analysis; active ingredients would be analyzed for their risk quotient and this value compared to a Level of Concern for surrogate species, as established by the EPA. All applications of herbicides will conform to the specific pesticide label requirements.

Employment of the herbicide approach will result in a moderate to minor risk from chemical exposure. However, unquantified risks may still occur via factors not assessed under current protocols, such as intermingling of unlike chemicals in the field; species-specific sensitivity that differs from surrogate species sensitivity; exposure through inhalation, exposure through ingestion of pesticide-contaminated soil, and other factors (see Appendix F).

Overall effects from habitat management: In summary, the use of the specified habitat management techniques is expected to improve the composition and structure of the riparian plant community. Although there are some impacts that would occur from habitat management techniques, they are considered minor relative to the benefit that would be realized through the greater quantity and quality of riparian habitat available in Alternatives 2 and 3.

6.8.2 Effects from Public Recreational Use

Under Alternative 2, additional trail mileage would be built into riparian habitat at Ankeny Refuge along Bashaw Creek and possibly along Sidney Ditch. Also under Alternative 2, at W.L. Finley, trail extensions through riparian habitat may occur near Cabell Marsh. Trail construction may require the removal of some trees. Trail expansion in this habitat type may result in a minor amount of habitat degradation (vegetation removal or modification and soil compaction) from trail use, and trail maintenance (vegetation clearing) may be expected in this habitat type.

New facilities may result in increased usage of this habitat type, causing some additional disturbance. Disturbance is expected to be minimal to minor for recreational uses in this habitat, as explored in the Compatibility Determinations (Appendix C).

Enhanced public use facilities and visitor service programs are expected to draw additional visitors over the course of 15 years under either Alternative 2 or Alternative 3. In general, the highest number of visitors is anticipated for Alternative 2, because this Alternative would result in the highest degree of facilities and program offerings in the recreation programs (see Table 6-1). As visitation increases, there will be the potential for a degree of additional trampling of riparian habitats from off-trail usage as well as some minor additional disturbance to riparian species. However, these negative effects (explored in more detail in the Compatibility Determinations – see Appendix C) are considered negligible because very few people (deer hunters excepted) venture away from established trails or kiosks/viewing sites into riparian habitats. Deer hunting may be popular in riparian habitat, compared to other habitats, so this habitat type may receive more visitation disturbance from hunting than other habitat types. However, deer hunting is expected to remain a low intensity use with < 100 participants per year over a period when the vegetation is largely dormant.

6.8.3 Overall Effects

Overall, a minor positive effect would result for riparian habitats and associated species under Alternative 2 and a moderate positive effect for Alternative 3.

6.9 Effects to Riverine Habitats and Associated Species

6.9.1 Effects from Habitat Actions

Under each of the alternatives, the riverine zone would remain intact. There are approximately 11.3 miles of "perennial" streams and 8.9 miles of "intermittent" streams passing through the refuges. The Service would contribute to maintaining riverine habitat features beneficial to native salmonids, including stream temperature and channel complexity, primarily through protecting, maintaining, and restoring riparian habitats as discussed in Section 6.8. Comparing 300-foot buffer areas (J. Beall pers. comm.) around the 11.3 miles of riverine habitat passing through the refuges, under Alternative 1, approximately 77 percent of this area would be occupied by forested habitat (riparian, oak woodland, oak conifer, or mixed-deciduous forest). The area occupied by forested habitat would improve slightly under Alternative 2, rising to 79 percent, and would improve even more under Alternative 3, rising to 81 percent.

A similar analysis was conducted for the 8.9 miles of intermittent streams that traverse the refuges. Under Alternative 1, only 32 percent of this area would be occupied by forested habitat (riparian, oak woodland, oak conifer, or mixed-deciduous forest). The area occupied by forested habitat would improve slightly under Alternative 2, rising to 35 percent, and would improve even more under Alternative 3, rising to 40 percent.

Streams and rivers traversing the refuges may not meet all the attributes listed in Objectives 8a and 8b under any of the alternatives; this would be due in large part to upstream influences off-refuge. See Section 3.7 of the Draft CCP/EA for more information. In addition, under Alternative 2, the Service would investigate opportunities to provide additional protection for off-channel aquatic habitats located beyond the present refuge boundaries. Off-channel habitats are known to be important fish rearing areas.

Under all alternatives, the Service would review refuge water control structures and features and consider fish passage modifications as appropriate. Under all alternatives, the refuges would continue to work with others to address fish passage and potential entrapment. Methods available that may potentially be used include monitoring of existing impoundments, impoundment drainage/refilling following flood events, steady water outflow through the spring, and alterations to spillways and water control structures. Any new wetland restorations in floodplain areas could be designed and managed in such a way as to minimize fish entrapment.

Some negative impacts to stream habitats would continue under all alternatives as runoff from agricultural fields would contribute sediment, fertilizers, and some pesticides to the streams. Best management practices, including maintaining vegetative and riparian buffers along streams, use of the IPM approach to address weeds (see Appendix F), and appropriate seasonal timing for activities that disturb soils, would help to mitigate these impacts.

Fewer acres would be farmed under Alternative 3, and those in grass crops would be farmed less intensively, which would indirectly benefit stream and riverine habitats, since it may be assumed that accordingly less fertilizer and pesticide would be present in sheet runoff.

Overall effects from habitat management: In summary, the use of the specified strategies is expected to result a minor benefit to the structure and function of riverine habitats under both Alternatives 2 and 3, however the benefit under Alternative 3 is expected to be slightly higher than that of Alternative 2.

6.9.2 Effects from Public Recreational Use

A canoe ramp would potentially be built under Alternatives 2 and 3 at the Snag Boat Bend Unit of W.L. Finley Refuge. This facility would create a potential for a minor amount of increased erosion into the stream channel. In addition, this canoe ramp would create the potential for additional visitors on and near the refuge's riverine habitats over the course of 15 years under either Alternative 2 or 3, which could result in some minor additional disturbance to riverine-associated species (see Wildlife Observation Compatibility Determination – Appendix C).

6.9.3 Overall Effects

Overall, there would be a negligible effect for riverine and stream habitats and associated species under Alternative 2 and a minor positive effect under Alternative 3.

6.10 Effects to Threatened and Endangered Species

6.10.1 Effects to Prairie Species (Kincaid's lupine, Fender's blue butterfly, Willamette daisy, Bradshaw's lomatium, and Nelson's checker-mallow)

Effects of Habitat Management Practices: The effects of habitat management practices, especially burning and mowing, have been investigated in various studies. The Recovery Plan for Prairie Species (USFWS 2010) cites various studies showing that prairie species populations respond positively to habitat restoration. These and other studies are discussed below.

Kincaid's lupine and Fender's blue butterfly***:*** Kincaid's lupine is a host plant for Fender's blue butterfly, thus positive outcomes for Kincaid's lupine are assumed to result in positive outcomes for Fender's blue butterfly as evidenced by the following studies. Fender's blue butterfly population trends have been correlated with lupine vigor; abundant leaf growth appears to produce larger butterfly populations. At Fern Ridge Reservoir, the Fender's blue butterfly population increased dramatically after fall mowing of lupine patches was implemented. The abundance of Fender's blue butterfly eggs was found to be correlated with the abundance of Kincaid's lupine leaves at a number of study sites (Kaye and Cramer 2003); egg abundance increased substantially at sites which had been mowed to control non-native weeds (Schultz et al. 2003).

Prescribed fire and mowing before or after the growing season have been effective in reducing the cover of invasive non-native plants; following treatments, Kincaid's lupine has responded with increased leaf and flower production (Wilson et al. 2003). At Fir Butte, Giles-Johnson et al. (2009) reported that mowing in late summer or early fall had neutral or negative effects on blackberry and positive effects on Kincaid's lupine. The effects of mowing annually were much stronger than the effects of mowing on a two or three year cycle. Relative to the plots that were mowed just once per year, there was four times the cover in plots that were burned. All treatments led to at least an 800 percent increase in the number of inflorescences present in the plots. Although the study observers noted an increase in butterfly larvae in mowed areas, the number of butterfly eggs was unaffected by treatments.

Mowing, burning, and mechanical removal of weeds have all resulted in increasing Fender's blue butterfly populations. At two sites in the West Eugene Wetlands, adult and larval Fender's blue butterflies increased in number following mowing, although the response to habitat restoration is often complicated by other confounding factors, such as weather fluctuations (Schultz and Dlugosch 1999, Fitzpatrick 2005, Kaye and Benfield 2005). At Baskett Slough, Wilson and Clark (1997) found that although fire killed all larvae in burned patches, female Fender's blue butterflies from the nearby unburned source patch were able to colonize the entire burned area the following year, including lupine patches that were 350 feet from the unburned source plants. In addition, Fender's blue butterfly eggs were 10 to 14 times more abundant in plots that were mowed or burned compared to undisturbed control plots; woody plants were reduced 45 percent with burning and 66 percent with mowing.

Willamette daisy: An ongoing study at Oxbow West (Thorpe and Kaye 2007) investigated the effects of fire and mowing treatments on Willamette daisy. Three cycles of mowing (every other year) resulted in mild negative effects on Willamette daisy. There was a strong trend for there to be fewer plants in plots that were mowed and burned compared to control plots. Mowing also resulted in a negative effect on the average number of capitula compared to control and burned plots.

Comparing burned and mowed plots as opposed to mowing only plots, average crown cover increased by 78 percent in mowed plots, but only 16 percent in burned plots. The authors speculated that burn treatments may stimulate competitors of Willamette daisy.

Bradshaw's lomatium*:* The density and abundance of reproductive plants increased following fires (Kaye and Pendergrass 1998, Pendergrass et al. 1999), although monitoring showed the effects to be temporary, dissipating after one to three years. Frequent burns may be required to sustain population growth, as determined from population models (Caswell and Kaye 2001, Kaye et al. 2001).

Nelson's checker-mallow: Although burning and mowing did not significantly affect Nelson's checker mallow vigor during the first year after manipulations (Bartells and Wilson 2001), both fire and mowing did alter the surrounding vegetation. However, the specific changes that happened in this first year after treatments may have acted in opposing directions to result in no net change in Nelson's checker-mallow growth and flowering intensity.

Wilson (2004) reported that burning and mowing treatments had the intended effect of reducing competitive vegetation for tall, woody cover; however, burning significantly stimulated the growth of herbaceous cover, which would increase competition with *S. nelsoniana*. Some treatment effects varied with hydrologic conditions. After two years of treatments, there was no evidence of increased vigor of *S. nelsoniana*; in fact, *S. nelsoniana* cover and flowering declined with burning. The author speculated that longer-term control of woody plants might eventually lead to increased vigor of this perennial plant and recommended that burning in similar habitats with *S. nelsoniana* should be approached with caution. Mowing, the alternative examined in this study, was determined to be as beneficial in controlling woody vegetation without harming *S. nelsoniana* plants.

Effects of Public Recreational Use: As explored in the Compatibility Determinations, (Appendix C), wildlife observation, photography , interpretation, and environmental education activities may pose a minor to moderate impact to these species, based partly on the fact that increased trampling may occur from a higher projected level of visitation under Alternatives 2 and 3. Waterfowl and deer hunting would pose a negligible impact to these species; some trampling could occur, but the plants would have largely senesced by the time these uses take place. No impact is expected to arise from fishing or bicycling.

Summary Effects to prairie species: The alternatives are nearly identical with respect to the population objectives and habitat condition targets adopted for federally listed prairie species. The intent under all alternatives would be to meet Recovery Plan objectives (USFWS 2010). Habitat management practices to benefit listed species would include mowing, burning, IPM, planting, and/or removal of woody vegetation, with the intention to improve conditions and support the expansion of existing populations or establishment of new populations of listed species. Based on the research cited above, mowing, burning, and removal of woody vegetation and weed species are generally positive or neutral practices with respect to listed prairie species. Minor, temporary, localized disturbance and damage to vegetation or wildlife (such as burned flowers, eggs, or non-dispersing young) could occur as a result of using these techniques, but the effects would be closely monitored. Any negative effects would be likely to be temporary. The effects of utilizing herbicides in prairie habitats are summarized above in Sections 6.4 and 6.5.

Alternative 3 would potentially restore the greatest number of acres to wet prairie, upland prairie/oak savanna, wetland, and riparian habitats. However, under Alternative 3, there is a risk that these restored lands could be in poor, weedy condition (with only a slightly enhanced capability to support rare species) since this alternative will demand a high percentage of staff attention to implementing the farming program. Consequently, less effort would be directed toward native habitat restoration and management. As a result of this risk, Alternative 2 is generally considered to be more beneficial than Alternative 3 for recovery of listed species because management of several of the listed plant species associated with native habitats requires at least a moderate degree of habitat quality for long-term survival and reproduction. Under Alternative 3, fewer farmed acres also would mean a smaller risk from herbicide drift negatively affecting native habitats and listed species, although the effect of this particular change is likely negligible.

6.10.2 Effects to Oregon Chub

Effects of habitat management practices: Oregon chub require habitats free from non-native predators. Sheerer et al. (2004) reported collapse of a known population of >7,000 chub after largemouth bass were introduced into their site. Other habitat parameters required by chub include depositional substrate, gradually sloping banks, varied and abundant aquatic vegetation, little or no water velocity, mostly less than 2 meters deep, limited use or access by the public, and summer water temperatures exceeding 16°C (Sheerer et al. 2004). Management of the refuge sites occupied by Oregon chub will continue to maintain these parameters, and under all alternatives, the intent of management would be to continue to fulfill Recovery Plan goals (USFWS 1998) of stable or increasing populations numbering > 500 fish per population. However, Alternatives 2 and 3 would have a greater positive effect than Alternative 1, since an additional wetland site for Oregon chub would be managed and maintained (six as compared to the current five sites).

Effects from public recreational use: As discussed in the Compatibility Determinations, (Appendix C), under all alternatives, all recreational activities would pose a negligible impact to Oregon chub. Visitors are not expected to be catching chub or introducing non-native fish into their habitats.

Overall effect to Oregon chub: Alternatives 2 and 3 would be expected to have an overall minor positive effect to Oregon chub.

6.10.3 Effects to Steelhead and Chinook salmon

Habitat management practices: Under all alternatives, the management of these species and their habitats on the refuges would remain generally passive or involve management of the riparian area or watershed. Alternative 2 adopts a few more active measures than the other alternatives to work on a watershed level. Efforts in the area of water quality improvement are presented in Objective 8b and compared in Section 6.16. Potential entrapment of listed fish is a concern in the Sidney Ditch area at Ankeny Refuge, but, the refuge has already mitigated against potential entrapment there by screening pumps and outlets. Objectives 2a, 2b, and 2c specify that the refuges will continue to work with all interested parties to address fish passage and entrapment concerns.

Effects from public recreational use: As explored in the Compatibility Determinations, (Appendix C), under all alternatives, all recreational activities would pose a negligible impact to listed salmonids.

Overall effect to steelhead and Chinook salmon: Alternatives 2 and 3 would be expected to have an overall neutral effect to steelhead and Chinook salmon.

6.11 Social Effects - General

All federal actions must address and identify, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations, low-income populations, and Indian Tribes in the United States. Under all alternatives, the Refuges are expected to contribute positively to the quality of the environment for local populations. As a result, no adverse human health or environmental effects were identified for minority or low-income populations, Indian tribes, or anyone else, under any of the alternatives.

6.11.1 Effects from New Facilities

Facilities associated with public uses can cause irretrievable habitat loss or habitat modification. General locations for new or modified facilities have been indicated in the strategies under Goal 10 and identified on the public use maps for each alternative (Maps 8, 9, 11, 12, 13,15). Exact dimensions and locations for new facilities will be determined at the site design stage prior to construction. For the purposes of the NEPA analysis, certain kinds of facilities were assumed to result in direct irretrievable habitat loss; however, given the inexact nature of the current facility site locations, these were not compared to the habitat maps and quantified by habitat type. In general, the following assumptions were used to determine the footprint radius and associated overall potential habitat loss from new facilities. The square footages shown below do not necessarily equate to the facility dimensions proper but represent a likely footprint of disturbed or modified habitat. Facilities that were listed as “potential” or “to evaluate” in the strategies were also included.

- Major Building- 125’ (except where detailed site design gives more precise numbers. See Appendix K and Appendix C for detailed analysis on the EE facility at W.L. Finley) – 125’ radius (equivalent to 49,087 square feet).
- Restroom or EE shelter- 25’ radius (equivalent to 1963 square feet).
- Viewing Facility (kiosk, overlook, observation structure) – 15’ radius (equivalent to 707 square feet).
- Parking lot – 10,000 square feet.
- Pullouts – 200 square Feet.
- Canoe launch- 20’ radius (equivalent to 1257 square feet).

Trails were not included as this type of facility does not result in the irretrievable loss that the other facilities result in. Trails will result in minor modifications of some habitats – these are discussed above by habitat type.

Based on these assumptions, new facilities under Alternative 2 would be expected to result in irretrievable loss of approximately 1.94 acres of habitat and facilities over the Complex as a whole; under Alternative 3 new facilities would be expected to result in irretrievable loss of approximately 1.87 acres of habitat over the Complex as a whole. About 75-80 percent of the habitat loss in each alternative is associated with the construction of the new environmental education center at W.L. Finley and the potential construction of a Nature Center at Ankeny Refuge.

6.11.2 Changes in Visitation

Refuge management can influence the number of visitors. Refuge decisions about features of public use management – such as how many facilities to build, where to build those facilities, how much staff time to devote to programs, and how much parking to provide – influence visitation for years to come. Similarly, demographic shifts, cultural preferences, and economics influence refuge visitation. Even small annual shifts can have a profound effect over time.

As a piece of the analysis, the CCP team projected the number of visits, by use that would be expected at the end of 15 years by Alternative. Table 6-1 displays the number of visits to the refuge expected under a variety of different uses. Visits are not totaled since visitors may engage in more than one activity per visit. The table totals visits, but the average number of hours per visit varies by activity. See Table 6-4 for the average number of hours per visit.

Assumptions used in generating the projections are provided as footnotes to the table. A key assumption was that visitation would increase by 2 percent annually in certain uses: wildlife observation, photography, visitor contact station, interpretation, and bicycling. By the end of the 15-year period, this would represent a 37 percent increase in the number of visits for these uses, above and beyond program and facility changes provided in these programs. This is a conservative estimate ;the Oregon State Outdoor Recreation Plan [SCORP] documented a 254 percent increase for Nature/Wildlife Observation during 1987-2002 in the regional area encompassing the refuges [Oregon Parks and Recreation Department 2003].

6.12 Effects to Opportunities for Quality Wildlife Observation, Photography, Interpretation, and Environmental Education Experiences

6.12.1 Effects from Habitat Actions

Alternatives 2 and 3 both increase the number of acres of native habitats relative to Alternative 1. The result of these additions for non-consumptive users would generally be positive as the increasing availability and connectivity of wetlands, riparian habitat, upland prairie, and forest habitats would likely result in enhanced opportunities to observe a variety of native wildlife, plants, and fish. There may be some negative short-term effects to the visitor experience as restoration work proceeds but these are expected to be temporary and minor.

6.12.2 Effects from Public Recreational Use

Alternative 2 provides a moderate increase in non-consumptive recreational opportunities at the refuges compared to the present. These opportunities arise primarily through an emphasis on increased trails and viewing facilities and increased offerings of interpretive and educational programs. Seasonal trails increase by 15 percent in Alternative 2 and two percent in Alternative 3. (Some seasonal trails follow diketops or management roads). Year-round trails increase more dramatically, with a 67 percent increase under Alternative 2 and a 44 percent increase in Alternative 3. In particular, environmental educational opportunities will be enhanced, with a strong emphasis on partnerships, staffing, volunteers, and the addition of an Environmental Education Center. Alternative 3 would provide a lesser increase in non-consumptive recreational opportunities, compared to Alternative 2, with fewer trails, viewing facilities, and interpretive developments, but would have similar effects for environmental education programs.

Table 6-1 Annual Refuge Visits, Projected in 15 Years, by Alternative

Estimated Number of Recreation Visits												
	Current			Alternative 1			Alternative 2			Alternative 3		
Recreation Category	**Ankeny**	**Baskett Slough**	**W.L. Finley**	**Ankeny**	**Baskett Slough**	**W.L. Finley**	**Ankeny**	**Baskett Slough**	**W.L. Finley**	**Ankeny**	**Baskett Slough**	**W.L. Finley**
Wildlife Observation*	75,685	198,336	209,311	103,688	203,220	286,756	108,873	232,900	301,094	104,725	219,200	289,624
Photography	2,877	10,322	29,900	3,941	14,141	40,963	4,139	14,848	43,011	3,981	14,283	41,373
Visitor Contact Station	0	0	1,241	0	0	1,700	0	0	15,070	0	0	14,385
Interpretive Programs**	270	450	1,150	370	617	1,576	555	925	3,151	462	771	2,363
Waterfowl Hunting	0	0	0	0	0	0	0	140	0	0	0	0
Deer Hunting	0	0	77	0	0	77	0	0	56	0	0	56
Fishing	0	0	1	0	0	2	0		750	0	0	750
Environmental Education	395	550	1,174	395	550	1,174	790	1,100	3,522	790	1,100	3,522
Bicycling	0	0	8	0	0	11	0	0	12	0	0	12

Numbers are tallied as visits by activity, not visitors. Therefore, there may be visitors engaging in more than one activity per visit. Therefore the visits are not totaled.

The table totals visits, but the average number of hours per visit varies by activity. See Table 6-4 for the average number of hours per visit.

Current visits used 2009 numbers from RAPP as the baseline. The average from several previous years was not used due to greater confidence in the integrity of the numbers for 2009 than those collected for previous years.

*Includes pedestrian, auto visitation associated with observation, trail use, auto tour route, and also includes people viewing interpretive signs associated with these facilities. This number counts trail use as additional to any auto tour use even if both uses occur during the same visit.

**Interpretive programs includes both on- and off-site programs and special events sponsored by the refuge (i.e., doesn't include walks or guided activities sponsored by local Audubon chapters).

Assumptions in Estimations of Future Visits

The increase in the number of trails is considered the most influential factor that could increase wildlife observation at Finley; under Alternative 2, about 15% more trail miles would occur. Under Alternative 3, there would be a 0.5% increase in trail miles but much more interpretive signage. Overall, we assumed a 5% increase in observation and photography under Alternative 2 and 1% increase under Alternative 3 for Finley and Ankeny. At Baskett Slough, we add about 70% additional year-round trail and a lot more interpretive signage along the trail, and a potential new photo blind - estimated a 20% increase from this. Also at Baskett Slough may lose "bathroom visits" along Hwy 22 - estimating approximately 100,000 visits/year to bathroom now that would drop to 50,000 visits after bathroom removal. Overall from about 200K visitors to 170K visitors.

Numbers for observation, photography, visitor contact station, interpretation, and bicycling incorporate a 37% increase for all Alternatives at the end of 15 years, based on a 2% annual increase above and beyond that foreseen by program or facility increases.

Photography: probably growing faster as a use due to trends in technology; cost of photography down over last decade. For all refuges, estimated 5% increase in Alternative 2 and 1% increase in Alternative 3.

Interpretive programs: Assumed 100% increase at Finley under Alternative 2 and a 50% increase under Alternative 3. At Ankeny and Baskett Slough, assumed 50% increase under Alternative 2 and 25% under Alternative 3.

Visitor contact station: recent door counter installation has increased accuracy of numbers and it is known that 2010 numbers showed a marked increase compared to 2009. Baseline for 2010 estimated at approximately 10,000 visits annually. Estimated increase in future from increase in school groups, reroute of Mill Hill trail; - 10% in Alternative 2 and 5% in Alternative 3.

Waterfowl hunting: September goose hunt: assumption of 10 blinds, 3 hunters per blind, 4 days. Youth hunt: assumption of 5 blinds, 2 hunters per blind, 2 days.

Bicycling - Road paving of Finley Refuge Rd. is an unknown. If it occurs, would increase bicycling. Given that it's an unknown, we chose to assume that it would not occur. Very minor increase projected under both alternatives
.

Fishing: Fishing access already exists at many points along river so there is not a lack of opportunity in the local area. Visitation estimate of about 25 visitors per week on average over the open fishing season.

Environmental Education: Projected 100% increase for Ankeny and Baskett Slough, and a 200% at W.L. Finley based on strategies increasing programmatic capability and infrastructure.

Deer Hunting: Archery component - we assumed the refuge would receive half the number of hunting visits due to shortened season. Shotgun hunt - total days for hunting are projected to be reduced by about half at Finley main unit under Alternatives 2 and 3. Due to this, we projected a decrease in hunters by about half due to this initially. We then adjusted with an increase (assuming the refuge could attract more or new hunters) because of a) the novelty factor (of hunting some areas that may not have been open for a long time), b) the likelihood that hunt quality may be better due to the season being shifted later, and c) the antlerless option being added.

There will also be some impacts to opportunities for these activities under Alternatives 2 and 3 that are a result of changes in the hunting program. At W.L. Finley Refuge, under Alternatives 2 and 3, the restricted firearms deer hunt will be allowed on the western border of the refuge during the last week of the State season. A popular recreational trail (Mill Hill Trail) would be closed during this week to minimize safety conflicts, which will slightly reduce the annual opportunity for non-hunters to enjoy wildlife at the refuges. However, safety will increase for non-hunting visitors during other fall weeks, as the restricted firearms deer season will also be shortened by about two weeks each year. Overall the changes in the hunting program would have a negligible impact on quality wildlife observation, photography, interpretation, and environmental education.

6.12.3 Overall Effects

Overall, a moderate positive effect would occur for visitor opportunities to enjoy quality wildlife observation, photography, interpretation, and environmental education under Alternative 2 and a minor positive effect would occur under Alternative 3.

6.13 Effects to Opportunities for Quality Hunting and Fishing Experiences

6.13.1 Effects from Habitat Actions

Alternative 2 and especially Alternative 3 increase the number of acres of native habitats relative to Alternative 1. The increasing availability and connectivity of wetlands, riparian habitat, upland prairie, and forest habitats could result in enhanced opportunities for sighting and harvesting deer.

6.13.2 Effects from Public Recreational Use

The total number of days available for deer hunting would decrease, but additional opportunity would be available by providing additional hunt areas and providing the opportunity to harvest antlerless deer under both Alternatives 2 and 3. In addition, under Alternatives 2 and 3, non-consumptive users would be prevented from accessing hunt areas through a portion of the deer hunt season. This would likely provide a higher quality hunting experience because the disturbance to wildlife during that week would be limited.

For waterfowl hunters, a youth duck hunt and September goose hunt, both at Baskett Slough Refuge, would be added under Alternative 2 only.

Under Alternatives 2 and 3, a canoe ramp would potentially also be added at Snag Boat Bend Unit, which will eventually aid anglers to access stream and river fishing areas. Bank fishing access would be added under Alternative 2, but not Alternative 3.

6.13.3 Overall Effects

Overall, there would be a minor beneficial effect for visitor opportunities to enjoy hunting and fishing under Alternative 2 and a negligible effect under Alternative 3, compared to current opportunities.

6.14 Effects to Cultural Resources

The Service is committed to protection of known cultural resources under all alternatives, however, Alternative 2 and Alternative 3 would implement actions to build in stronger evaluation, coordination, and partnership procedures. In general, this would help to strengthen long-term protection and preservation of all cultural resources at the refuges.

Prior to implementing all ground disturbing projects, the applicable cultural resource compliance investigation would be undertaken. If cultural resources are found, appropriate procedures and protocols would be followed to protect them. Whenever possible, resources would be avoided or mitigated. Mitigation options, in addition to site avoidance by relocating or redesigning facilities, would include data recovery, using either collection techniques or in-situ site stabilization protection.

Under Alternatives 2 and 3, the Service would seek to develop appropriate strategies to address maintenance needs identified in the Historic Buildings Assessment (Quatrefoil, in progress) which is currently being prepared for W.L. Finley Refuge. This assessment identifies specific maintenance needs for historic structures, and includes an associated cost estimate. This assessment is a first step in addressing a key issue in this program: how to effectively manage for cultural resources with the extremely limited funding available. Under all alternatives, the Service would actively recruit funding and seek to develop partnerships to address the maintenance needs of historic structures. Under Alternative 1, historic structures would continue to deteriorate. All structures would need to be evaluated through the Section 106 process prior to any work. In general, altering, modifying (including maintenance and repair), removing, and neglecting historic properties are examples of adverse effects under the National Historic Preservation Act. Maintenance and improvement of historic resources would result in positive impacts to cultural resources, while resulting in some temporary noise and disturbance at and near the cultural resource sites.

Outreach and interpretation of cultural resources would be expanded under Alternatives 2 and 3, compared to Alternative 1. This work may assist in laying the groundwork for establishment of more effective partnerships and coordination, and would contribute to the public's understanding and appreciation for archaeological and historic resources.

6.14.1 Overall Effects

Because needs would likely continue to exceed available resources despite efforts made to more strategically manage this program, effects to cultural resources are considered negative under all Alternatives. The magnitude of this effect would be considered minor under Alternative 1 and moderate under both Alternatives 2 and 3.

6.15 Effects to Soil Resources

A total of 4,570 acres of agricultural lands would be managed on the Refuge Complex to provide wintering Canada goose habitat under Alternative 1. Agricultural lands managed for Canada geese would decrease to 4,175 acres (a 9 percent decrease) under Alternative 2 and to 3,465 (a 24 percent decrease) under Alternative 3. Under all alternatives, grass crops would be grown in the majority of agricultural fields under all alternatives because they are generally favored by geese. Under the typical agricultural practices employed for grass seed production, most fields are disked (prior to seeding), seeded in fall (spring seeding may be used for perennial crops), and harvested in summer. Crop residues are generally removed by tilling in after harvest (or by removal of straw) and fields are left fallow over the summer. Fields planted by cooperative farmers are treated with fertilizers and herbicide to maximize growth and seed production.

In addition to agricultural practices, the refuge would use heavy equipment in wetlands and uplands to accomplish various habitat management practices. On uplands, heavy equipment would generally be used only during the dry season. In wetlands, heavy equipment would be utilized after the wetland has been drained.

Prescribed fire would be used as a management tool in wet prairie, upland prairie/oak savanna, and potentially in oak woodlands. When conducted properly, prescribed burning can result in faster nutrient recycling to soils. In some cases, prescribed fires can burn hot enough to scorch the top layers of soils, which can negatively affect water infiltration. In general, the only occurrences of such hot fires exist under burn piles created from woody vegetation disposal piles. The refuges address against these effects by mixing soils after the burn and by reusing burn pile areas in subsequent years. Fire prescriptions in grasslands would be written to avoid overly hot fires that can scorch soils, and the lightness of the fuel in these habitats would generally prevent overly hot fires. Fire does not necessarily result in decreases in soil nitrogen (MacDougall and Turkington 2007).

Indicators of soil quality are listed in Table 6-2. In general, tillage and cropping that leaves soil bare for portions of the year negatively affect soil quality indicators (Nelson et. al. 2006), such as aggregate stability, infiltration rates, and available water capacity. Compaction can result from the use of heavy equipment, causing undesirable increases in bulk density while tilling may also prevent the accumulation or accelerate the decomposition of organic matter and can diminish earthworm populations (USDA NRCS soil quality information sheets).

Table 6-2 Soil Quality Indicators

Indicator	Relationship to Soil Health
Soil organic matter (SOM)	Soil fertility, structure, stability, nutrient retention; soil erosion.
Physical: soil structure, depth of soil, infiltration and bulk density; water holding capacity	Retention and transport of water and nutrients; habitat for microbes; estimate of crop productivity potential; compaction, plow pan, water movement; porosity; workability.
Chemical: pH; electrical conductivity; extractable N-P-K	Biological and chemical activity thresholds; plant and microbial activity thresholds; plant available nutrients and potential for N and P loss.
Biological: microbial biomass C and N; potentially mineralizable N; soil respiration	Microbial catalytic potential and repository for C and N; soil productivity and N supplying potential; microbial activity measure.

Source: Natural Resources Conservation Service http://soils.usda.gov/sqi/assessment/assessment.html accessed 11/30/09

Some impact to soil quality in areas occupied by native habitats will happen through the use of heavy equipment on these sites, which could result in soil compaction, particularly when soils are wet. In addition, areas restored to native habitats would experience some ground disturbance from tillage, mowing, or fire for site preparation. This could produce temporary impacts to soil quality, such as reduced water infiltration, and some loss of soil organic matter, but over time, these areas would likely undergo a positive trend toward more stable ground cover, increased organic matter, and increased soil health.

6.15.1 Overall Effects

Overall, Alternative 3 would produce the strongest trend toward increased soil health, with a moderately beneficial effect on refuge soil resources. Alternative 2 would create a minor beneficial effect for refuge soil resources and Alternative 1 would have a neutral effect.

6.16 Effects to Water Resources and Water Quality

The water quality discussion below focuses on refuge operations and potential water quality impacts stemming from pollutants, sediment, or elevated water temperatures.

General pollution control: The Service has policies regarding pollution control at all of its facilities, including wildlife refuges. These policies direct all Service employees 1) to comply with all applicable environmental laws and regulations; 2) to reduce pollution; 3) to inventory and properly treat or handle any hazardous substances; and 4) to clean up or remove hazardous materials on contaminated sites. These policies are discussed in the Service's Manual in the 500 Series, which can be accessed at http://www.fws.gov/policy/manuals/. The refuges would comply with these policies under all alternatives.

Pollutants entering streams from runoff and erosion: Fields planted to annual grasses in Western Oregon are vulnerable to high surface runoff and erosion during the establishment period in the fall and early winter, the season of the greatest rainfall. Later in winter as the fields green up, the potential for runoff and erosion lessens. Permanently vegetated buffers between farm fields and streamcourses or wetlands can prevent or reduce pollutant and sediment entry into waterbodies because vegetation captures sediment and metabolizes nutrients. Most of the three refuges' farmed fields do have vegetative buffers comprised of a mix of native and non-native vegetation between the fields and adjacent wetlands. Often these vegetative buffers are herbaceous vegetation or grass. Since wintering Canada geese prefer to browse in fields adjacent to wetlands, especially where tall vegetation does not block access between the wetland and field, efforts in the past to promote shrub or tree riparian vegetation to prevent field runoff have been somewhat limited. However, riparian vegetation is becoming more established along the edges of many wetlands and dikes, either naturally or through plantings. Since almost all runoff and outflow from the refuges flows through wetlands or vegetative buffers before entering the outflow channel, this helps to reduce the amount of sediment and any associated contaminants entering the stream system.

Sediment and pollutant entry to streams from runoff and erosion would likely diminish under the action alternatives, especially under Alternative 3, since approximately 1,105 acres of farmland would be retired and restored to native habitats under this alternative, with attendant reductions in annual soil disturbance (although restoration to native habitats would involve maintenance burning in a variety of areas, which may expose mineral soil for a short time). A lesser benefit to water quality would result under Alternative 2, with 395 acres retired and restored.

Fertilizers used on the refuges could potentially diminish accordingly, because areas under native habitats would not be fertilized and areas under contract or refuge farming would not be grown with seed production as an objective.

In a study conducted at W.L. Finley Refuge, Materna and Buck (2007) documented the presence of several pesticides in refuge streams and attributed their presence to use of pesticides both on- and off-refuge. Although numerous pesticides were present at varying concentrations (tending to spike after heavy rainfall, indicating the potential for runoff to carry pesticides into refuge wetlands and streams), the authors concluded that the concentration of any single pesticide was relatively low and not likely to cause any direct effect on aquatic organisms, with the exception of subtle endocrine effects. However, the authors also noted that the effects of any combination of these compounds on the ecosystem are essentially unknown.

Herbicide use may diminish or remain approximately the same under Alternatives 2 and 3, because acres that would be taken out of farming would still receive weed control (as needed) to prevent unwanted invasives in areas converted to native habitat. For weed species that are or become established, mechanical, cultural, chemical, and biological control methods will be evaluated (see Appendix F, section F.2, for descriptions of general weed control methods). Chemical usage will be subject to provisions of the Refuge IPM Plan (Appendix F). Among other provisions, this plan provides direction that "the most efficacious pesticide available with the least potential to degrade environmental quality (soils, surface water and groundwater) as well as least potential effect to native species … would be acceptable for use on the refuge." Each approved pesticide would undergo a chemical profile analysis; active ingredients would be analyzed for their risk quotient and this value compared to a Level of Concern for surrogate species, as established by the EPA. All applications of herbicides will conform to the specific pesticide label requirements.

Employment of the herbicide approach would result in a moderate to minor risk from chemical exposure. However, unquantified risks may still occur via factors not assessed under current protocols, such as intermingling of unlike chemicals in the field; species-specific sensitivity that differs from surrogate species sensitivity; exposure through inhalation, exposure through ingestion of pesticide-contaminated soil, and other factors (see Appendix F).

Stream temperatures: Most of the wetlands on the Refuge Complex are seasonal and would be drawn down in late spring/early summer to promote the growth of moist soil vegetation. Although drawdown has the potential to release warmer water into streams, most of the drawdown of seasonal wetlands is complete by early July, therefore, there is very little outflow from the refuge in the summer, the period of greatest water quality concerns for the Willamette Basin. Generally, the refuges do not divert water for wetlands in the summer so we are not impacting surface water systems in this manner either. Although permanent wetlands can warm substantially during summer (Materna and Buck 2007), these types of wetlands are rarely drained in summer or fall and therefore do not result in impacts to local stream temperatures.

Increased acreages of riparian habitat would be available under Alternative 3 (452 additional acres) and Alternative 2 (158 additional acres). Because these riparian areas are not necessarily located next to streams and creeks (many valley riparian areas grow well based on winter precipitation and sheet runoff alone), they will likely not have any noticeable impact on water temperatures.

6.16.1 Overall Effects

Overall, Alternatives 2 and 3 would be expected to result in a minor beneficial effect to water quality, compared to Alternative 1, based on expected changes in potential pollutants entering streams and effects to stream temperatures.

6.17 Effects to Air Quality

Air quality over the refuges is occasionally subject to temporary, localized negative impacts. These occur primarily from burning for habitat management (as occurs on wet prairies and upland prairies). In addition, dust is generated locally from traffic during the dry season on unpaved refuge roads and from tilling of agricultural fields. Traffic from visitors in automobiles also generates vehicle exhaust.

Under Alternatives 2 and 3, wet prairie and upland prairie burning would be expected to increase, as these alternatives increase the acreages of these habitat types. Smoke may be present in increased quantities in the local area during limited periods of time. However, in the context of the Willamette Valley, the amount of smoke is expected to be minimal. Burning is only allowed during windows approved by the state Air Quality Control Board, therefore any potential air quality impacts to surrounding populations are expected to be within regional parameters.

Under Alternatives 2 and 3, tilling of agricultural fields would diminish, since the number of acres farmed would diminish under these alternatives. Traffic from visitors is expected to increase under all alternatives (see section 6.11), potentially increasing dust.

Increased maintenance and restoration of historic structures is planned under both Alternernatives 2 and 3. Lead paint may have the potential to be mobilized during any maintenance or removal process; enacting best practices (such as stripping the paint with a product that limits dust and binds with the lead, creating an inert substance for easier disposal, or covering the lead paint with an encapsulating paint product) would minimize this risk.

6.17.1 Overall Effects

Overall, Alternatives 2 and 3 would be expected to have a neutral impact on air quality compared with Alternative 1.

6.18 Economic Effects

6.18.1 Regional Economic Impacts of Current and Proposed Management Alternatives for Willamette Valley National Wildlife Refuge Complex

For refuge CCP planning, a regional economic analysis provides a means of estimating how current management (Alternative 1) and proposed management activities (Alternatives 2 and 3) affect the local economy. This type of analysis provides two critical pieces of information: 1) it illustrates the Refuge Complex contribution to the local community; and 2) it can help in determining whether economic effects are or are not a real concern in choosing among management alternatives.

For the purposes of an economic impact analysis, a region (and its economy) is typically defined as all counties within a 30-60 mile radius of the impact area. Only spending that takes place within this regional area is included as stimulating changes in economic activity. The size of the region influences both the amount of spending captured and the multiplier effects. The Refuge Complex is located in northwestern Oregon near the cities of Salem and Corvallis. The three refuges and a management unit, Snag Boat Bend, of William L. Finley NWR are located in the adjoining counties of Benton County (W.L. Finley NWR); Linn County (Snag Boat Bend Unit); Marion County (Ankeny NWR) and Polk County (Baskett Slough NWR). Most of the refuges-related visitor spending is located within the four county area of Benton, Linn, Marion, and Polk; therefore, these counties comprise the local economic region for this analysis.

It is important to note that the economic value of the refuges encompasses more than just the impacts of the regional economy. The refuges also provide substantial nonmarket values (values for items not exchanged in established markets) such as maintaining endangered species, preserving wetlands, educating future generations, and adding stability to the ecosystem (Carver and Caudill 2007). However, quantifying these types of nonmarket values is beyond the scope of this study.
This report first presents the methods used to conduct a regional economic impact analysis. An analysis of the final CCP management strategies that could affect stakeholders, residents, and the local economy is then presented. The management activities of economic concern in this analysis are:

- Refuge purchases of goods and services within the local community;
- Refuge personnel salary spending;
- Revenues generated from Refuge Revenue Sharing;
- Spending in the local community by refuge visitors; and
- Other management activities –Cooperative Farming Program.

Methods for a Regional Economic Impact Analysis: Economic input-output models are commonly used to determine how economic sectors will and will not be affected by demographic, economic, and policy changes. The economic impacts of the management alternatives for the refuges were estimated using IMPLAN (Impact Analysis for Planning), a regional input-output modeling system developed by the USDA Forest Service. IMPLAN is a computerized database and modeling system that provides a regional input-output analysis of economic activity in terms of 10 industrial groups involving more than 500 economic sectors (Olson and Lindall, 1999). The IMPLAN model draws upon data collected by the Minnesota IMPLAN Group from multiple federal and state sources including the Bureau of Economic Analysis, Bureau of Labor Statistics, and the U.S. Census Bureau (Olson and Lindall 1999). The year 2008 IMPLAN data profiles for Benton, Linn, Marion, and Polk counties were used in this study. The IMPLAN county level employment data estimates were found to be comparable to the U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System data for the year 2008.

Because of the way industries interact in an economy, activity in one industry affects activity levels in several other industries. For example, if more visitors come to an area, local businesses will purchase extra labor and supplies to meet the increase in demand for additional services. The income and employment resulting from visitor purchases from local businesses represent the *direct* effects of visitor spending within the economy. Direct effects measure the net amount of spending that stays in the local economy after the first round of spending; the amount that is spent outside of the local economy is termed a leakage (Carver and Caudill 2007). In order to increase supplies to local businesses to meet increased demand, input suppliers must also increase their purchases of inputs from other industries. The income and employment resulting from these secondary purchases by input suppliers are the *indirect* effects of visitor spending within the economy. Employees of the directly affected businesses and input suppliers use their incomes to purchase goods and services. The resulting increased economic activity from new employee income is the *induced* effect of visitor spending. The indirect and induced effects are known as the secondary effects of visitor spending. “Multipliers” (or “Response Coefficients”) capture the size of the secondary effects, usually as a ratio of total effects to direct effects (Stynes 1998). The sums of the direct and secondary effects describe the total economic impact of visitor spending in the local economy.

There are three alternatives evaluated in the CCP. For each alternative, regional economic effects from the IMPLAN model are reported for the following categories:

- **Employment** represents the change in number of jobs generated in the region from a change in regional output. IMPLAN estimates for employment include both full time and part time workers, which are measured in total jobs.
- **Labor Income** includes employee wages and salaries, including income of sole proprietors and payroll benefits.
- **Value Added** measures contribution to Gross Domestic Product. It is equal to the difference between the amount an industry sells a product for and the production cost of the product, and is thus net of intermediate sales.

The economic impacts reported in this report are on an annual basis in 2010 dollars. Large management changes often take several years to achieve. The estimates reported for Alternatives 2 and 3 represent the final economic effects after all changes in management have been implemented.

6.18.2 Economic Impacts

Impacts from Refuge Revenue Sharing: Under provisions of the Refuge Revenue Sharing (RRS) Act, local counties receive an annual payment for lands that have been purchased by full fee simple acquisition by the Service. Payments are based on the greater of 75 cents per acre or 0.75% of the fair market value of lands acquired by the Service. The exact amount of the annual payment depends on Congressional appropriations, which in recent years have tended to be less than the amount to fully fund the authorized level of payments. In Fiscal Year 2009 (FY 09), actual RRS payments were 30.7% of authorized levels. FY 09 Refuge Complex RRS payments (made in 2010) were: $27,702 to communities in Benton County; $3,145 to communities in Linn County; $12,983 to communities in Marion County; $10,699 to communities in Polk County for a total payment of $54,529. Table 6-3 shows the resulting economic impacts of RRS payments under all alternatives. Accounting for both the direct and secondary effects, RRS payments for Alternatives 1, 2, and 3 would generate total annual economic impacts of one job, $43.3 thousand in labor income and $54.4 thousand in value added in the local four-county impact area.

Table 6-3. Annual Impacts from Refuge Complex Refuge Revenue Sharing Payments (All Alternatives)

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2010)	**Value Added** (Thousands, $2010)
Direct effects	1	$36.9	$42.5
Secondary effects	0	$6.4	$11.9
Total economic impact	1	$43.3	$54.4

6.18.3 Impacts from Public Use and Access Management

Refuge Visitor Expenditures in Local Economy: Spending associated with recreational visits to national wildlife refuges generates significant economic activity. The report *Banking on Nature: The Economic Benefits of National Wildlife Refuges Visitation to Local Communities* (Carver and Caudill 2007) reported that more than 34.8 million visits were made to national wildlife refuges in FY 2006 which generated $1.7 billion of sales in regional economies. Accounting for both the direct and secondary effects, spending by refuge visitors generated nearly 27,000 jobs, and over $542.8 million in employment income. Approximately 82 percent of total expenditures were from non-consumptive activities, twelve percent from fishing, and six percent from hunting (Carver and Caudill 2007).

The Refuge Complex offers a wide variety of year round accessible recreational opportunities associated with the "Big-Six" wildlife dependent uses: wildlife observation and photography, interpretation, environmental education, hunting, and fishing. Wildlife observation is the primary visitor activity that occurs on the Willamette Valley Refuges. The program is designed to provide a diversity of wildlife viewing opportunities in a manner that minimizes disturbance to wildlife. Currently, the W.L. Finley NWR deer hunt provides a recreational opportunity for hunting that is uncrowded and used by families. However, the hunt is characterized by a low success rate. Fishing is allowed on W.L. Finley NWR, but is rarely used due to poor water quality, no existing facilities, lack of a quality fishery, and the inability to boat.

This section focuses on the local economic impacts associated with Refuge Complex visitation. Annual visitation estimates for the refuges are based on several refuge statistic sources including visitors entering the Administrative Office, hunting permits, and general observation by refuge personnel. Annual visitation estimates are on a per visit basis. Table 6-4 summarizes estimated visitation by type of visitor activity for Alternatives 1, 2, and 3. Although all of the Big Six uses would be provided to some degree on the Refuge Complex across all alternatives, the primary emphasis for the refuges' public use program would continue to be on providing high quality wildlife observation and interpretation opportunities.

To determine the local economic impacts of visitor spending, only spending by persons living outside the local four-county area are included in the analysis. The rationale for excluding local visitor spending is twofold. First, money flowing into the local four-county area from visitors living outside the local area (hereafter referred to as non-local visitors) is considered new money injected into the local economy. Second, if residents of the local four-county area visit the refuges more or less due to the management changes, they will correspondingly change their spending of their money elsewhere in the local four-county area, resulting in no net change to the local economy. These are standard assumptions made in most regional economic analyses at the local level. Refuge visitation statistics and hunting permits were used to determine the percentage of non-local refuge visitors. Table 6-4 shows the estimated percent of non-local refuge visits by refuge for each alternative.

A visitor usually buys a wide range of goods and services while visiting an area. Major expenditure categories include lodging, restaurants, supplies, groceries, and recreational equipment rental. In this analysis we use average daily visitor spending profiles from the Banking on Nature report (Carver and Caudill 2007) that were derived from the 2006 National Survey of Fishing, Hunting, and Wildlife Associated Recreation (NSHFWR - USFWS 2008). The NSHFWR reports trip related spending of state residents and non-residents for several different wildlife-associated recreational activities. For each recreation activity, spending is reported in the categories of lodging, food and drink, transportation, and other expenses. Carver and Caudill (2007) calculated the average per-person per-day expenditures by recreation activity for each Service region. We used the spending profiles for non-residents for Service Region 1 (the region the Refuge Complex is located in), and updated the 2006 spending profiles to 2010 dollars using the Consumer Price Index Inflation Calculator (U.S. Bureau of Labor Statistics, 2011). Average daily spending profiles for nonresident visitors to Region 1 for big game hunting ($92.07 per-day), migratory bird hunting ($186.83 per-day), and fresh water fishing ($63.96 per-day) were used to estimate non-local visitor spending for refuge hunting and fishing related activities. The average daily nonresident spending profile for non-consumptive wildlife recreation (observing or photographing fish and wildlife) was used for non-consumptive wildlife viewing activities ($117.87 per-day).

Table 6-4. Estimated Annual Refuge Complex Visitation by Activity (Alternatives 1, 2, and 3)

Visitor activity	Total number of visits	Percentage of non-local visits (%)	Total number of non-local visits	Number of hours spent at Refuge	Number of non-local visitor days[a]
Alternative 1					
Ankeny NWR					
Nature trails/ other wildlife observation	108,394	20%	21,679	4	10,839
Baskett Slough NWR					
Nature trails/ other wildlife observation	218,528	20%	43,706	4	21,853
W.L. Finley NWR					
Fishing	2	5%	0	4	0
Big game hunting	77	0%	0	8	0
Nature trails/ other wildlife observation	330,469	20%	66,094	4	33,047
Willamette Valley NRWC Total	***657,470***		***131,479***		***65,739***
Alternative 2					
Ankeny NWR					
Nature trails/ other wildlife observation	114,357	20%	22,871	4	11,436
Baskett Slough NWR					
Waterfowl and migratory bird hunting	140	10%	14	6	11
Nature trails/ other wildlife observation	249,773	20%	49,955	4	24,977
W.L. Finley NWR					
Fishing	750	5%	38	4	19
Big game hunting	56	0%	0	8	0
Nature trails/ other wildlife observation	350,778	20%	70,156	4	35,078
Willamette Valley NRWC Total	***715,854***		***143,034***		***71,521***
Alternative 3					
Ankeny NWR					
Nature trails/ other wildlife observation	109,958	20%	21,992	4	10,996
Baskett Slough NWR					
Nature trails/ other wildlife observation	235,354	20%	47,071	4	23,535
W.L. Finley NWR					
Fishing	750	5%	38	4	19
Big game hunting	56	0%	0	8	0
Nature trails/ other wildlife observation	336,882	20%	67,376	4	33,688
Willamette Valley NRWC Total	***683,000***		***136,477***		***68,238***

[a] One visitor day = 8 hours.

Visitor spending profiles are estimated on an average per day (8 hours) basis. Because some visitors only spend short amounts of time visiting a refuge, counting each refuge visit as a full visitor day would overestimate the economic impact of Refuge Complex visitation. In order to properly account for the amount of spending, the annual number of non-local refuge visits were converted to visitor days. Refuge personnel estimate that non-local big game hunters spend a full visitor day (8 hours) while waterfowl hunters and anglers spend approximately 6 hours (2/3 a visitor day). Non-local visitors that view wildlife on nature trails or participate in other wildlife observation activities typically spend 4 hours (1/2 half a visitor day). Table 6-4 shows the number of non-local visitor days by recreation activity for each alternative.

Total spending by non-local refuge visitors was determined by multiplying the average non-local visitor daily spending by the number of non-local visitor days at each refuge. Table 6-5 summarizes the total economic impacts associated with current non-local visitation by alternative. Under

Alternative 1, non-local Refuge Complex visitors would spend over $7.5 million in the local economy annually. This spending would directly account for 66 jobs, $1.6 million in labor income, and $2.8 million in value added in the local economy. The secondary or multiplier effects would generate an additional 20 jobs, $657.3 thousand in labor income, and $1.2 million in value added. Accounting for both the direct and secondary effects, spending by non-local visitors for Alternative 1 would generate total economic impacts of 86 jobs, $2.28 million in labor income, and $3.9 million in value added.

As shown in Table 6-4, overall Refuge Complex non-local visitation is anticipated to increase by 5,781 visitor days under Alternative 2 as compared to Alternative 1. Under Alternative 2, non-local Refuge Complex visitors would spend over $8.4 million in the local area annually. Accounting for both the direct and secondary effects, spending by non-local visitors for Alternative 2 would generate total economic impacts of 93 jobs, $2.48 million in labor income, and $4.26 million in value added.

Overall Refuge Complex non-local visitation is anticipated to increase by 2,499 visitor days under Alternative 3 as compared to Alternative 1 (Table 6-4). Under Alternative 3, non-local Refuge Complex visitors would spend over $8 million in the local area annually. Accounting for both the direct and secondary effects, spending by non-local visitors for Alternative 3 would generate total economic impacts of 89 jobs, $2.36 million in labor income, and $4.07 million in value added.

6.18.4 Impacts from Refuge Administration

Staff – Personal Purchases: Refuge employees reside and spend their salaries on daily living expenses in the local area, thereby generating impacts within the local economy. Household consumption expenditures consist of payments by individuals/households to industries for goods and services used for personal consumption. The IMPLAN modeling system contains household consumption spending profiles that account for average household spending patterns by income level. These profiles allow for leakage of household spending to outside the region. The current approved refuge staff consists of 37 employees for Alternative 1, while 61 employees have been identified as being necessary under Alternatives 2 and 3 (Table 6-6).

Based on FY 2011 salary charts, it was estimated that annual salaries would total over $1.9 million for Alternative 1 and $3.2 million for Alternatives 2 and 3. Table 6-7 shows the economic impacts associated with spending of salaries in the local four-county area by Refuge Complex employees under Alternatives 1, 2, and 3. For Alternative 1, salary spending by Refuge Complex personnel would generate additional secondary effects of 11 jobs, $389.2 thousand in labor income and $726.9 thousand in value added in the local economy. For Alternatives 2 and 3, salary spending by Refuge Complex personnel would generate additional secondary effects of 19 jobs, $639.4 thousand in labor income and $1.2 million in value added in the local economy.

Table 6-5. Annual Impacts of Non-local Visitor Spending (Alternatives 1, 2, and 3)

	Employment (# full & part time jobs)	Labor income (Thousands, $2010)	Value Added (Thousands, $2010)
Alternative 1			
Ankeny NWR			
Direct effects	11	$267.1	$457.0
Secondary effects	3	$108.4	$189.0
Total economic impact	14	$375.5	$646.0
Baskett Slough NWR			
Direct effects	22	$538.5	$921.4
Secondary effects	7	$218.5	$380.9
Total economic impact	29	$757.0	$1,302.3
W.L. Finley NWR			
Direct effects	33	$814.3	$1,393.4
Secondary effects	10	$330.4	$576.0
Total economic impact	43	$1,144.7	$1,969.4
Refuge Complex Total			
Direct effects	*66*	*$1,619.9*	*$2,771.8*
Secondary effects	*20*	*$657.3*	*$1,145.9*
Total economic impact	*86*	*$2,277.2*	*$3,917.7*
Alternative 2			
Ankeny NWR			
Direct effects	11	$281.8	$482.2
Secondary effects	4	$114.3	$199.3
Total economic impact	15	$396.1	$681.5
Baskett Slough NWR			
Direct effects	25	$615.5	$1,053.1
Secondary effects	7	$249.7	$435.4
Total economic impact	32	$865.2	$1,488.5
W.L. Finley NWR			
Direct effects	35	$864.4	$1,479.0
Secondary effects	11	$350.7	$611.4
Total economic impact	46	$1,215.1	$2,090.4
Refuge Complex Total			
Direct effects	*71*	*$1,761.6*	*$3,014.3*
Secondary effects	*22*	*$714.8*	*$1,246.1*
Total economic impact	*93*	*$2,476.4*	*$4,260.4*
Alternative 3			
Ankeny NWR			
Direct effects	11	$270.9	$463.6
Secondary effects	3	$110.0	$191.7
Total economic impact	14	$380.9	$655.3
Baskett Slough NWR			
Direct effects	24	$580.0	$992.3
Secondary effects	7	$235.3	$410.2
Total economic impact	31	$815.3	$1,402.6
W.L. Finley NWR			
Direct effects	34	$830.4	$1,420.8
Secondary effects	10	$336.9	$587.4
Total economic impact	44	$1,167.3	$2,008.2
Refuge Complex Total			
Direct effects	*69*	*$1,681.2*	*$2,876.7*
Secondary effects	*20*	*$682.2*	*$1,189.3*
Total economic impact	*89*	*$2,363.5*	*$4,066.0*

Table 6-6. Current Approved Staff (Alternative 1) and Additional Positions for Alternatives 2 and 3

Alternative 1	Additional Positions for Alternative 2 and 3
Project Leader	Wildlife Biologist
Deputy Project Leader	Wildlife Refuge Manager (2)
Wildlife Biologist (2)	Office Automation Clerk
Wildlife Refuge Manager	Environmental Education Specialist
Park Ranger (2)	IT Specialist
Administrative Officer	Maintenance Worker
Computer Assistant	Biological Science Technician (3)
Engineering Equipment Operator (2)	Tractor Operator (3)
Seasonal Engineering Equipment Operator (3)	Wildlife Refuge Manager
Fish & Wildlife Biologist (3)	Park Ranger (2)
Fire Management Officer	Refuge Operations Specialist
Forestry Technician (2)	Botanist
Biological Science Technician	Fisheries Biologist
Student Career Employment Program Intern	GIS Program Manager
Office Assistant	Maintenance Worker
Tractor Operator - temporary (3)	Biological Planner
Youth Crew Leader - temporary (2)	Engineering Equipment Operator
YCC Enrollee temporary (8)	Prescribed Fire Specialist
Americorp Intern	
Total Positions = 37	**Total Positions = 61**

Table 6-7. Annual Local Economic Impacts of Salary Spending by Refuge Staff

	Employment (# full & part time jobs)	Labor income (Thousands, $2010)	Value Added (Thousands, $2010)
Alternative 1			
Direct effects	0	$0.0	$0.0
Secondary effects	12	$389.2	$726.9
Total economic impact	*12*	*$389.2*	*$726.9*
Alternatives 2 and 3			
Direct effects	0	$0.0	$0.0
Secondary effects	19	$639.4	$1,194.1
Total economic impact	*19*	*$639.4*	*$1,194.1*

Work-related Purchases: A wide variety of supplies and services are purchased for refuge operations and maintenance activities. Refuge purchases made in the local four-county area, contribute to the local economic impacts associated with the Refuge Complex. Major local expenditures include: supplies and services related to building maintenance and construction; auto repairs, parts, and fuel; and utilities. Excluding purchases for the cooperative farming program, average annual non-salary expenditures are anticipated to be $721.1 thousand for Alternative 1, $2.36 million for Alternative 2, and $2.16 million for Alternative 3[1]. Table 6-8 shows the economic impacts associated with work related expenditures in local communities near the Refuge Complex. According to refuge records, approximately 79% of the annual non-salary budget expenditures are spent on goods and services purchased in the local four-county area. For Alternative 1, work related purchases would generate a total economic impact of 7 jobs, $303.4 in labor income, and $546.1 thousand in value added. Work related purchases under Alternative 2 would generate a total economic impact of 20 jobs, $913.2 in labor income, and $1.64 million in value added. For Alternative 3, work related purchases would generate a total economic impact of 18 jobs, $835.7 in labor income, and $1.5 million in value added.

Table 6-8. Local Economic Impacts of Refuge Related Purchases (Alternatives 1, 2, and 3)

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2010)	**Value Added** (Thousands, $2010)
Alternative 1			
Direct effects	4.	$211.8	$387.6
Secondary effects	3	$91.6	$158.5
Total economic impact	7	$303.4	$546.1
Alternative 2			
Direct effects	12	$637.6	$1,166.6
Secondary effects	8	$275.6	$476.9
Total economic impact	20	$913.2	$1,643.5
Alternative 3			
Direct effects	11	$583.5	$1,067.6
Secondary effects	7	$252.2	$436.5
Total economic impact	18	$835.7	$1,504.0

[1] Minor changes to project costs were made between the Draft CCP, published in May 2011, and the Final CCP (signed in September 2011). The largest change made was in the estimated cost of the Environmental Education building (changed from an estimated cost of $2 million to $3 million). The economic analysis was not updated to reflect the project cost changes as the overall direction and magnitude of the costs would remain approximately the same. The differences in economic impact between the alternatives would likewise remain very similar to the impacts discussed in the Draft CCP.

6.18.5 Other Management Activities – Cooperative Farming

Grass crops are grown on the refuges to help provide the necessary food resources for thousands of Canada geese that winter in the Willamette Valley from October to April each year. The refuges currently utilize cooperative farming agreements with local area farmers (using traditional farm equipment and approaches) to provide the majority of green forage crops including planted grass types and pasture mixes. The cooperative farming program benefits the refuges by providing green forage crops for wintering geese while allowing the local farmers to benefit from harvesting the grass seed during the summer months. The cooperative farming program also provides the additional benefit of reducing goose use and thus, crop depredation (damage) to private agricultural lands throughout the Willamette Valley.

In recent years, local farmers' interest in cooperative farming has declined due to numerous factors including low grass seed prices, the increase in costs associated with farming, as well as the increase in goose use on the refuge farm lands. The increased goose use has resulted in increased crop damage and thus reduced profits for local farmers. Farmers remaining in the cooperative farming program are not profiting as much from farming refuge lands, rather they are willing to plant crops on refuge lands in order to minimize goose use and depredation on adjacent private lands (pers. comm. J. Houk, FWS, April 2011). The loss in farmers involved in the cooperative farming program has required the refuge staff to farm more acreage directly, increasing the refuge farm program costs.

Under Alternative 1, the refuges would continue to emphasize goose management by maintaining cultivated grass fields under a cooperative farming program. The majority of the farming that occurs on the three refuges would continue to be conducted by local area farmers working under cooperative farming agreements with the refuges. Under Alternative 2, farming for geese will continue on the three refuges by a combination of cooperative and refuge farming programs. The refuge would pursue measures to help retain the services of cooperative farmers, such as providing enhanced irrigation capabilities; providing additional lure crops such as corn or other grains; the refuge taking over farming on certain high goose use fields; or the refuge offsetting a portion of the costs to cooperative farmers. Alternative 3 recognizes that cooperative farming may be increasingly infeasible and proposes other methods to accomplish goose management: either contract farming (paying farmers to grow crops on the refuges) and/or force account farming (refuge staff doing the farming). Refuge farming program costs would substantially increase and goose use would likely decrease under Alternative 3. Table 6-9 shows the estimated acres of cooperatively farmed and refuge farmed acres for each alternative.

Estimating the economic impact of the cooperative farming program would require information on the farmers' returns associated with farming on refuge lands, specific details about the measures refuge staff would take to retain the services of cooperative farmers, and the expenses the refuge would incur for contract and refuge farming. Due to the high level of goose use and resulting significant crop depredation, the quantity and quality of the grass crops produced on refuge lands are anticipated to be much lower than the average Willamette Valley yields and returns generated from farming lands off the refuge (pers. comm., J. Houk, FWS, April 2011). Therefore, grass seed enterprise budgets that represent the typical farm operation in the Willamette Valley do not accurately represent the production or returns of farmers participating in the cooperative farming program.

Under refuge farming scenarios, the refuge staff would grow grass crops for goose use only, not for harvest. Therefore, farming related expenses (and purchases in the local four-county area) by the refuge farming would not include the crop production expenditures (i.e., fertilizers, herbicides, and harvesting costs) made in the local economy by local farmers participating in the cooperative farming program (pers. comm., J. Houk, FWS, April 2011). Recent enterprise budgets for producing annual ryegrass seed in the Willamette Valley estimate the associated direct expenses at $401.31 per acre for tillage and $338.48 per acre for no-till operations (Eleveld et. all, 2010). Refuge farming expenses would be limited to seed, fuel, and labor for an estimated total of $75 per acre. While the costs associated with the refuge farming program would increase under Alternative 2 and Alternative 3, the amount of money actually spent in the local economy would decline as more acres are farmed by refuge staff instead of by the cooperative farming program.

Table 6-9. Estimated acres and costs associated with Cooperative Farming and Refuge Farming (Alternatives 1, 2, and 3).

	Alternative 1	Alternative 2	Alternative 3
Acres Cooperatively Farmed	***3470***	***2881***	***0***
Annual participant (farmer) costs and revenues of Cooperative Farming	Not Available	Not Available	Not Available
Annual Refuge Costs for Cooperative Farming Materials and Equipment	$8,000	$10,000	
Acres under Refuge Farming or Contract Farming	***1101***	***356***	***3465***
Acres Cooperatively or Refuge Farmed	***0***	***938***	***0***
Annual Refuge Farming costs	$82,575	$97,050	$259,875

More information is needed about farmers' returns associated with farming on refuge lands and the specific details about the measures refuge staff would take to retain the services of cooperative farmers in order to conduct a complete economic analysis of refuge farming and the cooperative farming program.

6.18.6 Summary of Economic Impacts for Alternative 1

Table 6-10 summarizes the direct and total economic impacts in the four-county area of refuge management activities for Alternative 1. Under Alternative 1, Refuge Complex management activities directly related to refuge operations generate an estimated 71 jobs, $1.87 million in labor income, and $3.2 million in value added in the local economy. Including direct, indirect, and induced effects, all Refuge Complex activities would generate a total economic impact of 105 jobs, $3.01 million in labor income, and $5.25 million in value added. In 2008, total labor income was estimated at $12.8 billion and total employment was estimated at 317,266 jobs for the local four-county area (IMPLAN 2008 data). Thus, total economic impacts associated with Refuge Complex operations under Alternative 1 represent less than one percent of total income (0.03%) and total employment (0.04%) in the overall four-county area economy. Total economic effects of refuge operations play a much larger role in the Willamette Valley communities near the refuges where most of the refuge related expenditures and public use related economic activity occurs.

Table 6-10. Economic Impacts of Refuge Complex Management Activities (Alternative 1)

	Employment (# full & part time jobs)	Labor income (Thousands, $2010)	Value Added (Thousands, $2010)
Refuge revenue sharing			
Direct effects	1	$36.9	$42.5
Total effects	1	$43.3	$54.4
Refuge administration (staff salary spending and work related purchases)			
Direct effects	4	$211.8	$387.6
Total effects	18	$692.6	$1,273.0
Public use activities			
Direct effects	66	$1,619.9	$2,771.8
Total effects	86	$2,277.2	$3,917.7
Aggregate impacts			
Direct effects	71	$1,868.6	$3,201.9
Total effects	105	$3,013.1	$5,245.1

6.18.7 Summary of Economic Impacts for Alternative 2

Table 6-11 summarizes the direct and total economic impacts in the four-county area of refuge management activities for Alternative 2. Under this alternative, management activities directly related to refuge operations generate an estimated 84 jobs, $2.44 million in labor income, and $4.22 million in value added in the local economy. Including direct, indirect, and induced effects, all Refuge Complex activities would generate a total economic impact of 133 jobs, $4.07 million in labor income, and $7.15 million in value added. Total economic impacts associated with Refuge Complex operations under Alternative 2 represent less than one percent of total income (0.03%) and total employment (0.04%) in the overall four-county area economy. Total economic effects of refuge operations play a much larger role in the Willamette Valley communities near the refuges where most of the refuge related expenditures and public use related economic activity occurs.

Table 6-11. Economic Impacts of Refuge Complex Management Activities (Alternative 2)

	Employment (# full & part time jobs)	Labor income (Thousands, $2010)	Value Added (Thousands, $2010)
Refuge revenue sharing			
Direct effects	1	$36.9	$42.5
Total effects	1	$43.3	$54.4
Refuge administration(staff salary spending and work related purchases)			
Direct effects	12	$637.6	$1,166.6
Total effects	39	$1,552.6	$2,837.6
Public use activities			
Direct effects	71	$1,761.6	$3,014.3
Total effects	93	$2,476.4	$4,260.4
Aggregate impacts			
Direct effects	84	$2,436.1	$4,223.4
Total effects	133	$4,072.4	$7,152.5

Table 6-12 summarizes the change in economic effects associated with Refuge Complex operations under Alternative 2 as compared to Alternative 1. Due to increases in refuge visitation and administration, Alternative 2 would generate 28 more jobs, $1.06 million more in labor income, and $1.9 million more in value added as compared to Alternative 1.

Table 6-12. Change in Economic Impacts under Alternative 2 Compared to Alternative 1.

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2010)	**Value Added** (Thousands, $2010)
Refuge revenue sharing			
Direct effects	0	$0	$0
Total effects	0	$0	$0
Refuge administration(staff salary spending and work related purchases)			
Direct effects	8	$425.8	$779.0
Total effects	21	$860.0	$1,564.7
Public use activities			
Direct effects	6	$141.7	$242.5
Total effects	7	$199.2	$342.7
Aggregate impacts			
Direct effects	14	$567.5	$1,021.5
Total effects	28	$1,059.2	$1,907.4

6.18.8 Summary of Economic Impacts for Alternative 3

Table 6-13 summarizes the direct and total economic impacts in the four-county area of refuge management activities for Alternative 3. Under Alternative 3, Refuge Complex management activities directly related to refuge operations generate an estimated 81 jobs, $2.3 million in labor income, and $3.97 million in value added in the local economy. Including direct, indirect, and induced effects, all Refuge Complex activities would generate a total economic impact of 127 jobs, $3.88 million in labor income, and $6.82 million in value added. Total economic impacts associated with Refuge Complex operations under Alternative 3 represent less than one percent of total income (0.03%) and total employment (0.04%) in the overall four-county area economy. Total economic effects of refuge operations play a much larger role in the Willamette Valley communities near the Refuge Complex where most of the refuge related expenditures and public use related economic activity occurs.

Table 6-14 summarizes the change in economic effects associated with Refuge Complex operations under Alternative 3 as compared to Alternative 1. Due to increases in refuge visitation and administration, Alternative 3 would generate 22 more jobs, $868.7 thousand more in labor income, and $1.57 million more in value added as compared to Alternative 1.

6.18.9 Summary and Conclusions

Under Alternative 1, the Refuge Complex management activities directly related to refuge operations generate an estimated 105 jobs, $3.01 million in labor income, and $5.25 million in value added in the local economy. Due to increases in refuge administration and public use activities, Alternative 2 would generate 28 more jobs, $1.06 million more in labor income, and $1.9 million more in value added as compared to Alternative 1. Under Alternative 3, refuge public use and administration activities would increase. Alternative 3 would generate 22 more jobs, $868.7 thousand more in labor income, and $1.57 million more in value added as compared to Alternative 1.

Table 6-13. Economic Impacts of Refuge Complex Management Activities (Alternative 3)

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2010)	**Value Added** (Thousands, $2010)
Refuge revenue sharing			
Direct effects	0	$36.9	$42.5
Total effects	1	$43.3	$54.4
Refuge administration(staff salary spending and work related purchases)			
Direct effects	11	$583.5	$1,067.6
Total effects	37	$1,475.1	$2,698.1
Public use activities			
Direct effects	69	$1,681.2	$2,876.7
Total effects	89	$2,363.5	$4,066.0
Aggregate impacts			
Direct effects	81	$2,301.6	$3,986.8
Total effects	127	$3,881.9	$6,818.6

Table 6-14. Change in Economic Impacts under Alternative 3 Compared to Alternative 1

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2010)	**Value Added** (Thousands, $2010)
Refuge revenue sharing			
Direct effects	0	$0	$0
Total effects	0	$0	$0
Refuge administration(staff salary spending and work related purchases)			
Direct effects	7	$371.6	$680.0
Total effects	19	$782.5	$1,425.2
Public use activities			
Direct effects	3	$61.4	$105.0
Total effects	3	$86.3	$148.3
Aggregate impacts			
Direct effects	10	$433.0	$784.9
Total effects	22	$868.7	$1,573.5

The total economic impacts associated with Refuge Complex operations across all alternatives represents less than one percent of total income and total employment in the overall four-county local economy. Total economic effects of refuge operations play a much larger role in the Willamette Valley communities near the Refuge Complex where most of the refuge related expenditures and public use related economic activity occurs.

6.19 Cumulative Effects

Council on Environmental Quality (CEQ) regulations, which implement the provisions of NEPA, define several different types of effects that should be evaluated in an environmental document, including direct, indirect, and cumulative effects (40 CFR § 1508.7). Direct and indirect effects are addressed in the resource-specific sections of this chapter (Sections 6.1—6.18). This section addresses cumulative effects.

According to the CEQ, cumulative effects can result from the incremental effects of a project when added to other past, present, and reasonably foreseeable future projects in the area, regardless of the entity undertaking the action. Cumulative impacts can result from individually minor but cumulatively significant actions over a period of time. This analysis is intended to consider the interaction of activities at the Willamette Valley Refuge Complex and with other actions occurring over a larger spatial and temporal frame of reference.

It should be noted that the cumulative effects analysis has essentially been completed by virtue of the comprehensive nature by which the direct and indirect effects associated with implementing the various alternatives has been presented in the previous sections of this chapter and in the Compatibility Determinations (Appendix C). The analysis in this section primarily focuses on effects associated with reasonably foreseeable future events and/or actions regardless of what entity undertakes that action.

6.19.1 Effects from Reasonably Foreseeable Future Refuge Activities

Compared to Alternative 1, Alternatives 2 and 3 present the potential for more benefit to conservation of native species of the Willamette Valley and to recreational users, because under these alternatives the Service would develop a land protection plan. This plan would provide a mechanism for further protection and restoration of habitats outside the current refuge area via easements, acquisition, cooperative agreement, and/or other means, for further protection and restoration of native habitats that may presently, or could in the future, support rare species.

Such additional lands may eventually be opened to public use, providing direct opportunity for enjoyment of nature and wildlife. However, even if they are never opened to the public, managing additional lands for conservation values would increase and support native species populations in the Willamette Valley, indirectly benefiting consumptive and non-consumptive recreationists.

6.19.2 Potential Effects from Climate Change

Potential effects to refuge ecosystems resulting from warming: According to the Climate Impacts Group at the University of Washington, “Even subtle changes in PNW precipitation and temperature have noticeable impacts on the region’s mountain snowpack, river flows and flooding, the likelihood of summer droughts, forest productivity and forest fire risk, salmon abundance, and quality of coastal and near-shore habitat.” (www.cses.washington.edu/cig)

Warming, whether it results from anthropogenic or natural sources, is expected to affect a variety of natural processes and associated resources. However, the complexity of ecological systems means that there is a tremendous amount of uncertainty about the impact climate change will actually have. In particular, the localized effects of climate change are still a matter of much debate.

The following paragraphs attempt to identify the potential effects of warming on refuge-specific habitats and biota, utilizing the available science and predictions, combined with awareness of refuge-specific conditions. By necessity this brief assessment is incomplete and represents professional judgment rather than hard science. All predicted effects should be treated as hypotheses and tested over time using scientific methods.

Effects of warming to hydrology and lowland habitats: Much of the Pacific Northwest (Climate Impacts Group 2008) is expected to see a greater percentage of precipitation falling as rain rather than snow. While the refuge lands themselves currently receive the vast majority of their annual precipitation as rainfall, the watersheds feeding the main refuge rivers and streams currently receive minor quantities (Muddy Creek and tributaries, Bashaw Creek, etc.) or most (Willamette River) of their annual precipitation as snow. Hence, while refuge streams may experience higher winter streamflows and lower summer streamflows, this would be mostly due to potential increases in precipitation (which are not forecasted to be outside the natural range of variability) rather than to temperature modifications of the snow cycle.

The Willamette River itself would be the exception to this statement. The Snag Boat Bend Unit, which is strongly influenced by the Willamette River, could experience more winter flooding and lower summer water levels. This could directly affect riparian habitats, causing greater stress during summer. In addition, Bakke (2008) concluded, based on geomorphological principles, that rivers will transport more sediment, erode their banks, and scour their beds more readily as the hydrologic patterns change from snowmelt to rainfall, and as the intensity of storms increases. This shift in hydrology will alter the dynamic state of the river, and will induce morphological changes even if total annual precipitation remains unchanged. A prolonged period of river channel instability is expected as rivers adjust to new patterns of flooding and sediment load. Different locations in the river network will have varying degrees of sensitivity to changes in quantity or temporal distribution of hydraulic energy caused by climate change. Depositional or response reaches will be the most severely impacted as these areas are where equilibrium between deposition and erosion of sediment is easily altered by relatively small changes in hydraulic energy or sediment volumes. Such a scenario could mean that Snag Boat Bend Unit may be affected by higher geomorphic instability than other areas of the Refuge Complex.

Rivers and streams in both rain-fed and snow-dominated basins will likely be warmer in the future, which could increase evapotranspiration and reduce water quality. In addition, warmer streams and rivers may facilitate the expansion of the ranges of warm-water fish species, and worsen conditions for cold-water species (Lawler et al. 2008).

Lawler et al. (2008) stated that of all aquatic systems, wetlands “will likely be the most susceptible to climate change” with drying, warming, and changes in water quality predicted.

Possible effects of warming to upland native habitats: Of the native upland habitats, many observers have noted the gradual loss of upland prairie and oak/savanna over the last 100 years, which has often coincided with succession on these sites to Douglas-fir forests. Investigators conducting a principal components analysis of topographic and soil variables in plots from Finley NWR concluded that remnant prairie/savanna plots only exist in areas with a high heat load (i.e., steep, south-facing), and shallow, low-nitrogen soils with high sand. Thus, harsh areas have avoided the succession of prairie/savanna areas to dense forests, even with broader scale landscape changes like fire suppression. In the study, edge plots are intermediate in character between forest and woodland plots and prairie/savanna plots (Murphy 2008). The same investigator found that available soil moisture appears to be a major limitation in the succession of prairie/savanna to forests (Murphy 2008). While these studies analyze only a few factors (and future temperature scenarios may result in entirely different outcomes), it is possible that upland successional changes that have resulted in more closed woodland or forest may be halted or reversed under a warming trend. The Willamette Sub-basin Plan (Willamette Restoration Initiative 2004) notes that climate change may result in increased frequency and severity of drought in the basin and predicts that the area of upland prairie might eventually increase, provided seed banks in the soil are still viable.

Wildfires: Wildfire frequency in western forests increased fourfold during the period 1987-2003 as compared to 1970-1986, while the total area burned increased six-fold (Westerling et al. 2006). The study demonstrated that earlier snowmelt dates correspond to increased wildfire frequency. Virtually all climate-model projections indicate that warmer springs and summers will occur over the region in coming decades. Although prolonged dry and hot periods are generally required for large fires in west-side forests (Gedalof et al. 2005), future conditions will likely make these periods, and resultant wildfires, more likely.

Potential effects to other biota: If warming happens, it could have a range of potential effects to wildlife and other biota. Obviously, habitat shifts that result in changed dominance in any particular habitat type, loss of habitat, or change in key habitat components can influence habitat availability and quality for dependent species. However, rising temperatures may affect other ecological interactions, such as sex ratios in reptiles (Janzen 1994), spring flowering times, or emergence timing and patterns for insect and pollinator species. Lawler et al. (2008) considers amphibians to be some of the most susceptible animals to climate change, partly because the microhabitats they depend on may be some of the most affected systems, and partly because they have limited abilities to disperse across a fragmented landscape.

6.19.3 Other Reasonably Foreseeable Events and Activities from Others

Development and population growth: By 2050, an additional 1.7 million people are expected to live in the Willamette River Basin, bringing the total population to around four million (Willamette Basin Explorer 2009), equivalent to adding three more cities the size of Portland or 13 cities the size of Eugene. This population growth will continue to place stress upon the ecosystems of the Willamette Valley, both through direct loss of remaining habitats, and indirectly through fragmentation and degradation of the Valley's remaining parcels of wildlife habitat and demands on water. The Willamette Valley CCP can do nothing to stem this trend but refuges and other tracts of habitats will become even more important as repositories of biodiversity.

Genetically Modified Organisms: Pollen blowing in the wind or carried by pollinator species may be capable of transferring genetically engineered traits, such as herbicide resistance and pest resistance, to closely related wild plants. Genetically engineered plants with weedy wild relatives are of particular concern. If expressed in the genetic background of a weed species, a transgene could increase the fitness of the weed in nature (Stewart et al. 2000). Laboratory studies have shown non-target pollinator species may also be harmed by wind-blown pollen. Monarch butterfly larvae have been shown in both laboratory and field tests (Losey et al. 1999, Jesse and Obrycki 2000) to suffer growth and mortality effects after feeding on milkweed plants dusted by corn pollen that was genetically engineered to express a Bt, a bacterial toxin.

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Appendix A

Photo by George Gentry/USFWS

Public Involvement

Public involvement was sought throughout the development of the CCP, starting in February of 2008. Public involvement strategies included face-to-face meetings with key agencies, tribal governments, federally-elected officials (or their aides), and local Refuge users. The Complex staff also held open houses, sent newsletters, conducted surveys, and gave presentations at community organizations to inform the public, invite discussion and solicit feedback. The Refuge Complex also maintained a website where CCP information could be found and where the public could provide comments during the scoping phase. Below is a brief summary of the events, meetings, and outreach tools that were used in our public involvement efforts.

Meetings with Congressional Representatives and/or their Aides:

- February 14, 2008. Met with Juine Chada (aide to Senator Ron Wyden) and Daniel Whelan (aide to Representative Peter DeFazio), Eugene, OR.
- February 19, 2008. Met with Andrea Salinas (aide to Representative Darlene Hooley) Salem, OR.
- March 18, 2008. Met with Richard Kyzka (aide to Senator Gordon Smith) Corvallis, OR.
- April 2008. Friends Conference. Met with aides to Senator Gordon Smith, Senator Ron Wyden, Representative Peter Defazio, and Representative Darlene Hooley

Meetings with Tribes

- February 29, 2008. Met with natural resource staff of the Confederated Tribes of the Grande Ronde.

Meetings with Local Community Organizations involving CCP Issues

- February 4, 2008. Presentation about the CCP to the Friends of the Willamette Valley National Wildlife Refuge Complex, Corvallis, OR.
- February 21, 2008. Presentation to the Audubon Society of Corvallis, Corvallis, OR.
- March 28, 2008. Presentation to the Corvallis Rotary Club, Corvallis, OR.

Meetings with Agencies

- November 29, 2007. Met with the Provincial Interagency Executive Committee (PIEC) (coalition of federal agencies including the Bureau of Land Management, U.S. Forest Service, EPA, and U.S. Fish and Wildlife Service).
- January 29, 2008. Met with the Oregon Department of Fish and Wildlife, Salem, OR.
- February 6, 2008. Met with the Oregon Department of Fish and Wildlife, South and North Willamette Watershed staff, Adair, OR.
- February 28, 2008. Met with the West Eugene Wetlands committee.
- March 6, 2008. Met with the PIEC.
- April 1, 2008. Attended meeting hosted by the Oregon Department of Fish and Wildlife for local landowners on the topic of elk, Monroe, OR.
- January 27, 2009. Met with extended team, including various agencies and partners, to review preliminary alternatives.
- April 14, 2010. Met with extended team, including various agencies and partners, to review preliminary alternatives.
- December, 2010. Met with the Oregon Department of Fish and Wildlife, Sherwood, OR.

Public Open Houses/Scoping Sessions

- February 7, 2008. Public open houses for CCP scoping afternoon and evening sessions. Salem, OR.

- February 13, 2008. Public open houses for CCP scoping afternoon and evening sessions. Corvallis, OR.

Other Meetings
- October 31, 2007. Regional Office Preplanning meeting.
- July 13, 2010. Met with the Goose Control Task Force. Salem, OR.

Press Coverage:
- February 5, 2008. Notice of CCP public open house in Salem Statesman-Journal.

Planning Updates
- January 2008. Planning Update 1 distributed to approximately 1,250 persons, organizations, and officials.
- September 2008. Planning Update 2 distributed to approximately 1,250 persons, organizations, and officials.
- September 2009. Planning Update 3 distributed to approximately 1,250 persons, organizations, and officials.
- May 2011. Planning Update 4 distributed to approximately 1,000 persons, organizations, and officials.

Other Tools
- January 2008. Website at www.fws.gov/willamettevalley/ccp featuring CCP information and scoping forms.
- February 1, 2008. Email sent to Refuge contacts informing them of upcoming CCP meetings and scoping process.

Federal Register Notices:
- February 29, 2008. Federal Register published Notice of Intent to Prepare a Draft Comprehensive Conservation Plan and Associated Environmental Assessment; and Notice of Public Meetings.
- May 25, 2011. Federal Register published Notice of Availability of Draft Comprehensive Conservation Plan and Environmental Assessment.

Appendix B

Photo by George Gentry/USFWS

Appropriate Uses

- Introduction
- Appropriate Use Findings
- Narrative Support for Negative Findings
- References

B.1 Introduction

The Appropriate Refuge Uses Policy (603 FW 1), finalized in 2006, outlines the process that the Service uses to determine when general public uses on refuges may be considered. Public uses previously defined as wildlife-dependent uses under the National Wildlife Refuge System Improvement Act of 1997 (hunting, fishing, wildlife observation and photography and environmental education and interpretation) are generally exempt from appropriate use review. Other exempt uses include situations where the Service does not have adequate jurisdiction to control the activity and refuge management activities. Other existing, proposed, or requested public uses are required to undergo the appropriateness screening.

The policy provides Refuge Managers with a consistent procedure to screen and document decisions concerning public uses, with the use of the following questions:

a) Do we have jurisdiction over the use?
b) Does the use comply with applicable laws and regulations (Federal, State, tribal and local)?
c) Is the use consistent with applicable Executive Orders and Department and Service policies?
d) Is the use consistent with public safety?
e) Is the use consistent with goals and objectives in an approved management plan or other document?
f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?
g) Is the use manageable within available budget and staff?
h) Will this be manageable in the future within existing resources?
i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?
j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality, compatible, wildlife-dependent recreation into the future?

Uses marked "no" for questions (a) or (b) are not evaluated further. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate.

When a use is determined to be appropriate, a Refuge Manager must then decide if the use is compatible before allowing it on a refuge.

The following forms show which uses have been determined appropriate and which determined not appropriate. Narrative answers for negative findings follow the forms.

B.2 Appropriate Use Findings

The following pages are the Appropriate Use Findings:

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: W.L. Finley NWR

Use: Bicycling

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager: [signature] Date: 9-7-11

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 9/12/11

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Ankeny, Baskett Slough, and W.L. Finley NWRs

Use: Cooperative Farming

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate____ **Appropriate** ✓

Refuge Manager: [signature] Date: 9-7-11

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** ~~outside the~~ CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 9/12/11

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Ankeny, Baskett Slough, and W.L. Finley NWRs

Use: Livestock Grazing

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate______ **Appropriate** ✓

Refuge Manager: [signature] Date: 9-7-11

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 9/12/11

A compatibility determination is required before the use may be allowed.

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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Ankeny, Baskett Slough, and W.L. Finley NWRs

Use: Forest Management

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager: ____________________ Date: 9-7-11

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: ____________________ Date: 9/12/11

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Ankeny, Baskett Slough, and W.L. Finley NWRs

Use: Research

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate _____ **Appropriate** ✓

Refuge Manager: [signature] Date: 9-7-11

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 9/12/11

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Ankeny, Baskett Slough, and W.L. Finley NWRs

Use: Geocaching, Letterboxing

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?		✓
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		
(d) Is the use consistent with public safety?		
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		
(g) Is the use manageable within available budget and staff?		
(h) Will this be manageable in the future within existing resources?		
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate** ___

Refuge Manager: ______ Date: 9-7-11

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: ______ Date: 9/12/11

A compatibility determination is required before the use may be allowed.

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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Ankeny, Baskett Slough, and W.L. Finley NWRs

Use: Horseback Riding

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate** _____

Refuge Manager: [signature] Date: 9-7-11

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 9/12/11

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Ankeny, Baskett Slough, and W.L. Finley NWRs

Use: Berry and Mushroom Picking

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?		✓
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		
(d) Is the use consistent with public safety?		
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		
(g) Is the use manageable within available budget and staff?		
(h) Will this be manageable in the future within existing resources?		
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate**_____

Refuge Manager: [signature] Date: 9-7-11

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 9-12-11

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
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FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Ankeny, Baskett Slough, and W.L. Finley NWRs

Use: Jogging

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate** ___

Refuge Manager: [signature] Date: 9-7-11

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 9-12-11

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Ankeny, Baskett Slough, and W.L. Finley NWRs

Use: All-Terrain Vehicles (ATVs)

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?		✓
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		✓
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate**_____

Refuge Manager: [signature] Date: 9-7-11

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 9-12-11

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Ankeny, Baskett Slough, and W.L. Finley NWRs

Use: Dog Trials

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate**_____

Refuge Manager: [signature] Date: 9-7-11

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 9-12-11

A compatibility determination is required before the use may be allowed.

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B.3 Narrative Support for Negative Findings

The following narratives provide more explanation for items checked No on the appropriate uses form. More information on items checked Yes and determined appropriate is generally located in the compatibility determination for the use (see Appendix C). Interpretation of two of the questions on the form (e) and (f) are explained below:

- Question (e) on the appropriate uses form (Is the use consistent with goals and objectives in an approved management plan or other document?) is interpreted as follows: The approved management plan in question is interpreted as the CCP.
- Question (f) (Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?) was checked yes if this is the first time the use has been formally considered in a planning process. Question (f) was also checked yes if there is no documentation of the use being denied in an earlier planning process.

B.3.1 Bicycling

This use occurs at a low level on Finley Refuge Road during the April 1 - October 31 season. Bicycles are not allowed on any trails.

(f) The use has been ongoing for many years.

B.3.2 Cooperative Farming

Includes haying, mowing, or grass seed production. In addition to seed removal, many fields would be hayed or mowed by farmers during summer to prepare.

(f) The use has been ongoing for decades as a foundational part of providing forage for wintering geese. The use has been the subject of earlier plans and various management objectives (USFWS 1986).

B.3.3 Livestock Grazing

This use includes use of livestock, including cattle or sheep, for the purposes of preparing agricultural fields into goose browse condition.

(f) The use has been ongoing for many years and was the subject of a management plan written in 1988 (USFWS 1988).

B.3.4 Forest Management

Forest management activities, including tree felling and potential removal, would occur in conjunction with the thinning program in oak savannahs, oak woodlands and mixed deciduous forests. Tree removal involves the felling or topping of selected live trees to promote the growth of remaining desired trees. At times, felled trees may be left to lay, but often felled trees are yarded, piled, and burned on-site to prevent fuel hazards from building up throughout the stand. Some felled trees may have value for other uses and may be removed from the site.

(f) This use has occurred on portions of W.L. Finley in the past.

B.3.5 Research

(f) The use has been ongoing for many years.

B.3.6 Geocaching

Geocaching, also known as letterboxing, is an outdoor activity in which the participants use a Global Positioning System (GPS) receiver or other navigational techniques to hide and seek containers, called "geocaches" or "caches". When physical placement is not involved, but instead, participants take a photo of themselves in front of a defined feature, the use is known as “virtual” geocaching. This appropriate uses determination covers only physical geocaching.

(b) According to 50 CFR 27.93, abandoning, discarding, or otherwise leaving any personal property in any national wildlife refuge is prohibited.

Due to the negative finding on (b), the use was not evaluated further and is considered inappropriate.

B.3.7 Horseback Riding

Horseback riding has not been allowed to-date at any of the refuges. Some use occurs illegally now on Baskett Butte and near Smithfield Road on Baskett Slough Refuge. The use was not mentioned in public scoping comments, but is occasionally requested by users.

(d) The use is not considered consistent with public safety. Existing refuge roads are generally narrow with limited pulloff space, and must accommodate both vehicles and pedestrians in the summertime period. Safety conflicts could be worsened if horseback riding were to be allowed on the roads. Trail options or cross-country options could address safety concerns, but present other problems (see below).

(e) and (j) The use is not considered consistent with other goals and objectives in the CCP. If permitted on trails, horseback riding could create conflicts w/other trail users engaged in wildlife observation, photography, interpretation, or environmental education. The use is not considered necessary for access as none of the refuges are particularly large or remote and good vehicle and trail access exists. Cross-country riding would reduce conflicts with trail users, but increases the possibility that weed seed could be introduced throughout the refuges. Horseback riding has the potential to introduce exotic plants through seed dispersal from manure and horse equipment and forage brought onto the refuge. Soil disturbance and compaction caused by horses’ hooves can aid in the establishment of non-native plants (Beck 1993, Hammitt and Cole 1987, Bainbridge 1974, Hendee et al. 1990).

Impacts related to horseback riding include exotic plant seed dispersal (Beck 1993, Hammitt and Cole 1987), soil compaction and erosion (Bainbridge 1974, Hendee et al. 1990, Hammitt and Cole 1987), stream sedimentation (Wilson and Seney 1994), trail widening (Whitaker 1978), vegetation trampling (Nagy and Scotter 1974, Weaver and Dale 1978, Whitaker 1978), aesthetic concerns relative to horse manure (Lee 1975), direct wildlife disturbance (Owen 1973), and direct and indirect conflicts with other recreationists.

(g) and (h) A separate trail system would need to be developed to avoid conflicts mentioned above. The land base is limited and resources are not immediately available for such a new trail system. The possible establishment of invasive exotic plant species would require staff attention and a monetary requirement for equipment and chemicals needed for control or elimination. With limited staff and resources, a need to control exotic plant species introduced as a result of horseback riding would compete against other priority needs on the refuges.

(i) Although horseback riding could enhance some people's understanding and appreciation of the refuge's natural and cultural resources, the use could not be considered beneficial to the refuge's natural or cultural resources, based on the potential for weed spread (see (e) and (j) above).

B.3.8 Collection of Fruits or Mushrooms

Berry or mushroom collection occurs occasionally by visitors. This use has not been formally allowed but enforcement has been inconsistent.

(b) 50 CFR 27.51 prohibits collection of any plant or animal on any national wildlife refuge unless otherwise permitted.

Due to the negative finding on (b), the use was not evaluated further.

B.3.9 Jogging

Jogging currently occurs semi-regularly on W.L. Finley Refuge and sporadically at the other refuges. Approximately five people per day jog on the Finley Refuge Road or on trails, primarily on weekends. The use was not mentioned in public scoping comments.

(d) The use could present safety conflicts if allowed on open refuge roads, particularly if joggers were in groups and came around blind corners.

(e) Because of the potential for joggers to create sudden disturbance and the potential to interfere with wildlife-dependent uses, this use would interfere with goals and objectives in the CCP.

(i) The use presents no benefit to the refuges' natural or cultural resources and is not thought to contribute to the public's understanding or appreciation of the refuges' natural or cultural resources.

(j) The use has the potential to impair existing and planned wildlife-dependent recreational use. Jogging, if allowed to continue unchecked, could become a regular occurrence on refuge trails. Animals show greater flight response to humans moving unpredictably than to humans following a distinct path (Gabrielsen and Smith 1995) and rapid movement by joggers is more disturbing to wildlife than slower moving hikers (Bennett and Zuelke 1999). Burger (1981) examined the effects of human activity on roosting and migrating birds at a coastal bay refuge along the Atlantic coast. Human activities which involved rapid movements or close proximity to roosting birds, such as jogging even when on the pathway, caused the birds to flush; in comparison, slow walking bird watchers and people walking on the path around the ponds did not usually cause birds to flush. Based on these studies, we concluded that joggers present a high potential for interfering with quality wildlife viewing.

B.3.10 All Terrain Vehicles (ATVs)

Although specifically permitted at some national wildlife refuges, public ATV use has not been allowed previously on the Willamette Valley Refuge Complex but has been requested from time to time. The use was not mentioned in public scoping comments.

(b) and (c) According to 50 CFR 27.31, the operation of a vehicle on a national wildlife refuge which does not bear valid license plates and is not properly certified, registered, or inspected in accordance with applicable State laws is prohibited. Since ATVs are not licensed and registered by the State of Oregon, their use on a refuge would be in violation of this regulation.

(d) ATV use on the Willamette Valley Refuges is not considered consistent with public safety. Available public access roads are generally narrow and sometimes do not accommodate more than one vehicle at a time. In addition, many roads are also designated as trails during the April 1-October 31 period. ATV riders often drive swiftly and allowing their use on Refuge roads could endanger pedestrians or other drivers. ATV use on trails would introduce safety issues of equal magnitude as trails are narrow, sometimes steep, and fraught with blind corners.

(e) The use is not consistent with goals and objectives in the CCP. The use would significantly conflict with wildlife engaged in feeding, resting, or breeding. Wildlife are frightened by high decibel noise and speed, and would seek to flee the area when ATVs are present, diminishing the value of the refuges as places where wildlife comes first. Off-road use, if allowed, could significantly damage habitats. In addition, the experience of visitors engaged in wildlife-dependent uses would be disrupted by the noise, disturbance, and exhaust fumes created by ATVs.

(g) and (h) Providing appropriate oversight of the use would exceed existing and future projections of budget and staff.

(i) The use is not likely to contribute to the public's understanding and appreciation of the refuge's natural and cultural resources. It would not significantly improve access to any features, and would adversely affect the refuges' natural resources.

(j) As noted above, ATV use would impair the potential to provide high quality wildlife-dependent recreation. The experience of visitors engaged in wildlife dependent uses would suffer and would be disrupted by the noise, disturbance, and exhaust fumes created by ATVs.

B.3.11 Dog Trials

A dog trial (also known as field trial) is a competitive event at which hunting dogs compete against one another. This use does not occur on any of the Willamette Valley Refuges at this time. The use is not considered a wildlife-dependent use. The use was not mentioned during scoping.

(d) Dog trials are potentially at conflict with public safety as visitors are allowed to wander at will throughout the refuges, except during winter sanctuary season. If dog trials were held at the refuge, this could put visitors at risk.

(e) The amount of disturbance that would be created by the use is considered inconsistent with other goals and objectives in the CCP. In the area of the trial, people, dogs, and vehicles would congregate for most of a day, making the area unusable by wildlife. Habitat quality could be affected by the congregation of people, dogs and vehicles in the area. The experience of visitors engaged in priority wildlife-dependent uses could be disrupted by the noise and disturbance of a field trial event.

(g) and (h) Providing appropriate oversight of the use would exceed existing and future projections of budget and staff.

(i) The use is not likely to contribute to the public's understanding and appreciation of the refuge's natural or cultural resources and could pose adverse effects to the refuge's resources.

(j) As noted above, the use has the potential to negatively affect existing wildlife-dependent use.

B.4 References

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Appendix C

Photo by George Gentry/USFWS

Compatibility Determinations

- Introduction
- Wildlife Observation, Photography, and Interpretation
- Waterfowl Hunting
- Deer Hunting
- Fishing
- Environmental Education
- Bicycling
- Farming and Livestock Grazing
- Forest Management
- Research

C.1 Introduction

The compatibility determinations (CDs) developed during the CCP planning process evaluate uses that are projected to occur under Alternative 2, the Preferred Alternative, in the Final EA for the Willamette Valley Refuges CCP (CCP/EA). The evaluation of funds needed for management and implementation of each use also assumes implementation as described under Alternative 2. Chapter 6 of the Final CCP/EA also contains analysis of the impacts of public uses to wildlife and habitats. That portion of the document is incorporated through reference into this set of CDs.

C.1.1 Uses evaluated at this time

The following section includes full CDs for all Refuge uses that are required to be evaluated at this time. According to Service policy, compatibility determinations will be completed for all uses proposed under a CCP that have been determined to be appropriate. Existing wildlife-dependent recreational uses must also be reevaluated and new CDs prepared during development of a CCP. According to the Service's compatibility policy, uses other than wildlife-dependent recreational uses are not explicitly required to be reevaluated in concert with preparation of a CCP, unless conditions of the use have changed or unless significant new information relative to the use and its effects have become available or the existing CDs are more than 10 years old. However, the Service planning policy recommends preparing CDs for all individual uses, specific use programs, or groups of related uses associated with the proposed action. Accordingly, the uses listed in Table C-1 have been evaluated and are included in this document, as applicable, for public review.

C.1.2 Compatibility - Legal and Historical Context

Compatibility is a tool Refuge managers use to ensure that recreational and other uses do not interfere with wildlife conservation, the primary focus of Refuges. Compatibility is not new to the Refuge System and dates back to 1918, as a concept. As policy, it has been used since 1962. The Refuge Recreation Act of 1962 directed the Secretary of the Interior to allow only those public uses of Refuge lands that were "compatible with the primary purposes for which the area was established."

Legally, Refuges are closed to all public uses until officially opened through a compatibility determination. Regulations require that adequate funds be available for administration and protection of Refuges before opening them to any public uses. However, wildlife-dependent recreational uses (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) are to receive enhanced consideration and cannot be rejected simply for lack of funding resources unless the Refuge has made a concerted effort to seek out funds from all potential partners. Once found compatible, wildlife-dependent recreational uses are deemed the priority public uses at the Refuge. If a proposed use is found not compatible, the Refuge manager is legally precluded from approving it. However, a use found not compatible may be modified such that it can be found compatible. Economic uses that are conducted by or authorized by the Refuge also require compatibility determinations.

Under compatibility policy, uses are defined as recreational, economic/commercial, or management use of a Refuge by the public or a non-Refuge System entity. Uses generally providing an economic return (even if conducted for the purposes of habitat management) are also subject to compatibility.

Table C-1. List of Refuge Uses, Determinations Made in this CCP, and Year for Re-evaluation

Refuge Use	Page	Appropriate?	Compatible?	Year Due for Re-evaluation
Wildlife Observation, Photography, and Interpretation	C-4	n/a	yes	2026
Waterfowl Hunting (Baskett Slough)	C-16	n/a	yes	2026
Deer Hunting (W.L. Finley)	C-26	n/a	yes	2026
Fishing (W.L. Finley)	C-32	n/a	yes	2026
Environmental Education	C-38	n/a	yes	2026
Bicycling (W.L. Finley)	C-45	yes	yes	2021
Farming/Grazing	C-50	yes	yes	2021
Forest Management	C-56	yes	yes	2021
Research	C-63	yes	yes	2021
Geocaching		no	n/a	n/a
Horseback Riding		no	n/a	n/a
Collection of fruits or mushrooms		no	n/a	n/a
Jogging		no	n/a	n/a
All Terrain Vehicles (ATVs)		no	n/a	n/a
Dog Trials		no	n/a	n/a

The Service does not prepare compatibility determinations for uses when the Service does not have jurisdiction. For example, the Service may have limited jurisdiction over Refuge areas where property rights are vested by others; where legally binding agreements exist; or where there are treaty rights held by tribes. In addition, aircraft overflights, emergency actions, some activities on navigable waters, and activities by other Federal agencies on "overlay Refuges" are exempt from the compatibility review process.

New compatibility regulations, required by the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act), were adopted by the Service in October 2000 (http://Refuges.fws.gov/policymakers/nwrpolicies.html). The regulations require that a use must be compatible with both the mission of the System and the purposes of the individual Refuge. This standard helps to ensure consistency in application across the Refuge System. The Act also requires that compatibility determinations be in writing and that the public have an opportunity to comment on most use evaluations.

The Refuge System mission emphasizes that the needs of fish, wildlife, and plants must be of primary consideration. The Improvement Act defined a compatible use as one that ". . . in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of the Refuge." Sound professional judgment is defined under the Improvement Act as "... a finding, determination, or decision, that is consistent with principles of sound fish and wildlife management and administration, available science and resources..." Compatibility for priority wildlife-dependent uses may depend on the level or extent of a use.

Court interpretations of the compatibility standard have found that compatibility is a biological standard and cannot be used to balance or weigh economic, political, or recreational interests against the primary purpose of the Refuge (Defenders of Wildlife v. Andrus [Ruby Lake Refuge]).

The Service recognizes that compatibility determinations are complex. For this reason, Refuge managers are required to consider "principles of sound fish and wildlife management" and "best available science" in making these determinations (House of Representatives Report 105-106). Evaluations of the existing uses on the Willamette Valley Refuges are based on the professional judgment of Refuge and planning personnel including observations of Refuge uses and reviews of appropriate scientific literature.

In July 2006, the Service published its Appropriate Refuge Uses Policy (603 FW1). Under this policy, most proposed uses must also undergo a review prior to compatibility. Uses excepted from the policy include Big Six uses and uses under reserved rights – see policy for more detail. Appropriate uses reviews are included in Appendix B.

References

Defenders of Wildlife v. Andrus (Ruby Lake Refuge I). 11 Envtl. Rptr. Case 2098 (D.D.C. 1978), p. 873.

House of Representatives Report 105-106 (on NWRSIA) - http://refuges.fws.gov/policyMakers/mandates/HR1420/part1.html

Compatibility regulations, adopted by the Service in October, 2000: (http://Refuges.fws.gov/policymakers/nwrpolicies.html).

Wildlife Observation, Photography, and Interpretation Compatibility Determination

RMIS Database Uses: Wildlife Observation; Photography (wildlife); Interpretation

Refuge Name: Ankeny, Baskett Slough, and William L. Finley National Wildlife Refuges

Establishing and Acquisition Authorities:
- Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.

Refuge Purposes – Ankeny Refuge
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Refuge Purposes - Baskett Slough Refuge
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Refuge Purposes - William L. Finley Refuge
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Additional detail on the purposes of these Refuges may be found in Chapter 1 of the Final CCP/EA.

National Wildlife Refuge System Mission: "To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended (16 U.S.C. 668dd et seq.).

Description of Use: Because there is often substantial overlap between activities associated with wildlife observation, wildlife photography, and interpretation, these uses are evaluated together in this compatibility determination.

Wildlife observation and photography takes place in all Refuge habitats; outside of the wintering period, approximately 95 percent of the Refuges (including designated RNAs) are open and available for this use (wetlands are closed to public entry at Baskett Slough year round). See Section 5.2 of the Final CCP/EA and Maps 8, 9, 12, and 15 for a description of Refuge open and closure policy. During the winter, most of the Complex (approximately 84 percent) is closed to entry to protect wintering waterfowl.

The majority of wildlife observation, photography, and interpretation takes place informally, and relies on the network of roads, parking areas, pulloffs, trails, dikes, viewpoints, kiosks, overlooks, and photography blinds, and associated signage (see Sections 5.2 and 5.3 of the Final CCP/EA) as the key facilities. Sometimes the use occurs from vehicles; other times the use is on foot, with much of the foot use occurring on trails and management roads that are open to hiking during the non-wintering period. Designated photo blinds for wildlife photographers are available by special permit in two designated sites.

Group size is usually small (families, individuals, and couples comprise the majority of groups) but occasionally larger groups use the Refuges for this purpose. Local Audubon chapters frequently lead field trips that commonly measure about 12 people each. The season of highest use is generally spring and fall, though there is some use throughout the year. Dogs are not permitted, whether on- or off-leash, except in parking lots.

Some interpretive programs are large, organized events that differ in character from the more informal day-to-day interpretation.

The wildlife observation and photography program would continue largely as described in Section 5.3 of the Final CCP/EA. However, specific facilities would be added (see Objective 10a of the Final CCP/EA) and some existing trails would be closed for approximately a week on the main portion of W.L. Finley Refuge during hunting season. The number of visitors engaging in this use would be expected to grow over 15 years; see Table 6-2 in the Final CCP/EA.

Interpretation would continue as described in Section 5.4 of the Final CCP/EA. However, specific facilities, mostly interpretive signage, would be added in a variety of locations (see objective 10b of the Final CCP/EA). Due to the emphasis on more special events under Preferred Alternative 2, and the growth of the wildlife observation and photography program, the number of visitors engaging in this use would be expected to grow over 15 years; see Table 6-2 in the Final CCP/EA.

Virtual geocaching (drawing people to specific sites via electronic means) is considered a legitimate form of interpretation under this Compatibility Determination. Physical geocaching (the actual placement of objects in the landscape by the public) is not appropriate (see Appendix B) and is not included as a form of interpretation.

Availability of Resources: Estimated costs for operating the wildlife observation, photography, and interpretation programs as envisioned under Preferred Alternative 2 are displayed in the following table.

Table C-2. Costs associated with Wildlife Observation, Photography, and Interpretation Uses

Proposed Activity or Project	Unit Cost	Units	One Time Expense ($)	Recurring Expenses ($/year)	Units	One Time Expense ($)	Recurring Expenses ($/year)	Units	One Time Expense ($)	Recurring Expenses ($/year)
		Ankeny Refuge			Baskett Slough Refuge			W.L. Finley Refuge		
Objective 10a projects										
New Trail Development	10,000	1.2	12,000		3.3	33,000		2.7	27,000	
Trail maintenance (new and existing trails)	1,000	5		5,000	7.5		7,500	18.4		18400
Create or upgrade restrooms	50,000	1	5,0000		1	50,000		1	50,000	
Modify Cabell Lodge restrooms or create nearby facility									$100,000	
Improve existing overlook (Mohoff Pond)	30,000	1	30,000	2,000						
Vehicle Pullouts	25,000				2	50,000				
New Observation Structures	40,000	1	40,000					6	240,000	
Maintain new and existing structures and blinds				100,000			100,000			175,000
Develop canoe launch at Snag Boat Bend									$50,000	
Totals by Refuge Objective 10a			**$132,000**	**$107,000**		**$133,000**	**$107,500**		**$467,000**	**$193,400**

Proposed Activity or Project	Unit Cost	Units	One Time Expense ($)	Recurring Expenses ($/year)	Units	One Time Expense ($)	Recurring Expenses ($/year)	Units	One Time Expense ($)	Recurring Expenses ($/year)
		Ankeny Refuge			Baskett Slough Refuge			W.L. Finley Refuge		
Objective 10b projects										
Develop interpretive panels	3,500	3	10,500		10	35,000		15	52,500	
Interpretive exhibits in EE Center									500,000	
Maintain Interpretive Panels (new and existing)	200	20		4,000	20		4,000	45		9,000
Host special events				1,000			1,000			2,500
Develop non-traditional interpretive media			5,000			5,000			10,000	
Totals by Refuge Obj. 10b			**$15,500**	**$5,000**		**$40,000**	**$5,000**		**$562,500**	**$11,500**
Objective 11b projects										
Cultural resources - Create interpretive media (brochures, etc)			20,000	5,000		20,000	5,000		$20,000	$5,000
Cultural resources - Develop outreach materials			10,000	2,000		10,000	2,000		$10,000	$2,000
Cultural resources - Create educational cultural materials			10,000	2,000		10,000	2,000		$10,000	$2,000
Totals by Refuge Obj. 11b			**$40,000**	**$9,000**		**$40,000**	**$9,000**		**$40,000**	**$9,000**
Total One Time Expenses for the Complex ($)										**$1,470,000**
Total Recurring Expenses for the Complex ($/year)										**$456,400**

Note: recurring expenses include estimated salary costs for staff involved in these programs. One-time costs would be incurred at various points within the 15-year implementation time frame.

Anticipated Impacts of the Use:

General Impacts: A general assessment of impacts resulting from wildlife observation, photography, and interpretation has been compiled from the literature and is briefly summarized below.
Effect of disturbance intensity: Some researchers have attempted to correlate disturbance events in wildlife to the intensity, proximity, or loudness of human disturbance. While studying shorebirds on an eastern coastal Refuge, Burger (1986) found that the level of disturbance in the shorebirds increased (fewer remained, more flew) as the total number of disturbances and the number of children, joggers, people walking, dogs, aircraft, and boats increased, and the duration of the disturbance and distance from the disturbance decreased.

Effect of human proximity: Other researchers have looked at the question of proximity. At what distance do humans on foot elicit a disturbance response? From an examination of the available studies, it appears that the distance varies dramatically from species to species. Burger and Gochfeld (1991) found that sanderlings foraged less during the day and more during the night as the number of people within 100m increased. Elk in Yellowstone National Park were disturbed when people were at average distances of 573m (Cassirer 1990). These elk temporarily left the drainage and their home range core areas and moved to higher elevations, steeper slopes, and closer to forested areas. Average return time to the drainage was two days. Erwin (1989) studied colonial wading and seabirds in Virginia and North Carolina. Mixed colonies of common terns-black skimmers responded at the greatest distances, with respective means of 142m and 130m; mixed wading bird species were more reluctant to flush (30-50m average). There were few statistically significant relationships between flushing distance and colony size. Similarly, there were few differences between responses during incubation compared to post-hatching periods.

Miller et al. (2001) defined an "area of influence" as the area that parallels a trail or line of human movement within which wildlife will flush from a particular activity with a certain probability. In a study analyzing response distance from hiking and mountain biking in sagebrush-grassland habitat in Utah, Taylor and Knight (2008) found that at 100m from the line of movement of an off-trail trial, mule deer showed a 96 percent probability of flushing. That probability did not drop to 70 percent until the perpendicular distance increased to 390m.

Taylor and Knight (2008) also found that the area of influence around a recreationist on a trail did not differ between mountain biking and hiking. This may mean that wildlife do not differentiate between hikers and bikers, but are instead reacting to the presence of a moving human on a trail, regardless of the person's activity. However, the area of influence differed considerably between on-trail and off-trail trials.

An analysis of over 4,000 human activity events near bald eagle nests in Central Arizona (Grubb and King 1991) found distance to disturbance to be the most important classifier of bald eagle response, followed in decreasing order of discriminatory value by duration of disturbance, visibility, number of units per event, position relative to affected eagle, and sound.

Breeding bald eagles in north-central Minnesota (Fraser et al. 1985) flushed at an average distance of 476m at the approach of a pedestrian. A multiple regression model including number of previous disturbances, date, and time of day, explained 82 percent of the variability in flush distance and predicted a maximum flush distance at the first disturbance of 503m (SE=131). Skagen (1980), also studying bald eagles in northwest Washington, found a statistically significant decrease in the

proportion of eagles feeding when human activity was present within 200m of the feeding area in the previous 30 minutes. A statistically significant between-season variation occurred in the use of feeding areas relative to human presence, which correlated with food availability. Eagles appeared more tolerant of human activity in the season of low food availability.
In a review of several studies of the reaction of waterfowl and other wetland birds to people on foot, distances greater than 100m in general did not result in a behavioral response (DeLong 2002).

Effects from pedestrian access: Wildlife is frequently more sensitive to disturbance from people on foot than in vehicles (Skagen 1980, Grubb and King 1991, MacArthur et al. 1982). Numerous studies have confirmed that people on foot can cause a variety of disturbance reactions in wildlife, including flushing or displacement (Erwin 1989, Fraser et al. 1985, Freddy 1986), heart rate increases (MacArthur et al. 1982), altered foraging patterns (Burger and Gochfeld 1991), and even, in some cases, diminished reproductive success (Boyle and Samson 1985). These studies and others have shown that the severity of the effects depends upon the distance to the disturbance and its duration, frequency, predictability, and visibility to wildlife (Knight and Cole 1991). Taylor and Knight (2008), in a logistic regression analyzing mule deer, pronghorn antelope, and bison response to mountain biking and hiking on- and off-trail found that the variables best explaining wildlife response included wildlife species, perpendicular distance of animals to trail (closest distance of animal to trail, regardless of recreationist position), trail position (on-trail or off-trail), and degree of vegetation cover.

Effects on migrant birds versus resident birds: Klein (1989) studied the effect of visitation on migrant and resident waterbirds at Ding Darling National Wildlife Refuge, finding that resident birds were less sensitive to human disturbance than migrants. Migrant ducks were particularly sensitive when they first arrived on-site in the fall. They usually remained more than 80m from [a visitor footpath on a dike], even at very low visitor levels. Herons, egrets, brown pelicans, and anhingas were most likely to habituate to humans, thus exposing them to direct disturbance as they fed on or near the dike. Shorebirds showed intermediate sensitivity. Strauss (1990) observed piping plover chicks spent less time feeding (50 percent versus 91 percent) and spent more time running (33 percent versus 2 percent), fighting with other chicks (4 percent versus 0.1 percent), and standing alert (9 percent versus 0.1 percent) when pedestrians or moving vehicles were closer than 100m than when they were undisturbed. In addition, plover chicks spent less time out on the feeding flats (8 percent versus 97 percent) and more time up in the grass (66 percent versus 0.1 percent) during periods of human disturbance.

Wildlife photography: Wildlife photography is likely more disturbing, per instance, than wildlife observation. Klein (1993) observed at Ding Darling National Wildlife Refuge that of all the nonconsumptive uses, photographers were the most likely to attempt close contact with birds. He also concluded that even slow approach by photographers was disruptive to waterbirds. Wildlife photographers tend to have larger disturbance impacts than those viewing wildlife since they tend to approach animals more closely (Morton 1995, Dobb 1998).

Predictability of Disturbance (Habituation): Dwyer and Tanner (1992) noted that wildlife habituate best to disturbance that is somewhat predictable or “background.” Investigating 111 nests of sandhill cranes in Florida, Dwyer and Tanner found that nesting cranes seemed to habituate to certain forms of human disturbance and nested within 400m of highways, railroads, and mines; cranes also were tolerant of helicopter flyovers. Visits to nests and development-induced alterations of surface water drainage were implicated in 24 percent of the nest failures. Taylor and Knight (2008) found that for mule deer, the area of influence around off-trail trials was much greater than that for on-trail trials, suggesting habituation to trails. However, the time it takes for wildlife to habituate, and what wildlife use is like compared to pre-disturbance uses, remains a fertile question. A study by Fairbanks and Tullous (2002) measured the distance of pronghorn from recreational trails on Antelope Island State Park in Utah. The study gathered data the year before the trails were opened for public use, and compared these to data gathered in three consecutive years after recreational use began. Groups of pronghorn were observed significantly farther from trails in years with recreational use than in the year before recreational areas were opened.

Some non-motorized boating could occur in conjunction with wildlife observation or photography at the Snag Boat Bend Unit of William L. Finley Refuge. See the fishing Compatibility Determination for an assessment of the effects and stipulations specific to non-motorized boating.

<u>Refuge Specific Impacts</u>: People engaging in wildlife observation, photography, or interpretation generally access the Refuges by motorized vehicles travelling public roads, and using pullouts and parking lots. Pullouts, parking lots, and public roads have minimal direct impacts because they occupy a relatively small acreage.

Trails would be added to support wildlife observation, photography, and interpretation. Under the preferred alternative, the Complex would add approximately 4.6 miles of year-round trails and 2.6 miles of seasonal trails. The majority of the year-round trail mileage would be located in upland prairie/oak savanna habitat, in oak woodland habitat, or in riparian habitats. In woodland or riparian habitats, additional trail construction or reroute may require the removal of some trees, snags, or logs. Additional trails will also result in a minor amount of habitat degradation (vegetation removal or modification and soil compaction) from trail use and trail maintenance (mowing).

Not including trails, only approximately a half-acre of habitat loss over the Complex as a whole would occur as a result of new wildlife observation and photography facilities constructed under Preferred Alternative 2. Interpretive signs were not included in this total as the assumption is that signs do not displace habitat.

Bicycle access: A few people access the Refuge or areas along its boundaries (county roads) by bicycle. Although bicycles on county roads may create additional disturbance, county roads are not under Refuge jurisdiction, therefore effects from activities occurring on these roads are not considered in this compatibility determination. On Refuge roads, bicycles are only permitted on Finley Refuge Road during the non-wintering period. Because migratory waterfowl have left by this time, the disturbance effect from bicycles is expected to be negligible. Bicycling is addressed in a separate Compatibility Determination in this document.

Pedestrian access: Pedestrian access to the Refuges creates the highest potential for disturbance or damage to natural resources. Foot travel associated with wildlife observation or photography could potentially result in temporary and minor vegetation trampling. Foot travel may also potentially create disturbance in or near any habitat.

During the wintering season, pedestrian access is limited. The majority of the three Refuges (84 percent of the Refuges) would be closed to pedestrian access during the wintering period. This sanctuary area limits pedestrian human disturbance during the season of highest waterfowl and shorebird activity at the vast majority of key wintertime wildlife congregation areas (wetlands and certain crop fields) and allows wildlife to habituate to the few areas where humans and wildlife may

both be regularly present. The only areas on Ankeny, Baskett Slough and the main unit of W.L. Finley Refuge that people would be permitted to access by foot during the wintering season are designated point locations on wetlands, or trails located away from wetland and cropland areas. Major portions of the Snag Boat Bend Unit of W.L. Finley Refuge will be open year-round, however, this area is not managed to attract and hold Canada geese during the winter months and as such there isn't the need for sanctuary similar to the three main Refuges. Trails open to foot travel traverse approximately 33 miles over the three Refuges under Preferred Alternative 2, however, approximately 20 miles of these are not open during the wintertime sanctuary period.
Outside the wintering season, people may access the majority of the three Refuges on foot and may wander at will anywhere off-trail except through the wetlands at Baskett Slough Refuge. Since most wildlife observers and hikers actually remain on trail, direct effects from trampling and disturbance effects would likely be minor.

Some interpretive programs are large, organized events that differ in character from the more informal day-to-day observation and interpretive activities. These types of programs create more disturbance and can overfill parking facilities to the point where people park on the sides of roads where normally there is no parking.

Maintaining speed limits and preventing use of the Refuges as a bypass to shorten travel times between adjacent roads and highways can minimize disturbance impacts related to roads.

Both Refuge visitation and the number of facilities and emphasis devoted to wildlife observation, photography, and interpretation are projected to increase under the Preferred Alternative 2. Given this, future disturbance effects are likely to be somewhat higher than present. Most studies cited above have demonstrated immediate, rather than long-term responses to disturbance. Long-term responses are inherently more difficult and expensive to determine. Given that wildlife observation, photography, and interpretation are not typically loud or intense kinds of activities, the area of habitat within a known distance of human activity centers (trails, kiosks, blinds, etc.) is considered a reasonable indicator to evaluate the disturbance effects of public uses on Refuge wildlife. In a review of several studies of the reaction of waterfowl and other wetland birds to people on foot, distances greater than 328 feet (100 meters) generally did not result in a behavioral response (DeLong 2002). Using this factor to estimate disturbance, approximately 47 additional acres of the Refuges (.008 percent) may be regularly affected by disturbance from visitors adjacent to all new facilities (new trails, kiosk, blind, pulloffs, and other facilities).

Public education that informs photographers of ethical and least intrusive methods could reduce some impacts. One new photography blind may be added under Preferred Alternative 2. The purpose of these blinds is to provide a site where photographers can get close-up photographs without disturbing wildlife. Placement of these additional areas would likely reduce disturbance from wildlife photographers, because photographers would gain known access to high quality photography sites without disturbing new areas.

Although disturbance to wildlife from these activities will be higher than at present, the overall effect to Refuge wildlife is expected to be minor. In addition, if disturbance to wildlife or damage to habitat reaches unacceptable levels, the Refuges would limit areas where unacceptable impacts occur (see stipulations).

Wildlife observation, photography, and interpretation may occur within any of the three designated RNAs on the refuge. Over the life of the CCP, none of these uses is expected to threaten serious impairment of research or education values.

Impacts to listed species: Wildlife observation and photography may pose a minor to moderate impact to threatened and endangered species, including any of several listed plants, the Fender's blue butterfly, or Oregon chub. Due to the increase in program offerings and visitation projected under Preferred Alternative 2, disturbance impacts to these species would be expected to increase, but could be reduced to a certain extent through locating public use facilities away from areas that host rare species. In addition, specific public education or use of designated tour routes during special events can assist in raising awareness and preventing undue impacts to these species. If off-trail use results in unacceptable adverse effects to listed species or habitats, the Refuges would limit use to the trails.

Impacts to other priority public uses: Wildlife observation and photography generally result in little disturbance to other visitors. However, some wildlife observers may inadvertently flush game being pursued by hunters. This conflict would be expected to be minimal at Baskett Slough Refuge, because hunting would occur only during September, a time of year when visitors engaged in wildlife observation and photography are fewer in number. To minimize safety conflicts between hunters and those engaged in wildlife observation, photography, and interpretation, during the last week of deer hunting season, Woodpecker Loop, Mill Hill, and Bald Top trails will be closed to non-hunter use. This closure will help prevent inadvertent flushing of game in addition to minimizing safety conflicts.

No significant effects to roads, trails, or other infrastructure from the wildlife observation and photography programs are foreseen. Normal road, trail, and facility maintenance will continue to be necessary. Additional facility construction or upgrade, if needed, is addressed in the Availability of Resources section.

Public Review and Comment: Various opportunities were provided for the public to engage with the planning process. Appendix A details public involvement undertaken during development of the CCP/EA. Written comments on this draft compatibility determination were solicited during the public review of the Draft CCP/EA, between May 25, 2011 and June 30, 2011. Appendix L summarizes the public commentary received, and includes responses from the Service.

Determination:
_____ Use is Not Compatible
__x__ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility:
- Motorized vehicles and bicycles will be limited to designated public roads and parking lots. Bicycles will be allowed only on Finley Refuge Road during the non-wintering period.
- Registration will be required for organized group events with group sizes > 12.
- To minimize safety conflicts with hunting, during the last week of deer hunting season, Woodpecker Loop, Mill Hill, and Bald Top trails will be closed to non-hunter use to prevent safety conflicts.
- Special Use Permits will be required for entry during normal closure hours or into closed areas.
- Improved signage will be developed by the Refuge Complex to inform visitors about consumptive use.

- Electric wheelchairs shall be allowed on trails for persons with disabilities.
- During interpretive events, ensure that tours avoid sensitive sites occupied by rare species.
- Wintertime sanctuary closures will be maintained as designated on Maps 8, 9, 12, and 15.
- Dogs are allowed outside vehicles only in parking areas (not on trails) and must be kept on-leash any time they are outside vehicles.
- Vehicles must observe posted speed limits.
- If disturbance to wildlife or damage to habitat reaches unacceptable levels, the Refuges would limit uses in areas where unacceptable impacts occur.

Justification:
As wildlife-dependent recreational uses, wildlife observation, photography, and interpretation receive enhanced consideration in the Comprehensive Conservation Planning process. Given the location of wintertime sanctuary closed areas and the locations of wildlife viewing, photography, and interpretation facilities, these uses would be expected to have a minor direct impact on Refuge resources. The associated disturbance to wildlife from these activities, though larger than at present, is also expected to be minor. It is anticipated that wildlife populations will find sufficient food resources and resting places such that their abundance and use of the Refuge will not be measurably lessened from allowing these activities to occur. The relatively limited number of individual animals and plants expected to be adversely affected will not cause wildlife populations to materially decline, the physiological condition and production of refuge species will not be impaired, their behavior and normal activity patterns will not be altered dramatically, and their overall welfare will not be negatively impacted. Thus, allowing wildlife photography, observation, and interpretation under the stipulations described above will not materially detract or interfere with the purposes for which the refuge was established or the refuge mission. Wildlife observation, photography, and interpretation provide visitors with the joy of experiencing wildlife on their public lands, and as such, help fulfill the mission of the National Wildlife Refuge System.

Mandatory Re-evaluation Date:
09/2026 Mandatory 15-year re-evaluation date (for wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision:
X Environmental Assessment and Finding of No Significant Impact

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C1. Wildlife Observation, Photography, and Interpretation Compatibility Determination. Uses are compatible with stipulations.

Prepared by:	Sharon J Selvaggio (Signature)	9/7/2011 (Date)
Refuge Manager/ Project Leader Approval:	(Signature)	9.7.2011 (Date)

Concurrence

Refuge Supervisor:	(Signature)	9-12-11 (Date)
Regional Chief, National Wildlife Refuge System:	Robyn L. West (Signature)	9-12-11 (Date)

Waterfowl Hunting Compatibility Determination

RMIS Database Uses: Hunting (waterfowl)

Refuge Name: Baskett Slough National Wildlife Refuge

Establishing and Acquisition Authorities:

- Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq

Refuge Purposes - Baskett Slough Refuge

- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Additional detail on the purposes of this Refuge may be found in Chapter 1 of the Final CCP/EA.

National Wildlife Refuge System Mission:
"The mission of the [National Wildlife Refuge] System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

Description of Use:
Under the Preferred Alternative 2 of the Final CCP/EA, a waterfowl hunting program would be added at Baskett Slough Refuge (see Objective 10f and Appendix G). Key parameters include:

- Youth hunt one weekend/year in September at up to five designated hunt sites in cropfields and wetlands.
- September goose two weekends/year at up to ten designated hunt sites in cropfields and wetlands.

Facilities that would be used for the hunt include the Refuge office, which would serve as the check-station, and various existing roads, vehicle pull-outs, trails, and parking lots needed for access. Permanent blinds would not be established; temporary blinds would be allowed to be set up by hunters with removal at the end of the hunting day.

Up to 140 hunt days per year are expected to accrue in this use annually.

Baskett Slough National Wildlife Refuge was established under, or to fulfill the purpose of, the Migratory Bird Conservation Act (16 U.S.C. §715a-715r), or through approval of the Migratory Bird Conservation Committee, as an "inviolate sanctuary for migratory birds, or for any other management purpose, for migratory birds." On units of the Refuge System, or portions thereof established as an "inviolate sanctuary," the Service may only allow hunting of migratory game birds on no more than 40 percent of that Refuge, or portion, at any one time unless the Service finds that taking of any such species in more than 40 percent of such area would be beneficial to the species (National Wildlife Refuge Administration Act (16 U.S.C. §668dd(d)(1)(A)); MBTA (16 U.S.C. §703-712); Migratory Bird Conservation Act (16 U.S.C. §715a-715r)).
Waterfowl hunting would occur on specific wetlands and in crop fields. Of the 2,521 acres that

comprise the Refuge (GIS estimate), up to 856 acres would be open for the September goose hunt, and 716 acres for the youth waterfowl hunt. Hence, 28-34 percent of the Refuge would be open to waterfowl hunting at some time of the year. This acreage does not exceed the 40 percent guideline for Refuge lands referenced above.

Availability of Resources: Estimated costs for operating the waterfowl hunting program as envisioned under Preferred Alternative 2 and described in the Hunt Plan (Appendix G) are displayed in the following table.

Table C-3. Costs associated with Waterfowl Hunting Use

Proposed Activity or Project	One Time Expense ($)	Recurring Expenses ($/year)
Develop hunt opening package	$10,000	
Administer Goose hunt	$10,000	$5,000
Administer Youth hunt	$10,000	$5,000
Construct hunt blinds	$20,000	$2,000
Develop new publications, signage, kiosk at Refuge office associated with new hunt	$6,000	$1,000
Total One Time Expenses for the Complex ($)		$56,000
Total Recurring Expenses for the Complex ($/year)		$13,000

Note: recurring expenses include estimated annual salaries for recreation and maintenance personnel involved in administering program.

Anticipated Impacts of the Uses:
Direct Take to Hunted Wildlife – Population Effects: Sport hunting involves the direct take of Refuge wildlife designated as huntable game species by Refuge regulations. In addition to loss of individual target species, some additional waterfowl are sometimes crippled or killed and not retrieved.

The following analysis of hunting effects utilizes data on population and harvest, comparing the number of birds taken at various scales with the estimated population size. For ducks taken during the wintering season, the mid-winter waterfowl survey count is used as the primary index. For resident geese, the population estimates are used as the primary index.

Wintering Population Index: Recent mid-winter waterfowl survey counts for geese and ducks in the Pacific Flyway, the State of Oregon, and each of the refuges are presented in Table C-4. These numbers only represent an index, not an absolute population number (see section 4.10). Oregon hosts only a small percentage of wintering waterfowl; within the Pacific Flyway, the majority of waterfowl winter in California.

Harvest Management – Regulatory Procedures: The hunting of waterfowl in the United States is based upon a thorough regulatory setting process that involves numerous sources of waterfowl population and harvest monitoring data. Waterfowl populations throughout the United States are managed through an administrative process known as flyways, of which there are four (Pacific, Central, Mississippi, and Atlantic). Oregon is included in the Pacific Flyway. The review of the policies, processes, and procedures for waterfowl hunting are covered in a number of documents.

NEPA considerations by the Service for hunted migratory game bird species are addressed by the programmatic document, ‘‘Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds’’ filed with the Environmental Protection Agency on June 9, 1988. The Service published the Record of Decision for this document on August 18, 1988 (53 FR 31341). This document is in the process of being updated; in August 2009, a Draft Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Hunting of Migratory Birds (hereafter abbreviated as SEIS 2009) was released (US DOI 2009). Annual NEPA considerations for waterfowl hunting frameworks are covered under a separate Environmental Assessment and Finding of No Significant Impact.

Because the Migratory Bird Treaty Act stipulates that all hunting seasons for migratory game birds are closed unless specifically opened by the Secretary of the Interior, the Service annually promulgates regulations (50 CFR Part 20) establishing the Migratory Bird Hunting Frameworks. The frameworks are essentially permissive in that hunting of migratory birds would not be permitted without them. Thus, in effect, Federal annual regulations both allow and limit the hunting of migratory birds.

The Migratory Bird Hunting Frameworks provide season dates, bag limits, and other options for the States to select that should result in the level of harvest determined to be appropriate based upon Service-prepared annual biological assessments detailing the status of migratory game bird populations. In North America, the process for establishing waterfowl hunting regulations is conducted annually. In the United States, the process involves a number of scheduled meetings (Flyway Study Committees, Flyway Councils, Service Regulations Committee, etc.) in which information regarding the status of waterfowl populations and their habitats is presented to individuals within the agencies responsible for setting hunting regulations. In addition, public hearings are held and the proposed regulations are published in the Federal Register to allow public comment.

For waterfowl, annual assessments used in establishing the Frameworks include the Breeding Population and Habitat Survey, which is conducted throughout portions of the United States and Canada. This survey is used to establish a Waterfowl Population Status Report annually. In addition, the number of waterfowl hunters and resulting harvest are closely monitored through both the Harvest Information Program (HIP) and Parts Survey (Wing Bee). Since 1995, such information has been used to support the adaptive harvest management (AHM) process for setting duck-hunting regulations. Under AHM, a number of decision-making protocols render the choice (package) of pre-determined regulations (appropriate levels of harvest) which comprise the framework offered to the States that year. Each State’s wildlife commission then selects season dates, bag limits, shooting hours and other options from the Pacific Flyway package. Their selections can be more restrictive, but cannot be more liberal than AHM allows. Thus, the level of hunting opportunity afforded each State increases or decreases each year in accordance with the annual status of waterfowl populations.

Season dates and bag limits for national wildlife refuges open to hunting are never longer or larger than the State regulations. In fact, based upon the findings of an environmental assessment developed when a refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the State allows. Each national wildlife refuge considers the cumulative impacts to hunted migratory species through the Migratory Bird Frameworks published annually in the Service's regulations on Migratory Bird Hunting.

Estimated harvest mortality: Waterfowl hunting at Baskett Slough Refuge under Alternative 2 would result in some direct mortality to resident geese and to wintering ducks. The expected take of geese and ducks at the Refuge due to hunting under Alternatives 1, 2, and 3 is captured in Table C-4, along with area harvests at flyway, state, and refuge scales for the years 2007 and 2008 as a point of reference.

Although in Table C-4, harvest appears to represent more than the actual mid-winter count for ducks at the State level, it is important to remember that to make any kind of comparison between the seasonal harvest and some population level, an estimate of the number of birds available for harvest in Oregon (those that were in the state for at least one day during the entire 107 day season - likely millions) would be needed. The mid-winter count represents simply a snapshot at one point during mid-winter, thus can underestimate total wintering populations. The number of birds migrating through and breeding in Oregon likely far exceeds the number of birds that actually winter in the State (pers. comm. Brandon Reishus, ODFW, 12/28/09).

Also, the Service's harvest estimate for Oregon has increased substantially since 2006 for reasons which ODFW cannot explain, but survey error cannot be ruled out (pers. comm. Brandon Reishus, ODFW, 12/28/09).

The duck harvest in Oregon accounted for approximately 20 percent of the Pacific Flyway duck harvest in 2007 and 2008. The estimated duck harvest for the Pacific Flyway in 2008 was 3.3 million birds, or approximately 24 percent of the estimated U.S. harvest of 14 million ducks in that year (US DOI 2009). Similarly, the goose harvest in Oregon accounted for approximately 20 percent of the Pacific Flyway goose harvest in 2007 and 2008. The estimated goose harvest for the Pacific Flyway was 550,000, or approximately 15 percent of the estimated U.S. goose harvest in 2008 (US DOI 2009).

Direct mortality stemming from Refuge hunts: The estimated refuge duck harvest from the youth hunt is less than 100 ducks over the seasons to be established. This estimated harvest represents a tiny fraction of a percent of the total midwinter population of wintering ducks in the State of Oregon and an even smaller fraction of the Pacific Flyway population.

Similarly, the number of resident Canada geese projected to be taken is less than 500 geese, which compared with area population is negligible. The September goose hunt would confine harvest to the Pacific Population of Western Canada geese, which are currently above population objectives in the Flyway (Subcommittee on Pacific Population Western Canada Goose 2000). The hunt would contribute to current state and federal efforts to lower this population.

At this time, duskys would not be impacted as they arrive later in the fall. If dusky arrival time shifted to earlier in the fall, these hunts would be re-evaluated.

Given the small amount and season of the expected take, the hunt as designed will not adversely affect the refuge's ability to sustain optimum population levels for meeting other refuge objectives, specifically maintaining wintering populations of migratory waterfowl, and maintaining enough wildlife to provide for wildlife viewing enjoyment.

Table C-4. Harvest and Populations at Flyway, State, and Local Scales: Ducks and Geese

Area	Area harvest 2007	Area harvest 2008	Breeding Population Estimate	Mid-Winter Population Index	Estimated Refuge Harvest		
DUCK					**Alt. 1**	**Alt. 2**	**Alt. 3**
Pacific Flyway, duck	3,400,000[3]	3,300,000[3]		5.4 million (2008)			
State of Oregon, duck	680,000[3]	640,000[3]		~470,000 (2008)			
Ankeny Refuge, duck	0	0		5,300 (2008)[5] 5,600 (2007)[5]	0	0	0
Baskett Slough Refuge, duck	0	0		13,000 (2008)[5] 8,000 (2007)[5]	0	<100	0
W.L. Finley Refuge, duck	0	0		26,000 (2008)[5] 16,000 (2007)[5]	0	0	0
GOOSE					**Alt. 1**	**Alt. 2**	**Alt. 3**
Pacific Flyway, goose	470,000[3]	550,000[3]		1.8 million (2008)[4]			
State of Oregon, goose (total season)	96,000[3]	105,000[3]		182,000 (2008)[4]			
State of Oregon, September goose	8,000	10,400	51,000[6] (state)	-			
Ankeny Refuge, goose	0	0		4,000 (2008)[5] 4,200 (2007)[5]	0	0	0
Baskett Slough Refuge, goose	0	0		7,400 (2008)[5] 9,300 (2007)[5]	0	<500	0
W.L. Finley Refuge, goose	0	0		17,000 (2008)[5] 2,800 (2007)[5]	0	0	0

Sources: 1. US DOI 2009 – numbers rounded to two significant digits; 2. http://web.ftc-i.net/~tuffye/mwi_2008_flypac.jpg; 3. Raftovich et al. 2009; 4.Trost and Sanders 2008; 5. Jock Beall, Complex biologist, 6. Brandon Reishus, Oregon Department of Fish and Wildlife

Disturbance Effects: In addition to direct take, hunting causes disturbances to feeding and resting waterfowl as well as nontarget species because of the noise (shotgun), movement, vehicular activity, and use of dogs for this activity. Studies cited by Korschgen and Dahlgren (1992) indicate that water-related activities by humans, including boating, hunting, and shoreline activities, do cause disturbance to waterfowl, manifested by alertness, fright (obvious or unapparent), flight, swimming, disablement, or death. Human disturbance can compel waterfowl to change food habits, feed only at night, lose weight, or desert feeding areas (Korschgen and Dahlgren 1992). Although disturbance from hunting is noted to have effects directly on waterfowl, US DOI (2009) concluded that hunting disturbance is of less impact than the direct mortality caused by hunting. Further, since the direct impacts of hunting cannot be clearly demonstrated to be detrimental at most population levels, then disturbance will not have any pronounced population level effects on waterfowl (US DOI 2009).

As described above, the hunt program would occur in up to 856 acres each year, or up to 34 percent of the Refuge acres (see Map 10 of the Final CCP/EA), and would only occur on 6 days each year; it is designed to pose minimal disturbance over the course of the year. However, due to disturbance that will occur on the days of hunt, hunting could result in some redistribution of Western Canada geese at Baskett Slough refuge. Disturbance effects associated with hunting were examined in the SEIS 2009 for waterfowl and some other migratory bird species. On the basis of a review by Dahlgren and Korschgen (1992), the SEIS 2009 noted that disturbance has its most pronounced detrimental effect during the nesting period. Hence the SEIS 2009 noted that hunting related disturbance does not have any pronounced population level effects (US D0I 2009).

Impacts to Non-hunted Wildlife: Non-hunted wildlife would include any non-target waterfowl and any other birds; small and medium-sized mammals; reptiles, amphibians, and invertebrates. Occasionally, nontarget species are illegally killed by hunters by accident or intentionally. However, the potential effect to non-hunted wildlife is largely in the realm of disturbance (see discussion above).

Disturbance from Dogs: Dogs elicit a greater response from wildlife than people on foot alone (MacArthur et al. 1982, Hoopes 1993). The presence of dogs may disrupt foraging activity in shorebirds (Hoopes 1993) and disturb roosting activity in ducks (Keller 1991). Despite thousands of years of domestication, dogs still maintain instincts to hunt and chase. Given the appropriate stimulus, those instincts can be triggered. Dogs that are unleashed or not under the control of their owners may disturb or potentially threaten the lives of some wildlife. In effect, off-leash dogs increase the radius of human recreational influence or disturbance beyond what it would be in the absence of a dog.

The role of dogs in wildlife diseases is poorly understood. However, dogs host endo- and ectoparasites and can contract diseases from, or transmit diseases to, wild animals. In addition, dog waste is known to transmit diseases that may threaten the health of some wildlife and other domesticated animals. Domestic dogs can potentially introduce various diseases and transport parasites into wildlife habitats (Sime 1999).

The cumulative effects of disturbance to non-hunted birds and other species under the proposed action are expected to be minor for the following reasons. Hunter education courses will be required for youths. Orientation will be provided to all hunters at the start of each hunting day. These measures will help to reduce effects to non-target species. In addition, hunting seasons do not coincide with the nesting season, thus reproduction will not be reduced by hunting. Disturbance to the foraging or resting activities of migrating or resident birds might occur, but would be minor because of the small amount of area available for these hunts, relative to the sizes of the Refuge, and the limited time parameters for hunting. There would not be disturbance to wintering wildlife because the hunts would be conducted prior to the wintering period.

Disturbance to other taxa would be unlikely or negligible for the following reasons. Encounters with reptiles and amphibians in the early fall would be few and should not have cumulative negative effects on reptile and amphibian populations. Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles would be restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season would not be permitted.

Some species of bats, butterflies, and moths are migratory. Cumulative effects to these species would be negligible. Although hunting would be allowed during September when these species are migrating, hunter interaction would be commensurate with that of non-consumptive users.

Habitat loss: No facilities will be constructed expressly for the waterfowl hunting program, therefore there would be no direct loss of habitat.

Impacts to listed species: This use is unlikely to pose more than a negligible impact to threatened and endangered species. Some trampling of listed plants could happen, but most of the listed plants have senesced by the beginning of hunting season and are not as vulnerable to damage. Waterfowl hunters would not be accessing Fender's blue butterfly habitat, known anadromous fish locations, or Oregon chub areas under the hunt program described in Preferred Alternative 2.

Impacts to other priority public uses: Hunting has the potential to disturb Refuge visitors engaged in other priority public uses. To minimize this potential conflict, the waterfowl hunt season would be limited in time to a total of six days - two weekends during the September goose season and the one weekend for the youth hunt. During this time, hunting locations would be limited to designated wetlands and crop fields. The month of September is not a particularly popular month for attracting non-hunters to view wildlife; therefore, the direct impacts to other users are expected to be minor. In addition, there is a potential for a minor indirect user conflict to develop. Because the wetlands and fields are highly visible, and are otherwise off-limits all year to other members of the public, allowing hunters into these wetlands may cause a perception of favoritism for one user group over another. This could be alleviated in the future, if necessary, by conducting the hunt in wetlands less viewable to the general public.

Providing waterfowl hunting opportunity at Baskett Slough Refuge helps to better provide a "Big Six" use, and this use is currently not provided at any of the Willamette Valley Refuges. Providing opportunities for youth is an important initiative in the Service and helps address a public desire to see more hunting opportunities for youth.

No significant effects to roads, trails, or other infrastructure from the hunting program are foreseen. Normal road, trail, and facility maintenance will continue to be necessary. Additional facility construction or upgrade, if needed, is addressed in the Availability of Resources section.

Other Effects: Other indirect beneficial impacts of Refuge hunting exist. Hunting can contribute to wildlife and habitat conservation and provide educational and sociological benefits. The hunting community in general remains the largest support base for funding land acquisitions in the Refuge System through the purchase of Duck Stamps. Refuges provide an opportunity for a high quality waterfowl hunting experience to all citizens regardless of economic standing. Many Refuges have developed extensive public information and education programs bringing hunters into contact with Refuge activities and facilitating awareness of wildlife issues beyond hunting.

Summary of effects: The Service believes that hunting on the Baskett Slough National Wildlife Refuge, as proposed under Preferred Alternative 2, would not have a significant impact on local, regional, or Pacific Flyway waterfowl populations because the percentage likely to be taken on the Refuge, though possibly additive to existing hunting take, would be a tiny fraction of the estimated populations. In addition, overall populations will continue to be monitored and future harvests will be adjusted as needed under the existing flyway and state regulatory processes.

This hunt would not add to cumulative impacts to waterfowl stemming from hunting on national wildlife refuges. Several points support this conclusion: 1) the proportion of the national waterfowl harvest that occurs on National Wildlife Refuges is only 6 percent (US DOI 2009); 2) there are no waterfowl populations that exist wholly and exclusively on national wildlife refuges; 3) annual hunting regulations within the United States are established at levels consistent with the current population status; 4) Refuges cannot permit more liberal seasons than provided for in Federal frameworks; and 5) Refuges purchased with funds derived from the Federal Duck Stamp must limit hunting to 40 percent of the available area.

Public Review and Comment: Various opportunities were provided for the public to engage with the planning process. Appendix A details public involvement undertaken during development of the CCP/EA. Written comments on this draft compatibility determination were solicited during the public review of the Draft CCP/EA, between May 25, 2011 and June 30, 2011. Appendix L summarizes the public commentary received, and includes responses from the Service.

Determination:
___ Use is Not Compatible
_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
- The use of lead shot would not be permitted for waterfowl hunting.
- Program will be conducted as outlined in Chapter 2 of the Final CCP/EA and the Refuge hunting plan (Appendix G). Hunt leaflets and Section 32 of 50 CFR will be updated as necessary.
- Hunting will be subject to Refuge specific hunt regulations in effect establishing set days, areas (see Map 10), times, points of entry, and permit requirements for hunting.
- Law enforcement patrols will be conducted on a regular basis to assure compliance with State, Federal, and Refuge regulations.
- The Refuge will ensure safety and minimize conflict with other priority public uses by providing information about hunting boundaries and seasons to the general public and those utilizing other Refuge programs. Information will be provided at interpretive kiosks, on the Refuge website, and in Refuge offices.
- Camping, overnight use, and fires will be prohibited.

Justification: Under the National Wildlife Refuge System Administration Act, as amended, hunting is a wildlife-dependent recreational activity which receives enhanced consideration in the Comprehensive Conservation Planning process and is to be encouraged on national wildlife refuges if compatible with refuge purposes. Despite the direct and indirect impacts associated with sport hunting waterfowl, waterfowl populations are unlikely to be affected significantly by the hunting program on Baskett Slough Refuge. Waterfowl population objectives and allowable harvests are determined on a flyway basis utilizing an established annual regulatory process as described in above. Limited hunt seasons at Baskett Slough, no hunt zones, and established winter sanctuary on the majority of the acreage for the Willamette Valley Refuges ensure that wintering and migrating waterfowl, as well as non-target species, will find adequate food and rest areas on the Refuges even in the midst of the hunting season. Thus, allowing waterfowl hunting under the stipulations described above will not materially detract or interfere with the purposes for which the refuge was established or the refuge mission.

Mandatory Reevaluation Date:
_09/2026__ Mandatory 15-year reevaluation date (for wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision:
_X_ Environmental Assessment and Finding of No Significant Impact

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C2. Waterfowl Hunting Compatibility Determination. Uses are compatible with stipulations.

Prepared by: Sharon J Selvaggio 9/7/2011
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: 9-7-2011
(Signature) (Date)

Concurrence

Refuge Supervisor: 9-12-11
(Signature) (Date)

Regional Chief,
National Wildlife
Refuge System: Robt J. West 9-12-11
(Signature) (Date)

Deer Hunting Compatibility Determination

RMIS Database Use: Hunting (big game)

Refuge Name: William L. Finley National Wildlife Refuge

Establishing and Acquisition Authorities:
- Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq

Refuge Purposes - William L. Finley Refuge:
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Additional detail on the purposes of this Refuge may be found in Chapter 1 of the Final CCP/EA.

National Wildlife Refuge System Mission: "The mission of the [National Wildlife Refuge] System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

Description of Use:
Under the Preferred Alternative 2 of the Final CCP/EA, a deer hunting program would continue at W.L. Finley Refuge as described in Objective 10d. Also see Hunt Plan (Appendix G) for further detail. Key features of the use would be as follows:

- Archery hunting would be allowed at W.L. Finley main unit from approximately last weekend in August until approximately September 30.. Approximately 60 percent of the Refuge will be available for hunting during archery season.
- The restricted firearms hunt would be modified from just allowing shotguns to include the use of muzzleloaders.

The restricted firearms deer hunt will be managed as follows:
- Antlerless hunting will be allowed.
- The season will extend from approximately the last week of October through the first week of November.
- The location during the first week of the shotgun hunt would remain the same as it is presently (see Map 14).
- The location during the second week of this hunt would change. Bald Top, Woodpecker Loop, and Mill Hill trail areas would be the only areas open to hunting, but would be closed to all other public use activities during this hunting period (see Map 14).

The use would take place in all Refuge habitats. During the open season, up to 60 percent of the Refuge would be open and available for this use. The number of users expected to engage in this use annually is estimated at 50 to100.

Like other Refuge users, deer hunters rely on roads, parking lots, pulloffs, trails, and dikes while using the Refuge. Two sign-in stations exist for hunters to complete Refuge hunting permits. Two additional sign-in kiosks may be needed.

Availability of Resources: Estimated costs for operating the deer hunting program as envisioned under Preferred Alternative 2 and described in the Hunt Plan (Appendix G) are displayed in the following table.

Table C-5. Costs associated with Deer Hunting Use

Proposed Activity or Project	**One Time Expense ($)**	**Recurring Expenses ($/year)**
	W.L. Finley Refuge	
Administer archery hunt		$2,000
Administer restricted firearms hunt		$2,000
Develop new publications, signage, and kiosk associated with modified hunt	$6,000	$1,000
Totals by Refuge	$6,000	$5,000
Total One Time Expenses for the Complex ($)		$6,000
Total Recurring Expenses for the Complex ($/year)		$5,000

Note: recurring expenses include estimated annual salary, benefits/expenses for recreation and maintenance personnel involved in administering program.

There are currently enough funds in Refuge operations to carry out this program.

Anticipated Impacts of the Use:

Impacts to Target Wildlife: Direct mortality to deer associated with the hunt would result. Some wounding could occur as well. Deer hunting removes a small amount of prey from the prey base for predators.

Deer populations and deer hunting are managed by the Oregon Department of Fish & Wildlife (ODFW). Annual deer surveys are generally conducted by department biologists and hunting tags apportioned among the management units according to the results of these surveys and unit objectives.

W.L. Finley NWR lies within ODFW-designated Willamette Hunt Unit. The total harvest of deer in this unit for the 2008 hunt season was 2,838, with a success rate of 25 percent. There is no reliable population estimate or herd composition information for the Valley as the Valley is not surveyed by ODFW (B. Wolfer, pers. comm.). The blacktail deer population on W.L. Finley is estimated at less than 100 animals (J. Beall pers. comm.). The average annual harvest of deer from W.L. Finley Refuge over the last several years has been less than two. An analysis in Chapter 6 of the CCP/EA concluded that, under the proposed hunt, the number of hunters visiting W.L. Finley Refuge would potentially drop from the current level of approximately 77 hunters to a projected 56 hunters annually, due primarily to the shortened season. However harvest may go up, considering the addition of an antlerless option and new hunt areas opened. Even if harvest increased by a factor of 20, the effect on the local and regional population would be negligible. Although the opening of new hunt areas and the new provision of antlerless harvest may cause harvest to increase, the size and time available for the hunts would constrain harvest to a level small enough to be considered negligible within the Willamette Unit as a whole.

Impact to Habitats: Foot travel associated with deer hunting could potentially result in temporary and minor vegetation trampling. Based on past history, since deer hunting would involve small numbers of hunters, this effect would likely have a negligible impact. However, impacts may be concentrated in riparian habitats.

Impacts to Non-target Wildlife: Non-target wildlife would include non-hunted migratory birds such as geese, waterfowl, songbirds, wading birds, raptors, and woodpeckers; small mammals such as voles, moles, mice, shrews, and bats; medium sized mammals such as skunks and coyotes; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and invertebrates such as butterflies, moths, other insects and spiders.

The timing and locations of the deer hunt is designed so as to avoid disturbance to waterfowl, especially geese. Existing sanctuary areas will be honored for the full wintering period under all alternatives

Occasionally, non-target species are illegally killed by hunters accidentally or intentionally. However, the potential effect to non-hunted wildlife is largely in the realm of disturbance. Hunting causes disturbances to non-target species because of the noise (shotgun), movement, and vehicular activity used for this activity.

Deer hunters walking in close proximity to wetlands and gunfire from hunting can result in behavioral responses by waterfowl and other wetland birds. Portions of the Refuge open to deer hunting would include wetlands. Most waterfowl and waterbird use, however, occurs earlier in the year for breeding and nesting activities, or later in the year during fall and winter migrations. Thus, minimal impacts to waterfowl or waterbirds would be expected.

The cumulative effects of disturbance to other birds under the proposed action are expected to be minor for the following reasons. Hunting seasons do not coincide with the nesting season, thus reproduction will not be reduced by hunting. Disturbance to the foraging or resting activities of migrating or resident upland birds might occur during the deer hunt seasons proposed under Alternative 2, but would also be likely minor because of the low level of hunting that occurs, and the limited time period within which hunting is available.

Disturbance to other taxa would be unlikely or negligible for the following reasons. Mammals, including bats, are generally nocturnal, thus hunter interactions with mammals are rare. Encounters with reptiles and amphibians in the early fall would be few and should not have cumulative negative effects on reptile and amphibian populations. Invertebrates are also less active during fall and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles would be restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season would not be permitted.

Some species of bats, butterflies, and moths are migratory. Cumulative effects to these species should be negligible. These species are in torpor or have completely passed through the area by peak hunting season in November. Deer hunting would occur during September and October when these species are migrating; however, hunter interaction would be commensurate with that of non-consumptive users.

Impacts to Listed Species: This use is unlikely to pose more than a negligible impact to threatened and endangered species. Some trampling of listed plants could occur, but most of the listed species have senesced by the beginning of hunting season and are not as vulnerable to damage. Deer hunters would not be expected to be traversing wetlands where Oregon chub are present. Fender's blue butterfly is not present at W.L. Finley Refuge at this time.

Impacts to other priority public uses: Hunting has the potential to disturb Refuge visitors engaged in other priority public uses. To minimize this potential conflict, under Alternative 2, the Refuge has designated spatially and temporally defined hunting areas (see Maps 14 and 16). During the archery season and the first portion of the restricted firearms season, other visitors would not be prevented from using deer hunting areas but hunters would be prevented from using upland high use trail areas. During the last portion of the season, deer hunt locations would be restricted to upland areas to keep deer hunters from disturbing wintering waterfowl. To prevent safety problems and conflicts between users, this upland area would then be closed to other visitors. This would prevent trail users from using Woodpecker Loop, Bald Top, and Mill Hill Trails for approximately 7 days each year. This effect is considered minor in the context of trail availability at the three Refuges over the year.

No significant effects to roads, trails, or other infrastructure from the hunting program are foreseen. Normal road, trail, and facility maintenance will continue to be necessary. Additional facility construction or upgrade, if needed, is addressed in the Availability of Resources section.

Big game hunting could have an effect on the wildlife observation and photography programs. Although uncertain, it is possible that wildlife observation/photography opportunities could be increased as animals move away from the hunted zones toward no hunting zones. It is also possible that deer hunters could move animals off the Refuge entirely.

Other Effects: Deer hunting may occur within any of the three designated RNAs on the refuge. Over the life of the CCP, deer hunting is not expected to threaten serious impairment of research or education values.

Public Review and Comment: Various opportunities were provided for the public to engage with the planning process. Appendix A details public involvement undertaken during development of the CCP/EA. Written comments on this draft compatibility determination were solicited during the public review of the Draft CCP/EA, between May 25, 2011 and June 30, 2011. Appendix L summarizes the public commentary received, and includes responses from the Service.

Determination:
_____ Use is Not Compatible
__X__ Use is Compatible with the following stipulations

Stipulations Necessary to Ensure Compatibility:
- Weapons used for hunting will be restricted to bows, shotguns and muzzleloaders, per State and specific Refuge regulations.
- Specific areas designated for deer hunting will be available as outlined on Maps 14 and 16.

- Camping, overnight use, and fires will be prohibited.
- To prevent safety problems and conflicts between users, hunt areas would be closed to non-hunting visitors during the first week of November.

Justification: Under the National Wildlife Refuge System Administration Act, as amended, hunting is a wildlife dependent recreational activity which is to be encouraged on national wildlife refuges if compatible with refuge purposes. Despite the direct and indirect impacts associated with sport hunting, deer populations are unlikely to be affected significantly by the hunting program on the Refuge. Deer population objectives and allowable harvests are determined by the State of Oregon. Limited hunt seasons at the Refuge, no hunt zones, and established winter sanctuary ensure that deer, as well as non-target species, can find adequate areas for food and rest areas even in the midst of the hunting season. Deer hunting can provide visitors with the joy of experiencing wildlife on their public lands, and as such, help fulfill the mission of the National Wildlife Refuge System. Thus, allowing deer hunting to occur under the stipulations described above will not materially detract or interfere with the purposes for which the refuge was established or the refuge mission.

Mandatory Reevaluation Date:
09/2026___ Mandatory 15-year reevaluation date (for wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision:
_X_ Environmental Assessment and Finding of No Significant Impact

C3. Deer Hunting Compatibility Determination. Uses are compatible with stipulations.

Prepared by: Sharon J Selvaggio (Signature) 9/7/2011 (Date)

Refuge Manager/
Project Leader
Approval: (Signature) 9-7-2011 (Date)

Concurrence

Refuge Supervisor: (Signature) 9-12-11 (Date)

Regional Chief,
National Wildlife
Refuge System: Robert L. West (Signature) 9-12-11 (Date)

Fishing Compatibility Determination

RMIS Database Use: Fishing (general)

Refuge Name: William L. Finley National Wildlife Refuge (Snag Boat Bend Unit only)

Establishing and Acquisition Authorities:

- Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq

Refuge Purposes - William L. Finley Refuge

- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Additional detail on the purposes of the Refuge may be found in Chapter 1 of the Final CCP/EA.

National Wildlife Refuge System Mission:
"To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd et seq.].

Description of Use:
Under Preferred Alternative 2 of the Final CCP, once safe bank access is developed, fishing would be allowed year-round (consistent with State regulations) along the banks of the Willamette River and along the banks of Lake Creek on the Snag Boat Bend Unit of W.L. Finley Refuge. Under current State regulations, fishing could occur for adipose fin-clipped Chinook salmon, adipose fin-clipped steelhead salmon, trout, sturgeon, warmwater gamefish and various other fish.

The use would occur in riparian and riverine habitats. No other areas on the three Refuges would be open to fishing. Any fishing on the mainstem Willamette River itself using motorized or unmotorized boats is an off-Refuge use and not subject to this compatibility determination. People may also fish from the bank, or from non-navigable portions of Lake Creek, both of which would fall under Refuge jurisdiction. This compatibility determination addresses both bank fishing and boat fishing (using non-motorized boats).

Anglers would rely on various facilities, including access roads into Snag Boat Bend Unit, trails, and a canoe ramp to be constructed along Lake Creek (see Objective 10a). Due to the lack of facilities and the fact that the use was not previously open, there are currently few to no visitors engaging in this activity. The number of visitors engaging in fishing at the Refuge would be expected to grow over 15 years; see Table 6-2 in the Final CCP/EA.

Availability of Resources: Estimated costs for operating the fishing program as envisioned under Preferred Alternative 2 are displayed in the following table.

Table C-6. Costs associated with Fishing Use

Proposed Activity or Project	One Time Expense ($)	Recurring Expenses ($/year)
	W.L. Finley Refuge	
Develop bank access for fishing at Snag Boat Bend Unit	$15,000	
Administer Fishing Program		5,000
Total One Time Expenses for the Complex ($)		$15,000
Total Recurring Expenses for the Complex ($/year)		$5,000

At this time, funds are not available to provide for the use. Funding will be sought from partners and/or grants.

Anticipated Impacts of the Use:

General Impacts: Fishing, when practiced as a solitary and stationary activity, tends to be less disturbing to wildlife than hunting or motorized boating (Tuite et al. 1983). Direct habitat impacts include a certain amount of litter and general garbage left at fishing sites. Installation and use of parking areas and access trails can decrease impacts to vegetation and soil adjacent to fishing areas, by concentrating visitors on hardened surfaces.

Fishing would cause disturbance to birds and other wildlife using open waters and backwaters of the Refuge. Fishing activities may influence the composition of bird communities, as well as distribution, abundance, and productivity of waterbirds (Tydeman 1977, Bouffard 1982, Bell and Austin 1985, Bordignon 1985, Edwards and Bell 1985, and Cooke 1987). Anglers often fish in shallow, sheltered bays and creeks that birds prefer, negatively impacting distribution and abundance of waterfowl, grebes, and coots (Cooke 1987). Increases in anglers and associated shoreline activity discouraged waterfowl from using otherwise suitable habitat (Jahn and Hunt 1964). In Britain, anglers displaced waterfowl from their preferred feeding and roosting areas and caused widgeon, green-winged teal, pochard, and mallard to depart from a reservoir prematurely (Jahn and Hunt 1964). On fishing days, anglers influenced the numbers, behavior, and diurnal distribution of avian scavengers present at sites in Washington when compared to nonfishing days (Knight et al. 1991). Shoreline activities, such as human noise, could cause some birds to flush and go elsewhere. In addition, vegetation trampling, and deposition of human waste would be expected to occur (Liddle and Scorgie 1980). Disturbance and destruction of riparian vegetation, and impacts to bank stability and water quality, may result from high levels of bank fishing activities.

Boating associated with fishing can alter bird distribution, reduce use of particular habitats or entire areas by waterfowl and other waterbirds, alter feeding behavior and nutritional status, and cause premature departure from areas (Knight and Cole 1995).

Canoes and kayaks can cause significant disturbance effects based on their ability to penetrate into shallower marsh areas (Speight 1973, Knight and Cole 1995). In the Ozark National Scenic Riverway, green-backed heron activity declined on survey routes when canoes and boat use increased on the main river channel (Kaiser and Fritzell 1984). Canoes or slow moving boats have also been observed to disturb nesting great blue herons (Vos et al. 1985). Huffman (1999) found that non-motorized boats within 30 meters of the shoreline in south San Diego Bay caused all wintering waterfowl to flush between the craft and shore. However, compared to motorboats, canoes and kayaks appear to have less disturbance effects on most wildlife species (Jahn and Hunt 1964, Huffman 1999, DeLong 2002).

The total number of boats and people can be an inappropriate measure of recreational intensity because the presence of a single boat might be just as disturbing as that of many (Tuite et al. 1983, Knight and Knight 1984). Even a low level of boating activity affects the duration and pattern of use by wildlife (Bratton 1990).

Refuge-Specific Impacts: The fishing program would provide public opportunity on established and hatchery released populations of salmonids. The program would not encourage high numbers of anglers as the stocks available for take would not have been artificially stocked at the Refuge or a nearby location. Since fishing pressure is predicted to be low, there should be little to no effect on fish populations.

A rookery of great blue herons is present at Snag Boat Bend Unit, approximately 1 mile away from Lake Creek. Western pond turtles are present and utilize logs for basking surfaces.

Great blue herons were one of the most sensitive of 23 waterbird species, when measuring flush distances from motorized watercraft (Rodgers and Schwikert 2002).

Fishing could result in some minor disturbance to species such as great blue herons, great egrets, bald eagles, waterfowl, or western pond turtle. These impacts are projected to be negligible due to the anticipated low fishing pressure. Fishing from non-motorized boats could result in some minor disturbance to species such as great blue herons, great egrets, bald eagles, waterfowl, or western pond turtle. However, the area affected is relatively small, and boating pressure is expected to remain low. Prohibiting motorized boating will prevent some of the more harmful effects associated with boating. Overall, the effect is considered to be negligible to minor.

Due to the low numbers of anglers expected to fish on the refuge, impacts to riparian vegetation and shoreline habitats are expected to be minor.

Impacts to Listed Species: There are two listed species found in the areas designated for fishing under Preferred Alternative 2: Chinook salmon (Upper Willamette River Ecological Significant Unit-ESU) and steelhead (Upper Willamette River ESU), both of which inhabit the Willamette River and Lake Creek. Anglers would be subject to State fishing regulations, which are designed to prevent adverse effects to these and other listed fish. No fishing would be allowed in any habitats known to host Oregon chub. No other listed species exist in the area that would be designated for fishing.

Impacts to other priority public uses: Fishing is expected to result in occasional disturbance to other visitors. For example, some anglers may inadvertently flush wildlife being viewed by wildlife observers. This conflict would be expected to be minimal because fishing is expected to occur at relatively low levels.

No significant effects to roads, trails, or other infrastructure from the fishing program are foreseen. Normal road, trail, and facility maintenance will continue to be necessary. Additional facility construction or upgrade, if needed, is addressed in the Availability of Resources section.

Public Review and Comment: Various opportunities were provided for the public to engage with the planning process. Appendix A details public involvement undertaken during development of the CCP/EA. Written comments on this draft compatibility determination were solicited during the public review of the Draft CCP/EA, between May 25, 2011 and June 30, 2011. Appendix L summarizes the public commentary received, and includes responses from the Service.

Determination (check one below):

_____ Use is Not Compatible

__x__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- Fishing will be opened only after an opening package is completed and safe bank fishing access is developed.
- Camping, overnight use, littering, and fires are prohibited.
- The Service will maintain portable toilet facilities near the fishing area.
- All persons fishing shall be required to have a valid State fishing license and follow applicable State regulations.
- Keep parking lot facility at current size so as to limit overall disturbance in the area.
- The fishing program will be conducted as outlined in Chapter 23 of the Final CCP/EA and in conformance with State regulations. The Refuge Fishing Plan, leaflets, and Section 32 of 50 CFR will be updated as necessary.
- Law enforcement patrols will be conducted on a regular basis to assure compliance with State and Refuge regulations.
- If disturbance to wildlife or damage to habitat reaches unacceptable levels, the Refuges would limit fishing access in areas where unacceptable impacts occur.

Justification: As a wildlife-dependent recreational use, fishing receives enhanced consideration in the Comprehensive Conservation Planning process. Despite the direct and indirect impacts associated with fishing, Refuge riparian and riverine species and habitats are unlikely to be affected significantly by the fishing program on the Refuge at the levels of use anticipated in Preferred Alternative 2. Other riparian and stream areas not subject to fishing disturbance will be maintained on the main portion of W.L. Finley. State regulations, including bag limits, ensure that harvesting of fish does not harm long-term populations. It is anticipated that wildlife populations will find sufficient food resources and resting places such that their abundance and use of the Refuge will not be measurably lessened from allowing fishing to occur. The relatively limited number of individual animals and plants expected to be adversely affected will not cause wildlife populations to materially decline, the physiological condition and production of refuge species will not be impaired, their behavior and normal activity patterns will not be altered dramatically, and their overall welfare will not be negatively impacted. Thus, allowing fishing under the stipulations described above will not materially detract or interfere with the purposes for which the refuge was established or the refuge mission.

Mandatory Reevaluation Date:

09/2026 Mandatory 15-year re-evaluation date (for wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)
__X__ Environmental Assessment and Finding of No Significant Impact

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Tydeman, C.F. 1977. The importance of the close fishing season to breeding bird communities. J. of Environmental Management 5 :289-296.
Vos, D.K., R.A. Ryder, and W.D. Graul. 1985. Response of breeding great blue herons to human disturbance in northcentral Colorado. Colonial Waterbirds 8:13-22.

C4. Fishing Compatibility Determination. Uses are compatible with stipulations.

Prepared by: Sharon Selvaggio (Signature) (Date) 9/7/2011

Refuge Manager/
Project Leader
Approval: Craig L. Hansen (Signature) (Date) 9-7-2011

Concurrence

Refuge Supervisor: (Signature) (Date) 9-12-11

Regional Chief,
National Wildlife
Refuge System: Lord L. West (Signature) (Date) 9-12-11

Environmental Education Compatibility Determination

RMIS Database Use: Environmental education (teaching teachers or group leaders); Environmental education (teaching students)

Refuge Name: Ankeny, Baskett Slough, and William L. Finley National Wildlife Refuges

Establishing and Acquisition Authorities:

- Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq

Refuge Purposes – Ankeny Refuge

- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Refuge Purposes - Baskett Slough Refuge

- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Refuge Purposes - William L. Finley Refuge

- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Additional detail on the purposes of these Refuges may be found in Chapter 1 of the Final CCP/EA.

National Wildlife Refuge System Mission: "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." (National Wildlife Refuge System Administration Act of 1966, as amended (16 U.S.C. 668dd et seq.)).

Description of Use: Environmental education (EE) could take place in any season at the Willamette Valley Refuges. In practice, most environmental education would occur between September and June and would likely occur in a diverse array of habitats at many of the same sites that wildlife observation activities now occur. The program could grow more quickly than the other public use programs over 15 years; see Table 8-2 in the Final CCP/EA.

The environmental education program would be administered as described in Objective 10c of the Final CCP/EA. Specifically, the program would grow, targeting a higher number of students over the next fifteen years. Several facilities would be added, including an Environmental Education Center at W.L. Finley and EE shelters at various locations around the Refuges (see Objective 10c of the Final CCP/EA). Inclusion of an Environmental Education Center at W.L. Finley Refuge is discussed further in Appendix K of the Final CCP/EA. Because the selected location of the EE Center is at the existing Refuge headquarters, which is also directly adjacent to the existing shop area, a redesign of the existing site has been undertaken to accommodate all the uses in this one area. Specific features of the newly designed headquarters site are analyzed within this CD, since it is the Environmental Education Center inclusion at the W.L. Finley headquarters is driving these changes. Site design additions or changes that are analyzed include:

- Addition of a new building with observation terrace
- Inclusion of path with observation deck
- Addition of a new parking area (20-24 spaces)
- Relocation of a historic smoke house
- Realignment of road accessing existing office and parking at existing office for better large vehicle (school bus) access and parking
- Addition of covered path connecting new Environmental Education Building with existing office
- Expansion of existing office to include new offices
- Addition of seasonal heavy equipment haul road to Shop area
- Addition of three RV spaces
- Removal of trail spur and restoration of vegetation.

Availability of Resources: Estimated costs for operating the environmental education program as envisioned under Preferred Alternative 2 are displayed in the following table .

Anticipated Impacts of the Uses:
Few studies specific to environmental education impacts on Refuges are available; however, an unpublished study (Jose 1997) examined the effect of EE site activities at Blackhorse Lake on the Turnbull National Wildlife Refuge. The study was designed to compare waterfowl presence and behavior patterns between the times when EE activities were occurring and when EE classes were not on-site. The study results indicated that fewer waterfowl were present in the study area when EE classes were on site as compared to the control times. The study also found more short flights undertaken by birds when EE classes were on site. Redheads displayed the highest number of flight responses, followed by mallards. Ruddy ducks almost never flew but had the highest increase in directional swimming away from the EE classes. The study author recommended that sites heavily used by smaller bodied birds, such as ruddy ducks, buffleheads, and teals, not be used as environmental education sites.

In general, impacts that could occur from EE programs would be similar to those expected from wildlife observation, photography, or interpretation activities, especially those expected from larger groups utilizing the site. Such impacts would be expected to include temporary damage to vegetation and disturbance to wildlife; see the Compatibility Determination for Wildlife Observation, Photography, and Interpretation for generalized categories of impacts.

<u>Refuge-specific impacts</u>: EE activities would be more localized and would occur less frequently than general wildlife observation. Larger group sizes would likely result in greater magnitude of disturbance to feeding, resting, or nesting birds or other wildlife in the vicinity; however the existence of a trained professional guiding the group may help to mitigate this disturbance somewhat. All of the sites to be used by EE groups are already regularly utilized by other wildlife viewers, so the additional impact by the EE program would likely be small. However, to the extent that students are encouraged to conduct hands-on studies of vegetation, insects, water, or less mobile wildlife, more off-trail use would be expected for this activity than for any other non-consumptive use, with attendant impacts that could be higher than for more typical wildlife observation activity.

Table C-7. Costs associated with Environmental Education Use

Proposed Activity or Project	**Unit Cost**	**Units**	**One Time Costs ($)**	**Recur-ring Costs ($/year)**	**Units**	**One Time Costs ($)**	**Recur-ring Costs ($/year)**	**Units**	**One Time Costs ($)**	**Recur-ring Costs ($/year)**
		Ankeny Refuge			**Baskett Slough Refuge**			**W.L. Finley Refuge**		
Environ-mental Education Position									75,000	75,000
Volunteer Coordinator									75,000	75,000
Construct Environ-mental Education Center									3,000,000	50,000
Develop Resources for educators									10,000	5000
Conduct Annual resource training									5000	5000
Develop outdoor classroom shelters (each shelter will include one RomTec restroom associated with it @ $50,000)	80,000	3	240,000		3	240,000	320,000	4		
Maintain outdoor shelters				15,000			15,000			20,000
Totals by Refuge			**240,000**	**15,000**		**240,000**	**15,000**		**3,485,000**	**230,000**
Total One Time Expenses for the Complex ($)									$2,965,000	
Totl Recurring Expenses for the Complex ($/year)									$260,000	

Note: Recurring expenses include estimated annual salaries for recreation and maintenance personnel involved in administering program.

Participation in environmental education programs is growing throughout Oregon and Washington. With the growth of participation in EE programs and the emphasis on these programs under Preferred Alternative 2, future effects can be expected to be higher than present. Nonetheless, EE activities would generally occur outside of the wintertime sanctuary area; hence large portions of the Refuges would remain undisturbed during the wintering period.

<u>Habitat loss</u>: The site additions and redesign needed at the Headquarters site, stemming from the addition of an EE center at this location, would result in some habitat loss. However, the site has already been occupied and impacted in the past [up to a few years ago the old shop was located at this site], so the existing habitat is of marginal quality. Nonetheless, a "worst-case" analysis was conducted for each of the site additions or redesigns, assuming complete loss of existing habitat. These are shown in Table C-8.

Based on the site design described above, the construction of the environmental facility and several shelters would result in the loss of approximately 0.60 acres of habitat, mostly at W.L. Finley Refuge (six of the ten shelters would be constructed at Baskett Slough or Ankeny Refuges). This represents approximately less than a fraction of a percent of the habitat contained at the three Refuges.

Environmental education may occur within any of the three designated RNAs on the refuge. Over the life of the CCP, the operation of the environmental education program is not expected to threaten serious impairment of research or education values; instead environmental education will enhance education values within the RNAs.

<u>Impacts to listed species</u>: Environmental education activities may impact threatened and endangered species, including any of several listed plants, the Fender's blue butterfly, or the Oregon chub. Disturbance impacts to these species would be expected to increase, but would be reduced by ensuring that EE groups avoid or severely limit their activity in areas hosting rare species.

<u>Impacts to other priority public uses:</u> Environmental education may result in disturbance to other visitors. School groups, especially those dominated by younger primary school children, may be loud and may flush wildlife being enjoyed by other visitors. This effect is expected to be fairly minimal, since the majority of other visitors use the Refuges on weekends and school groups will generally be present on weekdays.

Construction of an EE Center and field EE shelters will temporarily displace soil and create noise. Over the long-term, facilities construction will increase the maintenance burden for Refuge infrastructure. No other significant effects to roads, trails, or other infrastructure from the environmental education program are foreseen. Normal road, trail, and facility maintenance will continue to be necessary. Additional facility construction or upgrade, if needed, is addressed in the Availability of Resources section.

Table C-8. Site Additions, Modifications, Footprint and Associated Habitat Loss or Gain Associated with New Environmental Education Center at W.L. Finley Refuge

Specific Modification	Approximate Footprint (dimension in feet)	Potential Loss (Gain) of Habitat (acres)
Addition of a new building with observation terrace	70X60	0.10
Expansion of existing office to include new offices (displaced by exhibit area and nature store)	60X100	0.14
Inclusion of path with observation deck	480x10 plus 30x30	0.13
Addition of a new parking area (20-24 spaces)	30x30	0.02
Relocation of a historic smoke house to the historic area near Feichter house	8x8	0.00
Realignment of road accessing existing office and parking at existing office for better large vehicle (schoolbus) access and parking	200x15 plus120x15	0.11
Addition of covered path connecting new Environmental Education Building with existing office	20x10	0.00
Addition of seasonal heavy equipment haul road to Shop area	540x10	0.12
Addition of three RV spaces and common laundry room at bunk house	40x40	0.04
Removal of trail spur and restoration of vegetation	(600x10)	(0.14)
Removal of existing road and restoration of vegetation	(300x10)	(0.07)
Construction of EE shelters	10 @ 25x25	0.14
Total Net Loss of Habitat	**26,114**	**0.60**

Public Review and Comment: Various opportunities were provided for the public to engage with the planning process. Appendix A details public involvement undertaken during development of the CCP/EA. Written comments on this draft compatibility determination were solicited during the public review of the Draft CCP/EA, between May 25, 2011 and June 30, 2011. Appendix L summarizes the public commentary received, and includes responses from the Service.

Determination:
____ Use is Not Compatible
__X__ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- EE shelters shall be constructed in locations that consider the site's potential for contributing to a diverse and rich curriculum and minimizing impacts to sensitive resources, including

listed species and wintering waterfowl.
- Require advance reservations for all groups participating in environmental education.
- Instruct all groups in trail and off-trail etiquette and ways to reduce wildlife and habitat disturbance during a "welcome" session. During "teach the teachers" workshops, instructors will review trail etiquette and how to minimize wildlife disturbances.
- During spring when rare species are vulnerable to trampling or disturbance, limit EE activities in areas that host rare species.
- An effort will be made to limit EE activities to no more than 60 participants per day, reducing disturbance to wildlife and overcrowding of Refuge facilities during times of peak demand.
- Signs, pamphlets, and verbal instructions from Refuge staff and volunteers will promote appropriate use of trails, boardwalks, and platforms to minimize wildlife and habitat disturbance.
- Periodic monitoring and evaluation of sites and programs will be conducted to assess if objectives are being met and the resource is not being unacceptably degraded. If disturbance to wildlife or damage to habitat reaches unacceptable levels, the Refuges would avoid or limit EE activities in areas where unacceptable impacts occur.

Justification: As a wildlife-dependent recreational use, environmental education receives enhanced consideration in the Comprehensive Conservation Planning process. Environmental education can provide students with the joy of experiencing wildlife on their public lands, and as such, helps fulfill the mission of the National Wildlife Refuge System. Although the exact location of EE shelters is not yet specified, under the stipulations identified above and based on the analysis presented above, this use would be expected to have a minor direct impact on Refuge resources. By limiting the size of groups and locating EE activities in areas that are already regularly used, the additional disturbance to wildlife, though larger than at present, is also expected to be minor. It is anticipated that wildlife populations will find sufficient food resources and resting places such that their abundance and use of the Refuge will not be measurably lessened from EE activities. The relatively limited number of individual animals and plants expected to be adversely affected will not cause wildlife populations to materially decline, the physiological condition and production of refuge species will not be impaired, their behavior and normal activity patterns will not be altered dramatically, and their overall welfare will not be negatively impacted. Thus, allowing EE activities to occur on select areas of the Refuge under the stipulations described above will not materially detract or interfere with the purposes for which the refuge was established or the refuge mission.

Mandatory Reevaluation Date:
09/2026 Mandatory 15-year reevaluation date (for wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision:
__X__ Environmental Assessment and Finding of No Significant Impact

References:

Jose, J. 1997. Evaluation of the Effect of Environmental Education Classes on Waterfowl Behavior. Unpublished report. Biology 454 class, Eastern Washington University, Cheney, Washington.

C5. Environmental Education Compatibility Determination. Uses are compatible with stipulations.

Prepared by: Sharon J Selvaggio 9/7/2011
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: 9-7-2011
(Signature) (Date)

Concurrence

Refuge Supervisor: 9-12-11
(Signature) (Date)

Regional Chief,
National Wildlife
Refuge System: 9-12-11
(Signature) (Date)

Bicycling Compatibility Determination

RMIS Database Use: Bicycling

Refuge Name: William L. Finley National Wildlife Refuge

Establishing and Acquisition Authorities:

- Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq

Refuge Purposes - William L. Finley Refuge

- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Additional detail on the purposes of this Refuge may be found in Chapter 1 of the Final CCP/EA.

National Wildlife Refuge System Mission: "The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

Description of Use: While biking on Refuge roads, visitors may view wildlife. However, as an activity, bicycling is treated separately from wildlife observation since some studies show that impacts are of a different nature and bicycling does not automatically support the six wildlife-dependent priority uses.

Bicycling is currently allowed on Finley Refuge Road as described in Section 5.10 of the Final CCP/EA. Bicycling also occurs on County roads bordering or traversing the Refuges of the Willamette Valley Complex. Bicycling use on County roads is outside Refuge jurisdiction; hence, this CD only addresses use on Refuge roads and does not address County road bicycling. As noted in Section 2.2 of the Final CCP/EA, no changes would be made to bicycling under the Final CCP/EA, although possible improvements under Objective 10i could affect this activity.

Bicycling occurs informally, and relies mainly on Finley Refuge Road and its associated parking areas and pulloffs as the key facilities. Use is commonly by individuals up to a few cyclists in a group. The season of allowed use extends from April 1-October 31.

It is estimated that less than 20 visitors currently participate in this use on Finley Refuge Roads annually. The number of visitors engaging in this use would be expected to remain approximately the same, unless Finley Refuge Road is paved in which case it would likely increase. See Table 6.2 of the Final CCP/EA.

Availability of Resources: No facilities will be constructed or maintained expressly for the purposes of supporting this use and <$1000 per year no staff time is anticipated to be expended in for law enforcement, information, and education associated with this use.

Anticipated Impacts of the Use: See the Wildlife Observation, Photography, and Interpretation CD for a summary of scientific findings on impacts to wildlife from human activity, especially sections related to pedestrian travel.

Wildlife Response to Bicycling: Moving automobiles and trail bikes had little effect on elk resting in timber at distances of only 0.13 miles (Lyon and Ward 1982). Proximity of escape cover that breaks the line of sight between wildlife and the disturbance may reduce flight distances and consequently the amount of energy used in flight.

In a Canyonlands National Park study comparing effects of trail bikes, hikers, and vehicles to bighorn sheep behavioral responses, distances moved, and duration of responses, Papouchis et al. (2001) found that hikers caused the most severe responses in desert bighorn sheep (animals fled in 61 percent of encounters), followed by vehicles (17 percent fled) and mountain bikers (6 percent fled), apparently because hikers were more likely to be in unpredictable locations and often directly approached sheep. However, Taylor and Knight (2008), who found no difference in effects between hikers and bikers (see below), noted that Papouchis et al. compared the responses of sheep approached directly and off-trail by hikers with those of sheep approached tangentially on a road or trail by mountain bikers and vehicles. Generally, wildlife exhibit a stronger response to humans that approach them directly and to humans located off designated trails.

In a Utah study comparing mountain biking and hiking disturbance to mule deer, antelope and bison, both on- and off-trail, Taylor and Knight (2008) found little difference between the responses to hiking or biking. However, their results did show differences in species and whether the activity takes place on or off-trail (see Wildlife Observation CD for more discussion). They did suggest that, because bikers travel faster than hikers, they may cover more ground in a given time period than hikers, thus having the opportunity to disturb more wildlife per unit time.

Refuge-specific impacts: A few people access the Refuge or areas along its boundaries (county roads) by bicycle. Although bicycles on county roads may create additional disturbance, county roads are not under Refuge jurisdiction, therefore effects from activities occurring on these roads are not considered in this compatibility determination.

On Refuge roads, bicycles are only permitted on Finley Refuge Road during the non-wintering period. Because migratory waterfowl have left by this time, the disturbance effect from bicycles is expected to be negligible.

Under the CCP, the area designated for biking would occasionally put individuals on foot and bicycle adjacent to Turtle Flats wetland, wet prairie and riparian habitat, several cultivated grass fields, upland prairie/oak savanna habitat, and mixed-deciduous forest, during April 1-October 31.

Although the use poses the potential to cause flushing of birds from the Turtle Flats area, it would generally be expected to be negligible, based on the expected level of use and assuming compliance to regulations. Bicycling on the rest of Finley Refuge Road is not anticipated to cause large disturbances to wildlife, as long as riders do not directly approach wetlands or areas where wildlife congregates, and cyclists stay predictably on the designated road. The fact that the use will remain limited to the non-wintering period will help prevent impacts to larger congregations of wildlife. In addition, group size will be limited and special events and organized training will not be permitted. Enforcement of these provisions should minimize negative effects, especially disturbance effects, to wildlife and habitats.
Impacts to listed species: Bicycling may occur adjacent to habitats occupied by listed plant species

but since this use by definition occurs on the road, the activity would result in no direct impact to these species. No listed wildlife species likely to be disturbed or impacted by bicycle use in the areas adjacent to Finley Refuge Road.

Impacts to other priority public uses: Bicycling may result in disturbance to other visitors. This effect is expected to be negligible, since the use is expected to remain light. If all visitors abide by the posted speed limits, safety conflicts between bicycles, automobiles (and the occasional pedestrian) should be minimal.

No other significant effects to roads, trails, or other infrastructure from these activities are foreseen. Normal road, trail, and facility maintenance will continue to be necessary. Additional facility construction or upgrade, if needed, is addressed in the Availability of Resources section.

Public Review and Comment: Various opportunities were provided for the public to engage with the planning process. Appendix A details public involvement undertaken during development of the CCP/EA. Written comments on this draft compatibility determination were solicited during the public review of the Draft CCP/EA, between May 25, 2011 and June 30, 2011. Appendix L summarizes the public commentary received, and includes responses from the Service.

Determination:
_____ Use is Not Compatible
__x__ Use is Compatible with Following Stipulations

Stipulations necessary to ensure compatibility: The following stipulations are required to ensure that bicycling and jogging remain compatible:

- Bicycling will be permitted only on Finley Refuge Road, during April 1-October 31 only. Bicycling will not be allowed on any Refuge roads not open to the general public.
- All vehicles shall abide by posted speed limits.
- The Complex shall post signs alerting drivers that bicyclists may be on the road.
- Special events and organized training will not be permitted on the Refuge. The Refuge will limit the number of individuals in any biking group to five.
- If Finley refuge road is improved, especially paved, then biking and walking should be re-analyzed.

Justification: Biking does not directly contribute to the mission of the National Wildlife Refuge System or to the wildlife purposes of the William L. Finley NWR. It is merely one way visitors access the Refuge. We believe some bicyclists come with the expectation of wildlife observation which is one of the six wildlife-dependent recreational uses of the National Wildlife Refuge System as stated in the National Wildlife Refuge System Improvement Act of 1997. Though biking can cause disturbance, we believe that by limiting this activity to a small percentage of the Refuge and by always providing wildlife sanctuary from human disturbance in other areas of the Refuge, this activity will not interfere with the Refuge achieving its purposes to conserve and protect migratory birds.

Mandatory Reevaluation Date:
09/2021__ Mandatory 10-year reevaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision:

__X__ Environmental Assessment and Finding of No Significant Impact

References:

Lyon, L. J. and A. L. Ward. 1982. Elk and land management. In: J. W. Thomas and D. E. Toweill [EDS.]. Elk of North America: Ecology and management. Harrisburg, PA: Stackpole Books. p. 443–477.

Papouchis, C. M., F. J. Singer, and W. B. Sloan. 2001. Responses of desert bighorn sheep to increased human recreation. Journal of Wildlife Management 65:573–582.

Taylor, Audrey R., and Richard L. Knight. 2003. Wildlife Responses to Recreation and Associated Visitor Perceptions. Ecological Applications 13:951–963. [doi:10.1890/1051-0761(2003)13[951:WRTRAA]2.0.CO;2]

C6. Bicycling Compatibility Determination. Uses are compatible with stipulations.

Prepared by: Sharon J Selvaggio 9/7/2011
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: 9-7-2011
(Signature) (Date)

Concurrence

Refuge Supervisor: 9-12-11
(Signature) (Date)

Regional Chief,
National Wildlife
Refuge System: 9-12-11
(Signature) (Date)

Farming and Livestock Grazing Compatibility Determination

RMIS Database Use: Farming (crop production), grazing, haying

Refuge Name: Ankeny, Baskett Slough, and William L. Finley National Wildlife Refuges

Establishing and Acquisition Authorities:
- Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq

Refuge Purposes – Ankeny Refuge
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Refuge Purposes - Baskett Slough Refuge
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Refuge Purposes - William L. Finley Refuge
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Additional detail on the purposes of these Refuges may be found in Chapter 1 of the Final CCP/EA.

National Wildlife Refuge System Mission: "The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

Description of Use:
Approximately 4,175 acres of farmland (mainly cultivated grass fields with up to 10 percent grain crops) will be maintained under Preferred Alternative 2 to provide forage for wintering geese (1,782 acres at William L. Finley, 925 acres at Baskett Slough, and 1,467 acres at Ankeny). The use will be managed as described in Objectives 1a and 1b in the Final CCP/EA. The farming program would continue largely as described in Section 4.2 of the Final CCP/EA. However, as indicated in Objective 1b, additional irrigation capability would be added, allowing a greater percentage of the landscape to be turned to grain crops. In addition, some areas that are currently farmed would be restored to native habitats.

The main crops grown include annual ryegrass, perennial ryegrass, fescue, corn (where irrigation capability exists), winter wheat, or improved pasture mix. Under Preferred Alternative 2, croplands would typically be planted and maintained by local area cooperative farmers who operate according to cooperative farming agreements, as described in Section 4.2 of the Final CCP/EA. However, some fields may also be farmed by Refuge staff or farmed under contract.

Soil amendments (fertilizer, lime, etc.) and weed control methods may be used as necessary to improve the growth of desirable vegetation and reduce competition from weed species.

A small amount of land (less than 100 acres) is managed as improved pasture and is grazed by cattle or sheep and/or hayed as an alternative to farming, which also provides forage. Sensitive areas, including riparian, wetland, or other areas with sensitive vegetation, are fenced out with a hot wire. Generally grazing would occur only on fields planted to perennial grasses. In some cases, livestock may also be used to clean up residual field stubble.

Cooperative Farming Agreements are used to implement cooperative farming, grazing, and haying programs and to communicate management sideboards to cooperators. Currently the Complex has two Cooperative Farming Agreements at W.L.Finley. They are updated annually (although they extend for a 5 year period). One such agreement exists at Baskett Slough and three at Ankeny.

Availability of Resources: Estimated costs for operating the cooperative farming program as envisioned under Preferred Alternative 2 are displayed in the following table.

Table C-9. Costs associated with Operation of the Cooperative Farming Program

Category and Itemization	One-time Expenses($)	Recurring Expenses ($/yr)
Administrative support:	$0	$35,000
Materials and equipment:	$0	$10,000
Offsetting revenues:	$0	$0
Total Expenses for the Complex	$0	$35,000

Anticipated Impacts of the Use:
Under Preferred Alternative 2, croplands would occupy approximately 54 percent of Ankeny Refuge, 33 percent of Baskett Slough Refuge, and 33 percent of William L. Finley Refuge (for an average total of 37 percent of the total area of the three Refuges.

General Impacts: Direct impacts of cropland management include exposure of soils to wind erosion and impacts from machinery. In general, tillage and cropping that leaves soil bare for portions of the year negatively affect soil quality indicators (Nelson et al. 2006) such as aggregate stability, infiltration rates, and available water capacity. Compaction can result from the use of farming equipment for seeding, causing undesirable increases in bulk density while tilling may also prevent the accumulation or accelerate the decomposition of organic matter and can diminish earthworm populations (USDA NRCS).

Farming may also result in the use and introduction into the environment of chemical agents from pesticide usage and the potential exacerbation of weed issues through ground disturbance and field to field movement of cultivating and harvesting equipment. In addition, small mammals, reptiles, and amphibians may be occasionally subject to mortality from farm machinery, and nesting birds may be occasionally disrupted and nests destroyed.

Refuge-Specific Impacts: No native habitat loss would occur as no areas would be brought under cultivation or grazing that are not already farmed. Although some continued impact is expected to soil quality, Preferred Alternative 2 would reduce the acreage under cultivation, thus would be expected to have a minor beneficial impact on soil and water quality, compared to present.

The introduction and spread of weeds are expected to be mitigated partly through such practices as equipment cleaning, mowing to prevent seed set and dispersal, and treatments to any source populations that have the potential to infest agricultural fields (usually windborne seed dispersal). The refuge equipment operators are required to clean equipment before moving between fields when working in areas of weed infestations to minimize the spread of undesirable plants. Cooperators will also be similarly responsible for cleaning their equipment prior to moving between fields. The refuge will continue to monitor farming and grazing sites for invasive weeds and will maintain an aggressive approach to invasive plant control and restoring sites to vegetation with high wildlife value. In addition, the refuge will continue to work with the County Weed Board to prevent, identify, and eradicate new infestations.

For weed species that are or become established, mechanical, cultural, and biological controls methods will be evaluated in that order. If these methods are not expected to be effective or would have undesirable consequences (such as impacting nests of grassland-nesting birds), then the refuge may decide to use an herbicide. Chemical usage will be subject to provisions of the Refuge IPM plan (Appendix F). Among other provisions, this plan provides direction that "the most efficacious pesticide available with the least potential to degrade environmental quality (soils, surface water and groundwater) as well as least potential effect to native species … would be acceptable for use on the refuge." Each approved pesticide would undergo a chemical profile analysis; active ingredients would be analyzed for their risk quotient and this value compared to a Level of Concern for surrogate species, as established by the Environmental Protection Agency. All applications of herbicides will conform to the specific pesticide label requirements.

Employment of this approach will provide for a moderate to minor risk from chemical exposure. However, unquantified risks may still occur via factors not assessed under current protocols, such as: intermingling of unlike chemicals in the field; species-specific sensitivity that differs from surrogate species sensitivity; exposure through inhalation, exposure through ingestion of pesticide-contaminated soil, and other factors (see Appendix F).

Positive effects are also anticipated. In addition to providing high carbohydrate forage for wintering waterfowl and cranes, per the purpose of the farming program, crop fields planted to small grains such as winter wheat can indirectly benefit some other bird species by provide some foraging habitat for a variety of seed-eating migratory bird species. The Refuges' farmed and grazed lands provide areas of high-energy grain crops and green forage grasses to meet the energy needs of wintering waterfowl and cranes and reduce crop depredation in nearby agricultural lands.

<u>Impacts to Listed Species</u>: Currently there are no listed species inhabiting farm fields or pastures, however, some Nelson's checkermallow populations are located adjacent to farm fields. Based on past history, there is a potential for infrequent inadvertent impacts to these populations from spray drift and overspray. Should these conflicts occur in the future, measures such as erecting protective barriers and/or transplanting listed populations out of harm's way would be enacted.

Fertilizer or pesticide runoff or soil erosion may cause minor temporary impacts to wetlands inhabited by Oregon chub, however, refuge populations have steadily increased over time, so this impact is likely more hypothetical than real.

<u>Impacts to Priority Public Uses</u>: Farming operations would decrease slightly under Alternative 2, as

compared to present. Currently the public occasionally encounters farming operations while recreating on Refuge lands. Although some aspects of farming operations - including noise, dust, spraying, sight of grazing animals, and temporary traffic congestion - may be occasional annoyances to members of the public, conflicts and impacts are expected to remain minor over the life of the plan.

Public Review and Comment: Various opportunities were provided for the public to engage with the planning process. Appendix A details public involvement undertaken during development of the CCP/EA. Written comments on this draft compatibility determination were solicited during the public review of the Draft CCP/EA, between May 25, 2011 and June 30, 2011. Appendix L summarizes the public commentary received, and includes responses from the Service.

Determination (check one below):
_____ Use is Not Compatible
__X__ Use is Compatible with the following stipulations

Stipulations Necessary to Ensure Compatibility:

- Cropland farming will be operated under an approved Cropland Management Plan and Cooperative farming agreements will be established with the cooperator per agency policy.
- Genetically modified seeds and other organisms will not be permitted for use in the farming program.
- Pest plants and weeds will be controlled by crop rotations, mechanical treatments and biological controls where practical; approved pesticides will be used only on a case by case basis.
- Pesticide use will only occur per terms of approved Pesticide Use Proposals and other terms of the IPM Plan (see Appendix F). Pesticide applicators must meet all State, Federal and agency requirements.
- Equipment of cooperating farmers and refuge farm machinery will be cleaned prior to being moved between fields when working in areas with weed infestations.
- Cooperators will provide a record of herbicides used including chemical name, amount used, date, location, and how applied.
- Diligence shall be exercised in the control of county-listed invasive weeds.
- Best Management Practices (BMPs) will be used to avoid fertilizer runoff into wetlands or leaching into groundwater and to minimize sedimentation of streams and waterbodies. Examples of BMPs include avoiding nitrogen fertilizer applications in the fall to help avoid waste and prevent fertilizer from leaching into groundwater, and leaving buffer strips of dense vegetation between cropland and wetlands to filter runoff and prevent sedimentation.
- Crop varieties adapted for local conditions and disease resistance will be selected for refuge use.
- Monitoring of the cropland farming program will be performed by qualified Refuge staff.
- Sensitive areas, including riparian, wetland, or other areas with sensitive vegetation, would be fenced out from grazing with a hot wire.
- Grazed areas would be monitored to ensure that grazing occurs only to the point to maintain browse in condition for geese browsing. Cattle will be removed if vegetation reaches < 2” height.

Justification:
Cropland farming is a habitat management practice performed to meet the purposes of the Refuge. Canada geese feed primarily on green vegetation, with grasses and sedges dominating the diets of most North American species (Krapu and Reinecke in Batt 1992). Options for providing sufficient natural foods from native habitats for wintering geese are limited, given the current availability of native grassland and wetlands in the Willamette Valley and the current distribution of geese within the Pacific Flyway. While the Willamette Valley historically only provided habitat for Dusky Canada Geese (Pacific Flyway Council 2008) there are now large wintering populations of Cackling geese (Pacific Flyway Council 1999), Taverner's cackling geese, western Canada geese, and lesser Canada geese. Remaining wetlands do not produce sufficient natural waterfowl foods for the thousands of geese that winter on the Refuges. Also, Canada geese are generally browsers and prefer to forage on green grass.

Although large monocultures of planted grasses are not native, and do not support the diversity of species that native habitats do, these areas mimic native grasslands and are necessary for the Refuges to achieve their purposes for providing for wintering Canada geese. In addition, maintaining croplands on the Refuges diminishes crop depredation (damage) on surrounding private agricultural lands. Projects that represent public or private economic use of the natural resources of any National Wildlife Refuge must contribute to the achievement of the National Wildlife Refuge purposes or the National Wildlife Refuge System mission to be compatible (50 C.F.R. 29.1). Croplands at the Willamette Valley Refuges contribute to the achievement of the purposes for the three Refuges.

Mandatory Reevaluation Date:
09/2021 Mandatory 10-year reevaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision:
__X__ Environmental Assessment and Finding of No Significant Impact

References:

Krapu, G.L. and K.J. Reinecke. 1992. Foraging Ecology and Nutrition. Chapter 1 in *Ecology and Management of Breeding Waterfowl*, edited by Batt B, Afton A, and others. University of Minnesota Press: Minneapolis.
Nelson, M.A., S. M. Griffith, and J. J. Steiner. 2006. Tillage Effects on Nitrogen Dynamics and Grass Seed Crop Production in Western Oregon, USA. Soil Sci Soc Am J 70:825-831.
Pacific Flyway Council. 2008. Pacific Flyway management plan for the dusky Canada goose. Dusky Canada Goose Subcomm., Pacific Flyway Study Comm. [c/o USFWS], Portland, OR. Unpubl. rept. 38 pp.+ appendices.
Pacific Flyway Council. 1999. Pacific Flyway management plan for the cackling Canada goose. Cackling Canada Goose Subcomm., Pacific Flyway Study Comm. [c/o USFWS], Portland, OR. Unpubl. Rept. 36 pp.+ appendices.
USDA Natural Resources Conservation Service. Soil quality indicator information sheets: http://soils.usda.gov/sqi/assessment/assessment.html#indicator_sheets accessed 11/30/09.

C7. Farming and Livestock Grazing Compatibility Determination. Uses are compatible with stipulations.

Prepared by: Sharon Selvaggio (Signature) 9/7/2011 (Date)

Refuge Manager/
Project Leader
Approval: (Signature) 9-7-2011 (Date)

Concurrence

Refuge Supervisor: (Signature) 9-12-11 (Date)

Regional Chief,
National Wildlife
Refuge System: (Signature) 9-12-11 (Date)

Forest Management Compatibility Determination

RMIS Database Use: Tree harvest (other);

Refuge Name: Baskett Slough and William L. Finley National Wildlife Refuges

Establishing and Acquisition Authorities:
- Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq

Refuge Purposes - Baskett Slough Refuge
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Refuge Purposes - William L. Finley Refuge
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Additional detail on the purposes of these Refuges may be found in Chapter 1 of the Final CCP/EA.

National Wildlife Refuge System Mission: "The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

Description of Use:
Forest management will require the removal of some live trees - in a manner often described as "thinning" - in order to achieve desired structural and compositional requirements identified for upland prairie/oak savanna, oak woodland, and mixed-deciduous forest habitats (see Objectives 4a, 4b, 4c, 5a, and 6a under Preferred Alternative 2 of the Final CCP). Within these habitats, smaller diameter trees (up to 15" in diameter at breast height [d.b.h.]), including big leaf maple, cherry, oak, and Douglas-fir, may be felled and removed.

Some of the work may be performed within the boundaries of the Mill Hill Research Natural Area, or the Pigeon Butte Research Natural Area. Tree removal involves the felling or topping of selected live trees to promote the growth of remaining desired trees. At times felled trees may be left to lay, but often felled trees are yarded, piled, and burned on-site to prevent fuel hazards from building up throughout the stand. Some felled trees may have value for other uses. These trees may be available for restoration use on or off-Refuge, such as using instream to enhance fish habitat. They may also be donated to schools or communities in need. Additionally, these trees may also be available for commercial use such as lumber, pulpwood, or wood biomass product. These activities are the subject of this CD.

Including both oak woodland and mixed deciduous/coniferous forest habitats, thinning work may occur on up to 1,126 acres on W.L. Finley and Baskett Slough Refuges over the lifetime of the CCP. The felling of trees may be done with chainsaws or with use of light or low ground pressure heavy tracked equipment. At times the contractor or permittee would conduct the felling and sometimes the felling may be done by Service personnel (force account).

Commercial harvest: Commercial harvest with the use of ground-based heavy equipment could occur when soil moisture levels are low to moderate. Forest units will be selected by Refuge staff. Stewardship or service contracts may be awarded to accomplish the work.

Removal of cut trees would be accomplished by horse, helicopter, or ground-based skidders or forwarders, as appropriate for conditions.

No road construction is proposed to accommodate this activity.

Availability of Resources: Estimated costs for operating forest management activities as envisioned under Preferred Alternative 2 are displayed in the following table.

For the one-time expenses, all available sources will be investigated.

Table C-10. Costs Associated with Forest Management Use

Proposed Activity or Project	One Time Expense ($)	Recurring Expenses ($/year)	One Time Expense ($)	Recurring Expenses ($/year)
	Baskett Slough Refuge		W.L. Finley Refuge	
Forest management oak woodland	600,000	36,000	395,000	40,000
Forest management mixed deciduous	0	1,000	40,000	11,000
Totals by Refuge	600,000	37,000	435,000	51,000
Total One Time Expenses for the Complex ($)			1,035,000	
Total Recurring Expenses for the Complex ($/year)			88,000	

Note: recurring expenses include the estimated annual salary and benefits expenses for recreation and maintenance personnel involved in administering the program.
Funding for work prior to the date of this CD has been from “soft money” sources. At current levels of treatment, funds have been available.
To accomplish the objectives of thinning as projected under preferred alternative, either Forestry Stewardship contracts would need to be in place or additional funds would need to be in place.

Anticipated Impacts of the Use:
Wildlife effects: Disturbance to wildlife is expected to occur during forest management activities. Felling of trees or bucking of logs requires chain saws, which will cause high decibel localized noise. Many species would be temporarily displaced, but would be expected to readily move into these sites after the disturbance is removed. This level of activity is expected to occur on less than 1 percent of the Refuge at any given time. In addition, vegetation trampling, injury, and some soil compaction and damage to soil-dwelling biota would occur. Tree harvest activities occurring during the nesting season can disrupt nesting for both ground and foliage nesting birds. This would be reduced by restricting activity during the nesting season.

Log removal by helicopter is proposed for areas like Baskett Butte, specifically to reduce the impacts from ground-based removal equipment. Due to noise, helicopters can cause temporary displacement to wildlife, however, this effect would be very short-term in nature and would be largely mitigated by requiring helicopters to operate only outside of the nesting and wintering seasons.

The suite of species inhabiting the stand would likely change. For example, oak-dependent species, (such as slender-billed (white-breasted) nuthatch, western wood peewee, western bluebird, gopher snake) would replace mixed forest species after removal of conifer (pers. comm. Jock Beall).

Cavity nesting birds may be impacted if snags or dead top trees are removed. The use of mechanized fellers would allow operations to occur near large snags without violating Occupational Safety and Hazard Administration rules. Unless safety reasons require, all snags will be left in the stand, which will minimize loss of this resource to cavity-nesting birds.

<u>Impacts to listed species</u>: This use is unlikely to pose more than a negligible impact to threatened and endangered species. Some trampling of listed plants could occur where this activity occurs in upland prairie/oak savanna habitat, but stipulations below requiring rare plants to be senesced would minimize any impact. Logs would not be skidded over sites occupied by Fender's blue butterfly. No other listed species would be expected in the habitats subject to these uses.

<u>Soil and vegetation effects</u>: In addition to the impacts described above, the potential negative impacts of commercial harvest include ground disturbance from the use of heavy equipment. Ground disturbance will likely occur when skidding trees to a landing. Ground-based skidders would only be used if soil moisture was low enough to minimize compaction/significant ground disturbance or the trees/logs were in close proximity to a rocked surface.

Impact will also occur at the landing site during log processing and loading. It is expected that up to 1,126 acres of the Refuge will be subject to potentially ground disturbance from this activity over for the next 15 years. If mineral soils are exposed there is a high probability that these sites could be invaded by exotic plant species such as Canadian thistle thus all soil surfaces disturbed by harvest operations shall be re-seeded with native seed mixes as specified by Refuge staff, upon completion of harvest operations, thereby minimizing the potential for soil erosion and the spread of undesirable exotic vegetation.

No work is expected to impact wetlands. Although forest management activities may occur near seasonal stream courses, practices such as crossing limitations, seasonal restrictions, directional felling and reseeding will all help mitigate potential damage to vegetation or erosion.
Horses used in log removal have the potential to spread weedy species. However, most work horses are fed a high quality diet such that this risk is minimal. Horse logging, like other ground-based methods, may result in some minor ground disturbance and compaction.

Despite the negative effects mentioned above, overall, effects are expected to be positive with respect to community composition. Devine and Harrington (2006) studied the effect of varying levels of removal of overtopping Douglas fir on oak woodland communities. They found the following results:

- Five years after treatment, oak trees had suffered no mortality or windthrow. Stem diameter growth was 194 percent greater in the full-release treatment relative to the control.
- Acorn production varied widely by year, but in years of higher production, acorn production was significantly greater in both release treatments than in the control.
- Trees with relatively less crown dieback at the time of treatment generally had greater stem growth and acorn production responses to release treatments.

Impacts to priority public uses: Commercial harvest activities pose the potential to disturb visitors engaged in priority public uses. To the extent possible these uses would be spatially separated. When necessary, some visitor areas may be temporarily closed. Most work would be conducted during weekdays, not during weekends when visitation is highest.

Heavy equipment can create some impact to Refuge roads. Stewardship contracts may allow for mitigating those impacts caused by forest management operations.

Other effects: With the use of chainsaws there is the chance of a spark causing a fire. Uncontrolled fire in any of the Refuge habitats can have large negative impacts. Therefore, precautions will be taken to reduce any chance of fire resulting from forest management activities (see stipulations).

Forest management may occur within designated RNAs on the refuge. Over the life of the CCP, forest management activities are not expected to threaten serious impairment of research or education values. When occurring within designated RNA boundaries, forest management prescriptions will take into account the RNA intent and Service policy regarding RNAs.

Public Review and Comment: Various opportunities were provided for the public to engage with the planning process. Appendix A details public involvement undertaken during development of the CCP/EA. Written comments on this draft compatibility determination were solicited during the public review of the Draft CCP/EA, between May 25, 2011 and June 30, 2011. Appendix L summarizes the public commentary received, and includes responses from the Service.

Determination (check one below):
_____ Use is Not Compatible
__X__ Use is Compatible with the following stipulations

Stipulations Necessary to Ensure Compatibility:
- When occurring within designated RNA boundaries, forest management prescriptions shall address Refuge goals and objectives.
- Helicopters, low pressure ground equipment or horses will be the preferred method of log extraction from Refuge lands.
- Under no circumstances shall oil, grease, fuel, de-greasers or other hazardous chemicals be dumped, buried, or otherwise disposed of in the treatment unit or elsewhere on the Refuge.
- Harvesting and heavy equipment use will be limited to periods of time when soil moisture is low to moderate. Refuge staff will make the determination whether the ground conditions are acceptable for operation.
- Trees will be skidded by lifting the butt-end off the ground (one end suspension) to minimize ground disturbance. Ground-based skidders will be used only if soil moisture is low enough to minimize compaction/significant ground disturbance, or the trees/logs are in close proximity to a rocked surface.
- Existing road access will be improved, if necessary for specified harvest and haul equipment so that road surface degradation can be avoided.
- Landings will be designated and located by Refuge staff.
- All soil surfaces disturbed by harvest operations shall be re-seeded with native seed mixes as specified by Refuge staff, upon completion of harvest operations.
- Heavy equipment will not be allowed within 25 yards of a wetland. Directional felling, crossing limitations, seasonal restrictions, and reseeding will be used to avoid impacts to

wetlands or stream courses.
- The Refuge will provide the contractor with maps of any sensitive areas (cultural or historical included).
- State forest management guidelines would be followed to prevent unintentional fire during fire season.
- Commercial harvest is to be used only to support Refuge forest management practices in the support of Refuge purposes, goals, or objectives and not primarily for economic purposes.
- Compliance inspections will be undertaken by the Service regularly.
- Fair market, open-bid, service or stewardship contracts may be issued to accomplish the work. The amount of specified material to be removed would be tracked and used in finalizing contract specifications and finances.
- Prior to harvest, the area will be evaluated to assure that no listed plant species are present. Any identified populations in the area would be allowed to senesce before activity could be initiated. Avoidance will be the preferred method of protection.
- Felling will generally be restricted during the breeding season for migratory birds (April 15-July 15). Tree removal will be allowed during this time frame unless the activity is in close proximity to a heron rookery, bald eagle nest, or other sensitive site.
- Unless safety reasons dictate otherwise, no snags or dead top trees will be removed.
- Service will comply with current policies and procedures related to cultural resource protection and perform mitigation required through cultural resources review. Known cultural resource areas will be avoided. If new cultural resource sites are discovered during activities, modifications will be undertaken as needed to avoid impacts.
- Most work will occur during weekdays when visitor use is lower. All work will occur during regular Refuge hours.

Justification:
Forest management, including tree harvest, contributes to the biological integrity of Refuge native habitats on Baskett Slough and William L. Finley Refuges by helping to remove excess stocking and encroaching Douglas-fir, with the ultimate aim to restore the Refuges' oak savanna, oak woodland, and mixed-deciduous forests to historical conditions. It also supports the National Fire Plan in reducing hazardous fuel loads on federal lands. While fire was the primary natural disturbance that maintained healthy historic forest conditions on the Refuges, a combination of forest management activities and prescribed fire is needed to address today's current forest conditions, air quality and human safety concerns, and resource protection needs. Although temporary impacts from the noise, and localized habitat damage could occur, the long-term benefits outweigh these impacts. Oregon oak plant communities will be released from encroachment and overcrowding. Trees left behind will grow more quickly, attaining greater size and complex limb development which supports a wider variety of species. Limiting the use during sensitive periods will limit impacts. Projects that represent public or private economic use of the natural resources of any National Wildlife Refuge, in accordance with 16 U.S.C. 715s, must contribute to the achievement of the National Wildlife Refuge purposes or the National Wildlife Refuge System mission to be compatible (50 C.F.R. 29.1).

By conducting the forest management program under the practices and stipulations described above, it is anticipated that wildlife species which could be adversely affected would find sufficient food resources and resting places so their abundance and use will not be measurably lessened on the refuge(s) and in some cases, enhanced. Additionally, it is anticipated that monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, and their habitats.

The combination of forest management practices and stipulations identified above will ensure that tree harvest activities contribute to the enhancement, protection, conservation, and management of native wildlife populations and their habitats on the refuge. As a result, forest management contributes to achieving refuge purpose(s); contributes to the Mission of the NWRS; and helps maintain the biological integrity, diversity, and environmental health of the refuge.

Mandatory Reevaluation Date:
09/2021__ Mandatory 10-year reevaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision:
__X__ Environmental Assessment and Finding of No Significant Impact

References:

Devine, W. D., and C. A. Harrington. 2006. Changes in Oregon white oak (Quercus garryana Dougl. ex Hook.) following release from overtopping conifers. Trees 20:747-756.

C8. Forest Management Compatibility Determination. Uses are compatible with stipulations.

Prepared by: ______________________ 9/7/2011
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: ______________________ 9-7-2011
(Signature) (Date)

Concurrence

Refuge Supervisor: ______________________ 9-12-11
(Signature) (Date)

Regional Chief,
National Wildlife
Refuge System: ______________________ 9-12-11
(Signature) (Date)

Research Compatibility Determination

RMIS Database Use: Research; Scientific Collecting; Surveys

Refuge Name: Ankeny, Baskett Slough, and William L. Finley National Wildlife Refuges

Establishing and Acquisition Authorities:
- Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq

Refuge Purposes – Ankeny Refuge
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Refuge Purposes - Baskett Slough Refuge
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Refuge Purposes - William L. Finley Refuge
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act of 1929, 16 U.S.C. 715 et. seq.).

Additional detail on the purposes of these Refuges may be found in Chapter 1 of the Final CCP/EA.

National Wildlife Refuge System Mission: "The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

Description of Use: Research is an existing use and is conducted on Refuge lands and waters by independent scientists, universities, partnering agencies, educational groups, and Refuge staff. The Complex as a whole receives approximately 20-40 requests per year on average from non-Service entities (e.g., universities, state or territorial agencies, other Federal agencies, nongovernmental organizations) to conduct scientific research, scientific collecting, and surveys on Refuge lands. These project requests can involve a wide range of natural and cultural resources as well as public use management issues including basic absence/presence surveys, collection of new species for identification, habitat use and life-history requirements for specific species/species groups, practical methods for habitat restoration, extent and severity of environmental contaminants, techniques to control or eradicate pest species, effects of environmental change on resource conditions and associated habitat/wildlife response, etc.

The Service's Research and Management Studies (4 RM 6) and Appropriate Refuge Uses (603 FW1.10D(4)) policies indicate priority for scientific investigatory studies that contribute to the enhancement, protection, use, preservation, and management of native wildlife populations and their habitat as well as their natural diversity. Projects that contribute to Refuge-specific needs for resource goals and objectives, where applicable, would be given a higher priority over other requests. Research proposals will be reviewed by the Refuge and conservation partners, as appropriate. If a proposal is approved, Special Use Permits are issued and administered by the Refuge Manager.

Evaluation criteria for approving studies will include, but not be limited to, the following:

- Research contributing to specific Refuge management issues will be given higher priority over other research requests.
- Research projects that can be accomplished off-Refuge are less likely to be approved.
- The level and type of disturbance will be carefully evaluated when considering a request. Refuge evaluation will determine if any effort has been made to minimize disturbance through study design, including considering adjusting location, timing, scope, number of permittees, study methods, number of study sites, etc. If project methods impact or conflict with Refuge-specific resources, priority wildlife-dependent public uses, other high-priority research, or Refuge habitat and wildlife management programs, then it must be clearly demonstrated that its scientific findings will contribute to resource management and that the project cannot be conducted off Refuge lands for the project to be compatible. If unacceptable impacts cannot be avoided, then the project will not be compatible.
- Approvals are subject to sufficient staffing for the Refuge to monitor researcher activity in a sensitive area.
- The length of the project will be specified before approval.
- Projects will be reviewed annually.
- These criteria will also apply to any properties acquired in the future within the approved boundary of the Refuge.

Availability of Resources: Refuge staff responsibilities for projects by non-Service entities will be primarily limited to the following: review of proposals, prepare Special Use Permits (SUPs) and other compliance documents (e.g., Section 7 of the Endangered Species Act of 1973, Section 106 of the National Historic Preservation Act), and monitor project implementation to ensure that impacts and conflicts remain within acceptable levels (compatibility) over time. Additional administrative, logistical and operational support may also be provided depending on each specific request. Estimated costs will be determined for each project. Sufficient funding in the general operating budget of the Refuges must be available to cover expenses for these projects. The terms and conditions for funding and staff support necessary to administer each project on the Refuges will be clearly stated in the SUPs.

Under the Preferred Alternative 2, the following annual funding costs would be required to administer and manage research activities as described above. Refuge operational funds are currently available through the Service budget process to administer this program as envisioned under Preferred Alternative 2. Any substantial increase in the number of projects would create a need for additional resources to oversee the administration and monitoring of the investigators and their projects. Any substantial additional costs above those itemized below may result in finding a project not compatible unless expenses are offset by the investigator, sponsoring agency, or organization.

Table C-11. Costs Associated with Research Use

Category and Itemization	One-time ($)	Recurring ($/yr)
Administrative support: Evaluation of applications and permit management	$0	$1,500
Monitoring of ongoing research projects and their effects (Refuge biologist and managers)	$0	$3,500
Special equipment, facilities, or improvements	$0	$0
Offsetting revenues	$0	$0
Total One Time Expenses for the Complex ($)		$ 0
Total Recurring Expenses for the Complex ($/year)		$ 5,000

Anticipated Impacts of Use:

Short-term impacts: Impacts would be project- and site-specific, where they will vary depending upon the nature and scope of the field work. Some effects would occur through disturbance which is expected with some research activities, especially where researchers are entering sanctuaries or sensitive areas. Researcher disturbance could include altering wildlife behavior, trampling vegetation, or inflicting injury or stress due to trapping and handling wildlife. Death of animals from lethal collection methods or from accidental death and injury from handling (e.g., pit-tagging, force feeding, and blood collection) may occur. Experimental manipulation of habitats may result in the alteration or destruction of wildlife habitat. Impacts may also occur from infrastructure necessary to support a projects (e.g., permanent transects or plot markers, monitoring equipment, etc.).

Disturbance to breeding, resting and feeding wildlife and their habitats may occur through frequent contact with researchers performing data collection and monitoring activities. Results of disturbance could include the abandonment of nest and young resulting from frequent visitation to nest or breeding sites.

These effects would be expected to be localized and temporary, therefore minor, given the stipulations guiding project approval and implementation that are outlined below. Some increase in invasive plants is possible from ground disturbance and/or transportation of source seed on research equipment and personnel, but it will be minimized or eliminated by requiring proper cleaning of investigator equipment and clothing as well as quarantine methods, where necessary. This increase is not expected to be significant relative to the likelihood of invasive plants spreading from typical habitat management or public use.

Projects which are not included in Objectives under Goal 13 may require additional NEPA documentation.

Long-term impacts: Use of the Refuges to conduct research, scientific collecting, and surveys will generally provide information that would benefit fish, wildlife, plants, and their habitats. Scientific findings gained through these projects provide important information regarding life-history needs of species and species groups as well as identify or refine management actions to achieve resource management objectives in Refuge management plans (especially CCPs). Reducing uncertainty regarding wildlife and habitat responses to Refuge management actions in order to achieve desired outcomes reflected in resource management objectives is essential for adaptive management in accordance with 522 DM 1.

Public Review and Comment: Various opportunities were provided for the public to engage with the planning process. Appendix A details public involvement undertaken during development of the CCP/EA. Written comments on this draft compatibility determination were solicited during the public review of the Draft CCP/EA, between May 25, 2011 and June 30, 2011. Appendix L summarizes the public commentary received, and includes responses from the Service.

Determination:
_____ Use is Not Compatible
__x__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
- All researchers will be required to submit a detailed research proposal for review and recommendation by the Refuge Biologist and approval by the Refuge Manager. The Biologist will provide the required proposal format to researchers.
- Each project will require a SUP, with a defined termination date. Annual or other short-term SUPs are preferred where feasible. Renewals will be subject to Refuge Manager approval based upon timely submission of and content in progress reports and compliance with SUP terms.
- Special use permits will contain specific terms and conditions that the researcher must follow relative to activity, location, duration, seasonality, etc. to ensure continued compatibility. Measures to minimize potential impacts (e.g., reduce the numbers of researchers entering an area, restrict research in specified areas) may be developed and included as part of the study design and included on the SUP. If researcher is out of compliance with terms of the SUP or if unacceptable impacts to natural resources or conflicts arise or are documented, then the Refuge Manager may suspend, modify conditions of, or terminate a SUP.
- Extremely sensitive wildlife habitat areas will be avoided unless sufficient protection from research activities (i.e., disturbance, collection, capture and handling) is implemented to limit the area and/or wildlife potentially impacted by the proposed research. When and where needed, some areas may be temporarily/seasonally closed to research. Research activities will be modified to avoid harm to sensitive wildlife and habitat when unforeseen impacts arise, such as a wildfire altering landscape conditions or large declines in a population.
- Consultation will be conducted for any research activities that may possibly have an impact on threatened or endangered species or critical habitat. Only projects which have no effect or will result in not likely to adversely affect determinations will be approved.
- Investigators must possess appropriate and comply with conditions of State or Territorial and Federal permits for their projects.
- Research requiring species collection will only be authorized after careful consideration by the Refuge Biologist and Refuge Manager as to the importance of Refuge populations to the conservation of the species, the possible adverse impacts to the Refuge populations, and the humaneness of the collection methodology. Where possible, researchers should coordinate and share collections to reduce sampling needed for multiple projects. For example, if one investigator collects fish for a diet study and another investigator examines otoliths, then it may be possible to accomplish sampling for both projects with one collection effort.
- Only a minimum number of samples required for identification and/or experimentation and

statistical analysis would be permitted for collection. All samples collected on Refuge lands are the property of the Service even while in the possession of the investigator. Service personnel shall be provided access to the samples and specimens at any time at no cost (unless arrangements are made to the contrary). Any future work with previously collected samples not clearly identified in the project proposal will require submission of a subsequent proposal for review and approval. In addition, a new SUP will be required for additional project work. For samples or specimens to be stored at other facilities (e.g., museums), a Memorandum of Understanding will be necessary. Once research is complete or terminated, researchers shall check with the Refuge to ascertain whether samples and specimens are to be turned over to Refuge offices.
- Sampling equipment as well as investigator clothing and vehicles (e.g., ATV, boats) will be thoroughly cleaned (free of dirt and plant material) before being allowed for use Refuge lands to prevent the introduction and/or spread of pests. Where necessary, utilize quarantine methods.
- At any time, Refuge staff may accompany investigators in the field.
- Investigators and support staff will follow all Refuge-specific regulations, unless otherwise excepted in writing by Refuge management.
- Agencies and entities operating stationary monitoring stations requiring utilities (air quality, weather) will cover maintenance and operating costs including utilities for their station.
- Upon completion of the project or annually, all equipment and markers (unless required for long-term projects), must be removed and sites must be restored to the Refuge Manager's satisfaction. Conditions for clean-up and removal of equipment and physical markers will be stipulated in the SUP.
- Progress reports are required at least annually for multiple-year projects. The minimum required elements for a progress report will be provided to investigator(s). Final reports are due one year after completion of the project unless negotiated otherwise with the Refuge Manager.
- The Refuge staff will be given the opportunity to review draft manuscripts from the project before submittal to scientific journals for consideration of publication. The Refuge staff will be provided with copies (reprints) of all publications resulting from a Refuge project. The Refuge staff will be provided with copies of raw data (preferably electronic database format), if requested, at the conclusion of the project.
- The NWRS, specific Refuge, names of Refuge staff and other Service personnel that supported or contributed to the project will be appropriately cited and acknowledged in all written and oral presentations resulting from projects on Refuge lands.
- The Refuge Manager will issue special use permits annually for Refuge research. Additional permits may be considered depending on staff workload and cumulative impacts of existing research projects on wildlife and habitats. The permit holder will list each person assisting on the research project and provide description and license number of vehicles that will be used.
- The SUP must be prominently displayed in the permittee's vehicle at all times when present on the Refuge.

Justification:
Research, scientific collecting, and surveys on Refuge lands are inherently valuable to the Service because they expand scientific information available for resource management decisions. Refuge monitoring and research will directly benefit and support Refuge goals, objectives and management plans and activities and can contribute to recovery of endangered or threatened species. Management

of fish, wildlife, plants and their habitat should improve through the application of knowledge gained from monitoring and research. By allowing the use to occur under the stipulations described above, it is anticipated that wildlife species which could be disturbed during the use would find sufficient food resources and resting places so their abundance and use will not be measurably lessened on the Refuges. Additionally, it is anticipated that monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, and their habitats. The combination of stipulations identified above and conditions included in any SUPs will ensure that proposed projects contribute to the enhancement, protection, conservation, and management of native wildlife populations and their habitats on the refuge(s). As a result, these projects will help fulfill refuge purposes; contribute to the Mission of the NWRS; and maintain the biological integrity, diversity, and environmental health of the refuges.

Mandatory Reevaluation Date:
09/2021 Mandatory 10-year reevaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision:
X Environmental Assessment and Finding of No Significant Impact

C9. Research Compatibility Determination. Uses are compatible with stipulations.

Prepared by: (Signature) (Date) 9/7/2011

Refuge Manager/
Project Leader
Approval: (Signature) 9-7-2011 (Date)

Concurrence

Refuge Supervisor: (Signature) 9-12-11 (Date)

Regional Chief,
National Wildlife
Refuge System: (Signature) 9-12-11 (Date)

Appendix D

Photo by Tom Kaye/ Institute for Applied Ecology

Biological Resources of Concern

D.1 Introduction

Management direction of individual refuges is driven by refuge purposes and statutory mandates, coupled with species and habitat priorities. Management on a refuge should first and foremost address the individual refuge purposes. Additionally, management should address maintenance and, where appropriate, restoration of biological integrity, diversity, and environmental health as well as management for NWRS Resources of Concern. In this approach, the refuge contributes to the goals of the NWRS (601 FW 1) and achievement of the NWRS Mission.

In concert with this approach, and as an initial step in planning, the planning team identified resources of concern for the Complex. As defined in the *Policy on Habitat Management Plans* (620 FW 1), resources of concern are:

> "all plant and/or animal species, species groups, or communities specifically identified in refuge purpose(s), System mission, or international, national, regional, State, or ecosystem conservation plans or acts. For example, waterfowl and shorebirds are a resource of concern on a refuge whose purpose is to protect 'migrating waterfowl and shorebirds.' Federal or State threatened and endangered species on that same refuge are also a resource of concern under terms of the respective endangered species acts (620 FW1.4G)."

To provide a framework for development of goals and objectives in the CCP, the planning team identified resources of concern, following the process outlined in the handbook Identifying Refuge Resources of Concern and Management Priorities: A Handbook (FWS 2009).

D.2 Comprehensive Resources of Concern

A comprehensive list of potential resources of concern was created early in the planning process. The team identified species, species groups, and communities of concern, based upon a review of the Refuge's establishing history and purposes, a description of the key habitat types existing at the Refuges and a review of numerous conservation plans (see Section 1.9 of the Draft CCP/EA), many of which highlight priority species or habitats for conservation. The Comprehensive Resources of Concern list is contained in Table D-1.

Table D-1. Willamette Valley Refuges Table of Potential Resources of Concern

Species / Species Groups / Communities	Refuge Purposes	Federal T & E	State T & E	ONHIC-2004	Flyway Waterfowl Plans	Canada Goose Depredation Plan	Birds of Conservation Concern 2002 (USFWS)	Comprehensive Wildlife Conservation (ODFW)	NPC Regional Shorebird Plan 2000	ODFW Elk Management Plan	N. American WMP (2004)	Landbird Conservation Strategy- 2000	Grassland Birds of the Willamette Valley- 1999	WV Ecoregional Assessment - Finley	WV Ecoregional Assessment - Ankeny	WV Ecoregional Assessment - Baskett	Wetland Habitat	Agricultural Habitat	Wet Prairie Habitat	Oak Savanna Habitat	Oak Woodland Habitat	Riparian Habitat	Forested Habitat	Riverine Habitat	
Dusky Canada geese	X			1	X	X	GBBDC	X									x	x	x						
Aluetian Cackling Geese	X			1	X	X										33	x	x							
Cackling Geese	X				X	X	GBBDC										x	x	x						
Other Canada geese	X					X						I					x	x							
Pacific White-fronted geese	X						GBBDC										x	x							
Trumpeter swan							GBBDC										x	x							
Other Migratory Birds	X											X					x	x	x	x	x	x	x		
Ring-necked duck							GBBDC										x					x	x		
Wood duck							GBBDC										x	x				x			
Mallard							GBBDC										x	x				x			
Northern pintail							GBBDC				D						x	x							
American wigeon							GBBDC										x	x							
Bufflehead			SU	2				X									x								
Lesser Scaup							GBBDC				D						x								
Canvasback							GBBDC										x								
Redhead							GBBDC										x								
American white pelican			SV	2				X									x								
Bald Eagle			LT	4			T	X									x	x				x	x		
Northern harrier							BCC/N										x	x	x						
American Kestrel												D						x	x	x					
American Peregrine Falcon			LE	2			BCC	X									x		x			x			
Prairie Falcon							BCC										x		x			x			
Short Eared Owl				NR				X										x	x	x					
Western burrowing owl		SOC	SC	4														x		x					
Northern spotted owl		LT	LT																				x		
California quail												D								x	x	x	x		
Acorn Woodpecker		SOC		4				X				D								x	x				
Lewis's woodpecker		SOC	SC	2			BCC/BCR	X												x	x				
Red-naped sapsucker							BCC													x	x		x		
Pileated woodpecker			SV	NR				X													x	x	x		

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Common snipe									4								x	x	x					
Black-bellied plover									4								x	x						
Dunlin									4								x	x						
Greater yellowlegs									4								x	x						
Lesser yellowlegs									2								x	x						
Killdeer									4			D					x	x						
Western sandpiper									4								x	x						
Least sandpiper									3								x	x						x
Pectoral sandpiper									2								x	x						
Solitary sandpiper									2								x							
Red phalarope									4								x							
Red-necked phalarope									4								x							
Wilson's phalarope									2								x							
Semi-palmated plover									3								x							
Spotted sandpiper									3			D					x	x						
Long-billed dowitcher									2								x	x						
Short-billed dowitcher							BCC		4								x	x						
Black-necked stilt			NR	NR				X	1								x							
Black tern		SOC															x							
Great blue heron																	x	x	x	x	x	x	x	
Belted kingfisher												D					x					x		x
Olive-sided flycatcher		SOC	SV				BCC/BCR														x	x	x	
Pacific -slope flycatcher												D									x		x	
Western wood pee-wee												D									x	x	x	
Western kingbird												D						x	x					
Willow flycatcher		SOC	SV	4				X				D										x		
Loggerhead Shrike				4			BCC											x	x					
White-crowned sparrow												D							x	x	x	x	x	
Chipping sparrow								X				D									x		x	
Song sparrow												D					x	x						
Dark-eyed junco												D									x	x	x	
Purple Finch												D									x	x	x	

Table D-1. Willamette Valley Refuges Table of Potential Resources of Concern

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Wrentit												D									x	x	x	
Bullock's oriole												D									x	x	x	
Swainson's Thrush												D									x	x	x	
House wren												D									x	x	x	
Oregon Vesper Sparrow		SOC	SC	2			BCC	X					X						x	x				
Grasshopper Sparrow			SP	2				X					X	16		16			x	x				
Streaked Horned Lark(ssp.)		C	SC	1			BCC/BCR	X					X					x	x					
Western Meadowlark			SC	4				X				D	X					x	x	x				
Lazuli Bunting												D							x	x				
Western Bluebird			SV	4				X				D								x	x			
Orange-crowned warbler												D									x		x	
MacGillivray's Warbler												D											x	
Wilson's warbler												D									x	x	x	
Yellow-breasted chat		SOC	SC	4				X				I										x	x	
Western Purple Martin		SOC	SC	2				X									x						x	
Brown-headed cowbird												D						x	x		x		x	
Brewer's blackbird												D						x	x		x			
Tri-colored blackbird		SOC	NR														x							
Yellow-billed cuckoo			SC				BCC/BCR															x		
Band-tailed Pigeon		SOC		4			GBBDC	X				D								x	x		x	
Mourning dove							GBBDC					D						x		x	x			
Vaux's swift												D					x		x	x	x		x	
Cliff swallow												D					x		x	x	x		x	
Barn swallow												D					x		x	x	x		x	
Black-capped chickadee												D									x	x	x	
American goldfinch												D						x		x	x		x	
Lesser goldfinch												D						x		x	x		x	
Rufous hummingbird							BCR					D							x	x	x	x	x	
S-Billed (White Breasted) nuthatch				4				X												x	x			
Bushtit												D									x	x	x	
Common nighthawk			SC	4				X				D	X						x	x				
																					x	x	x	

Table D-1. Willamette Valley Refuges Table of Potential Resources of Concern

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Western Pond Turtle		SOC	SC	2				X									x					x		x
Painted turtle			SC	2				X						11			x					x		x
Sharptail snake			SV																	x				
Western rattlesnake			SV	4				X												x				
Northern Red-legged Frog		SOC	SV	4				X						20			x					x		
Oregon Spotted Frog		C	SC	1				X									x					x		
Oregon slender salamander		SOC	Und	1													x				x	x	x	
Western toad			SV	4													x	x	x			x	x	
Golden paintbrush (*Castilleja levisecta*)		LT	LE	1X				X								100				x				
Nelson's Checkermallow (*Sidalcea nelsoniana*)		LT	LT	1				X						21		13	x		x			x		
Kincaid's Lupine *(Lupinus oreganus var. kincaidii)*		LT	LT	1				X												x				
Willamette Valley Daisy *(Erigeron decumbens var. decumbens)*		LE	LE	1				X											x	x				
Bradshaw Desert Parsley *(Lomatium dissectum var. dissectum)*		LE	LE	1				X						20					x	x	x			
Peacock larkspur (*Delphinium pavonaceum)*		SOC	LE	1				X						42	12				x	x				
White-rock larkspur		SOC	LE	1				X												x				
Howell's montia (*Montia howellii)*		SOC																	x					
Water howellia *(Howellia aquatilis)*		LT		1				X						100			x		x					
Thin -leaved peavine (*Lathyrus holochlorus)*		SOC												24						x				
White-topped aster		SOC	LT					X											x					
Wayside aster		SOC	LT					X															x	

Table D-1. Willamette Valley Refuges Table of Potential Resources of Concern

Species / Species Groups / Communities	Refuge Purposes	Federal T & E	State T & E	ONHIC-2004	Flyway Waterfowl Plans	Canada Goose Depredation Plan	Birds of Conservation Concern 2002 (USFWS)	Comprehensive Wildlife Conservation (ODFW)	NPC Regional Shorebird Plan 2000	ODFW Elk Management Plan	N. American WMP (2004)	Landbird Conservation Strategy- 2000	Grassland Birds of the Willamette Valley- 1999	WV Ecoregional Assessment - Finley	WV Ecoregional Assessment - Ankeny	WV Ecoregional Assessment - Baskett	Wetland Habitat	Agricultural Habitat	Wet Prairie Habitat	Oak Savanna Habitat	Oak Woodland Habitat	Riparian Habitat	Forested Habitat	Riverine Habitat	
Large fruit desert-parsley *(Lomatium macrocarpum)*																50				x					
Showy milkweed (*Asclepias speciosa)*																50			x	x					
Smooth goldfields *(Lasthenia glaberrima)*														14			x		x	x					
Branched Indian clover (*Trifolium dichotomum)*																50				x					
Winecup Clarkia (*Clarkia purpurea ssp. viminea)*																25				x					
Lobb's water-buttercup *(Ranunculus lobbii)*														100			x								
Tri-color monkey flower *(Mimulus tricolor)*														33	33		x								
Small-leaf bentgrass *(Agrostis microphylla)*														50			x		x						
Willamette Valley bittercress *(Cardamine penduliflora)*														15					x						
Puget Sound Gumweed (*Grindelia integrifolia*)																15	x		x	x					
Deltoid balsamroot *(Balsamorhiza deltoidea*)															25					x	x				
Tufted Foxtail *(Alopecurus carolinianus)*														100			x								
Fishpoison (*Eremocarpus setigerus*)														100						x					
Meadow checker-mallow (*Sidalcea campestris*)														21					x	x	x				
Physcomitrella patens														100											
Oregon Crane's-bill (*Geranium oreganum)*														25					x	x	x				
Fender's Blue Butterfly (*Plebehys icarioides fenderi)*		LE		1				X								19				x					
Taylor's checkerspot butterfly		C		1				X												x					

Table D-1. Willamette Valley Refuges Table of Potential Resources of Concern

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American Grass bug				1				X											x						
Oregon giant earthworm		SOC																				x			
Willamette floater (freshwater mussel)								X																	
Oregon white oak/Roemer's														X						x					
Oregon white oak-(Oregon ash)														X								x			
Oregon white oak																				x	x				
Willamette Valley wet prairie														X					x						
Tufted hairgrass/CA oatgrass														X					x						
Willamette Valley riparian																						x			
Roosevelt elk										X							x	x	x	x	x	x	x		
Blacktail deer																		x		x	x	x	x		
Western gray squirrel			SU	4				X												x	x		x		
Pacific pallid bat		SOC	SV	2																			x		
Townsend's big-eared bat		SOC	SC	2				X															x		
Silver-haired bat		SOC	Und	4																		x	x		
Long-eared myotis		SOC	Und																				x		
Fringed myotis		SOC	Und	2																			x		
Yuma myotis		SOC																				x	x		
California myotis								X																	
Camas Pocket gopher		SOC																x	x			x			
White-footed vole		SOC	Und																			x			
Red tree vole		SOC		1,4																			x		
Pacific lamprey		SOC	SV	4				X																x	
Oregon chub		LE	LE	1				X									x							X	
Steelhead (Upper Will ESU)-winter		LT	SS	1				X																x	
Chinook (Upper Will ESU)-spring		LT		1				X																x	
Coastal cutthroat trout (Upper Willamette ESU)		SOC		4				X																x	

D.3 Priority Resources of Concern

The Priority Resources of Concern (Table D-2) were selected from the Comprehensive Resources of Concern list as particular indicators by which to gauge habitat conditions. The Priority Resources of Concern table includes 23 focal species, including birds, fish, reptiles, amphibians, a butterfly, and two rare plants, that were selected as representatives or indicators for the overall condition of important refuge habitats. Most of the biological emphasis of the CCP is focused on maintaining and restoring these priority resources.

Several different conservation focal species may be listed for specific habitats to cover the variety of habitat structures and plant associations. In addition, species with specific "niche" ecological requirements may be listed as a focal species. Other species utilizing the habitat will generally be expected to benefit as a result of management for the focal species.

Definitions for the column headings in Table D.2 are as follows:

- **Focal Species**: Species selected as representatives or indicators for the overall condition of the conservation target. In situations where the conservation target may include a broad variety of habitat structures and plant associations, several different conservation focal species may be listed. In addition, species with specific "niche" ecological requirements may be listed as a focal species. Management will be focused on attaining conditions required by the focal species. Other species utilizing the conservation target will generally be expected to benefit as a result of management for the focal species.
- **Habitat Type:** The general habitat description utilized by the focal species.
- **Habitat Structure and Other Ecological Requirements:** The specific and measurable habitat attributes considered necessary to support the focal species.
- **Life History:** The general season of use for the focal species.
- **Other Benefiting Species:** Other species that are expected to benefit from management for the selected focal species. The list is not comprehensive; see the *Table of Potential Resources of Concern for the Refuges* for a more complete list.

Table D.2 Willamette Valley National Wildlife Refuges Priority Resources of Concern

Focal Species	Habitat Type	Habitat Structure and Other Ecological Requirements	Life History	Other Benefiting Species
Riparian				
Yellow warbler	Mid-late successional bottomland forest with intact understory, dense shrub layer	>70% cover shrub-subcanopy layers with subcanopy contributing >40% of the total; shrub layer (< 10 feet) cover 30-60%; shrub layer height >6.6 feet. (1)	Breeding	song sparrow, house wren, pileated woodpecker, great blue heron, belted kingfisher, olive-sided flycatcher, bushtit, elk, northern red-legged frog, Swainson's thrush, Wilson's warbler, willow flycatcher
Wood duck	Late successional bottomland forest, streams, beaver ponds, marshes	Shallow water wetlands, flooded beds of maturing moist-soil plants, and overflow floodplains. Cavities needed for nesting, trees or snags >12"diameter. Uses nest boxes. (4)	Year-round, Breeding	bushtit, song sparrow, yellow breasted chat, great blue heron
Nelson's checkermallow	Edge of seasonal wetlands, wet prairie, floodplain openings. Tolerates short-term winter inundation, low summer soil moisture	Open habitats with seasonally saturated soils supporting early seral plant species. (6) Reduce competition from thatch, invasive weeds, and ecological succession (woody) with mowing (post seed set) and prescribed fire.	Year-round	Western pond turtle (nesting), song sparrow, yellowthoat
Wet Prairie				
Western Meadowlark	Wet prairie – moderate to tall	Manage native prairies to <10% shrub cover; Maintain patches of > 200 acres (if opportunities exist < 200 acres, provide in tracts of > 25 ac. each). Variable grass heights up to 30 in. tall. (1)	Breeding	northern harrier, short-eared owl, grasshopper sparrow, , Oregon vesper sparrow, elk, peacock larkspur
Northern harrier	Wet prairie – moderate to tall	Contiguous herbaceous habitat of short-medium height native emergent species in >400 ac block (can include wetlands and/or dry prairie). No-activity buffer >400 feet radius for nests; no mowing before July 15. (1)	Breeding, wintering	Western kingbird, American kestrel, prairie falcon

Focal Species	Habitat Type	Habitat Structure and Other Ecological Requirements	Life History	Other Benefiting Species
Bradshaw's desert parsley	Wet prairie	Seasonally saturated or flooded prairies, with dense clay soils and slowly permeable clay layer (6) Reduce encroachment of woody vegetation Disturbance/ thatch removal necessary for long-term viability (mowing, fire, seasonal grazing) (6)	Year-round	wet prairie plant community (tufted hairgrass) short-eared owl, savanna sparrow, common snipe, western meadowlark ,peacock larkspur
Mixed Deciduous/Coniferous Forest				
Swainson's thrush	Mixed coniferous/Deciduous forest with intact understory	Mid to late successional forests provide: shrub layer cover >50% with >60% of that native shrubs; canopy cover >50%. (1)	Breeding	Rufous hummingbird, western wood pee-wee, song sparrow, Swainson's thrush, pileated woodpecker
Western gray squirrel	Mixed coniferous/Deciduous forest	Diet includes seeds, nuts, fungi, green vegetation, berries, insects, acorns, nuts, seeds of conifers, and fungi. Gathers and buries acorns. Brood dens typically are in tree cavities, often in old woodpecker holes. (8)	Year-round	Pileated woodpecker, wood duck
Pileated woodpecker	Mature mixed coniferous/ deciduous forest	Retain defective and dying trees, large snags. >70% canopy closure; >5 nest snags/ 10ha >76 cm dbh and 30 foraging snags/ha >25 cm dbh. (3)	Breeding, foraging	Wood duck, western gray squirrel, red-naped sapsucker
Wetlands				
Cackling/ Canada geese	Seasonal emergent wetlands, semi-permanent /permanent wetlands	See Dusky Canada Geese target below		
Northern red-legged frog	Seasonal emergent wetlands, semi-permanent /permanent wetlands	Wetland vegetation includes both emergent/submergent vegetation. Seasonal emergent wetlands with water depth 4-18 inches, water present until July 1. Sites <100 yds from woodland/riparian habitat to provide corridor to breeding locations. (7)	Breeding	Great blue herons

FOCAL SPECIES	HABITAT TYPE	HABITAT STRUCTURE AND OTHER ECOLOGICAL REQUIREMENTS	LIFE HISTORY	OTHER BENEFITING SPECIES
Dabbling ducks	Emergent wetlands – Semi-permanent	Summer depths vary from mudflat to several inches, winter depths 18-36 inches, vegetation includes both emergent/submergent vegetation.	Foraging, breeding, migrating	tundra swan, western pond turtles, shorebirds (edge), Northern red-legged frog
Oregon chub	Slack water off-channel habitats such as beaver ponds, oxbows, side channels, backwater sloughs, low gradient tributaries, flooded marshes.	Little or no water flow, silty organic substrate, need dense aquatic vegetation for hiding and spawning. Average depth <6 ft and summer temps >61°. Habitat void of non-native warm-water fish. (5)	Year-round	Northern red-legged frog, western pond turtle
Great blue heron	Emergent wetlands – Semi-permanent	Summer depths vary from mudflat to several inches, winter depths 18-36 inches, vegetation includes both emergent/submergent vegetation.	Year-round	Wood duck, ring-necked duck, yellow warbler
DUSKY CANADA GEESE (AND OTHER SUBSPECIES OF CANADA/CACKLING GEESE)				
Dusky and other Canada geese	Croplands	Annual/perennial ryegrass, fescue, pasture, corn. Grass height less than 4 inches during wintering period.	Foraging (winter)	wigeon, Northern pintail, mallard, streaked horned lark, elk
Cackling/ Canada geese	Seasonal emergent wetlands, semi-permanent /permanent wetlands	Variable wetland vegetation/open water. Seasonal emergent wetlands with water depth 4-18 inches.	Foraging, roost/loafing water (sanctuary)	Dabbling ducks, tundra swans
Streaked horned lark	Croplands	Habitats dominated by grasses and forbs with few or no trees or shrubs; free from disturbance. Habitats contain sparsely vegetated patches measuring ~4300 sq ft. with 20-50% of area bare or sparsely vegetated; herbaceous vegetation <12 inches tall. (1)	Breeding, wintering	Grasshopper sparrow, killdeer
Killdeer	Croplands	Fields, meadows, pastures, mudflats, and shores of lakes, ponds, and rivers. Nests on ground in open dry or gravelly situations. (8)	Breeding, wintering	Spotted sandpiper, savanna sparrow, northern harrier, short-eared owl, grasshopper sparrow, streaked horned lark, Oregon vesper sparrow, elk, peacock larkspur

Focal Species	Habitat Type	Habitat Structure and Other Ecological Requirements	Life History	Other Benefiting Species
Riverine				
Coastal cutthroat trout (Upper Willamette ESU)	Stream and off-channel riverine habitats	Barrier free, temperature <73 F (8) , intact riparian corridor.	Anadromous fish rearing, connectivity between spawning habitat/river	Chinook, steelhead
Steelhead (Upper Willamette ESU-winter)	Stream and off-channel riverine habitats	Medium to deep depths, capable of surviving in a wide range of temperature conditions. Does best where dissolved oxygen concentration is at least 7 ppm. (8)	Migrating	Chinook salmon, coastal cutthroat trout
Western pond turtle	Stream and off-channel riverine habitats	Basking structures (logs, vegetation mats, rocks), suitable adjacent terrestrial habitat for nesting (open areas with non-gravelly soils. Water temperatures < 35 ºC (95ºF). (10) Presence of underwater refugia to escape from predators, including rocks, undercut banks and large woody debris. (10, 11)	Wintering, breeding	Red-legged frog, great blue heron
Upland Prairie/Oak Savannah				
Western bluebird	Scattered large Oregon white oak w/herbaceous understory	100-300 ft spacing, open grown savannah form trees with at least 8 snags/ha >25cm dbh; at least 2 >71cm; hard and soft snags >40 ft tall. Grass groundcover w/bare ground. (3)	Breeding, wintering	Acorn woodpecker, white breasted nuthatch, American kestrel
Oregon white oak/Roemer's fescue community	Native upland prairie herbaceous understory	Mosaic of low growing native grasses (Roemer's fescue, CA oatgrass, blue wildrye, prairie junegrass), forbs, and bare ground, with an absence of dense canopy vegetation. Singular or small groves of oaks with scattered shrub component. Disturbance factors (mowing, fire) necessary to prevent succession. (1, 6)	Year-round	Fender's blue butterfly, Willamette Daisy, Kincaid's/spurred lupine, golden paintbrush

Focal Species	Habitat Type	Habitat Structure and Other Ecological Requirements	Life History	Other Benefiting Species
Slender-billed (white-breasted) nuthatch	Oak savannah/Woodland	Maintain and provide: Contiguous minimum stand size 100 acres. Canopy closure 40 to 80% with non-oak cover <10%. Mean dbh of oak should exceed 22 inches with 20% greater than 28 inches. (1)	Breeding, year-round	western gray squirrel, western bluebird, Lazuli bunting, Swainson's thrush
Fender's blue butterfly	Native upland prairie with scattered Oregon white oak	Roemer's fescue/native prairie forbs for adult nectar within 100 m (330 feet) of larval food plants, ideally native plants > 60% cover. (9) Minimum patch size of 10 acres of high quality habitat required. Habitat to include the presence of abundant larval host plants including Kincaid's/spurred lupine as well as 75% matrix species and 10% prairie indicator species (6). Must be managed for invasive species and woody vegetation. (2)	Breeding	Kincaid's/spurred lupine, Willamette daisy, western meadowlark
Oak Woodland				
Acorn woodpecker	Oak dominant, late successional	Large trees with cavities and snags for granaries, mean stand dbh >15 in with 20% >22 in; <5% Douglas fir canopy; <50% cover in sub canopy. (1)	Year-round	Slender-billed (white-breasted nuthatch
Western wood peewee	Oak dominant, late successional	Mature overstory foliage/ canopy with high edge to openings ratio; canopy closure 40-85% with >80% oaks and <5% Douglas fir; shrub-herbaceous understory each <80% cover. (1)	Breeding	Acorn woodpecker, lazuli bunting, house wren

D.4 Priority Resources of Concern

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Appendix E


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Implementation

- Overview and Historical Funding Picture
- Future Needs
- References

E.1 Overview and Historical Funding Picture

A Comprehensive Conservation Plan (CCP) provides long-term guidance for management decisions, sets forth goals, objectives, and strategies needed to accomplish refuge purposes, and identifies the U.S. Fish and Wildlife Service's best estimate of future needs. Often, a CCP provides detailed program planning levels that are substantially above current budget allocations, and as such, are primarily for Service strategic planning and program prioritization purposes. A CCP does not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

Implementation of the preferred alternative of the CCP will require increased funding, which will be sought through an increase in base funding (Congressional allocations), partnerships (both private and public) and grants. Activities and projects identified will be implemented as funds become available.

E.1.1 Operating Funds History

Operational management of refuge lands is accomplished by permanent and temporary staffing, volunteers, and partnerships. Operational management includes managing public use, law enforcement, cultural resources, biology, fire, maintenance, administration, and habitat/wildlife restoration/maintenance management programs, both on and off the refuges.

In Fiscal Year 2010, 41 percent of the station's operating funds came from Congressional allocated base funding. Base funds typically just include operational and maintenance funds however for the purpose of this CCP base funds include deferred maintenance, Service invasive species grants, Service Challenge Cost Share grants, Cross-Program Recovery funds, and annual maintenance dollars, and goes to fund salaries and benefits, special projects, etc.

Fifty-nine percent of the remaining station's total funds came from other sources, such as the Partners for Fish and Wildlife Program, interagency agreements (NRCS –Wetland Reserve Program), grants (North American Wetland Conservation Act), donations, Fire (Suppression/non Suppression), Migratory Birds, Refuge Roads, and ARRA Youth Programs. Without these additional funds, over half of what is accomplished each year would not happen.

Table E-1 tabulates station funding sources and salary allocations by source for the last five years.

Table E-1. Funding History for the Willamette National Wildlife Refuge Complex, 2006-2010

	2006		2007		2008	
Funding Source	**Allocated**	**Salary**	**Allocated**	**Salary**	**Allocated**	**Salary**
Base Funding*	$1,206,201	$ 875,761	$ 1,702,467	$779,868	$1,961,724	$ 871,785
Partners	$165,449	$83,997	$ 164,863	$ 98,084	$ 193,488	$100,804
Interagency	$668,503	$190,311	$806,380	$197,945	$ 681,343	$189,399
Grants	-	-	-	-	$1,447	-
Donations	$ 965	-	$1,601	-	$21,957	$11,503
Fire	$151,352	$147,778	$180,935	$99,628	$336,641	$211,062
Migratory Birds	$10,000	$ 10,000	$ 10,000	$8,179	$10,000	$ 8,147
Refuge Roads	$94,000	-	-	-	$ 501,000	-
ARRA Funds	-	-	-	-	-	-
Total Non-base Funding	$ 1,090,268	$432,086	$1,163,779	$403,836	$1,745,876	$520,915
Total Base*Funding	$ 1,206,201	$875,761	$1,702,467	$779,868	$1,961,724	$871,785
	2009		**2010**		**All Five Years**	
Funding Source	Allocated	Salary	Allocated	Salary	Allocated	Salary
Base Funding*	$1,554,209	$1,012,197	$1,801,436	$1,028,455	$8,226,037	$4,568,066
Partners	$291,189	$179,694	$358,258	$193,167	$1,173,247	$655,746
Interagency	$704,760	$143,458	$1,480,435	$114,563	$4,341,421	$835,676
Grants	$296,400	-	-	$ 53,051	$594,247	$53,051
Donations	$48,841	$ 21,561	$63,443	$23,952	$136,806	$57,017
Fire	$280,684	$209,676	$234,324	$195,893	$1,183,936	$864,037
Migratory Birds	$10,000	$8,352	$10,000	$9,554	$50,000	$44,232
Refuge Roads	-	-	-	-	$ 595,000	-
ARRA Funds	$105,632	$76,060	-	-	$105,632	$76,060
Total Non-base Funding	$1,737,506	$638,800	$2,146,459	$590,181	$8,180,289	$2,585,818
Total Base* Funding	$1,554,209	$1,012,197	$1,801,436	$1,028,455	$8,226,037	$4,568,066

* Base funding is defined in the text preceding the table.

E.1.2 Revenue Sharing

In lieu of property taxes, the Willamette Valley National Wildlife Refuge Complex annually provides revenue sharing payments to Benton, Linn, Marion, and Polk Counties of Oregon. Total revenue sharing payments made in 2010 were $27,702, $3,145, $12,983, and $10,699 respectively. The U.S. Congress each year determines what percent of funds will be appropriated for all appraised federal lands. Counties are not restricted in the use of these funds.

E.2 Future Needs

E.2.1 Future Sources of Funds

Projects listed below were drawn from the goals, objectives, and strategies and could be implemented over the next 15 years. Many of these projects will be included in either the Refuge Operational Needs System (RONS) or the Service Asset Management System (SAMMS). Both are used to request funding from Congress. Currently, a large backlog of maintenance needs exists on the refuges. In 2010, the deferred maintenance backlog for the Willamette Valley National Wildlife Refuge Complex was $15,667,193. Reduction of the backlog is an on-going goal and is included here in the analysis of funding needs. The RONS documents proposed new projects to implement the CCP to meet refuge goals and objectives and legal mandates.

Several infrastructure and facility projects will be eligible for funding through construction, deferred maintenance or Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) funds (i.e., Refuge Roads program).

Funds for other “one-time costs” (see below) will be sought through increases in refuge base funding, special project funds, grants, Refuge Roads, and fire funds.

E.2.2 Spending Priorities

Priorities are designated in Table E-2 for one-time and on-going (recurring) projects (strategies) identified within the CCP. Priorities are designated as either “A” or “B” ranked as per the definitions shown below. All of the projects incorporate the mission of the USFWS and the NWRS mission including the ‘Wildlife First’ premise as well as the Big 6 policy on wildlife-dependent recreation. It should be noted that while many of the habitat related strategies listed within this CCP are included on Table E-2, all of the various strategies are not equal in priority between the different refuges or even between management units within the same refuge. Step-down habitat management plans need to be developed that would further refine priorities between refuges and amongst units within a particular refuge.

Obviously funding could be a limiting factor regarding how much, or what parts, of the CCP that is implemented. As such, project priorities (strategies) have been outlined in Table E-2 that should help provide some general guidance and direction towards implementation. Projects have been assigned one of two different rankings

- “A” ranked projects are those that substantially contribute to the Refuge Purpose and/or to the various goals and objectives within this CCP. These are the projects that would provide the highest degree of resource benefits whether that be wildlife, habitat or public use related.

Generally, on-going maintenance activities especially related to existing habitats and public use facilities are within this category.

- “B” ranked projects are those that contribute to the Refuge Purpose and/or to the various goals and objectives within this CCP but to a lesser degree than “A” ranked projects. These projects still provide resource (wildlife, habitat, and public use) benefits but not as much as “A” ranked projects. Generally, the development of new facilities especially those related to public use are within this category.

E.2.3 Operational Costs to Implement CCP by Alternative

The following sections detail both one-time and recurring costs for various projects by alternative. Recurring costs reflect the future operational and maintenance costs associated with the project.

One-Time Costs: One-time costs reflect initial start-up costs associated with a project, whether it is a purchase of equipment, contracting service, or construction. Included also are items such as designing and installing an interpretive sign. These projects are usually projects that can be completed in three years or less. These projects do not include permanent operational costs (staff salary and support). They can, however, include the cost of temporary or term salary associated with a short term project. Salary for new positions and operational costs are reflected in operational or “recurring” costs. Table E-2 compares both one-time and recurring costs between the three alternatives.

Operational and Maintenance (Recurring) Costs: Operational and maintenance costs reflect refuge spending of base funds allocated each year. These are also known as recurring costs and are usually associated with day-to-day operations and projects that last longer than three years. Operational costs use base funding in Service codes 1261, 1262, 1263, 1264, 9131, 9263, and 9264.

Maintenance includes preventive maintenance; cyclic maintenance; repairs; replacement of parts, components, or items of equipment; adjustments, lubrication, and cleaning (non-janitorial) of equipment; painting; resurfacing; rehabilitation; special safety inspections; and other actions to assure continuing service and to prevent breakdown. Maintenance also includes maintaining public use, administrative, historical, and shop buildings and facilities. Through normal use and weather conditions, buildings and facilities need annual maintenance and repairs. Maintenance of habitat throughout the refuges from the threat of invasive plants and animals, succession, and protection of threatened and endangered species is an annual occurrence.

Alternative 1 reflects the current backlog. Alternatives 2 and 3 reflect the backlog and chart the increased maintenance needs associated with new facilities and projects.

Table E-2 displays estimated operating and maintenance costs by alternative for the major project items identified in the CCP. Alternative 1 is based on an estimate of costs for implementing the CCP under current management. Alternatives 2 and 3 reflect increased funding needs for proposed increases in public uses and facilities, increased habitat restoration and conservation activities, and other strategies as proposed in Chapter 2.

Table E-2. Operational (Materials, Supply, Equipment and Contract) Costs by Alternative

Goal	Objective(s)	Strategy	One time Cost	Recurring Cost (Annual)	Priority	Cost/unit	Units/ Total Cost	Alt 1	Alt 2	Alt 3
							Acres	1101	1294	3465
1	1a	Refuge farming		x	A	$75	Cost	$ 82,575	$ 97,050	$ 259,875
1	1a	Cooperative Farming Support Costs		x	A		Cost	[illegible]	$ 10,000	$ -
1	1b	Infrastructure for irrigation development	x		A		Cost	$ -	$ 500,000	$ 500,000
							Acres**	566	570	601
2	2a/2b/2c	Ongoing wetlands maintenance (IPM, water quality tests, nutria removal, etc.) each 3 years on average		x	A	$250	Cost	$ 141,417	$ 142,500	$ 150,250
							Acres	0	4	35
2	2b	Wetland development (restoration)	x		A	$2,000	Cost	$ -	$ 4,333	$ 35,333
							Acres**	217	295	374
3	3a/3b/3c/3d	Ongoing wet prairie maintenance (fire, woody veg treatment, IPM, etc.) each 3 years		x	A	300 (Alt 2) 200 (Alts 1 and 3)*	Cost	$ 43,467	$ 88,500	$ 74,867
							Acres	0	233	370
3	3d	Wet prairie development (restoration)	x		A	$1,000	Cost	$ -	$ 233,000	$ 370,000
4	4a/4b/4c	Ongoing maintenance		x	A	300 (Alt 2)	Acres**	191	339	401

Goal	Objective(s)	Strategy	One time Cost	Recurring Cost (Annual)	Priority	Cost/unit	Units/ Total Cost	Alt 1	Alt 2	Alt 3
		upland prairie/oak savanna (IPM, mowing, fire, oak density reduction) each 3 years				200 (Alts 1 and 3)*	Cost	$ 38,133	$ 101,600	$ 80,200
4	4d	Upland prairie/oak savanna development (restoration)	x		A	$1,500	Acres	0	444	631
							Cost	$ -	$ 666,000	$ 946,500
5	5a	Maintenance oak woodland (IPM, fire, supplemental seeding) each 3 years		x	A	300 (Alt 2) 200 (Alts 3) 100 (Alt 1)	Acres	253	255	255
							Cost	$ 25,267	$ 76,500	$ 50,933
5	5a	Maintenance oak woodland (oak density reduction, fir removal)	x		A	1300 (Alt 2) 900 (Alts 1 and 3)	Acres	758	765	764
							Cost	$ 682,200	$ 994,500	$ 687,600
6	6a	Maintenance mixed coniferous/deciduous forest (snag creation, fir removal, IPM)	x		B	600 (Alt 2) 250 (Alts 1 and 3)*	Acres***	371	361	370
							Cost	$ 92,750	$ 216,600	$ 92,500
7	7a/7b	Maintenance riparian (IPM, plantings) approx. each three years		x	A	$100	Acres**	0	655	0
							Cost	0	$ 65,500	0
7	7c	Restore riparian (planting, mow, IPM)	x		A	$400	Acres	0	158	452
							Cost	$ -	$ 63,200	$ 180,800
9	9a/9b/9c/9d	Collect seed, redistribute, outplant	x		A	$150	Acres****	122.3	190.1	232.6
							Cost	$ 18,345	$ 28,515	$ 34,890
9	9e	Establish new chub wetland	x		B	$3,000	Acres	0	25.2	25.2
							Cost	$ -	$ 75,600	$ 75,600

Goal	Objective(s)	Strategy	One time Cost	Recurring Cost (Annual)	Priority	Cost/unit	Units/ Total Cost	Alt 1	Alt 2	Alt 3
							# Structures	4	5	5
9	9e	Install safeguards on water control structures	x		A	$5,000	Cost	$ 20,000	$ 25,000	$ 25,000
							Miles	0	7.18	3.28
10	10a	Establish new trails (include reroute)	x		B	$10,000	Cost	$ -	$ 71,800	$ 32,800
						$1,000	Miles	23.7	30.9	27
10	10a	Maintain existing trails		x	A		Cost	$ 23,700	$ 30,900	$ 27,000
							Structures	15	23	19
10	10a	Maintain existing and new observation structures and blinds.		x	A	$4,000	Cost	$ 60,000	$ 92,000	$ 76,000
							# Structures	0	8	4
10	10a	Install new observ. structures (and remove where specified)	x		B	$40,000	Cost	$ -	$ 320,000	$ 160,000
							# Structures	0	3	4
10	10a	Install/upgrade new restrooms	x		A	$50,000	Cost	$ -	$ 150,000	$ 200,000
							# Structures	0	2	0
10	10a	Install new vehicle pullouts	x		B	$10,000	Cost	$ -	$ 20,000	$ -
							# Structures	0	1	1
10	10a	Install new canoe launch	x		B	$50,000	Cost	$ -	$ 50,000	$ 50,000
							# Structures	0	28	18
10	10b	Install new interpretive signs	x		B	$3,500	Cost	$ -	$ 98,000	$ 63,000
10	10b	Maintain existing		x	A	$200	#	52	85	75

Goal	Objective(s)	Strategy	One time Cost	Recurring Cost (Annual)	Priority	Cost/unit	Units/ Total Cost	Alt 1	Alt 2	Alt 3
		interpretive signs					Structures			
							Cost	$ 10,400	$ 17,000	$ 15,000
10	10b	Develop and install interpretive exhibits EE center	x		B	$500,000	Cost	$ -	$ 500,000	$ 500,000
10	10b	Develop non-traditional interpretive media, languages, etc.	x		B	$20000	Cost	$ -	$ 20,000	$ 20,000
							# Events	4.5	4.5	2.5
10	10b	Host special events		x	A	$1,000	Cost	$ 4,500	$ 4,500	$ 2,500
10	10c	Construct new EE center	x		A	$3,000,000	Cost	$ -	$ 3,000,000	$ 3,000,000
							# Structures	0	10	10
10	10c	Construct new EE shelters	x		B	$80,000	Cost	$ -	$ 800,000	$ 800,000
10	10c	Maintain EE Center and shelters		x	A	$65,000	Cost	$ -	$ 65,000	$ 65,000
10	10d	Construct additional kiosk, develop materials & signage	x		B	$6,000	Cost	$ -	$ 6,000	$ 6,000
							# Plans	5	8	8
9,10,12, 13	Various	Develop step-down plans	x		A	$15,000	Cost	$ 75,000	$ 120,000	$ 120,000
10	10f	Waterfowl hunt initial costs (develop package, publications, signs, purchase blinds, etc.)	x		B	$56,000	Cost	$ -	$ 56,000	$ -

Goal	Objective(s)	Strategy	One time Cost	Recurring Cost (Annual)	Priority	Cost/unit	Units/ Total Cost	Alt 1	Alt 2	Alt 3
10	10g	Develop safe fishing access	x		B	$15,000	Cost	$ -	$ 15,000	$ 15,000
10	10h	Road and transportation improvements	x		A	10,000,000	Cost	$ -	$10,000,000	$10,000,000
10	10h	Road and transportation maintenance		x	A		Cost	$ 200,000	$ 200,000	$ 200,000
11	11b	Create interpretive media, educational materials and outreach materials	x		B	$120,000	Cost	$ -	$ 120,000	$ 120,000
11	11b	Maintain and repair historic structures	x		B	$150,000	Cost	$ -	$ 1,200,000	$ 1,200,000
11	11b	Maintain historic structures		x	B		Cost	$ 15,000	$ 50,000	$ 50,000
13	13a, 13b, 13c	Monitoring		x	A		Cost	$ 100,000	$ 200,000	$ 150,000

*Costs for Alternative 3 may be overestimated for some ongoing habitat maintenance as some strategies will not be implemented under this alternative.

** Acres for this treatment comprise all acres in this habitat type, divided by three (the estimated frequency of treatment on each acre being every 3 years)

***Acres for this treatment comprise all acres in this habitat type, divided by five (the estimated frequency of treatment on each acre being every 5 years)

****Acres for this treatment were estimated at 10% of total acres in the wet prairie and upland prairie/oak savanna habitat type.

One-time costs are expected to be applied only once over the lifetime of the CCP (15 years)
Recurring costs are costs that would be incurred each year during the lifetime of the CCP (annually)
Costs do not include staff costs (these are outlined in Table E-3)

E.2.4 Staffing Needs to Implement the CCP, by Alternative

Staff is needed to manage and enhance the quality and diversity of indigenous wildlife habitats on the Willamette Valley National Wildlife Refuge Complex. With the proper staffing to implement this plan, habitat management practices can be implemented and monitoring of flora and fauna responses to management can be applied, which would allow us to apply adaptive management strategies so crucial for long term success in meeting the mission, goals, and objectives of the Refuges.

Staff will interact with the public for education purposes and to provide for public safety. Maintenance staff will maintain facilities and equipment. Training of staff and coordination among staff, volunteers and partners will ensure the mission and guiding principles of the National Wildlife Refuge System endure.

Table E-3 includes costs for permanent and seasonal staff needed each year. It does not include staff costs associated with special projects; these are summarized in Table E-2. Table E-3 is also related to the Refuge Annual Performance Plan. Alternative 1 reflects how allocations were spent among management activities in FY 2010 at Willamette Valley National Wildlife Refuge Complex. The table includes funds spent in 1121, 1231, 1261, 1262, 1263, 1264, 1971, 9131, and 9263.

In Table E-3, the section entitled "Alternative 2 and 3 Staffing Positions" reflects an increase in staff positions to fully support operation and maintenance of all programs associated with these Alternatives. The Refuge Annual Performance Plan (RAPP) was used in concert with Regional Refuge management to calculate which type of position (manager, biologist, equipment operator, etc.) and how many were needed. This process was an outcome of the Final Report: Staffing Model for Field Stations (USFWS 2008) that tasked each refuge to prepare an “Ultimate Organization Staffing Chart.” The proposed full development-level staffing plan would achieve optimum refuge outputs within this planning period (15 years). The rate at which this station achieves its full potential to fulfill the objectives and strategies contained in the plan is dependent upon receiving adequate funding and staffing.

Table E-3. Annual Costs of Salaries and Benefits, Associated with Staff , by Alternative

Staff-Refuge Operations	Status*	Staff Positions	Justifying Objective	Alt 1	Alt 2	Alt 3
Present Core Staff (Base Funded)						
Project Leader	PFT	GS-0485-14	Current	X	X	X
Deputy Project Leader	PFT	GS-0485-13	Current	X	X	x
Wildlife Biologist	PFT	GS-0486-12	Current	X	X	x
Wildlife Refuge Manager	PFT	GS-485-12	Current	X	X	X
Park Ranger (EE)	PFT	GS-0025-11	Current	X	X	X
Park Ranger (LE)	PFT	GS-0025-9	Current	X	X	X
Administrative Officer	PFT	GS-0341-9	Current	X	X	X
Computer Assistant	PFT	GS-0335-7	Current	X	X	X
Engineering Equipment Oper.	PFT	WG-5716-10	Current	X	X	X

Staff-Refuge Operations	Status*	Staff Positions	Justifying Objective	Alt 1	Alt 2	Alt 3
Engineering Equipment Oper.	PS	WG-5716-10	Current	X	X	X
Engineering Equipment Oper.	PS	WG-5716-10	Current	X	X	X
Engineering Equipment Oper.	PS	WG-5716-10	Current	X	X	X
Present Core Staff (Non-Base Funded)						
Fish & Wildlife Biologist	PFT	GS-0401-12	Current	X	X	X
Fish & Wildlife Biologist	PFT	GS-0401-11	Current	X	X	x
Fish & Wildlife Biologist	PFT	GS-0401-11	Current	X	X	X
Fire Management Officer	PFT	GS-0401-11	Current	X	X	X
Forestry Technician	PFT	GS-0462-7	Current	X	X	X
Forestry Technician	PFT	GS-0462-7	Current	X	X	X
Present Temporary Staff (Non-Base One Time Funded)						
Wildlife Biologist	TERM	GS-0486-9	Current	X	X	X
Biological Science Technician	TERM	GS-0404-8	Current	X	X	X
Student Career Emp. Program	INTERN	GS-0499-5	Current	X	X	X
Office Assistant	TERM	GS-0303-5	Current	X	X	X
Engineering Equipment Oper.	TERM	WG-5716-10	Current	X	X	X
Tractor Operator	TEMP	WG-5705-6	Current	X	X	X
Tractor Operator	TEMP	WG-5705-6	Current	X	X	X
Tractor Operator	TEMP	WG-5705-6	Current	X	X	X
Youth Crew Leader	TEMP	GS-0186-5	Current	X	X	X
Youth Crew Leader	TEMP	GS-0186-5	Current	X	X	X
YCC Enrollee	TEMP	Minimum Wage	Current	X	X	X
YCC Enrollee	TEMP	Minimum Wage	Current	X	X	X
YCC Enrollee	TEMP	Minimum Wage	Current	X	X	X
YCC Enrollee	TEMP	Minimum Wage	Current	X	X	X
YCC Enrollee	TEMP	Minimum Wage	Current	X	X	X
YCC Enrollee	TEMP	Minimum Wage	Current	X	X	X
YCC Enrollee	TEMP	Minimum Wage	Current	X	X	X
YCC Enrollee	TEMP	Minimum Wage	Current	X	X	X
Americorp Intern	TEMP	Contracted	Current	X	X	X
Alternative 2 and 3 Staffing Positions						
Wildlife Biologist	PFT	GS-0486-11	13A		X	X
Wildlife Refuge Manager	PFT	GS-0485-12	12B		X	X

Staff-Refuge Operations	**Status***	**Staff Positions**	**Justifying Objective**	**Alt 1**	**Alt 2**	**Alt 3**
Office Automation Clerk	PFT	GS-0326-4	13D		X	X
Environmental Education Specialist	PFT	GS-1710-11	10C		X	X
IT Specialist	PFT	GS-2210-9	13D		X	X
Maintenance Worker	PFT	WG-4749-8	11A		X	X
Biological Science Technician	PFT	GS-0404-7	13A		X	X
Tractor Operator	PFT	WG-5705-7	1A		X	X
Biological Science Technician	PFT	GS-0404-7	13A		X	X
Wildlife Refuge Manager	PFT	GS-0485-11	1A		X	X
Park Ranger (Vol. Prog. Mgr.)	PFT	GS-0025-9	10C		X	X
Refuge Operations Spec.	PFT	GS-0485-11	2C		X	X
Tractor Operator	PFT	WG-5705-7	1A		X	X
Botanist	PFT	GS-0430-11	13B		X	X
Biological Science Technician	PFT	GS-0404-7	13B		X	X
Fisheries Biologist	PFT	GS-0482-11	8A		X	X
GIS Program Manager	PFT	GS-2210-11	13B		X	X
Maintenance Worker	PFT	WG-4749-8	2B		X	X
Biological Planner	PFT	GS-0401-11	13B		X	X
Tractor Operator	PFT	WG-5705-7	1A		X	X
Engineering Equipment Oper.	PFT	WG-5716-9	2A		X	X
Prescribed Fire Specialist	PFT	GS-0401-9	4C		X	X
Wildlife Refuge Manager	PFT	GS-0485-11	1A		X	X
Park Ranger	PFT	GS-0025-11	10A		X	X
Total Positions				**37**	**61**	**61**

*Status definitions:
PFT: Permanent Full Time
PS: Permanent Seasonal
TEMP: Temporary Position
TERM: Term Position
GS: General Schedule Federal Employees
WG: Wage Grade Scale

Youth Programs: Each year, the Complex hires two Youth Conservation Corps (YCC) crews (Ankeny/Baskett Slough and W.L. Finley NWRs). In FY 2009, funding for the two YCC programs was $46,412. The YCC crews are used for light maintenance on the Refuges including litter pick-up, trail maintenance, invasive species control, lawn cutting, painting, and other light maintenance duties. A temporary Youth Crew Leader is hired, usually at the GS-5 wage, for the summer term of ten weeks for each YCC crew. Each crew usually consists of four to five youths, aged 15 to 18, hired at current Oregon state minimum wage for an eight week season. Transportation is provided, either through use of existing Refuge vehicles or by rental. All tools, training, and equipment are provided. In addition, the crews are offered educational opportunities on conservation-related matters throughout the summer which may result in additional costs to the program.

Over the past two years, the Refuge has received funding through national youth hiring initiatives to obtain an AmeriCorps member and an intern. Funding for FY 2009 was $19,000 and for FY 2010 was $18,500. The Refuge provided office space, transportation, training, equipment, materials and housing in support of the positions. These positions are supervised by the Visitor Services Manager. Responsibilities for the members includes developing environmental education opportunities, volunteer coordination, and outreach.

Volunteer Programs: The Complex has a varied and somewhat active volunteer program. During FY 2010, individual volunteers donated 5,583 hours towards accomplishing Refuge programs including maintenance, public use assistance, biological support, environmental education, and administrative duties. The Refuge provides transportation, training, supplies, equipment and sometimes housing in support of the volunteer program. The amount of hours contributed has been fairly constant for the last five years. The total number of volunteers has doubled in the last five years (Table E-4). The amount of volunteer hours donated is the equivalent of approximately 2 ½ full time employees. This is calculated by taking the number of hours a full time employee works per year (26 pay periods/year x 80 hours/pay period = 2080 hours) and applying that to the number of volunteer hours worked (5583/2080 = 2.68).

Table E-4. Volunteer Numbers/Hours Contributed at Willamette Valley Refuges (2006-2010)

	2006	2007	2008	2009	2010
Volunteers	123	180	220	266	274
Hours	5,685	5,150	5,350	5,242	5,583

According to the Independent Sector, the estimated dollar value of volunteer time for 2009 is $20.85 per hour. The value of volunteer hours for 2010 for the Willamette Valley Complex is therefore $116,405.

Partnership (Cooperative Funding) Opportunities: The Willamette Valley National Wildlife Refuge Complex location near large metropolitan areas facilitates many opportunities for partnerships with other agencies, interest groups and schools. Coordinated partnership efforts will focus on habitat restoration, land protection, environmental education, fish and wildlife monitoring, outreach, and quality wildlife dependent recreation. Current and past partners include Natural Resource Conservation Service, Oregon Department of Fish and Wildlife, and non-profit groups (such as Local Audubon Societies, Friends of the Willamette Valley National Wildlife Refuge Complex, Oregon State University, University of Oregon, local school districts, McKenzie River Trust, Greenbelt Land Trust, The Nature Conservancy, Trust for Public Lands, Watershed Councils, Institute for Applied Ecology, County fire districts, and many others). Future partners will include these groups as well as other county, state and tribal agencies. Partnerships like these will increase our effectiveness, knowledge, and community support, as well as reduce Refuge operating costs. Presently, five non-base staffing positions are funded partially through our partners. These positions support off refuge restoration of unique habitats and species throughout the Willamette Valley. We also depend on Service Challenge Cost Share Grants to accomplish restoration/maintenance of unique habitats, restore/maintain historic structures, and improve visitor service programs and facilities. These grants require matching funds from our partners.

References

Independent Sector. http://www.independentsector.org/volunteer_time

U.S. Fish and Wildlife Service. 2008. Final Report: Staffing Model for Field Stations, National Wildlife Refufe System. June 2008. 26pp.

Appendix F

Photo by Josh Gentry/USFWS

Integrated Pest Management Plan

- Introduction
- General Pest Control Methods and Strategies
- Treatment Priorities - General
- Refuge Specific Pests, Objectives, and Control Strategies
- Pesticide Usage – Best Management Practices
- Evaluation of Ecological Risk Associated with Pesticide Use
- Chemical Profile Preparation
- References

F.1 Introduction

The Willamette Valley Refuges (Ankeny, Baskett Slough, and W.L. Finley) total just over 11,000 acres in size, and include a diversity of native habitats and agricultural lands. Approximately half of the land is managed as cultivated croplands to provide forage for wintering Canada geese. The other half of the land base is occupied by wetlands, wet prairie, upland prairie/oak savanna, oak woodlands, mixed deciduous/coniferous forests, riparian, and riverine habitats. Each of these habitat types has its own associated pest management problems.

The Refuges were created primarily to provide wintering habitat for dusky Canada geese and other migratory waterfowl. Other management goals articulated in the CCP include providing habitat and protection for threatened and endangered species, and restoring and maintaining historical habitat types endemic to the area to maintain high wildlife diversity. The development of an Integrated Pest Management Plan (IPM) is central in helping the Refuges meet these management goals.

F.1.1 What Integrated Pest Management Is

IPM is a science-based, decision-making process that incorporates management goals, consensus building, pest biology, monitoring, environmental factors, and selection of the best available technology to achieve desired outcomes while minimizing effects to non-target species and the environment and preventing unacceptable levels of pest damage (569 FW1). The overall goal of this plan is to use an integrated pest management approach for the prevention, early detection and identification, monitoring, and control (or eradication) of invasive plant species and other pests on the Refuge.

Pests are defined as "…living organisms that may interfere with the site-specific purposes, operations, or management objectives or that jeopardize human health or safety" (DOI policy 517 DM 1). Similarly, 569 FW 1 defines pests as "…invasive plants and introduced or native organisms, that may interfere with achieving our management goals and objectives on or off our lands, or that jeopardize human health or safety." 517 DM 1 also defines an invasive species as "a species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health." Throughout the remainder of this plan, the terms pest and invasive species are used interchangeably.

This IPM plan identifies and describes pest species considered problematic at the three Willamette Valley National Wildlife Refuges. For each pest, this plan discusses its distribution on the Refuges, sets specific thresholds[1], outlines available pest-specific control strategies and treatment schedules, and sets target priorities. As the plan is implemented, staff time and available funding would be considered when determining feasibility/practicality of various treatments.

Best management practices in support of human and environmental health are outlined in Section F.5 for biological and chemical control.

1 General tolerable pest population thresholds are expressed within specific habitat objectives in Chapter 2 of the CCP. This IPM plan includes more specific and measurable thresholds tailored to specific pests.

As outlined herein, the IPM program will benefit the overall habitat restoration program at the Refuges by preventing the spread of noxious weed species in restoration projects and other refuge lands. The program helps protect restored and remnant native habitats and wetland areas from potential invaders. In addition, utilization of pest control under an IPM strategy will help prevent substantial damage to important to refuge resources; protect newly introduced or re-establish native species; and control non-native (exotic) species in order to support existence for populations of native species.

F.1.2 Laws and Policies Governing Integrated Pest Management

Laws and Regulations: The Service recognizes the economic and ecological damage caused by noxious weeds and other pests on Refuge resources. Pest control on federal (refuge) lands and waters also is authorized under the following laws and executive orders:

- National Wildlife Refuge System Administration Act of 1966, as amended (16 USC 668dd-668ee);
- Plant Protection Act of 2000 (7 USC 7701 *et seq*.);
- Noxious Weed Control and Eradication Act of 2004 (7 USC 7781-7786, Subtitle E);
- Federal Insecticide, Fungicide, and Rodenticide Act of 1996 (7 USC 136-136y);
- National Invasive Species Act of 1996 (16 USC 4701);
- Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (16 USC 4701);
- Food Quality Protection Act of 1996 (7 USC 136);
- Executive Order 13148, Section 601(a);
- Executive Order 13112; and
- Animal Damage Control Act of 1931 (7 USC 426-426c, 46 Stat. 1468).
-

Animal species damaging/destroying federal property and/or detrimental to the management program of a refuge may be controlled as described in 50 CFR 31.14 (Official Animal Control Operations).

Trespass and feral animals also may be controlled on refuge lands. Based upon 50 CFR 28.43 (Destruction of Dogs and Cats), dogs and cats running at large on a national wildlife refuge and observed in the act of killing, injuring, harassing or molesting humans or wildlife may be disposed of in the interest of public safety and protection of the wildlife. Feral animals should be disposed by the most humane method(s) available and in accordance with relevant Service directives (including Executive Order 11643). Disposed wildlife specimens may be donated or loaned to public institutions. Donation or loans of resident wildlife species will only be made after securing State approval (50 CFR 30.11 [Donation and Loan of Wildlife Specimens]**)**. Surplus wildlife specimens may be sold alive or butchered, dressed, and processed subject to federal and state laws and regulations (50 CFR 30.12 [Sale of Wildlife Specimens]**)**.

Policies: This IPM Plan supports the Service's Coordinated Weed Prevention and Management Strategy issued in 1996. This plan conforms to Department of the Interior Pesticide Use Policy as described in 517 DM 1.1 and the new Service Manual Chapter on Integrated Pest Management (569 FW 1). These policies outline an "integrated approach" to pest management using mechanical/physical, cultural, biological, and chemical control methods to meet defined resource management objectives. In addition, the policies stress that the use of pesticides (chemical control) should only be considered when this use represents the most feasible, lowest risk alternative for controlling a pest other than by mechanical, cultural, or biological methods. Service policy 569 FW 1 (Integrated Pest Management) allows for control of plant, invertebrate, and vertebrate pests on units of the National Wildlife Refuge System to ensure balanced wildlife and fish populations in support of refuge-specific wildlife and habitat management objectives. From 569 FW 1, pests may be managed if the following criteria are met:

- The pest causes a threat to human or wildlife health or private property; action thresholds for the pest are exceeded; or Federal, State, or local governments designate the pest as noxious;
- The pest is detrimental to site management goals and objectives; and
- The planned pest management actions will not interfere with achieving site management goals and objectives.
-

Service policy 620 FW 1 (Habitat Management Plans), includes directives regarding invasive species:

- “We are prohibited by Executive Order, law, and policy from authorizing, funding, or carrying out actions that are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere.”
- “Manage invasive species to improve or stabilize biotic communities to minimize unacceptable change to ecosystem structure and function and prevent new and expanded infestations of invasive species. Conduct refuge habitat management activities to prevent, control, or eradicate invasive species...”

F.2 General Pest Control Methods and Strategies

Applicable methods that will be utilized are described in general terms in this section. According to the Service manual (569 FW 1), the Service must choose pest management methods by considering the following in this order of importance: a) Human safety, b) Environmental integrity, c) Effectiveness, and d) Cost.

F.2.1 Prevention

Prevention is the most effective and least expensive long-term management option for pests. It encompasses methods to prevent new introductions or the spread of established pests to un-infested areas. Prevention strategies may include source reduction, using weed-free seeds or fill; exclusion methods and/or sanitation methods (e.g., barriers/wash stations) to prevent re-introductions by various mechanisms including vehicle, personnel, livestock, and horses.

The methods would be utilized to prevent the introduction or spread of pests on refuge lands:

- Before starting ground-disturbing activities, Refuge staff would identify pest species on-site or within potential invasion vicinity and, where possible, would begin project activities in un-infested areas before working in infested areas.
- Refuge staff would determine the need for and establish sanitation sites for cleaning equipment. These sites would be used to clean equipment before moving into new project areas. Refuge staff would clean all equipment before leaving project sites infested with pests.
- Areas with bare or disturbed soil would be seeded with native species or effective interim cover to prevent weed establishment.

- The Refuge would establish education programs for visitors, volunteers, and staff to increase the awareness of weeds and the importance of preserving native plant communities.

F.2.2 Early detection, identification, and monitoring

- Conduct annual surveys to detect, identify, and monitor pest species and potential infestations.
- Establish threshold levels for species and habitats and develop a plan of action for control.
- Follow up on weed sightings and eradication of small patches as they are discovered.
- Monitor and map weeds with GPS, surveys, counts, and photo points to track infestations and the effectiveness of control methods and the expansion or reduction of populations.

F.2.3 Mechanical/Physical Methods

These methods would remove and destroy, disrupt the growth of, or interfere with the reproduction of pest species. For plant species, these treatments can be accomplished by hand, hand tool (manual), or power tools (mechanical) and include pulling, grubbing, digging, tilling/disking, cutting, swathing, grinding, sheering, girdling, mowing, and mulching of the pest plants.

Some examples of mechanical/physical methods could include:

- Mowing/disking undesired vegetation to set back succession, dry up root stocks, and encourage native seed bank dispersal. This method can be used to control larger areas of a wide variety of invasive species, especially in habitat restoration areas where the use of pesticides is limited.
- Hand pulling, digging, and cutting can be employed in areas of small, patchy infestations with a limited range, i.e. – removal of tansy ragwort and oxeye daisy along dikes and roadsides, yellow flag iris along dikes, wetland margins, and ditches.
- Physical removal of large species like Douglas-fir and selected hardwoods during restoration efforts. These efforts could be followed up with chemical stump treatment, stump grinding, or some trees left girdled and standing for perch and snag trees.

Each of these tools would be efficacious to some degree and applicable to specific situations. In general, mechanical controls can effectively control annual and biennial pest plants. However, to control perennial plants, the root system has to be destroyed or it would resprout and continue to grow and develop. Some mechanical control methods (e.g., mowing), used in combination with herbicides, can be a very effective technique to control perennial species. For example, mowing perennial plants followed sequentially by treating the plant regrowth with a systemic herbicide often would improve the efficacy of the herbicide compared to herbicide treatment only.

F.2.4 Cultural Methods

Cultural methods involve manipulating habitat to increase pest mortality by reducing its suitability to the pest. This might include:

- Seeding, fertilizing, mulching, thinning or pruning, water level management, prescribed burning, and other agronomic techniques like winter cover crops and crop rotations.

These methods are used extensively on the Refuge to control weeds and other non-native invasives and to prepare the soil for restoration to a more suitable native habitat for Refuge wildlife. The use of “weed-free” seed mixes, and mulches is required for all restoration activities.

The Service conducts prescribed burns under a Refuge Fire Management Plan. The burns are conducted primarily on habitat restoration sites or to remove vegetative cover to prepare a site for restoration. However, prescribed burns also are conducted on remnant native prairie sites to control weeds by invigorating the native plant communities or to remove vegetative growth/litter to make target pest plants more susceptible to other control methods.

Restoration and/or proper maintenance of refuge habitats associated with achieving wildlife and habitat objectives is a cultural method that would be essential for long-term prevention, eradication, or control of pests (at or below threshold levels). Promoting desirable plant communities through the manipulation of species composition, plant density, and growth rate is an essential component of invasive plant management (Masters et al. 1996, Masters and Shelly 2001, Brooks et al. 2004). The following three components of succession could be manipulated through habitat maintenance and restoration: site availability, species availability, and species performance (Cox and Anderson 2004).

Cultural methods may be used in combination with other methods for longer-term control of pests. For example, herbicide treatment may be used to initially eliminate or suppress pest species. However, the resulting gaps and bare soil create niches that are conducive to further invasion by the species and/or other invasive plants. Therefore, (especially on sites where desirable species are absent or in low abundance), revegetation with native/desirable grasses, forbs, and legumes may be necessary to direct and accelerate plant community recovery, and achieve site-specific objectives in a reasonable time frame.

F.2.5 Biological Control

Biological control involves the deliberate release and establishment of natural enemy populations (parasites, predators, or pathogens) to control or reduce invasive weed/pest populations. Many of the most ecologically or economically damaging pest species in the United States originated in foreign countries. The competitive advantage these new pests often enjoy in their new home allows them flourish and become widespread. Once the introduced pest species population reaches a certain level, traditional methods of pest management may be cost prohibitive or impractical. Biological controls typically are used when these pest populations have become so widespread that eradication or effective control would be difficult or no longer practical.

Biological control has advantages as well as disadvantages. Some benefits include reducing pesticide usage, host specificity for target pests, long-term self-perpetuating control, and low cost/acre. Disadvantages include the following: limited availability of agents from their native lands, the dependence of control on target species density, and a slow rate at which control occurs.
A reduction in target species populations from biological controls is typically a slow process, and efficacy can be highly variable. Biological control agents would not eradicate a target pest; rather, when using biological control agents, residual levels of the target pest typically are expected; the agent population level or survival would be dependent upon the density of its host.

The refuge staff would ensure introduced agents are approved by the applicable authorities. Except for a small number of formulated biological control products registered by USEPA under FIFRA, most biological control agents are regulated by the US Department of Agriculture (USDA)-Animal Plant Health Inspection Service, Plant Protection and Quarantine (APHIS-PPQ). State departments of agriculture and, in some cases, county agricultural commissioners or weed districts, have additional approval authority.

Biological control agents are subject to 7 RM 8 (Exotic Species Introduction and Management). In addition, the refuge staff would follow the International Code of Best Practice for Classical Biological Control of Weeds (http://sric.ucdavis.edu/exotic /exotic.htm) as ratified by delegates to the X International Symposium on Biological Control of Weeds, Bozeman, MT, July 9, 1999. This code identifies the following:

- Release only approved biological control agents,
- Use the most effective agents,
- Document releases, and
- Monitor for impact to the target pest, nontarget species and the environment.

Biological control agents formulated as pesticide products and registered by the USEPA (e.g., *Bti*) are also subject to Pesticide Use Proposal (PUP) review and approval (see below).

F.2.6 Chemical control

Pests may be controlled through the use of chemical controls, or pesticides. The term "pesticide" includes all insecticides, insect and plant growth regulators, dessicants, herbicides, fungicides, rodenticides, acaricides, nematicides, fumigants, avicides, and piscicides.

The selective use of pesticides would be based upon pest ecology (including mode of reproduction), the size and distribution of its populations, site-specific conditions (e.g., soils, topography), known efficacy under similar site conditions, and the capability to utilize best management practices (BMPs) to reduce/eliminate potential effects to non-target species, sensitive habitats, and potential to contaminate surface and groundwater. Where ground-based application of pesticide would be necessary to address pests, a structured procedure will be utilized (see Sections F.6 and F.7) to evaluate the potential effects of proposed uses to refuge biological resources and environmental quality. Only pesticide uses with projected effects not likely to exceed minor, temporary, or localized impacts to refuge biological resources and environmental quality (including consideration of appropriate best management practices (BMPs), where necessary), would be allowed for use on the refuge.

- Any pesticide used would be approved through the submittal of a Pesticide Use Proposal. PUPs are prepared by the site manager and approved by the Refuge Project Leader or the Regional IPM coordinator. PUPs are written for all EPA-registered pesticides used by the Service on the Refuge.
- Pesticides are applied under the supervision of a Certified Pesticide Applicator by hand sprayers, boom sprayer (tractor mounted or ATV). Applications on woody species may be injected, foliar, basal bark, or "stump-painted".
- The Refuge currently has approval for use of over 20 different pesticides; however, the most commonly applied by Refuge staff are Glyphosate, Milestone, Garlon 3A, and Rodeo (aquatic glyphosate).
- Annual pesticide application records are required to be filed and submitted to the Service and the Oregon Department of Agriculture.

This IPM plan does not describe the more detailed process to evaluate potential effects associated with aerial applications of pesticides. Moreover, it does not address effects of mosquito control with pesticides (larvicides, pupacides, or adulticides) based upon identified human health threats and presence of disease-carrying mosquitoes in sufficient numbers from monitoring conducted on a refuge (but see section F.4.1). However, the basic framework to assess potential effects to refuge biological resources and environmental quality from aerial application of pesticides or use of insecticides for mosquito management would be similar to the process described in this plan for ground-based treatments of other pesticides.

F.3 Treatment Priorities - General

Relative priorities in treating specific pests are outlined in Section F.4. In addition, staff will consider the size and degree of establishment of the infestation when prioritizing response efforts. Early detection, combined with rapid response to eliminate infestations of new pests, will constitute the highest priority. Next in priority will be treating established pests that appear in one or more previously un-infested areas. Moody and Mack (1988) demonstrated through modeling that control efforts focusing on the large, main infestation rather than the new, small satellites reduced the chances of overall success. The lowest priority will be treating large infestations (sometimes monotypic stands) of well-established pests.

F.4 Refuge-Specific Pests, Thresholds, and Control Strategies

Refuge-specific pests are described in this section, together with control thresholds and strategies for control. Relative priorities were determined between these pests as follows. Noxious weeds classified on the "A" or "B" State list (http://www.oregon.gov/ODA/PLANT/WEEDS/statelist2.shtml) are rated as high priority when the goal is usually eradication; where control capabilities are poorly known; and/or where no action may result in uncontrollable infestation. Medium-rated pests are classified as such when known capabilities exist for their control, and where containment (as opposed to eradication) is the primary goal. Low-rated pests include those species with low refuge infestation; a lower threat of spreading; and /or less damaging effect to Refuge habitats.

F.4.1 Mosquitoes

The protection of human and wildlife health and well-being, and the restoration and maintenance of native wetland habitat may necessitate occasional suppression of mosquito populations. This topic is covered in general terms following Service guidelines.

Approximately 1,400 acres of the Willamette Valley NWR Complex consists of seasonal and permanent wetlands. In the spring and summer months, these areas provide an insignificant amount of breeding habitat for mosquitoes.

A 2002 draft of the Service's Mosquito Management Policy stated that mosquitoes are considered a natural part of biological communities. Mosquito populations on refuge lands would be allowed to fluctuate and function unimpeded unless they pose a threat to wildlife and/or human health. We recognize mosquitoes are native invertebrates inhabiting aquatic habitats, which provide a forage base for fish and wildlife including migratory birds.

To protect human and wildlife health and safety, the state or a local vector control agency would be allowed to control mosquito populations on refuge lands. Pesticide treatments (larvicides, pupacides, or adulticides) would be allowed on refuge lands only if local, current population monitoring and/or disease surveillance data indicate refuge-based mosquitoes pose a health threat to humans and/or wildlife. Proposed pesticide uses for mosquito control would utilize appropriate and practical BMPs, where possible, given potential effects documented in Chemical Profiles.

After approval of the CCP, a disease contingency plan (DCP) would be prepared addressing response to mosquito-borne disease outbreaks on and/or adjacent to refuge lands. IPM treatment options would be described with additional specificity, where necessary, into this plan. The DCP also would include other information such as the history of mosquito-borne diseases on and/or adjacent to the refuge as well as measures to protect refuge visitors, Service authorized agents, and Service employees when a health threat or emergency is identified by health officials.

F.4.2 Nutria/Beaver Control

Animal species damaging/destroying federal property and/or detrimental to the management program of a refuge may be controlled as described in 50 CFR 31.14 (Official Animal Control Operations).

For example, the incidental removal of beaver damaging refuge infrastructure (e.g., clogging with subsequent damaging of water control structures) and/or negatively affecting habitats (e.g., removing woody species from existing or restored riparian) managed on refuge lands may be conducted. We recognize beavers are native species and most of their activities on refuge lands represent a natural process beneficial for maintaining wetland habitats. Exotic nutria, whose denning and burrowing activities in wetland dikes causes cave-ins and breaches, can be controlled using the most effective techniques considering site-specific factors without a pest control proposal. Along with the loss of quality wetland habitats associated with breaching of impoundments, the safety of refuge staffs and public (e.g., auto tour routes) driving on structurally compromised levees and dikes can be threaten by sudden and unexpected cave-ins.

The Refuge would opt first to control certain pests through habitat management strategies. For example, during wetland rehabilitation projects, the Refuge will often shave down interior nesting islands, thus reducing the angle of slope, reslope and stabilize dikes, and shore up road shoulders. These techniques discourage nutria because it reduces the areas available for them to burrow above the water table. It has proven to be a fairly effective non-lethal method for controlling nutria on the refuges.

F.4.3 *Centaurea pratensis* (Meadow knapweed)

Priority: *High.* Meadow knapweed out-competes grasses and other pasture species, causing productivity to decline. It is susceptible to herbicide treatments, but control efforts must persist for the long-term. It has the potential to invade native prairie and oak savanna. Meadow knapweed favors moist roadsides, sand or gravel bars, river banks, irrigated pastures, moist meadows, and forest openings. It also can invade industrial sites, tree farms, and grasslands.

Description: Meadow knapweed blooms in midsummer to fall. It grows from woody root crown and up to 3 1/2 feet tall. The lower leaves are long-stalked, upper leaves have no stalk. Stems are many-branched and tipped by a solitary flower head up to one inch wide. Flower heads are pink to reddish purple, oval or almost globe-shaped. A key identifying feature is the fringed bracts on the flower head. It is a hybrid of black and brown knapweeds. Its foliage is coarse and tough; however, because meadow knapweed is a hybrid, its traits can vary.

Current Distribution on the Refuges: Small infestations of individual plants and isolated patches (< .10 ac) of meadow knapweed are situated in the Bald Top, Mill Hill, and Bellfountain oaks areas on Finley Refuge. Small patches and individual plants occur along Buena Vista Road on Ankeny. Many of these sites are along fence lines or roadways in weedy forb vegetation.

Specific thresholds: Prevent competition with newly seeded native plants in habitat restoration sites, oak savanna habitat, along roadways, and other disturbed soil areas.

Treat 100% of diffuse knapweed plants - targeting for elimination - to reduce competition with native plants and prevent establishment of knapweed and knapweed seed bank. Larger infestation patches will be mapped and measured using geographic information software and a global positioning system device. Patches will be treated to prevent increase in the infestation area.

Control Options: Chemical treatment will be a primary option as the most effective way to target the infestation quickly. Hand pulling or digging is a feasible control of small infestations and individual plants, however, handling this plant is not recommended, as some species in this family are known to be carcinogenic. The taproot should be removed to at least 2 inches below the ground surface.

Some approved biological control agents released for other knapweeds have become established on meadow knapweed including a seed head fly, a seed head moth, and two seed head weevils. This plant is currently being tested as a host for other approved knapweed biocontrol agents. Use of biological control agents is still in the experimental stage and is currently not used on the refuge.

The chemical treatment of meadow knapweed with an appropriate herbicide provides relatively effective control. Currently, glyphosate (Roundup™, Roundup Pro™) and aminopyralid (milestone) are the herbicides used to control meadow knapweed on the Refuge. Glyphosate is soil binding, inexpensive, and a low threat to groundwater quality. Aminopyralid (milestone) is a low rate, low persistence pesticide effective on many perennials. This chemical can be broadcast in restoration areas where the establishment of native grasses is essential for restoration success. Other recommended chemical treatments for diffuse knapweed are picloram (Tordon), clopyralid (Stinger), dicamba (Banvel), and 2, 4-D. The Refuge avoids the use of restricted use pesticides like picloram. Clopyralid is not recommended for use on permeable soils due to potential groundwater contamination and the Refuge is moving away from the use of this herbicide. Dicamba has low toxicity for wildlife but is not recommended for use near water. Aquatic formulations of glyphosate currently serve for weed control near water. 2, 4-D could be used for future knapweed control, particularly in tank mixes, however, the Refuge is moving away from the frequent use of this herbicide due to potential ground water contamination. Other chemicals will be added as needed and be approved at the required level.

Treatment Schedule: Hand removal will be conducted in small isolated patches or individuals. Established areas too large to practically control by hand, or in areas prohibited to chemical control, will be mowed to prevent floret emergence and seed production.

The application of glyphosate or milestone will occur once during the growing season, according to label instructions (June - September). The most effective time of control is during the rosette or bolt stage before budding. Annual treatment is necessary as long as there is a viable seed source.

Additional Strategies to Reduce Abundance:

- Monitor known infestation sites, newly seeded areas, roadways, and other disturbed sites (e.g., remediation areas, wildfire areas) depleted of native perennial plants.
- Seed disturbed sites with native species.
- Maintain healthy stands of native perennial plants.

F.4.4 *Cirsium arvense* (Canada thistle)

Priority: Low-Medium. Canada thistle can be found in cultivated fields, riparian areas, pastures, rangeland, forests, lawns, gardens, roadsides, and waste areas. A lack of control will result in a reduction in crop production of up to 25 percent in heavily infested ground. New infestation can be spread from seeds, but are more often caused by redistribution of roots by tillage practices.

Description: Perennial; blooms midsummer. Leaves wavy margined to lobed, up to 6 inches long and armed with yellowish spines. Small purple to white flowers in clusters. Extensive deep seated root system spreading horizontally. Large seed production but low percentage of viable seeds.

Current Distribution on the Refuge: Canada thistle is distributed throughout all three Refuges, and is found primarily around wetland margins, seasonally wet fields and upland wet sites. This species invades disturbed restoration areas, waste areas, and riparian zones.

Specific thresholds: Keep infestations to less than 1 acre in area and weedy species comprising 5 percent or less of live vegetation cover. Prevent competition with newly seeded native plants in habitat restoration sites, along roadways, dikes, and other disturbed soil areas. Strive for eventual control through competition from native grasses and forbs.

Control Options: The nature of the Canada thistle infestation makes it difficult to control with simple hand methods.

The removal of shoots by mowing is a viable option, however nesting season, and the flowering schedule of listed plant species (e.g., Nelson's Checkermallow) make this method difficult to achieve in the desired time frame (i.e., during its bolting/flowering stage).

The stem-and-shoot gadfly (Urophora cardui) and Canada thistle beetles (Ceutorhyncus litura) are biological agents that are available, but have yet to be used on the Refuge. The use of these insects is an option in areas that are sensitive to chemical or mechanical control methods.

The chemical treatment of Canada thistle with an appropriate herbicide applied temporally provides relatively effective control. Currently, glyphosate (Roundup™, Roundup Pro™, and Rodeo®) and aminopyralid (Milestone) are the herbicides used to control Canada thistle on the Refuge. Glyphosate is soil binding, inexpensive, with low groundwater contamination potential. Glyphosate is a nonspecific herbicide and should be used for control in areas void of desired vegetation where reseeding, ground cover cultivation, or native species rehabilitation would occur. Milestone has shown to be effective on newly sprouted rosettes in spring and later in the summer during bolting stage. Other herbicides that are shown to be effective on Canada thistle are picloram, clopyralid, and 2,4-D, however, the Refuge avoids the use of these due to the availability of low rate/low risk pesticides like Milestone. Other chemicals will be added as needed and be approved at the required level.

Treatment Schedule: Hand pulling or digging of plants in the rosette stage is effective for small infestations.

Mowing of bolted plants in moist soil areas or areas with a high water table (riparian/wetlands) are effective in limiting spread. Mowing would occur in late summer after nesting season (July 15), and after September 1st in areas with sensitive or listed plant species.

Biological control agents like those listed above are viable options and could be used in areas of large infestation where chemical and mechanical controls are not feasible.

Chemical control will occur in spring primarily on dikes and areas where desired grass species have been planted or encouraged. Fall application is most effective when shoot to root translocation is highest. This species is sensitive to moisture content. Application of pesticide should occur when moisture condition is higher.

Additional Strategies to Reduce Abundance:
- Monitor known infestation sites, newly seeded areas, roadways, dikes, and other disturbed sites (e.g., remediation areas, wildfire areas) depleted of native perennial plants.
- Seed disturbed sites with native species.
- Maintain healthy stands of native perennial grasses and plants.

F.4.5 *Phalaris arundinacea* (Reed canarygrass)

Priority: Low-Medium. The priority for controlling this species is dependent upon location and degree of infestation. Reed canarygrass is an aggressive species that regenerates through large rootstocks. Excessive proliferation of reed canarygrass can lower the groundwater level, reduce the amount of surface water, reduce habitat for wildlife dependent on open water, and interfere with water flow through drainages.

Description: Reed canarygrass is a perennial grass with stems reaching 7 feet. The stems have a waxy coating. Leaves are flat, 1/4 to 3/4 inch wide. Ligules surround the stem, auricles are blunt. Reproduction is by creeping rhizomes. The panicle is 3 to 8 inches long, initially compact but opening upon maturity.

Current Distribution on the Refuges: Reed canarygrass is found in all wetland areas on all three refuges and throughout Refuge drainages in areas with adequate soil moisture.

Specific thresholds: Treatment applied to keep infestation to less than 20 percent of live vegetation covers and prevents infestations from increasing in area. Prevent/reduce competition with native plants and established native communities in disturbed moist soil, riparian, and wetland habitats. Control reed canarygrass to prevent significant alterations of the desired condition of the habitat.

Control Options: Water level management is a cultural control method most easily used by the

Refuge particularly in late winter/early spring to control initial sprouting. Water levels can be kept high to discourage regrowth in previously disturbed areas (i.e., mowed/disked) or in areas with enough depth to discourage sprouting.

Mowing and disking can be utilized on a rotational basis in wetlands and riparian areas to set back infestation to desired levels and allow for native species seeding/planting or regeneration to occur. Chemical control of reed canarygrass with Glyphosate (Rodeo, Round Up) can be employed when determined to be the best effective method. Glyphosate is soil binding, inexpensive, a low threat to groundwater quality, and used to target numerous weed species. Spot spraying of individual plants or small isolated infestations on wetland edges can effectively halt the further spread with minimal effort. Broadcast spraying can be utilized on large scale infestations in areas targeted for rehabilitation or where non target species populations wouldn't be adversely affected with the application.

Mowing, disking, and spraying could be utilized in combination to effectively control reed canary grass over an extended period of time.

Treatment Schedule: The treatment schedule and strategy will be determined based on the level of infestation, the acceptable threshold of infestation, and priority habitats.

Mechanical treatment (mowing/disking) in wetland areas will be set on a rotational schedule generally set to no > than 5 years between treatments, based on the accepted level of infestation. Treatment will be conducted 1 to 2 times per season: once in the summer (July - August) and/or once in the fall (September - October).

Cultural control (water level management) will occur February – May when water levels can be affectively elevated to control new growth.

Chemical control is best performed when the plant's carbohydrate stores are lowest. Spot spraying of small patches or populations can be employed during the summer or fall when the plants are pulling reserves down to their roots. Large scale broadcast applications will most likely be conducted in concert with a long term larger scale restoration plan.

Additional Strategies to Reduce Abundance:

- Monitor known infestation sites - riparian, wetland, and moist areas for significant adverse effects on water flow and wildlife habitat.
- Seed disturbed sites with native species.
- Maintain healthy stands of native perennial plants.

F.4.6 *Lythrum salicaria* (Purple Loosestrife)

Priority: Medium. Its showy purple flowers crown a vigorous plant that crowds out marsh vegetation required by wildlife for food and shelter. Decreased waterfowl and songbird production has been well documented in heavily infested marshes. This former ornamental species can be found along wetlands, stream banks, and shorelines of shallow ponds.

Description: Perennial; blooms midsummer. Grows up to 7 ft tall. Upright bushy plant. Flowers pink to purple, possessing 5-6 petals and numerous on a long spike. Spreads by seed and spreading rhizomes that form dense, woody mats.

Current Distribution on the Refuges: In Goose Pond at Ankeny Refuge in small patches; in Cabell Marsh at Finley; in NW corner of Parvipes and north half of Cacklers Marsh and along Cackler Marsh dike at Baskett Slough.

Specific thresholds: Apply treatments to keep infestation to less than 5 percent of live vegetation covers and prevents infestations from increasing in area. Prevent/reduce competition with native plants and established native communities in disturbed moist soil, riparian, and wetland habitats. Control to levels that prevent it from significantly altering the desired condition of the habitat.

Control Options: Water level management is a cultural method with limited effectiveness particularly in shallow marshes. Most wetlands on the Refuge are less than two feet deep throughout the growing season which can make for ideal growing conditions for purple loosestrife.

Four biocontrol agents, two leaf beetles, a root weevil and a seed weevil, are approved for release and are established in Oregon.

Currently, all four agents are being used on specific refuge sites for control of purple loosestrife. Agents were released on Morgan Lake several years ago and have reduced the flowering population to a handful of plants. Parvipes Marsh has all four agents and the flowering population has been reduced to several plants. A recent outbreak has occurred in Cackler Marsh but beetles have established themselves and have been spreading.

Mowing/disking can be used in situations of severe infestation, but would have to be followed with increased water levels during the growing season or chemical control.

Chemical control can be effective on individual plants and small patches. Glyphosate (Rodeo, Round Up) is soil binding, inexpensive, a low threat to groundwater quality, and used to target numerous weed species. Spot spraying of individual plants or small isolated infestations on wetland edges can effectively halt the further spread with minimal effort.

Hand pulling or flower cutting can be employed on individual plants or small patches to prevent further spread.

Treatment Schedule: The treatment schedule and strategy will be determined based on the level of infestation, the acceptable threshold of infestation, and priority habitats.

The Refuge will continue its current strategy of using biological control agents to keep populations of purple loosestrife under control. Refuge staff and staff from the Oregon Department of Agriculture are annually monitoring these agents and their level of control.

In situations where management actions may inadvertently encourage the spread of purple loosestrife, methods such as mowing/disking can be used as a stop gap measure, but will have to be followed up with other methods such as chemical application or increased water levels.

Hand pulling, flower cutting, and spot spraying will be utilized with small isolated patches or individuals.

Additional Strategies to Reduce Abundance:

- Monitor known sites for level of infestation and spread; evaluate and determine measures needed to reduce and control populations and prevent further spread into unoccupied areas. Monitor unoccupied sites for potential spread.
- Seed disturbed sites with native species.
- Maintain healthy stands of native wetland plants.

F.4.7 (*Rubus discolor procerus* and *Rubus discolor aremeniacus*) Armenian blackberry (Himalayan)

Priority: Medium. Armenian blackberry is the most widespread and economically disruptive of all the noxious weeds in western Oregon. It aggressively displaces native plant species, dominates most riparian habitats, and has a significant economic impact on right-of-way maintenance, agriculture, and park maintenance and forest production. It is a significant cost in riparian restoration projects and physically inhibits access to recreational activities. It reproduces at cane apices (tips) and by seeds, which are carried by birds and animals. This strategy allows it to expand en masse across a landscape or to jump great distances and create new infestations. Any control strategy can be considered short-lived unless projects are planned and funded for the long-term.

Description: Perennial; blooms June to August. Root buds produce trailing reddish stems with sharp spines that can grow more than 20 ft per season. Leaves alternate, palmate and compound with serrate margins. Flowers five petaled, white to light pink. Fruits aggregate.

Current Distribution on the Refuges: Prolific and widespread in most habitats on all three refuges. Occupies roadsides, ditches, dikes, streambanks, fields, fencelines, upland prairie/oakwoodland, wetlands, drainages, etc.

Specific thresholds: Control to keep infestation to less than 10 percent of live vegetation covers depending on the desired conditions and prevent infestations from increasing in area. Eliminate from areas of native habitat restoration, along dikes, water control structures, and other habitat management facilities. Eliminate, reduce, or control along wetland edges, seasonal drainages, and riparian edges. Prevent/reduce competition with native plants and established native communities.

Control Himalayan blackberry in specific areas and to levels that prevent it from significantly altering the desired condition of the habitat.

Control Options: Though Himalayan blackberry is an aggressive invader, it can be controlled in habitats that can be mowed and sprayed on a regular schedule.

A combination of summer mowing, followed by fall spraying can effectively reduce and control blackberry on dikes, ditches, riparian edges, grass fields, and wetland edges.

At this time, no approved biological agent is available for release in Oregon. In March of 2005, a rust was found severely impacting Armenian blackberry along a 100 mile stretch of the Oregon Coast.

The rust has been confirmed as Phragmidium violaceum (Schultz) which has been used as a biocontrol agent for blackberry in parts of Australia, New Zealand, and Chile.

Chemical control with Triclopyr (Garlon 3A) is an effective broadleaf control when applied to blackberry in the fall. Glyphosate (Rodeo, Round Up) is soil binding, inexpensive, a low threat to groundwater quality, and can be used along wetland edges, drainages, and ditches.

Treatment Schedule: The treatment schedule and strategy will be determined based on the level of infestation, the acceptable threshold of infestation, and priority habitats.

The Refuge will target areas for blackberry control based on habitat management priorities and facility maintenance needs. The general strategy will be to mow in the summer and follow with a fall application of Garlon 3A or Glyphosate.

Additional Strategies to Reduce Abundance:

- Monitor known infestation sites: Monitor known sites for level of infestation and set acceptable thresholds based on habitat management priorities
- Seed disturbed sites with native species.
- Maintain healthy stands of native grasses and plants.

F.4.8 *Paspalum distichum* (Knotgrass)

Priority: Low to Medium. The priority for controlling this species is dependent upon location and degree of infestation. Knotgrass is found in both wet and well-drained areas. It frequents meadows, marshes, and ditches. It can also be found in cultivated or disturbed areas, and bordering wooded areas. It is located throughout the southeast United States, Arkansas, Texas, Oklahoma, and in the western United States. It is native to Louisiana. Though considered to be beneficial in most of its range, knotgrass is an aggressive species that can quickly dominate other more desired wetland plant species. Excessive proliferation of knotgrass can lower the groundwater level, reduce the amount of surface water, reduce habitat for wildlife dependent on open water, and interfere with water flow through drainages.

Description: Grass Family (Poaceae). It is a perennial which may be creeping or growing in clumps. The creeping stems produce roots at the nodes in which flowering stems emerge. The culms are firm and range in heights up to 1½ feet. The nodes on creeping stems are often pubescent whereas the nodes on the mat-forming stems are glabrous. The sheaths are loose and glabrous to pubescent. The blades are flat and taper to an inrolled apex. They are 2 to 6 inches long and about 1 inch wide. The flowering stem bears terminal digital racemes in 2's or 3's that are up to 3 inches long. Axes are winged and glabrous with thin, dry margins. The spikelets are solitary and straw-purple in color. The first glume is rarely present. The second glume and sterile lemma are glabrous and 3-nerved. The grain is yellowish and oblong to ellipsoid.

Current Distribution on the Refuges: Knotgrass is found in all wetland areas on all three refuges and throughout Refuge drainages in areas with adequate soil moisture.

Specific thresholds: Control to keep infestation to less than 10 percent of live vegetation covers and prevents infestations from increasing in area. Prevent/reduce competition with native plants and established native communities in disturbed moist soil, and wetland habitats. Control knotgrass to reduce competition with native plants and from significantly altering the desired condition of the habitat.

Control Options: Water level management is a cultural control method most easily used by the Refuge particularly in late winter/early spring to control initial sprouting. Water levels can be kept

high to discourage regrowth in previously disturbed areas (i.e., mowed/disked) or in areas with enough depth to discourage sprouting.

Mowing and disking can be utilized on a rotational basis in wetlands and riparian areas to set back infestation to desired levels and allow for native species seeding/planting or regeneration to occur.

Chemical control of knotgrass with Glyphosate (Rodeo, Round Up) can be employed when determined to be the best effective method. Glyphosate is soil binding, inexpensive, a low threat to groundwater quality, and used to target numerous weed species. Spot spraying of individual plants or small isolated infestations on wetland edges can effectively halt the further spread with minimal effort. Broadcast spraying can be utilized on large scale infestations in areas targeted for rehabilitation or where non target species populations wouldn't be adversely affected with the application.

Mowing, disking, and spraying could be utilized in combination to effectively control knotgrass over an extended period of time.

Treatment Schedule: The treatment schedule and strategy will be determined based on the level of infestation, the acceptable threshold of infestation, and priority habitats.

Mechanical treatment (mowing/disking) in wetland areas will be set on a rotational schedule generally set to no > than 5 years between treatments, based on the accepted level of infestation. Treatment will be conducted 1 to 2 times per season: once in the summer (July - August) and/or once in the fall (September - October).

Cultural control (water level management) will occur February – May when water levels can be affectively elevated to control new growth.

Chemical control is best performed when the plants carbohydrate stores are lowest. Spot spraying of small patches or populations can be employed during the summer or fall when the plants are pulling reserves down to their roots. Large scale broadcast applications will most likely be conducted in concert with a long term larger scale restoration plan.

Additional Strategies to Reduce Abundance:

- Monitor known infestation sites - riparian, wetland, and moist areas for significant adverse effects on water flow and wildlife habitat.
- Seed disturbed sites with native species.
- Maintain healthy stands of native wetland and perennial plants.

F.4.9 *Convolvulus arvensis* (Field bindweed)

Priority: Low to Medium. Field bindweed is highly competitive species with prodigious powers of regeneration from roots and rhizomes. Bindweed can survive a wide range of environmental conditions, but disturbed soil is a necessity for invasion. Bindweed is a threat to the regeneration of native vegetation.

Description: Field bindweed is perennial forb growing as a climbing and prostrate vine that forms dense mats. The taproot is deep, forming an extensive root system. The leaves are sagittate; flowers are bell-shaped and pink to white. Blooming occurs from June until frost.

Current Distribution on the Refuges: Bindweed is widely spread throughout the Refuge, invading disturbed areas, particularly restored agriculture fields, and native upland restoration areas.

Specific thresholds: Control field bindweed to reduce competition with native plants by keeping any infestation at less than 10 percent of live vegetation cover. Prevent competition with newly seeded native plants in habitat restoration sites, along roadways, and other disturbed soil areas.

Control Options: Mechanical and hand methods of control are impractical and ineffective due to the species' distribution and ability to regenerate from severed roots and rhizomes.

The chemical treatment of field bindweed with an appropriate herbicide provides the most effective treatment. Milestone (aminopyralid) would be the preferred herbicide as it is a low rate/low risk herbicide that can be applied both in early and late season applications. Other chemicals will be added as needed and be approved at the required level.

Two approved biological control agents are available, but have not been successfully established in Oregon. The defoliating moth *Tyta luctuosa* was introduced against field bindweed in 1998 and 1999 at Baskett Slough National Wildlife Refuge in Polk County and in 1999 in Douglas County. The moth failed to establish. Currently the agent is not available for release, but the Oregon Department of Agriculture is setting catch traps on the refuge.

Treatment Schedule: Early season and late summer/ fall applications along roadsides and dikes. Restored agriculture fields and native grass plantings will be targeted for spring/fall applications depending on level of infestation.

Additional Strategies to Reduce Abundance:

- Monitor known infestation sites, newly seeded areas, roadways, and other disturbed sites (e.g., restoration areas, wildfire areas) depleted of native perennial plants.
- Seed disturbed sites with native species.
- Maintain healthy stands of native perennial plants and grasses.

F.4.10 *Senecio jacobaea (*Tansy ragwort)

Priority: Low. Prolific in pastures, clearcuts, and disturbed roadside areas. Tansy ragwort is toxic to cattle and horses, causing irreversible liver damage. Unlike cattle and horses, sheep appear to be unaffected y ragwort's toxicity. They may be either grazed exclusively as a pretreatment to cattle grazing or grazed with cattle. Continuous heavy grazing will prevent flowering and, in many cases, reduce density (Bedell et al. 1981, Sharrow and Mosher 1982). Tansy ragwort's seeds can lay dormant in the soil for 15 years. Once considered Western Oregon's most serious noxious weed, biological controls have reduced the severity of outbreaks below economic threshold levels.

Description: Biennial or short-lived perennial; blooms midsummer to fall. Grows1 ½ – 6 feet tall. Leaves are dark green and deeply lobed. Numerous seed heads, each with multiple, yellow, multi-rayed flowers. Reproduces by seed only but can also regenerate vegetatively if grazed or mowed and moisture conditions are right

Current Distribution on the Refuges: Distributed throughout all three refuges in many habitat types.

Specific thresholds: Control tansy ragwort to reduce competition with native plants by keeping any infestation at less than 5 percent of live vegetation cover. Prevent competition with newly seeded native plants in habitat restoration sites, along roadways, and other disturbed soil areas.

Control Options: Mechanical and hand methods of control are mostly used to control this pest.

Hand pulling and clipping can be utilized to control spread where small patches and individuals exist (i.e., along roadsides and dikes). Mowing can be utilized in larger grass fields and restoration areas to prevent flowering and spread.

The chemical treatment of tansy ragwort with an appropriate herbicide can provide effective treatment if applied during rosette stage or preflowering. Milestone (aminopyralid) would be the preferred herbicide as it is a low rate/low risk herbicide that can be applied both in early and late season applications. Glyphosate could be effective where non-target species are not significant. Other chemicals will be added as needed and be approved at the required level.

Three biological control agents, a seed head fly, a flea beetle, and a moth, have been approved for release and are established in Western Oregon. Oregon Department of Agriculture staff is currently monitoring Cinnabar moth (Tyria jacobaeae) larvae on Baskett Slough to determine the effectiveness of this agent.

Treatment Schedule: Summer hand pulling and cutting in areas of small infestations to prevent flowering and spread.

Mowing of larger infestations prior to flowering. Post mowing applications with a broadleaf herbicide (Milestone or 2, 4, D) to control biannual rosette stage.

Additional Strategies to Reduce Abundance:

- Monitor known infestation sites, newly seeded areas, roadways, and other disturbed sites (e.g., restoration areas, wildfire areas) depleted of native perennial plants.
- Seed disturbed sites with native species.
- Maintain healthy stands of native perennial plants and grasses.

F.4.11 *Iris pseudacorus* (Yellow Flag Iris)

Priority: Medium. An infestation of yellow flag iris presents a dual impact on both human interests and native environments. This plant displaces native plants including sedges and rushes. This can reduce the carrying-capacity of wetlands for waterfowl and disrupt other ecological relationships. Irrigation canals and flood control ditches can be severely restricted by the physical nature of the plant clumps. Removal can be costly requiring large excavation equipment or herbicides. Control of heavily infested waterways can be cost prohibitive due to the huge volume of plant material needing to be removed.

Description: Yellow flag is a very showy species growing 3-4 feet in height with the most vigorous growth attained in the wettest environments. The leaves are long, flattened and sword-like, typical of most iris. Large plant clumps are formed from the lateral growth of rhizomes sometimes attaining 20 feet in width. It has erect plant stalks with multiple flowers produced on each. Fruit capsules are large, 3-angled and up to 4 inches in length. Disk-like seeds are shed from the capsules throughout the fall and winter. Floating mats of seed can be observed in backwaters and marshes aiding dispersal. Reproduction can occur asexually through rhizome fragmentation or by seed production. Food storage in this species is unique. Fructan is the main storage compound held in the cells as opposed to starch. This allows the plants to metabolize energy under very low oxygen conditions and may provide cells with a natural anti-freeze for the winter.

Current Distribution on the Refuges: Ankeny in small patches in Willow and Teal Marshes; along Sidney ditch. McFadden’s Marsh at Finley.

Specific thresholds: Control yellow flag iris to a level acceptable to prevent any wide spread infestation, to reduce competition with native plants, and by keep any infestation at less than 10 individual plants. Prevent spread and proliferation in Refuges wetlands and waterways

Control Options: Mechanical and hand methods of control are mostly used to control this pest.

Digging and/or clipping flower heads can be utilized to control spread where small patches and individuals exist.

Chemical treatment with Glyphosate (Rodeo) could be effective where non-target species are not significant. Other chemicals will be added as needed and be approved at the required level.

There are no approved biological control agents for this plant.

Treatment Schedule: Digging with machinery or by hand May – September.

Spot spray with Rodeo (Glyphosate) May – September.

Other Strategies to Reduce Abundance:

- Monitor known infestation sites, wetland areas and moist areas where plant can establish. Eradicate immediately.

F.4.12 *Silybum marianum* (Milk thistle)

Priority: High. Once established, it forms dense clumps which exclude livestock and crowd out more desirable forage species. It has the potential to invade extensive acres of pasture land. Individual plants are so large that forage displacement is high. It is a nitrate accumulator, lethal when livestock ingest the plant. Milk thistle seed is valued as an herbal medicine. The seed is capable of remaining

dormant in the soil for many years. It infests roadsides, waste and disturbed areas, grazing lands, and often occurs in association with Italian and slender-flowered thistles.

Description: Biennial or winter annual; blooms from April to July. Grows two to six feet tall. Stems are stout, rigid and generally branching. Leaves broad, clasp stem, have spiny margins and have white marbling along veins. Flower heads reddish-purple and have leathery spine-tipped bracts.

Current Distribution on the Refuges: Disturbed areas, burned areas, parking lots, roadsides.

Specific thresholds: Control 100 percent of milk thistle on all known sites. Prevent spread and proliferation on Refuges.

Control Options: Chemical treatment with a broad leaf herbicide (Milestone, 2, 4, D) is the quickest, most effective method to target this species.

One approved biocontrol agent, *Rhinocyllus conicus,* a seed head weevil, has become established in Oregon; however, they do not always make their way to the seeds due the large receptacle on this plant.

There are no biological agents employed on the Refuges for this pest.

Treatment Schedule: Spot spray upon detection with Glyphosate or Milestone/2, 4, D.

Other Strategies to Reduce Abundance:
- Monitor known infestation sites, disturbed areas (e.g. parking lots, burn piles), and upland restoration sites. Quick action and eradication on discovered populations.

F.4.13 *Brachypodium sylvaticum* (Huds.)Beauv.) (False brome)

Priority: High. False brome can quickly become the dominant plant species in forest under stories, demonstrating great shade and drought tolerance. It is able to grow in a wide variety of habitats and competes strongly for early season moisture. Its presence in commercial timberlands creates a perfect environment for rodents which damage tree seedlings. It can dominate oak savanna habitats and can be expected to severely restrict native oak regeneration. This weedy grass is also a serious threat to natural areas.

Description: Perennial grass; forms short "squatty" bunches. Stems hollow with broad, flat one quarter to one third inch wide lax leaves and a leaf sheath open to the base. Leaf color a bright green that often remains through fall and part of winter. Leaf margins and lower stems hairy; ligules membranous. Flowers born in a true spike that droops noticeably, and spikelets with short or no stalks. False brome plants appear to be self-fertile producing few to a couple hundred seeds per plant.

Isolated plants are observed to produce viable seeds and become new weed epicenters complicating control efforts. Seed movement by wildlife is locally important with both birds and small mammals transporting seeds. Deer and elk also are important vectors of localized spread. Long-distance dispersal is predominantly through logging activities, roadside maintenance equipment and recreational activities within infested areas.

Current Distribution on the Refuges: Woodpecker Loop, Mill Hill Trail, entrance to Mill Hill Prairie at Finley; east boundary at Baskett Slough.

Specific thresholds: Control 100 percent of False brome on all known sites. Prevent spread and proliferation on Refuges.

Control Options: Chemical treatment with a Glyphosate herbicide, or Poast (grass specific) herbicide in areas with desired forb species.

Cutting of seed heads is an option with small patches.

No approved biological control agents are available at this time.

Treatment Schedule: Spot spray upon detection with Glyphosate or Poast. Fall application with Glyphosate when natives have senesced.

Other Strategies to Reduce Abundance:

- Monitor known infestation sites, disturbed areas (e.g., parking lots, burn piles), upland restoration sites, T & E restoration sites, boundaries. Quick action and eradication on discovered populations.
- Reseed with native grasses – Roemer's Fescue, Blue Wild Rye, California Oat grass

F.4.14 *Cytisus scoparius* (Scotch broom)

Priority: Low. Scotch broom is a pioneer species known to displace native plant species and increase the costs of timber production. It readily invades disturbed sites, natural areas, dunes and public and private forest lands. Maintenance of rights-of-way, facilities, parkland and private property costs millions of dollars each year because of rapid growth of young plants and the plant's persistent nature. Seeds of Scotch broom are long-lived (50 years plus) and mature plants are prolific seed producers, establishing persistent seed banks requiring long-term management objectives.

Description: Perennial; blooms April to June. Grows 3 to 10 feet tall. Evergreen shrub with many slender, erect, dark green angled branches with small, simple leaves. Abundant small, yellow, pea-shaped flowers. Easily confused with Spanish broom. Spanish broom (S. Junceum) has round stems, very few leaves, and larger yellow flowers.

Current Distribution on the Refuges: Finley north side of Bald Top, Bellfountain Road, Mill Hill Prairie, and Bellfountain Prairie.

***Specific thresholds* and Goal:** Control 100 percent of Scotch Broom on all known sites. Prevent spread and proliferation on Refuges.

Control Options: Chemical treatment with a Garlon 3A and Escort is effective.

Pulling of individual plants in small patches.

Three biological control agents (a beetle, a seed weevil, and a twig miner) are approved for release and have been established in Oregon. The seed beetle *Bruchidius villosus* was first released in Oregon in 1998, in Marion and Lane Counties. The beetle is an accidental introduction to the East Coast, but went through the TAG testing protocol for safety in order to be introduced into OR. The insect has also been released as a biocontrol agent in New Zealand. The beetle has been introduced at numerous sites since 2000. Populations are slowly increasing. Limited redistribution began in 2004. In 2001, it was found to attack French broom in the Eugene area.

Currently there are no biological agents employed on the Refuges.

Treatment Schedule: Spot spray with Garlon 3A and Escort tank mix during growing season.

Hand dig individual plants April – May when flowering.

Other Strategies to Reduce Abundance:
- Monitor known infestation sites, Quick action and eradication on discovered populations.

F.4.15 *Agrostis stolonifera* (Sprawling Bentgrass)

Priority: Medium. Sprawling Bentgrass aggressively produces horizontal stems, called stolons, that run along the soil's surface. These allow Sprawling Bentgrass to form dense stands under conducive conditions and outcompete bunch-type grass and native broadleaf forbs. Once established it becomes nearly impossible to control without negatively affecting the existing native grass species.

Description: A perennial grass species in the Poaceae family. It is stoloniferous and may form mats or tufts. The prostrate stems of this species grow to 1.3-3.3 ft (0.4–1 m) long with 0.8-4in (2–10 cm) long leaf blades and a panicle reaching up to 16in (40 cm) in height. It can be found growing in a variety of habitats including woodlands, grasslands and meadows, wetlands, riparian zones, and as a pioneer species on disturbed sites.

Current Distribution on the Refuges: Finley: fields 1, 29, and 31; Ankeny: east end of Eagle Marsh Prairie (nearly 100 percent) and west end of Eagle Marsh Prairie.

Specific thresholds: Eradicate in areas prior to restoration activities. Prevent spread and proliferation on Refuge wet prairie restoration areas;.

Control Options: Chemical treatment with Glyphosate in spring and/or fall depending on the condition and species profile of the site. Spot spray in fields with targetable populations of bent grass, or restored fields where non-targeted native species are present.

Fall treatment with a grass specific herbicide like Poast or Fusilade when other native grasses are dormant.

Fire is a cultural method that could be used in the fall prior to spraying or seeding. A combination of summer burning and fall spraying could effectively control bentgrass.

Currently there are no biological agents employed on the Refuges.

Treatment Schedule: In fields scheduled for restoration, a late summer application of Glyphosate followed with burning would clear the site fall green up. A subsequent application with Glyphosate in fall would kill the new growth. This could be followed up with native grass seeding or a second cycle of treatment depending on the level of infestation and desired control.
Poast could be applied in the fall in areas with desired native grass species when natives are dormant and native forb species have senesced.
Spot spraying with Poast or Glyphosate could target individual plants or small groups without significantly affecting desired native species.

Other Strategies to Reduce Abundance:

- Monitor known infestation sites. Determine level of infestation to initiate appropriate level of control.
- Control in areas scheduled for restoration to a level allowing for the establishment of desired native grass and forb species.

F.4.16 *Arrhenatherum elatius* (Tall Oatgrass)

Priority: Medium. Tall oatgrass is easily established and adapted to well drained, low fertility soils. It can out compete and dominate native grass communities that contain smaller, lower lying species like Roemer's fescue (Festuca roemeri) and California oatgrass (Danthonia californica). It is well established in oak savanna/upland prairie sites on Baskett Slough and Finley Refuges and hinders Refuge recovery efforts for listed species such as the Fender's Blue butterfly, Kincaid's lupine, and Willamette Valley Daisy.

Description: Tall oatgrass is a perennial, cool-season bunchgrass generally grown in Europe where it once was a component of the grasslands. Culms are erect, from 3 to 5 feet tall. Leaf blades, from 3/8 to 3/4 inches wide, are flat and rough to the touch. Seed heads are narrow panicles 6 to 10 inches long with long, twisted, angled, exposed awns.

Current Distribution on the Refuges: Finley - Pigeon Butte, Bald Top. Baskett Slough: Baskett Butte butterfly plots and surrounding oak savanna habitat.

Specific thresholds: Control spread and proliferation on Refuge upland prairie and oak savanna restoration areas; reduce and control populations in butterfly/lupine recovery areas. Eradicate in areas prior to restoration activities.

Control Options: Chemical weed wiping with Glyphosate can affect tall oatgrass's ability to set seed while not impacting low lying native grasses and forbs.

Treatment with a grass specific herbicide like Poast or Fusilade in areas void of desired native grass species or where native species resistant to grass specific herbicides (i.e., Roemer's fescue) exist.

Fire is a cultural method that could be used in the fall to reduce biomass and stimulate native grass response.

Currently there are no biological control agents employed on the Refuges.

Treatment Schedule: Early season mowing is a method that has been used to stress tall oatgrass plants to reduce or impede seed production. This method has shown little result in halting or controlling spread.

Weed wiping is used during spring/summer where Glyphosate can be applied to tall oatgrass without affecting other native or T & E species.

Grass specific herbicides like Poast or Fusilade will be applied in areas to control tall oatgrass where other undesirable grass species or those tolerant to the application exist. Spot spraying with Poast or Glyphosate could target individual plants or small groups without significantly affecting desired native species.

Prescribed burning is employed on a rotational basis in restoration areas and butterfly plots to reduce non-native grasses and encourage native grass and forb response.

Other Strategies to Reduce Abundance:
- Monitor known infestation sites. Reduce populations to an acceptable threshold level for establishment of native grass species and T & E species.
- Control in areas scheduled for restoration to a level allowing for the establishment of desired native grass and forb species.

F.4.17 *Phalaris aquatica* (Harding Grass*)

Priority: High. In wild land habitats Harding grass outcompetes and displaces native plant species. Tall stands of its dry foliage can present a fire hazard in summer. Harding grass reproduces by seed. Flowering occurs in May and June, as soils dry after winter rains, with viable seed formed between May and September. A significant amount of seed is produced each year by established plants, up to 40,000 seeds per square meter under some conditions (Reddy et al. 1996).

Description: Harding grass (*Phalaris aquatica*) is an erect, waist-high, stout perennial grass with grayish to bluish green leaves. Flowering heads are dense, spike-like, and usually two to five inches long. It is slow to develop from seed, but can form large bunches after several years. Harding grass is similar to three other species: littleseed canary grass (Phalaris minor), canary grass (P. canariensis), and reed canary grass (P. arundinacea). Unlike these other species, the base of the Harding grass stem often produces a reddish sap when cut.

Current Distribution on the Refuges: Finley - Between office and Fiechter House; Baskett Slough: field 12m and other spots on Butte.

Specific thresholds: Control spread and proliferation on Refuge upland prairie and oak savanna restoration areas; reduce and control populations in butterfly/lupine recovery areas. Eradicate in areas prior to restoration activities. Reduce populations to an acceptable threshold level for establishment of native grass species and T & E species. Eradicate if possible.

Control in areas scheduled for restoration to a level allowing for the establishment of desired native grass and forb species.

Control Options: Cultivation is generally not an effective method of control because Harding grass produces an abundant seed bank and can also regenerate from short pieces of rhizome left in the ground. Repeated cultivation when plants are actively growing would be necessary. Active growth corresponds to the time of frequent rainfall, which limits the ability to cultivate. However, cultivation may be used to remove a flush of seedlings and reduce the seed bank.
Close mowing or clipping late in the growing season can greatly reduce the vigor of Harding grass. Mowing should be done when plants are still green but seasonal soil moisture is almost exhausted.

Fire is a cultural method that could be used in the fall to reduce biomass and stimulate native grass response.

Post-emergence control-- Spot treatment with a 2 percent solution of glyphosate applied as a foliar spray to actively growing plants will kill Harding grass (Parsons 1992). A broadcast rate of 1.5 to 2.0 lb ai/acre is effective for large infestations. Ideal timing for this treatment is either at the early heading stage of development (mid- to late spring) or in early fall.

Currently there are no biological agents employed on the Refuges.

Treatment Schedule: Currently, treatment of Harding grass consists of a combination of spot spraying and seed head clipping during the growing season.

Chemical treatment consists of an application of Glyphosate to targeted populations early before they set seed.

Seed heads are clipped on plants that have already formed seed, then bagged and hauled away from the site.

Fire could be used in areas to clean up a site prior to restoration efforts.

Other Strategies to Reduce Abundance:

- Monitor known infestation sites.

Table F-1. Summary of Invasive Plant Species and Possible Control Methods to be Used, Willamette Valley National Wildlife Refuge Complex

Species	Priority	Mechanical	Biological	Chemical	Cultural
Meadow Knapweed	High	X	* Potential Biological Controls	X	X
Milk Thistle	High	X		X	
False Brome	High	X		X	
Harding Grass	High	X		X	
Armenian (Himalayan) Blackberry	Medium	X		X	
Oxeye Daisy	Medium	X		X	X
Poison Hemlock	Medium	X		X	X
Purple loosestrife	Medium		Leaf Beetle (*Galerucella calmariensis*); Leaf Beetle (*Galerucella pusilla*); Root Weevil (*lHylobius transversovittatus*); Seed Weevil (*Nanophyes marmoratus*)	X	X
Sprawling Bentgrass	Medium	X		X	X
Tall Oatgrass	Medium	X		X	X
Yellow Flag Iris	Medium	X		X	X
Canada thistle	Low to Medium	X	Stem-and-shoot gallfly (*Urophora cardui*)	X	
English Ivy	Low to Medium	X			X
Field bindweed	Low to Medium		Field bindweed moth (*Tyta luctuosa*) Field bindweed mite (*Aceria malherbae*)	X	
Knotgrass	Low to Medium	X		X	X
Reed canarygrass	Low to Medium	X		X	X
Bachelor’s Buttons	Low	X			X
Black Locust	Low	X			X (stumps)

Species	Priority	Mechanical	Biological	Chemical	Cultural
Bull thistle	Low	X	Seed Head gallfly (*Urophora stylata*)	X	
Scotch Broom	Low	X	Seed weevil Seed beetle (*Bruchidius villosus)*	X	X
Tansy Ragwort	Low	X	Cinabar moth		X
Velvet grass	Low	X			

F.5 Pesticide Usage – Best Management Practices

Best Management Practices (BMPs) can minimize or eliminate possible effects associated with pesticide usage to non-target species and/or sensitive habitats as well as degradation of water quality from drift, surface runoff, or leaching. Based upon the Department of the Interior Pesticide Use Policy (517 DM 1) and the Service's Integrated Pest Management Policy (569 FW 1), the use of applicable BMPs (where feasible) also would likely ensure that pesticide uses may not adversely affect federally listed species and/or their critical habitats through determinations made using the process described in 50 CFR part 402.

F.5.1 Human Safety

Personal Protective Equipment:
All applicators would wear the specific personal protective equipment (PPE) identified on the pesticide label. The appropriate PPE will be worn at all times during handling, mixing, and applying. PPE can include the following: disposable (e.g., Tyvek) or laundered coveralls; gloves (latex, rubber, or nitrile); rubber boots; and/or an NIOSH-approved respirator. Because exposure to concentrated product is usually greatest during mixing, extra care should be taken while preparing pesticide solutions. Persons mixing these solutions can be best protected if they wear long gloves, an apron, footwear, and a face shield.

Coveralls and other protective clothing used during an application would be laundered separately from other laundry items. Transporting, storing, handling, mixing and disposing of pesticide containers will be consistent with label requirements, USEPA and OSHA requirements, and Service policy.

If a respirator is necessary for a pesticide use, then the following requirements would be met in accordance with Service safety policy: a written Respirator Program, fit testing, physical examination (including pulmonary function and blood work for contaminants), and proper storage of the respirator.

Notification: The restricted entry interval (REI) is the time period required after the application at which point someone may safely enter a treated area without PPE. Refuge staff, authorized management agents of the Service, volunteers, and members of the public who could be in or near a pesticide treated area within the stated re-entry time period on the label would be notified about treatment areas. Posting would occur at any site where individuals might inadvertently become exposed to a pesticide during other activities on the refuge. Where required by the label and/or state-specific regulations, sites would also be posted on its perimeter and at other likely locations of entry. The refuge staff would also notify appropriate private property owners of an intended application, including any private individuals have requested notification. Special efforts would be made to contact nearby individuals who are beekeepers or who have expressed chemical sensitivities.

Medical Surveillance: Medical surveillance may be required for Service personnel and approved volunteers who mix, apply, and/or monitor use of pesticides (see 242 FW 7 [Pesticide Users] and 242 FW 4 [Medical Surveillance]). In accordance with 242 FW 7.12A, Service personnel would be medically monitoring if 1 or more of the following criteria is met: exposed or may be exposed to concentrations at or above the published permissible exposure limits or threshold limit values (see 242 FW 4); use pesticides in a manner considered "frequent pesticide use"; or use pesticides in a manner that requires a respirator (see 242 FW 14 for respirator use requirements). In 242 FW7.7A, "**Frequent Pesticide Use** means when a person applying pesticide handles, mixes, or applies pesticides, with a Health Hazard rating of 3 or higher, for 8 or more hours in any week or 16 or more hours in any 30-day period." Under some circumstances, individuals may be medically monitored who use pesticides infrequently, experience an acute exposure (sudden, short term), or use pesticides with a health hazard ranking of 1 or 2. This decision would consider the individual's health and fitness level, the pesticide's specific health risks, and the potential risks from other pesticide-related activities. Refuge cooperators (e.g., cooperative farmers) and other authorized agents (e.g., state and county employees) would be responsible for their own medical monitoring needs and costs.

Standard examinations (at refuge expense) of appropriate refuge staff would be provided by the nearest certified occupational health and safety physician as determined by Federal Occupational Health.

Avoiding Adverse Effects to Humans: Areas subject to human visitation will be marked with warning flags if entry restrictions after chemical application are required. Biological control release sites will be mapped and monitored to prevent inappropriate mechanical or chemical applications and to facilitate effectiveness.

Outreach and Education: The Refuge staff will include weed awareness in education and interpretive programs for the general public. The general staff will be informed of pest control being performed on the Refuge, introduced to recognizing noxious weeds, made aware of procedures that will minimize the spread of weed seeds, and the procedure for reporting the presence of noxious weeds. Volunteers involved with recreation and education programs will be made aware of the problems that invasive weeds pose to native plants, wildlife, and agriculture, as well as ways to prevent weeds establishment and spread. Volunteers, and students involved in habitat restoration, wildlife habitat improvement, and general Refuge operations will be trained to identify weed species, pest management techniques, and work procedures that will minimize the spread of weed seeds.

Inter-government Coordination: The Refuge staff will work with the state, county, and local municipalities to work cooperatively on weed control efforts that threaten the Refuge boundary. Personnel involved in vegetation management will participate in cooperative weed awareness and education programs, weed control networks, and continuing education in order to stay current on integrated pest management techniques.

F.5.2 Pesticide Handling and Mixing

Use in Accordance with Manufacturer's Instructions: The use of all pesticides will be in accordance with the manufacturer's instructions as indicated by the Product Label and Material Safety Data Sheets (MSDS). The manufacturer's instructions include personal protection equipment, storage and disposal practices, application rates and equipment, environmental precautions and locations, and target species. Material Safety Data Sheets contain additional safety, environmental, and health information.

Pesticide labels and material safety data sheets (MSDSs) will be maintained at the refuge shop and laminated copies in the mixing area. These documents also will be carried by field applicators, where possible. A written reference (e.g., note pad, chalk board, dry erase board) for each tank to be mixed will be kept in the mixing area for quick reference while mixing is in progress. In addition, approved PUPs stored in the PUPS database typically contain website links (URLs) to pesticide labels and MSDSs.

Handling Pesticides: The IPM Plan and PUPs will be kept in the station files and the staff will be aware of the file's location. Pesticide labels and MSDS will be available to all staff. The labels and

MSDSs for all pesticides in use or in storage will be kept in a consolidated file - one copy in the pesticide storage and handling area, one in a location available to the general staff.

Certification and Supervision of Pesticide Applicators: Appropriate refuge staff or approved volunteers handling, mixing, and/or applying or directly supervising others engaged in pesticide use activities would be trained and state or federally (BLM) licensed to apply pesticides to refuge lands or waters. In accordance with 242 FW7.18A, certification is required to apply restricted use pesticides based upon USEPA regulations. For safety reasons, all individuals participating in pest management activities with general use pesticides also are encouraged to attend appropriate training or acquire pesticide applicator certification. The certification requirement would be for a commercial or private applicator depending upon the state. New staff unfamiliar with proper procedures for storing, mixing, handling, applying, and disposing of herbicides and containers would receive orientation and training before handling or using any products. Documentation of training would be kept in the files at the refuge office.

Additional Precautions:
- The refuge staff would comply with all federal, state, and local pesticide use laws and regulations as well as Departmental, Service, and NWRS pesticide-related policies. For example, the refuge staff would use application equipment and apply rates for the specific pest(s) identified on the pesticide label as required under FIFRA.
- Before each treatment season and prior to mixing or applying any product for the first time each season, all applicators would review the labels, MSDSs, and PUPs for each pesticide, determining the target pest, appropriate mix rate(s), PPE, and other requirements listed on the pesticide label.
- As a precaution against spilling, spray tanks would not be left unattended during filling.
- All pesticide containers would be triple rinsed and the rinsate would be used as water in the sprayer tank and applied to treatment areas.
- All pesticide spray equipment would be properly cleaned. Where possible, rinsate would be used as part of the make-up water in the sprayer tank and applied to treatment areas.

- The refuge staff would empty, triple rinsed pesticide containers that can be recycled at local herbicide container collections.
- All unused pesticides would be properly discarded at a local "safe send" collection.
- Pesticides and pesticide containers would be lawfully stored, handled, and disposed of in accordance with the label and in a manner safeguarding human health, fish, and wildlife and prevent soil and water contaminant.
- The refuge staff would consider the water quality parameters (e.g., pH, hardness) that are important to ensure greatest efficacy where specified on the pesticide label.
- All pesticide spills would be addressed immediately using procedures identified in the refuge spill respond plan.

F.5.3 Minimizing Adverse Environmental Effects

Avoiding Adverse Effects to Water Quality: Various soil types and vegetation communities exist at the Refuge. To avoid ground and surface water contamination, herbicides will be selected and used according to the manufacturer's instruction; technical bulletins, and updated scientific evidence to match the environmental conditions. For example, glyphosate will be used wherever practicable due to its soil binding capability and relatively rapid breakdown in the environment. Aquatic formulations of agents will be used near surface water. The more permeable soil types will be treated with herbicides with low leaching potential at the proposed application amounts. Mechanical and biological control methods will be used whenever practicable in aquatic and permeable soil areas.

Avoiding Adverse Effects to Non-Target Species: Adverse effects to non-target species will be avoided by using selective herbicides, timing of applications to when desirable plants are dormant or at an unsusceptible life stage, the use of bio-control agents with target pest specificity, and avoiding sensitive areas. Treatment areas will be carefully scrutinized as to the boundaries and extent of infestation before a control method is applied; treatment will be targeted for the specific area only. Treatments that remove vegetation cover with resulting erosion, excessive dust, or sedimentation will be avoided if mitigation is not possible.

The schedule for the work varies considerably for the individual weed or insect species and control methods. In general, pest management is highly dependent upon weather, and pest and biological control insect morphology and life cycles. In addition, habitat use by wildlife, especially nesting birds, in pest control areas will alter pest control techniques and schedules.

Additional Precautions:
- A 1-foot no-spray buffer from the water's edge would be used, where applicable, and it does not detrimentally influence effective control of pest species.
- Use low impact herbicide application techniques (e.g., spot treatment, cut stump, oil basal, Thinvert system applications) rather than broadcast foliar applications (e.g., boom sprayer, other larger tank wand applications), where practical.
- Use low volume rather than high volume foliar applications where low impact methods above are not feasible or practical, to maximize herbicide effectiveness and ensure correct and uniform application rates.
- Applicators would use and adjust spray equipment to apply the coarsest droplet size spectrum with optimal coverage of the target species while reducing drift.

- Applicators would use the largest droplet size that results in uniform coverage.
- Applicators would use drift reduction technologies such as low-drift nozzles, where possible.
- Where possible, spraying would occur during low (average<7mph and preferably 3 to 5 mph) and consistent direction wind conditions with moderate temperatures (typically <85 degrees F).
- Where possible, applicators would avoid spraying during inversion conditions (often associated with calm and very low wind conditions) that can cause large-scale herbicide drift to non-target areas.
- Equipment would be calibrated regularly to ensure that the proper rate of pesticide is applied to the target area or species.
- Spray applications would be made at the lowest height for uniform coverage of target pests to minimize/eliminate potential drift.
- If windy conditions frequently occur during afternoons, spraying (especially boom treatments) would typically be conducted during early morning hours.
- Spray applications would not be conducted on days with >30 percent forecast for rain within 6 hours, except for pesticides that are rapidly rain fast (e.g., glyphosate in 1 hour) to minimize/eliminate potential runoff.
- Where possible, applicators would use drift retardant adjuvants during spray applications, especially adjacent to sensitive areas.
- Where possible, applicators would use a non-toxic dye to aid in identifying target area treated as well as potential over spray or drift. A dye can also aid in detecting equipment leaks. If a leak is discovered, the application would be stopped until repairs can be made to the sprayer.
- For pesticide uses associated with cropland and facilities management, buffers, as appropriate, would be used to protect sensitive habitats, especially wetlands and other aquatic habitats.
- When drift cannot be sufficiently reduced through altering equipment set up and application techniques, buffer zones may be identified to protect sensitive areas downwind of applications. The refuge staff would only apply adjacent to sensitive areas when the wind is blowing the opposite direction.
- Applicators would utilize scouting for early detection of pests to eliminate unnecessary pesticide applications.
- The refuge staff would consider timing of application so native plants are protected (e.g., senescence) while effectively treating invasive plants.
- Rinsate from cleaning spray equipment after application would be recaptured and reused or applied to an appropriate pest plant infestation.
- Application equipment (e.g., sprayer, ATV, tractor) would be thoroughly cleaned and PPE would be removed/disposed of on-site by applicators after treatments to eliminate the potential spread of pests to un-infested areas.

F.5.4 Pesticide use proposals (PUPs)

Use only After Pesticide Use Proposal Approved: A PUP will be prepared for each proposed pesticide use associated with annual pest management on refuge lands and waters. Pesticides will only be applied after receiving approval of a submitted PUP. PUPs would be created, approved or disapproved, and stored as records in the Pesticide Use Proposal System (PUPS), which is a centralized database on the Service's intranet (https://systems.fws.gov/pups). Only Service employees can access PUP records in this database.

A PUP will include specific information about the proposed pesticide use including the common and chemical names of the pesticide(s), target pest species, size and location of treatment site(s), application rate(s) and method(s), and federally listed species determinations, where applicable. Other information in the PUP may include distance to surface and ground water, slope, soil types, weather condition, and other specifics will be explained in the Pesticide Use Proposal.

In accordance with Service guidelines (Director's memo [December 12, 2007]), a refuge staff may receive up to 5-year approvals for Washington Office and field reviewed proposed pesticide uses based upon meeting identified criteria including an approved IPM plan, where necessary (see http://www.fws.gov/contaminants/Issues/IPM.cfm). PUPs are reviewed each year for specific product information on application frequency and rate, target species, locations, local environmental conditions, reentry times, and restrictions.

In accordance with 569 FW 1, PUPs would be required for the following:

- Uses of pesticides on lands and facilities owned or managed by the Service, including properties managed by Service personnel as a result of the Food Security Act of 1985;
- Service projects by non-Service personnel on Service owned or controlled lands and facilities and other pest management activities that would be conducted by Service personnel; and
- Where the Service would be responsible or provides funds for pest management identified in protective covenants, easements, contracts, or agreements off Service lands.

F.5.5 Record Keeping

In accordance with 569 FW 1, the refuge Project Leader will maintain records of all pesticides annually applied on lands or waters under refuge jurisdiction, including pesticides applied by other agencies, non-government applicators, cooperators, and their pest management service providers. The following usage information can be reported for approved PUPs in the PUPS database:

- Pesticide trade name(s)
- Active ingredient(s)
- Total acres treated
- Total amount of pesticides used (lbs or gallons)
- Total amount of active ingredient(s) used (lbs)
- Target pest(s)
- Efficacy (% control)

To determine whether treatments are efficacious (eradicating, controlling, or containing the target pest) and achieving resource objectives, habitat and/or wildlife response would be monitored both pre- and post-treatment, where possible. Considering available annual funding and staffing, appropriate monitoring data regarding characteristics (attributes) of pest infestations (e.g., area, perimeter, degree of infestation-density, % cover, density) as well as habitat and/or wildlife response to treatments may be collected and stored in a relational database (e.g., Refuge Habitat Management Database), preferably a geo-referenced data management system (e.g., Refuge Lands GIS [RLGIS]) to facilitate data analyses and subsequent reporting. In accordance with adaptive management, data analysis and interpretation would allow treatments to be modified or changed over time, as necessary, to achieve resource objectives considering site-specific conditions in conjunction with habitat and/or wildlife responses. Monitoring could also identify short- and long-term impacts to natural resources and environmental quality associated with IPM treatments in accordance with adaptive management principles identified in 43 CFR 46.145.

F.6 Evaluation of Ecological Risk Associated with Pesticide Use

F.6.1 Introduction to Ecological Risk Assessment

This section describes a primary tool, known as ecological risk assessment that will be utilized prior to use of any pesticide. The protocols, forms, and assumptions behind this method are explained in detail in subsequent text.

Ecological risk assessment is an established quantitative and qualitative methodology for comparing and prioritizing risks of pesticides and conveying an estimate of the potential risk for an adverse effect. This quantitative methodology provides an efficient mechanism to integrate best available scientific information regarding hazard, patterns of use (exposure), and dose-response relationships in a manner that is useful for ecological risk decision-making. It would provide an effective way to evaluate potential effects where there is missing or unavailable scientific information (data gaps) to address reasonable, foreseeable adverse effects in the field as required under 40 CFR Part 1502.22.

Potential effects to species (listed and non-listed) will be evaluated with this tool. Potential effects to environmental quality will also be evaluated, based upon pesticide characteristics of environmental fate (water solubility, soil mobility, soil persistence, and volatilization). Evaluations will be documented in Chemical Profiles (see Section F.7). These profiles would compare chemical and site-specific values to include threshold values which represent maximal tolerable effects to species and environmental quality.

Pesticides would only be used on refuge lands for habitat management as well as croplands/facilities maintenance after approval of a PUP; approval of a PUP generally requires completion of an accompanying Chemical Profile and Ecological Risk Assessment. In general, PUPs on refuge lands would only be approved where there would likely be minor, temporary, or localized effects to fish and wildlife species as well as minimal potential to degrade environmental quality. Appropriate BMPs (see Section F.5) are required as part of the PUP documentation.

Protocols for ecological risk assessment of pesticide uses on the refuge were developed through research and established by the US Environmental Protection Agency (2004). Assumptions underlying these risk assessments are presented in Section F.6.5.

F.6.2 Overview of Calculated Method for Determining Ecological Risk to Fish and Wildlife

The potential for pesticides used on the refuge to cause direct adverse effects to fish and wildlife would be evaluated by the Regional IPM Coordinator (or other regional staff) using USEPA's Ecological Risk Assessment Process (US Environmental Protection Agency 2004). This deterministic approach is based upon a two-phase process involving estimation of environmental concentrations and then characterization of risk. This method integrates exposure estimates (estimated environmental concentration [EEC] and toxicological endpoints [e.g., LC_{50} and oral LD_{50}]) to evaluate the potential for adverse effects to species groups (birds, mammals, and fish) representative of legal mandates for managing units of the NWRS. LD stands for "Lethal Dose". LD_{50} is the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals. The LD_{50} is one way to measure the short-term poisoning potential (acute toxicity) of a material. LC_{50} (Lethal Concentration, 50%) is the concentration of the material in the surrounding medium (air or water) required to kill half the members of a tested population through exposure.

This integration is achieved by determining a risk quotient (RQ) calculated by dividing the EEC by the appropriate acute and chronic toxicity values selected from standardized toxicological endpoints or published effects (Table F-2).

RQ = EEC/Toxicological Endpoint

The level of risk associated with direct effects of pesticide use would then be ascertained by comparing calculated RQs to the appropriate Level of Concern (LOC) established by US Environmental Protection Agency (1998 [Table 2]). The LOC represents a quantitative threshold value for screening potential adverse effects to fish and wildlife resources associated with pesticide use.

In general, a PUP that resulted in an ecological risk assessment where RQ > LOC would not be approved (however see Section F.7 and F.7.1.4 for more detail).

Identifying Toxicological Endpoints: The toxicological data used in ecological risk assessments are typically results of standardized laboratory studies provided by pesticide registrants to the US Environmental Protection Agency (USEPA) to meet regulatory requirements under the Federal Insecticide, Fungicide and Rodenticide Act of 1996 (FIFRA). These studies assess the acute (lethality) and chronic (reproductive) effects associated with short- and long-term exposure to pesticides on representative species of birds, mammals, freshwater fish, aquatic invertebrates, and terrestrial and aquatic plants. Other effects data publicly available would also be utilized for risk assessment protocols described herein. Toxicity endpoint and environmental fate data are available from a variety of resources. Some of the more useful resources can be found in Section F.7.1.5.

Table F-2. Ecotoxicity Tests Used to Establish Toxicological Endpoints

Species Group	Exposure	Measurement endpoint
Bird	Acute	Median Lethal Concentration (LC_{50})
	Chronic	No Observed Effect Concentration (NOEC) or No Observed Adverse Effect Concentration (NOAEC)[1]
Fish	Acute	Median Lethal Concentration (LC_{50})
	Chronic	No Observed Effect Concentration (NOEC) or No Observed Adverse Effect Concentration (NOAEC)[2]
Mammal	Acute	Oral Lethal Dose (LD_{50})
	Chronic	No Observed Effect Concentration (NOEC) or No Observed Adverse Effect Concentration (NOAEC)[3]

1 Measurement endpoints typically include a variety of reproductive parameters (e.g., number of eggs, number of offspring, eggshell thickness, and number of cracked eggs).

2 Measurement endpoints for early life stage/life cycle typically include embryo hatch rates, time to hatch, growth, and time to swim-up.

3 Measurement endpoints include maternal toxicity, teratogenic effects or developmental anomalies, evidence of mutagenicity or genotoxicity, and interference with cellular mechanisms such as DNA synthesis and DNA repair.

Acute risks indicate the potential for mortality associated with short-term dietary exposure to pesticides immediately after an application. For characterization of acute risks, median values from LC_{50} and LD_{50} tests would be used as toxicological endpoints for RQ calculations. In contrast, chronic risks indicate the potential for adverse effects associated with long-term dietary exposure to pesticides from a single application or multiple applications over time (within a season and over years). For characterization of chronic risks, the no observed concentration (NOAEC) or no observed effect concentration (NOEC) for reproduction would be used as toxicological endpoints for RQ calculations. Where available, the NOAEC would be preferred over a NOEC value.

Depending on the pesticide and on the refuge, four exposure-species group scenarios may would be used to characterize ecological risk to fish and wildlife on the refuge: acute-listed species, acute-nonlisted species, chronic-listed species, and chronic-nonlisted species. (Listed species are those federally designated as threatened, endangered, or proposed in accordance with the Endangered Species Act of 1973 (16 USC 1531-1544, 87 Stat. 884, as amended-Public Law 93-205).

For listed species, potential adverse effects would be assessed at the individual level because loss of individuals from a population could detrimentally impact a species. In contrast, risks to nonlisted species would consider effects at the population level. A RQ<LOC would indicate the proposed pesticide use "may affect, not likely to adversely effect" individuals (listed species) and it would not pose an unacceptable risk for adverse effects to populations (non-listed species) for each taxonomic group (Table F-3). In contrast, a RQ>LOC would indicate a "may affect, likely to adversely affect" for listed species and it would also pose unacceptable ecological risk for adverse effects to nonlisted species.

Table F-3. Levels of Concern and Presumption of Unacceptable Risk for Birds, Fish, and Mammals

Risk Presumption		Level of Concern	
		Listed Species	**Non-listed Species**
Acute	Birds	0.1	0.5
	Fish	0.05	0.5
	Mammals	0.1	0.5
Chronic	Birds	1.0	1.0
	Fish	1.0	1.0
	Mammals	1.0	1.0

Source: US Environmental Protection Agency 1998

F.6.3 Identifying Expected Environmental Concentrations

Following release into the environment through application, pesticides experience several different routes of environmental fate. Pesticides which are sprayed can move through the air (e.g., particle or vapor drift) and may eventually end up in other parts of the environment such as non-target vegetation, soil, or water. Pesticides applied directly to the soil may be washed off the soil into nearby bodies of surface water (e.g., surface runoff) or may percolate through the soil to lower soil layers and groundwater (e.g., leaching) (Baker and Miller 1999, Pope et. al. 1999, Butler et. al. 1998, Ramsay et. al. 1995, EXTOXNET 1993*a*). Pesticides injected into the soil may also be subject to the latter two fates.

The aforementioned possibilities are by no means complete, but serve to illustrate that movement of pesticides in the environment is very complex with transfers occurring continually among different environmental compartments. In some cases, these exchanges occur not only between areas that are close together, but it also may involve transportation of pesticides over long distances (Barry 2004, Woods 2004).

F.6.3.1 Terrestrial Exposure

The estimated environmental concentration (ECC) for exposure to terrestrial wildlife would be quantified using an USEPA screening-level approach (US Environmental Protection Agency 2004). This screening-level approach is not affected by product formulation because it evaluates pesticide active ingredient(s). This approach would vary depending upon the proposed pesticide application method: spray or granular.

Terrestrial-spray application: For spray applications, exposure would be determined using the Kanaga nomogram method (US Environmental Protection Agency 2005a, US Environmental Protection Agency 2004, Pfleeger et al. 1996) through the USEPA's Terrestrial Residue Exposure model (T-REX) version 1.2.3 (US Environmental Protection Agency 2005b). To estimate the maximum (initial) pesticide residue on short grass (<20 cm tall) as a general food item category for terrestrial vertebrate species, T-REX input variables would include the following from the pesticide label: maximum pesticide application rate (pounds active ingredient [acid equivalent]/acre) and pesticide half-life (days) in soil. Although there are other food item categories (tall grasses; broadleaf plants and small insects; and fruits, pods, seeds and large insects), short grass was selected because it would yield maximum EECs (240 ppm per lb ai/acre) for worse-case risk assessments. Short grass is not representative of forage for carnivorous species (e.g., raptors), but it would characterize the maximum potential exposure through the diet of avian and mammalian prey items. Consequently, this approach would provide a conservative screening tool for pesticides that do not biomagnify.

For RQ calculations in T-REX, the model would require the weight of surrogate species and Mineau scaling factors (Mineau et. al. 1996). Body weights of bobwhite quail and mallard are included in T-REX by default, but body weights of other organisms (Table F-4) would be entered manually. The Mineau scaling factor accounts for small-bodied bird species that may be more sensitive to pesticide exposure than would be predicted only by body weight. Mineau scaling factors would be entered manually with values ranging from 1 to 1.55 that are unique to a particular pesticide or group of pesticides. If specific information to select a scaling factor is not available, then a value of 1.15 would be used as a default. Alternatively, zero would be entered if it is known that body weight does not influence toxicity of pesticide(s) being assessed. The upper bound estimate output from the T-REX Kanaga nomogram would be used as an EEC for calculation of RQs. This approach would yield a conservative estimate of ecological risk.

Table F-4. Average Body Weight of Selected Terrestrial Wildlife Species Frequently Used in Research to Establish Toxicological Endpoints

Species	Body Weight (kg)
Mammal (15 g)	0.015
House sparrow	0.0277
Mammal (35 g)	0.035
Starling	0.0823
Red-winged blackbird	0.0526
Common grackle	0.114
Japanese quail	0.178
Bobwhite quail	0.178
Rat	0.200
Rock dove (aka pigeon)	0.542
Mammal (1000 g)	1.000
Mallard	1.082
Ring-necked pheasant	1.135

Source: Dunning 1984

Terrestrial – granular application: Granular pesticide formulations and pesticide-treated seed would pose a unique route of exposure for avian and mammalian species. The pesticide is applied in discrete units which birds or mammals might ingest accidentally with food items or intentionally as in the case of some bird species actively seeking and picking up gravel or grit to aid digestion or seed as a food source. Granules may also be consumed by wildlife foraging on earthworms, slugs or other soft-bodied soil organisms to which the granules may adhere.

Terrestrial wildlife RQs for granular formulations or seed treatments would be calculated by dividing the maximum milligrams of active ingredient (ai) exposed (e.g., EEC) on the surface of an area equal to 1 square foot by the appropriate LD50 value multiplied by the surrogate's body weight (Table F-4). An adjustment to surface area calculations would be made for broadcast, banded, and in-furrow applications. An adjustment also would be made for applications with and without incorporation of the granules. Without incorporation, it would be assumed that 100% of the granules remain on the soil surface available to foraging birds and mammals. Press wheels push granules flat with the soil surface, but they are not incorporated into the soil. If granules are incorporated in the soil during band or T-band applications or after broadcast applications, it would be assumed only 15% of the applied granules remain available to wildlife. It would be assumed that only 1% of the granules are available on the soil surface following in-furrow applications.

EECs for pesticides applied in granular form and as seed treatments would be determined considering potential ingestion rates of avian or mammalian species (e.g., 10-30% body weight/day). This would provide an estimate of maximum exposure that may occur as a result of granule or seed treatment spills such as those that commonly occur at end rows during application and planting. The availability of granules and seed treatments to terrestrial vertebrates would also be considered by calculating the loading per unit area (LD50/ft2) for comparison to USEPA Level of Concerns (US Environmental Protection Agency 1998). The T-REX version 1.2.3 (US Environmental Protection Agency 2005b) contains a submodel which automates Kanaga exposure calculations for granular pesticides and treated seed.

The following formulas will be used to calculate EECs depending upon the type of granular pesticide application:

- In-furrow applications assume a typical value of 1% granules, bait, or seed remain unincorporated.

mg a.i./ft.^{2} = [(lbs. product/acre)(% a.i.)(453,580 mg/lbs)(1% exposed))] / {[(43,560 ft.^{2}/acre)/(row spacing (ft.))] / (row spacing (ft.)}
or
mg a.i./ft^2 = [(lbs product/1000 ft. row)(% a.i.)(1000 ft row)(453,580 mg/lb.)(1% exposed)

EEC = [(mg a.i./ft.^{2})(% of pesticide biologically available)]

- Incorporated banded treatments assume that 15% of granules, bait, seeds are unincorporated.

mg a.i./ft.^{2} = [(lbs. product/1000 row ft.)(% a.i.)(453,580 mg/lb.)(1-% incorporated)] / (1,000 ft.)(band width (ft.))
EEC = [(mg a.i./ft.^{2})(% of pesticide biologically available)]

- Broadcast treatment without incorporation assumes 100% of granules, bait, seeds are unincorporated.

mg a.i./ft.^{2} = [(lbs. product/acre)(% a.i.)(453,590 mg/lb.)] / (43,560 ft.^{2}/acre)
EEC = [(mg a.i./ft.^{2})(% of pesticide biologically available)]

Where:

- % of pesticide biologically available = 100% without species-specific ingestion rates
- Conversion for calculating mg a.i./ft.^{2} using ounces: 453,580 mg/lb. /16 = 28,349 mg/oz.

The following equation would used to calculate a RQ based on the EEC calculated by one of the above equations. The EEC would divided by the surrogate LD_{50} toxicological endpoint multiplied by the body weight (Table F-4) of the surrogate.

$$RQ = EEC / [LD_{50} (mg/kg) * body\ weight\ (kg)]$$

As with other risk assessments, a RQ>LOC would be a presumption of unacceptable ecological risk. A RQ<LOC would be a presumption of acceptable risk with only minor, temporary, or localized effects to species.

F.6.3.2 Aquatic exposure

Exposures to aquatic habitats (e.g., wetlands, meadows, ephemeral pools, water delivery ditches) would be evaluated separately for ground-based pesticide treatments of habitats managed for fish and wildlife compared with cropland/facilities maintenance. The primary exposure pathway for aquatic organisms from any ground-based treatments likely would be particle drift during the pesticide application. However, different exposure scenarios would be necessary as a result of contrasting application equipment and techniques as well as pesticides used to control pests on agricultural lands (especially those cultivated by cooperative farmers for economic return from crop yields) and facilities maintenance (e.g., roadsides, parking lots, trails) compared with other managed habitats on the refuge. In addition, pesticide applications may be done <25 feet of the high water mark of aquatic habitats for habitat management treatments; whereas, no-spray buffers (≥25 feet) would be used for croplands/facilities maintenance treatments.

Habitat treatments: For the worst-case exposure scenario to non-target aquatic habitats, EECs (Table F-5) would be would be derived from Urban and Cook (1986) that assumes an intentional overspray to an entire, non-target water body (1-foot depth) from a treatment <25 feet from the high water mark using the max application rate (acid basis [see above]). However, use of BMPs for applying pesticides (see Section F.5) would likely minimize/eliminate potential drift to non-target aquatic habitats during actual treatments. If there would be unacceptable (acute or chronic) risk to fish and wildlife with the simulated 100% overspray (RQ>LOC), then the proposed pesticide use may be disapproved or the PUP would be approved at a lower application rate to minimize/eliminate unacceptable risk to aquatic organisms (RQ=LOC).

Table F-5. Estimated Environmental Concentrations (ppb) of Pesticides in Aquatic Habitats

Lbs/acre	EEC (ppb)
0.10	36.7
0.20	73.5
0.25	91.9
0.30	110.2
0.40	147.0
0.50	183.7
0.75	275.6
1.00	367.5
1.25	459.7
1.50	551.6
1.75	643.5
2.00	735.7
2.25	827.6
2.50	919.4
3.00	1103.5
4.00	1471.4
5.00	1839
6.00	2207
7.00	2575
8.00	2943
9.00	3311
10.00	3678

Source: Urban and Cook 1986. Concentrations at 1 foot depth immediately after direct application.

Cropland/facilities maintenance treatments: Field drift studies conducted by the Spray Drift Task Force, which is a joint project of several agricultural chemical businesses, were used to develop a generic spray drift database. From this database, the AgDRIFT computer model was created to satisfy USEPA pesticide registration spray drift data requirements and as a scientific basis to evaluate off-target movement of pesticides from particle drift and assess potential effects of exposure to wildlife. Several versions of the computer model have been developed (i.e., v2.01 through v2.10). The Spray Drift Task Force AgDRIFT® model version 2.01 (SDTF 2003, AgDRIFT 2001) would be used to derive EECs resulting from drift of pesticides to refuge aquatic resources from ground-based pesticide applications >25 feet from the high water mark. The Spray Drift Task Force AgDRIFT model is publicly available at http://www.agdrift.com. At this website, click "AgDRIFT 2.0" and then click "Download Now" and follow the instructions to obtain the computer model.

The AgDRIFT model is composed of submodels called tiers. Tier I Ground submodel would be used to assess ground-based applications of pesticides. Tier outputs (EECs) would be calculated with AgDRIFT using the following input variables: max application rate (acid basis [see above]), low boom (20 inches), fine to medium droplet size, EPA-defined wetland, and a ≥25-foot distance (buffer) from treated area to water.

F.6.4 Incorporating Published Information through Reference

NEPA documents regarding biological and other environmental effects of biological control agents, pesticides, degradates, and adjuvants prepared by another federal agency, where the scope would be relevant to evaluation of effects from pesticide uses on refuge lands, would be reviewed. Possible source agencies for such NEPA documents would include the Bureau of Land Management, US Forest Service, National Park Service, US Department of Agriculture-Animal and Plant Health Inspection Service, and the military services. It might be appropriate to incorporate by reference parts or all of existing document(s). Incorporating by reference (40 CFR 1502.21) is a technique used to avoid redundancies in analysis. It also would reduce the bulk of a Service NEPA document, which only would identify the documents that are incorporated by reference. In addition, relevant portions would be summarized in the Service NEPA document to the extent necessary to provide the decision maker and public with an understanding of relevance of the referenced material to the current analysis.

In accordance with the requirements set forth in 43 CFR 46.135, the Service would specifically incorporate through reference ecological risk assessments prepared by the US Forest Service (http://www.fs.fed.us/r6/invasiveplant-eis/Risk-Assessments/Herbicides-Analyzed-InvPlant-EIS.htm) and Bureau of Land Management (http://www.blm.gov/wo/st/en/prog/more/veg_eis.html). These risk assessments and associated documentation also are available in total with the administrative record for the Final Environmental Impact Statement entitled *Pacific Northwest Region Invasive Plant Program – Preventing and Managing Invasive Plants* (US Forest Service 2005) and *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic EIS (PEIS)* (Bureau of Land Management 2007). In accordance with 43 CRF 46.120(d), use of existing NEPA documents by supplementing, tiering to, incorporating by reference, or adopting previous NEPA environmental analyses would avoid redundancy and unnecessary paperwork.

As a basis for completing "Chemical Profiles" for approving or disapproving refuge PUPs, ecological risk assessments for the following herbicide and adjuvant uses prepared by the US Forest Service would be incorporated by reference:

- 2,4-D
- Chlorosulfuron
- Clopyralid
- Dicamba
- Glyphosate
- Imazapic
- Imazapyr
- Metsulfuron methyl
- Picloram
- Sethoxydim
- Sulfometuron methyl

- Triclopyr
- Nonylphenol polyethylate (NPE) based surfactants

As a basis for completing "Chemical Profiles" for approving or disapproving refuge PUPs, ecological risk assessments for the following herbicide uses as well as evaluation of risks associated with pesticide degradates and adjuvants prepared by the Bureau of Land Management would be incorporated by reference:

- Bromacil
- Chlorsulfuron
- Diflufenzopyr
- Diquat
- Diuron
- Fluridone
- Imazapic
- Overdrive (diflufenzopyr and dicamba)
- Sulfometuron methyl
- Tebuthiuron
- Pesticide degradates and adjuvants (*Appendix D – Evaluation of risks from degradates, polyoxyethylene-amine (POEA) and R-11, and endocrine disrupting chemicals*)

F.6.5 Assumptions for ecological risk assessments

There are a number of assumptions involved with the ecological risk assessment process for terrestrial and aquatic organisms associated with utilization of the US Environmental Protection Agency's (2004) process. These assumptions may be risk neutral or may lead to an over- or under-estimation of risk from pesticide exposure depending upon site-specific conditions. The following describes these assumptions, their application to the conditions typically encountered, and whether or not they may lead to recommendations that are risk neutral, underestimate, or overestimate ecological risk from potential pesticide exposure.

- Indirect effects would not be evaluated by ecological risk assessments. These effects include the mechanisms of indirect exposure to pesticides: consuming prey items (fish, birds, or small mammals), reductions in the availability of prey items, and disturbance associated with pesticide application activities.
- Exposure to a pesticide product can be assessed based upon the active ingredient. However, exposure to a chemical mixture (pesticide formulation) may result in effects that are similar or substantially different compared to only the active ingredient. Non-target organisms may be exposed directly to the pesticide formulation or only various constituents of the formulation as they dissipate and partition in the environment. If toxicological information for both the active ingredient and formulated product are available, then data representing the greatest potential toxicity would be selected for use in the risk assessment process (US Environmental Protection Agency 2004). As a result, this conservative approach may lead to an overestimation of risk characterization from pesticide exposure.
- Because toxicity tests with listed or candidate species or closely related species are not available, data for surrogate species would be most often used for risk assessments. Specifically, bobwhite quail and mallard duck are the most frequently used surrogates for evaluating potential toxicity to federally listed avian species. Bluegill sunfish, rainbow trout, and fathead minnow are the most common surrogates for evaluating toxicity for freshwater

fishes. However, sheep's head minnow can be an appropriate surrogate marine species for coastal environments. Rats and mice are the most common surrogates for evaluating toxicity for mammals. Interspecies sensitivity is a major source of uncertainty in pesticide assessments. As a result of this uncertainty, data is selected for the most sensitive species tested within a taxonomic group (birds, fish, and mammals) given the quality of the data is acceptable. If additional toxicity data for more species of organisms in a particular group are available, the selected data will not be limited to the species previously listed as common surrogates.

- The Kanaga nomogram outputs maximum EEC values that may be used to calculate an average daily concentration over a specified interval of time, which is referred to as a time-weighted-average (TWA). The maximum EEC would be selected as the exposure input for both acute and chronic risk assessments in the screening-level evaluations. The initial or maximum EEC derived from the Kanaga nomogram represents the maximum expected instantaneous or acute exposure to a pesticide. Acute toxicity endpoints are determined using a single exposure to a known pesticide concentration typically for 48 to 96 hours. This value is assumed to represent ecological risk from acute exposure to a pesticide. On the other hand, chronic risk to pesticide exposure is a function of pesticide concentration and duration of exposure to the pesticide. An organism's response to chronic pesticide exposure may result from either the concentration of the pesticide, length of exposure, or some combination of both factors. Standardized tests for chronic toxicity typically involve exposing an organism to several different pesticide concentrations for a specified length of time (days, weeks, months, years or generations). For example, avian reproduction tests include a 10-week exposure phase. Because a single length of time is used in the test, time response data is usually not available for inclusion into risk assessments. Without time response data it is difficult to determine the concentration which elicited a toxicological response.
- Using maximum EECs for chronic risk estimates may result in an overestimate of risk, particularly for compounds that dissipate rapidly. Conversely, using TWAs for chronic risk estimates may underestimate risk if it is the concentration rather than the duration of exposure that is primarily responsible for the observed adverse effect. The maximum EEC would be used for chronic risk assessments although it may result in an overestimate of risk. TWAs may be used for chronic risk assessments, but they will be applied judiciously considering the potential for an underestimate or overestimate of risk. For example, the number of days exposure exceeds a Level of Concern may influence the suitability of a pesticide use. The greater the number of days the EEC exceeds the Level of Concern translates into greater the ecological risk. This is a qualitative assessment, and is subject to reviewer's expertise in ecological risk assessment and tolerance for risk.
- The length of time used to calculate the TWA can have a substantial effect on the exposure estimates and there is no standard method for determining the appropriate duration for this estimate. The T-REX model assumes a 21-week exposure period, which is equivalent to avian reproductive studies designed to establish a steady-state concentration for bioaccumulative compounds. However, this does not necessarily define the true exposure duration needed to elicit a toxicological response. Pesticides, which do not bioaccumulate, may achieve a steady-state concentration earlier than 21 weeks. The duration of time for calculating TWAs will require justification and it will not exceed the duration of exposure in the chronic toxicity test (approximately 70 days for the standard avian reproduction study). An alternative to using the duration of the chronic toxicity study is to base the TWA on the application interval. In this case, increasing the application interval would suppress both the estimated peak pesticide concentration and the TWA. Another alternative to using TWAs

would be to consider the number of days that a chemical is predicted to exceed the LOC.

- Pesticide dissipation is assumed to be first-order in the absence of data suggesting alternative dissipation patterns such as bi-phasic. Field dissipation data would generally be the most pertinent for assessing exposure in terrestrial species that forage on vegetation. However, this data is often not available and it can be misleading particularly if the compound is prone to "wash-off". Soil half-life is the most common degradation data available. Dissipation or degradation data that would reflect the environmental conditions typical of refuge lands would be utilized, if available.
- For species found in the water column, it would be assumed that the greatest bioavailable fraction of the pesticide active ingredient in surface waters is freely dissolved in the water column.
- Actual habitat requirements of any particular terrestrial species are not considered, and it is assumed that species exclusively and permanently occupy the treated area, or adjacent areas receiving pesticide at rates commensurate with the treatment rate. This assumption would produce a maximum estimate of exposure for risk characterization. This assumption would likely lead to an overestimation of exposure for species that do not permanently and exclusively occupy the treated area (US Environmental Protection Agency 2004).
- Exposure through incidental ingestion of pesticide contaminated soil is not considered in the USEPA risk assessment protocols. Research suggests <15% of the diet can consist of incidentally ingested soil depending upon species and feeding strategy (Beyer et al. 1994). An assessment of pesticide concentrations in soil compared to food item categories in the Kanaga nomogram indicates incidental soil ingestion will not likely increase dietary exposure to pesticides. Inclusion of soil into the diet would effectively reduce the overall dietary concentration compared to the present assumption that the entire diet consists a contaminated food source (Fletcher et al. 1994). An exception to this may be soil-applied pesticides in which exposure from incidental ingestion of soil may increase. Potential for pesticide exposure under this assumption may be underestimated for soil-applied pesticides and overestimated for foliar-applied pesticides. The concentration of a pesticide in soil would likely be less than predicted on food items.
- Exposure through inhalation of pesticides is not considered in the USEPA risk assessment protocols. Such exposure may occur through three potential sources: spray material in droplet form at time of application, vapor phase with the pesticide volatilizing from treated surfaces, and airborne particulates (soil, vegetative matter, and pesticide dusts). The USEPA (1990) reported exposure from inhaling spray droplets at the time of application is not an appreciable route of exposure for birds. According to research on mallards and bobwhite quail, respirable particle size (particles reaching the lung) in birds is limited to maximum diameter of 2 to 5 microns. The spray droplet spectra covering the majority of pesticide application scenarios indicate that less than 1% of the applied material is within the respirable particle size. This route of exposure is further limited because the permissible spray drop size distribution for ground pesticide applications is restricted to ASAE medium or coarser drop size distribution.
- Inhalation of a pesticide in the vapor phase may be another source of exposure for some pesticides under certain conditions. This mechanism of exposure to pesticides occurs post application and it would pertain to those pesticides with a high vapor pressure. The USEPA is currently evaluating protocols for modeling inhalation exposure from pesticides including near-field and near-ground air concentrations based upon equilibrium and kinetics-based models. Risk characterization for exposure with this mechanism is unavailable.
- The effect from exposure to dusts contaminated with the pesticide cannot be assessed

generically as partitioning issues related to application site soils and chemical properties of the applied pesticides render the exposure potential from this route highly situation specific.

- Dermal exposure may occur through three potential sources: direct application of spray to terrestrial wildlife in the treated area or within the drift footprint, incidental contact with contaminated vegetation, or contact with contaminated water or soil. Interception of spray and incidental contact with treated substrates may pose risk to avian wildlife (Driver et al. 1991). However, available research related to wildlife dermal contact with pesticides is extremely limited, except dermal toxicity values are common for some mammals used as human surrogates (rats and mice). The USEPA is currently evaluating protocols for modeling dermal exposure. Risk characterization may be underestimated for this route of exposure, particularly with high risk pesticides such as some organophosphates or carbamate insecticides. If protocols are established by the USEPA for assessing dermal exposure to pesticides, they will be considered for incorporation into pesticide assessment protocols.
- Exposure to a pesticide may occur from consuming surface water, dew or other water on treated surfaces. Water soluble pesticides have potential to dissolve in surface runoff and puddles in a treated area may contain pesticide residues. Similarly, pesticides with lower organic carbon partitioning characteristics and higher solubility in water have a greater potential to dissolve in dew and other water associated with plant surfaces. Estimating the extent to which such pesticide loadings to drinking water occurs is complex and would depend upon the partitioning characteristics of the active ingredient, soils types in the treatment area, and the meteorology of the treatment area. In addition, the use of various water sources by wildlife is highly species-specific. Currently, risk characterization for this exposure mechanism is not available. The USEPA is actively developing protocols to quantify drinking water exposures from puddles and dew. If and when protocols are formally established by the USEPA for assessing exposure to pesticides through drinking water, these protocols will be incorporated into pesticide risk assessment protocols.
- Risk assessments are based upon the assumption that the entire treatment area would be subject to pesticide application at the rates specified on the label. In most cases, there is potential for uneven application of pesticides through such plausible incidents such as changes in calibration of application equipment, spillage, and localized releases at specific areas in or near the treated field that are associated with mixing and handling and application equipment as well as applicator skill. Inappropriate use of pesticides and the occurrence of spills represent a potential underestimate of risk. It is likely not an important factor for risk characterization. All pesticide applicators are required to be certified by the state in which they apply pesticides. Certification training includes the safe storage, transport, handling, and mixing of pesticides, equipment calibration and proper application with annual continuing education.
- The USEPA relies on Fletcher (1994) for setting the assumed pesticide residues in wildlife dietary items. The USEPA (2004) "believes that these residue assumptions reflect a realistic upper-bound residue estimate, although the degree to which this assumption reflects a specific percentile estimate is difficult to quantify". Fletcher's (1994) research suggests that the pesticide active ingredient residue assumptions used by the USEPA represent a 95th percentile estimate. However, research conducted by Pfleeger et al. (1996) indicates USEPA residue assumptions for short grass was not exceeded. Baehr and Habig (2000) compared USEPA residue assumptions with distributions of measured pesticide residues for the USEPA's UTAB database. Overall residue selection level will tend to overestimate risk characterization. This is particularly evident when wildlife individuals are likely to have selected a variety of food items acquired from multiple locations. Some food items may be

contaminated with pesticide residues whereas others are not contaminated. However, it is important to recognize differences in species feeding behavior. Some species may consume whole above-ground plant material, but others will preferentially select different plant structures. Also, species may preferentially select a food item although multiple food items may be present. Without species specific knowledge regarding foraging behavior characterizing ecological risk other than in general terms is not possible.

- Acute and chronic risk assessments rely on comparisons of wildlife dietary residues with LC_{50} or NOEC values expressed as concentrations of pesticides in laboratory feed. These comparisons assume that ingestion of food items in the field occurs at rates commensurate with those in the laboratory. Although the screening assessment process adjusts dry-weight estimates of food intake to reflect the increased mass in fresh-weight wildlife food intake estimates, it does not allow for gross energy and assimilative efficiency differences between wildlife food items and laboratory feed. Differences in assimilative efficiency between laboratory and wild diets suggest that current screening assessment methods are not accounting for a potentially important aspect of food requirements.
- There are several other assumptions that can affect non-target species not considered in the risk assessment process. These include possible additive or synergistic effects from applying two or more pesticides or additives in a single application, co-location of pesticides in the environment, cumulative effects from pesticides with the same mode of action, effects of multiple stressors (e.g., combination of pesticide exposure, adverse abiotic and biotic factors) and behavioral changes induced by exposure to a pesticide. These factors may exist at some level contributing to adverse affects to non-target species, but they are usually characterized in the published literature in only a general manner limiting their value in the risk assessment process.
- It is assumed that aquatic species exclusively and permanently occupy the water body being assessed. Actual habitat requirements of aquatic species are not considered. With the possible exception of scenarios where pesticides are directly applied to water, it is assumed that no habitat use considerations specific for any species would place the organisms in closer proximity to pesticide use sites. This assumption produces a maximum estimate of exposure or risk characterization. It would likely be realistic for many aquatic species that may be found in aquatic habitats within or in close proximity to treated terrestrial habitats. However, the spatial distribution of wildlife is usually not random because wildlife distributions are often related to habitat requirements of species. Clumped distributions of wildlife may result in an under- or over-estimation of risk depending upon where the initial pesticide concentration occurs relative to the species or species habitat.
- For species found in the water column, it would be assumed that the greatest bioavailable fraction of the pesticide active ingredient in surface waters is freely dissolved in the water column. Additional chemical exposure from materials associated with suspended solids or food items is not considered because partitioning onto sediments likely is minimal. Adsorption and bioconcentration occurs at lower levels for many newer pesticides compared with older more persistent bioaccumulative compounds. Pesticides with RQs close to the listed species level of concern, the potential for additional exposure from these routes may be a limitation of risk assessments, where potential pesticide exposure or risk may be underestimated.
- Mass transport losses of pesticide from a water body (except for losses by volatilization, degradation and sediment partitioning) would not be considered for ecological risk assessment. The water body would be assumed to capture all pesticide active ingredients entering as runoff, drift, and adsorbed to eroded soil particles. It would also be assumed that

pesticide active ingredient is not lost from the water body by overtopping or flow-through, nor is concentration reduced by dilution. In total, these assumptions would lead to a near maximum possible water-borne concentration. However, this assumption would not account for potential to concentrate pesticide through the evaporative loss. This limitation may have the greatest impact on water bodies with high surface-to-volume ratios such as ephemeral wetlands, where evaporative losses are accentuated and applied pesticides have low rates of degradation and volatilization.

- For acute risk assessments, there would be no averaging time for exposure. An instantaneous peak concentration would be assumed, where instantaneous exposure is sufficient in duration to elicit acute effects comparable to those observed over more protracted exposure periods (typically 48 to 96 hours) tested in the laboratory. In the absence of data regarding time-to-toxic event, analyses and latent responses to instantaneous exposure, risk would likely be overestimated.
- For chronic exposure risk assessments, the averaging times considered for exposure are commensurate with the duration of invertebrate life-cycle or fish-early life stage tests (e.g., 21-28 days and 56-60 days, respectively). Response profiles (time to effect and latency of effect) to pesticides likely vary widely with mode of action and species and should be evaluated on a case-by-case basis as available data allow. Nevertheless, because the USEPA relies on chronic exposure toxicity endpoints based on a finding of no observed effect, the potential for any latent toxicity effects or averaging time assumptions to alter the results of an acceptable chronic risk assessment prediction is limited. The extent to which duration of exposure from water-borne concentrations overestimate or underestimate actual exposure depends on several factors. These include the following: localized meteorological conditions, runoff characteristics of the watershed (e.g., soils, topography), the hydrological characteristics of receiving waters, environmental fate of the pesticide active ingredient, and the method of pesticide application. It should also be understood that chronic effects studies are performed using a method that holds water concentration in a steady state. This method is not likely to reflect conditions associated with pesticide runoff. Pesticide concentrations in the field increase and decrease in surface water on a cycle influenced by rainfall, pesticide use patterns, and degradation rates. As a result of the dependency of this assumption on several undefined variables, risk associated with chronic exposure may in some situations underestimate risk and overestimate risk in others.
- There are several other factors that can affect non-target species not considered in the risk assessment process. These would include the following: possible additive or synergistic effects from applying two or more pesticides or additives in a single application, co-location of pesticides in the environment, cumulative effects from pesticides with the same mode of action, effects of multiple stressors (e.g., combination of pesticide exposure, adverse abiotic [not pesticides] and biotic factors), and sub-lethal effects such as behavioral changes induced by exposure to a pesticide. These factors may exist at some level contributing to adverse affects to non-target species, but they are not routinely assessed by regulatory agencies. Therefore, information on the factors is not extensive limiting their value for the risk assessment process. As this type of information becomes available, it would be included, either quantitatively or qualitatively, in this risk assessment process.
- USEPA is required by the Food Quality Protection Act to assess the cumulative risks of pesticides that share common mechanisms of toxicity, or act the same within an organism. Currently, USEPA has identified four groups of pesticides that have a common mechanism of toxicity requiring cumulative risk assessments. These four groups are: the organophosphate

insecticides, N-methyl carbamate insecticides, triazine herbicides, and chloroacetanilide herbicides.

F.6.5.1 Pesticide Mixtures and Degradates

Pesticide products are usually a formulation of several components generally categorized as active ingredients and inert or other ingredients. The term active ingredient is defined by the FIFRA as preventing, destroying, repelling, or mitigating the effects of a pest, or it is a plant regulator, defoliant, desiccant, or nitrogen stabilizer. In accordance with FIFRA, the active ingredient(s) must be identified by name(s) on the pesticide label along with its relative composition expressed in percentage(s) by weight. In contrast, inert ingredient(s) are not intended to affect a target pest. Their role in the pesticide formulation is to act as a solvent (keep the active ingredient is a liquid phase), an emulsifying or suspending agent (keep the active ingredient from separating out of solution), or a carrier such as clay in which the active ingredient is impregnated on the clay particle in dry formulations. For example, if isopropyl alcohol would be used as a solvent in a pesticide formulation, then it would be considered an inert ingredient. FIFRA only requires that inert ingredients identified as hazardous and associated percent composition, and the total percentage of all inert ingredients must be declared on a product label. Inert ingredients that are not classified as hazardous are not required to be identified.

The USEPA (September 1997) issued Pesticide Regulation Notice 97-6 which encouraged manufacturers, formulators, producers, and registrants of pesticide products to voluntarily substitute the term “other ingredients” for “inert ingredients” in the ingredient statement. This change recognized that all components in a pesticide formulation potentially could elicit or contribute to an adverse effect on non-target organisms and, therefore, are not necessarily inert. Whether referred to as “inerts” or “other ingredients,” these constituents within a pesticide product have the potential to affect species or environmental quality. The USEPA categorizes regulated inert ingredients into the following four lists (http://www.epa.gov/opprd001/inerts/index.html):

- List 1 – Inert Ingredients of Toxicological Concern
- List 2 – Potentially Toxic Inert Ingredients
- List 3 – Inerts of Unknown Toxicity
- List 4 – Inerts of Minimal Toxicity

Several of the List 4 compounds are naturally-occurring earthen materials (e.g., clay materials, simple salts) that would not elicit toxicological response at applied concentrations. However, some of the inerts (particularly the List 3 compounds and unlisted compounds) may have moderate to high potential toxicity to aquatic species based on MSDSs or published data.

Comprehensively assessing potential effects to non-target fish, wildlife, plants, and/or their habitats from pesticide use is a complex task. It would be preferable to assess the cumulative effects from exposure to the active ingredient, its degradates, and inert ingredients as well as other active ingredients in the spray mixture. However, it would only be feasible to conduct deterministic risk assessments for each component in the spray mixture singly. Limited scientific information is available regarding ecological effects (additive or synergistic) from chemical mixtures that typically rely upon broadly encompassing assumptions. For example, the US Forest Service (2005) found that mixtures of pesticides used in land (forest) management likely would not cause additive or synergistic effects to non-target species based upon a review of scientific literature regarding toxicological effects and interactions of agricultural chemicals (ATSDR 2004). Moreover, information on inert ingredients, adjuvants, and degradates is often limited by the availability of and access to reliable toxicological data for these constituents.

Toxicological information regarding "other ingredients" may be available from sources such as the following:

- TOMES (a proprietary toxicological database including USEPA's IRIS, the Hazardous Substance Data Bank, the Registry of Toxic Effects of Chemical Substances [RTECS]).
- USEPA's ECOTOX database, which includes AQUIRE (a database containing scientific papers published on the toxic effects of chemicals to aquatic organisms).
- TOXLINE (a literature searching tool).
- Material Safety Data Sheets (MSDSs) from pesticide suppliers.
- Other sources such as the Farm Chemicals Handbook.

Because there is a lack of specific inert toxicological data, inert(s) in a pesticide may cause adverse ecological effects. However, inert ingredients typically represent only a small percentage of the pesticide spray mixture, and it would be assumed that negligible effects would be expected to result from inert ingredient(s).

Although the potential effects of degradates should be considered when selecting a pesticide, it is beyond the scope of this assessment process to consider all possible breakdown chemicals of the various product formulations containing an active ingredient. Degradates may be more or less mobile and more or less hazardous in the environment than their parent pesticides (Battaglin et al. 2003). Differences in environmental behavior (e.g., mobility) and toxicity between parent pesticides and degradates would make assessing potential degradate effects extremely difficult. For example, a less toxic and more mobile, bioaccumulative, or persistent degradate may have potentially greater effects on species and/or degrade environmental quality. The lack of data on the toxicity of degradates for many pesticides would represent a source of uncertainty for assessing risk.

An USEPA-approved label specifies whether a product can be mixed with one or more pesticides. Without product-specific toxicological data, it would not possible to quantify the potential effects of these mixtures. In addition, a quantitative analysis could only be conducted if reliable scientific information allowed a determination of whether the joint action of a mixture would be additive, synergistic, or antagonistic. Such information would not likely exist unless the mode of action would be common among the chemicals and receptors. Moreover, the composition of and exposure to mixtures would be highly site- and/or time-specific and, therefore, it would be nearly impossible to assess potential effects to species and environmental quality.

To minimize or eliminate potential negative effects associated with applying two or more pesticides as a mixture, the use would be conducted in accordance with the labeling requirements. Labels for two or more pesticides applied as a mixture should be completely reviewed, where products with the least potential for negative effects would be selected for use on the refuge. This is especially relevant when a mixture would be applied in a manner that may already have the potential for an effect(s) associated with an individual pesticide (e.g., runoff to ponds in sandy watersheds). Use of a tank mix under these conditions would increase the level of uncertainty in terms of risk to species or potential to degrade environmental quality.

Adjuvants generally function to enhance or prolong the activity of pesticide. For terrestrial herbicides, adjuvants aid in the absorption into plant tissue. Adjuvant is a broad term that generally applies to surfactants, selected oils, anti-foaming agents, buffering compounds, drift control agents, compatibility agents, stickers, and spreaders. Adjuvants are not under the same registration requirements as pesticides and the USEPA does not register or approve the labeling of spray adjuvants. Individual pesticide labels identify types of adjuvants approved for use with it. In general, adjuvants compose a relatively small portion of the volume of pesticides applied. Selection of adjuvants with limited toxicity and low volumes would be recommended to reduce the potential for the adjuvant to influence the toxicity of the pesticide.

F.6.6 Determining Effects to Soil and Water Quality

The approval process for pesticide uses would consider potential to degrade water quality on and off refuge lands. A pesticide applied to terrestrial sites can only affect water quality through movement away from the treatment site. After application, pesticide mobilization can be characterized by one or more of the following (Kerle et al. 1996):

- Attaches (sorbs) to soil, vegetation, or other surfaces and remains at or near the treated area;
- Attaches to soil and moves off-site through erosion from run-off or wind;
- Dissolves in water that can be subjected to run-off or leaching.

Mobility of a pesticide is a function of how strongly it is adsorbed to soil particles and organic matter, its solubility in water, and its persistence in the environment. Pesticides strongly adsorbed to soil particles, relatively insoluble in water, and not environmentally persistent would be less likely to move across the soil surface into surface waters or to leach through the soil profile and contaminate groundwater. Conversely, pesticides that are not strongly adsorbed to soil particles, are highly water soluble, and are persistent in the environment would have greater potential to move from the application site (off-site movement).

F.6.6.1 Influence of chemical characteristics of the pesticide on mobility

As an initial screening tool, selected chemical characteristics and rating criteria for a pesticide can be evaluated to assess potential to enter ground and/or surface waters. These would include the following: persistence, dissipation time, Soil adsorption coefficient (K_{oc}), groundwater ubiquity score (GUS), and solubility.

Persistence: Persistence, which is expressed as half-life ($t_{½}$), represents the length of time required for 50% of the deposited pesticide to degrade (completely or partially). Persistence in the soil can be categorized as the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days (Kerle et. al. 1996). Half-life data is usually available for aquatic and terrestrial environments.

Dissipation Time: This measure (DT_{50}) represents the time required for 50% of the deposited pesticide to degrade and move from a treated site; whereas, half-life describes the rate for degradation only. As for half-life, units of dissipation time are usually expressed in days. Field or foliar dissipation time is the preferred data for use to estimate pesticide concentrations in the environment. However, soil half-life is the most common persistence data cited in published literature. If field or foliar dissipation data is not available, soil half-life data may be used. The average or representative half-life value of most important degradation mechanism will be selected for quantitative analysis for both terrestrial and aquatic environments.

Soil Adsorption Coefficient: The degree of pesticide adsorption to soil particles and organic matter (Kerle et. al. 1996) is expressed as the soil adsorption coefficient (K_{oc}). The soil adsorption coefficient is measured as micrograms of pesticide per gram of soil (µg/g) that can range from near zero to the thousands. Pesticides with higher Koc values are strongly sorbed to soil and, therefore, would be less subject to movement.

Groundwater Ubiquity Score: This score (GUS) is a quantitative screening tool to estimate a pesticide's potential to move in the environment. It utilizes soil persistence and adsorption coefficients in the following formula.

$$GUS = log_{10}\,(t_{½})\ x\ [4 - log_{10}\,(K_{oc})]$$

The potential pesticide movement rating would be based upon its GUS value. Pesticides with a GUS <0.1 would considered to have an extremely low potential to move toward groundwater. Values of 1.0-2.0 would be low, 2.0-3.0 would be moderate, 3.0-4.0 would be high, and >4.0 would have a very high potential to move toward groundwater.

Water solubility: Water solubility describes the amount of pesticide dissolving in a specific quantity of water, where it is usually measured as mg/l or parts per million (ppm). Pesticide with solubility <0.1 ppm are virtually insoluble in water, 100-1000 ppm are moderately soluble, and >10,000 ppm highly soluble (US Geological Survey 2000). Solubility is useful as a comparative measure because pesticides with higher values are more likely to move by run-off or leaching. GUS, water solubility, t½, and Koc values are available for selected pesticides from the OSU Extension Pesticide Properties Database at http://npic.orst.edu/ppdmove.htm. Many of the values in this database were derived from the SCS/ARS/CES Pesticide Properties Database for Environmental Decision Making (Wauchope et al. 1992).

F.6.6.1 Influence of environmental conditions on pesticide mobility

The potential for a pesticide to affect water quality through run-off and leaching would consider site-specific environmental and abiotic conditions including soil properties, rainfall, water table conditions, and topography (Huddleston 1996).

Soil properties influence the fate of pesticides in the environment. The following six properties are mostly likely to affect pesticide degradation and the potential for pesticides to move off-site by leaching (vertical movement through the soil) or runoff (lateral movement across the soil surface).

- Permeability is the rate of water movement vertically through the soil. It is affected by soil texture and structure. Coarse textured soils (e.g., high sand content) have a larger pore size and they are generally more permeable than fine textured soils (i.e., high clay content). The more permeable soils would have a greater potential for pesticides to move vertically down through the soil profile. Soil permeability rates (inches/hour) are usually available in county soil survey reports.
- Soil texture describes the relative percentage of sand, silt, and clay. In general, greater clay content with smaller the pore size would lower the likelihood and rate water that would move through the soil profile. Clay also serves to adsorb (bind) pesticides to soil particles. Soils with high clay content would adsorb more pesticide than soils with relatively low clay content. In contrast, sandy soils with coarser texture and lower water holding capacity would have a greater potential for water to leach through them.

- Soil structure describes soil aggregation. Soils with a well developed soil structure have looser, more aggregated, structure that would be less likely to be compacted. Both characteristics would allow for less restricted flow of water through the soil profile resulting in greater infiltration.
- Organic matter would be the single most important factor affecting pesticide adsorption in soils. Many pesticides are adsorbed to organic matter which would reduce their rate of downward movement through the soil profile. Also, soils high in organic matter would tend to hold more water, which may make less water available for leaching.
- Soil moisture affects how fast water would move through the soil. If soils are already wet or saturated before rainfall or irrigation, excess moisture would runoff rather than infiltrate into the soil profile. Soil moisture also would influence microbial and chemical activity in soil, which effects pesticide degradation.
- Soil pH would influence chemical reactions that occur in the soil which in turn determines whether or not a pesticide will degrade, rate of degradation, and, in some instances, which degradation products are produced.

Based upon the aforementioned properties, soils most vulnerable to groundwater contamination would be sandy soils with low organic matter. In contrast, the least vulnerable soils would be well-drained clayey soils with high organic matter. Consequently, pesticides with the lowest potential for movement in conjunction with appropriate best management practices (see below) would be used in an IPM framework to treat pests while minimizing effects to non-target biota and protecting environmental quality.

Water is necessary to separate pesticides from soil. This can occur in two basic ways. Pesticides that are soluble move easily with runoff water. Pesticide-laden soil particles can be dislodged and transported from the application site in runoff. The concentration of pesticides in the surface runoff would be greatest for the first runoff event following treatment. The rainfall intensity and route of water infiltration into soil, to a large extent, determine pesticide concentrations and losses in surface runoff. The timing of the rainfall after application also would have an effect. Rainfall interacts with pesticides at a shallow soil depth (¼ to ½ inch), which is called the mixing zone (Baker and Miller 1999). The pesticide/water mixture in the mixing zone would tend to leach down into the soil or runoff depending upon how quickly the soil surface becomes saturated and how rapidly water can infiltrate into the soil. Leaching would decrease the amount of pesticide available near the soil surface (mixing zone) to runoff during the initial rainfall event following application and subsequent rainfall events.

Terrain slope would affect the potential for surface runoff and the intensity of runoff. Steeper slopes would have greater potential for runoff following a rainfall event. In contrast, soils that are relatively flat would have little potential for runoff, except during intense rainfall events. In addition, soils in lower areas would be more susceptible to leaching as a result of receiving excessive water from surrounding higher elevations.

Depth to groundwater would be an important factor affecting the potential for pesticides to leach into groundwater. If the distance from the soil surface to the top of the water table is shallow, pesticides would have less distance to travel to reach groundwater. Shallower water tables that persist for longer periods would be more likely to experience groundwater contamination. Soil survey reports are available for individual counties. These reports provide data in tabular format regarding the water table depths and the months during which it is persists. In some situations, a hard pan exists above the water table that would prevent pesticide contamination from leaching.

F.6.7 Determining Effects to Air Quality

Pesticides may volatilize from soil and plant surfaces and move from the treated area into the atmosphere. The potential for a pesticide to volatilize is determined by the pesticide’s vapor pressure which would be affected by temperature, sorption, soil moisture, and the pesticide’s water solubility. Vapor pressure is often expressed in mm Hg. To make these numbers easier to compare, vapor pressure may be expressed in exponent form ($I \times 10^{-7}$), where I represents a vapor pressure index. In general, pesticides with $I<10$ would have a low potential to volatilize; whereas, pesticides with $I>1{,}000$ would have a high potential to volatilize (Oregon State University 1996). Vapor pressure values for pesticides are usually available in the pesticide product MSDS or the USDA Agricultural Research Service (ARS) pesticide database.

F.7 Chemical Profile Preparation

This section describes the process used to prepare Chemical Profiles prior to pesticide use. Service personnel will prepare profiles for pesticide active ingredients (e.g., glyphosate, imazapic) contained in one or more trade name products that are registered and labeled with USEPA. Figure 1 shows the Chemical Profile Data Sheet to be utilized.

Completed Chemical Profiles will provide a structured decision-making process utilizing quantitative assessment/screening tools with threshold values (where appropriate) that will be used to evaluate potential biological and other environmental effects to refuge resources.

Threshold values (to prevent or minimize potential biological and environmental effects) would be clearly identified for specific information presented in a completed Chemical Profile. Comparison with these threshold values provides an explicit scientific basis to approve or disapprove PUPs for habitat management and cropland/facilities maintenance on refuge lands. In general, PUPs would be approved for pesticides with Chemical Profiles where there would be no exceedances of threshold values. However, BMPs are identified for some screening tools that would minimize/eliminate potential effects (exceedance of the threshold value) as a basis for approving PUPs.

For ecological risk assessments presented in these profiles, the “worst-case scenario” would be evaluated to determine whether a pesticide could be approved for use considering the maximum single application rate specified on pesticide labels for habitat management and croplands/facilities maintenance treatments pertaining to refuges. Where the “worst-case scenario” likely would only result in minor, temporary, and localized effects to listed and non-listed species with appropriate BMPs (see Section F.5), the proposed pesticide’s use in a PUP would have a scientific basis for approval under any application rate specified on the label that is at or below rates evaluated in a Chemical Profile. In some cases, the Chemical Profile would include a lower application rate than the maximum labeled rate in order to protect refuge resources. As necessary, Chemical Profiles would be periodically updated with new scientific information or as pesticides with the same active ingredient are proposed for use on the refuge in PUPs.

F.7.1 Chemical Profile Data Sheet Instructions

All information fields under each category (e.g., Toxicological Endpoints, Environmental Fate) will be completed for a Chemical Profile. If no information is available for a specific field, then "No data is available in references" would be recorded in the profile. Available scientific information will be used to complete Chemical Profiles. Each entry of scientific information would be shown with applicable references.

F.7.1.1 General Fields

Date: Record the date when the Chemical Profile is completed or updated. Chemical Profiles (e.g., currently approved pesticide use patterns) will be periodically reviewed and updated, as necessary. The most recent review date will be recorded on a profile.

Trade Name(s): Accurately and completely record the trade name(s) from the pesticide label, which includes a suffix that describes the formulation (e.g., WP, DG, EC, L, SP, I, II or 64). The suffix often distinguishes a specific product among several pesticides with the same active ingredient. Service personnel will record a trade name for each pesticide product with the same active ingredient.

Figure 1. Chemical Profile Data Sheet

Date:			
Trade Name(s):		Common Chemical Name(s):	
Pesticide Type:		EPA Registration Number:	
Pesticide Class:		CAS Number:	
Other Ingredients:			

Toxicological Endpoints

Mammalian LD_{50}:	
Mammalian LC_{50}:	
Mammalian Reproduction:	
Avian LD_{50}:	
Avian LC_{50}:	
Avian Reproduction:	
Fish LC_{50}:	
Fish ELS/Life Cycle:	
Other:	

Ecological Incident Reports

Environmental Fate

Water solubility (S_w):	
Soil Mobility (K_{oc}):	
Soil Persistence ($t_{½}$):	
Soil Dissipation (DT_{50}):	
Aquatic Persistence ($t_{½}$):	
Aquatic Dissipation (DT_{50}):	
Potential to Move to Groundwater (GUS score):	
Volatilization (mm Hg):	
Octanol-Water Partition Coefficient (K_{ow}):	
Bioaccumulation/Biocentration:	BAF:` BCF:

Worst Case Ecological Risk Assessment

Max Application Rate (ai lbs/acre – ae basis)	Habitat Management: Croplands/Facilities Maintenance:
EECs	Terrestrial (Habitat Management): Terrestrial (Croplands/Facilities Maintenance): Aquatic (Habitat Management): Aquatic (Croplands/Facilities Maintenance):

Risk Quotient Thresholds for Habitat Management Treatments

Presumption of Unacceptable Risk		Risk Quotient (RQ)	
		Listed (T&E) Species	Nonlisted Species
Acute	Birds	[0.1]	[0.5]
	Mammals	[0.1]	[0.5]
	Fish	[0.05]	[0.5]
Chronic	Birds	[1]	[1]
	Mammals	[1]	[1]
	Fish	[1]	[1]

Risk Quotient Thresholds for Cropland/Facilities Maintenance Treatments:

Presumption of Unacceptable Risk		Risk Quotient (RQ)	
		Listed (T&E) Species	Nonlisted Species
Acute	Birds	[0.1]	[0.5]
	Mammals	[0.1]	[0.5]
	Fish	[0.05]	[0.5]
Chronic	Birds	[1]	[1]
	Mammals	[1]	[1]
	Fish	[1]	[1]

Justification for Use:	
Specific Best Management Practices (BMPs):	
References:	

Table CP.1 Pesticide Name

Trade Name[a]	Treatment Type[b]	Max Product Rate – Single Application (lbs/acre or gal/acre)	Max Product Rate -Single Application (lbs/acre - AI on acid equiv basis)	Max Number of Applications Per Season	Max Product Rate Per Season (lbs/acre/season or gal/acre/season)	Minimum Time Between Applications (Days)

a From each label for a pesticide identified in pesticide use proposals (PUPs), Service personnel would record application information associated with possible/known uses on Service lands.

b Treatment type: H – habitat management or CF – cropland/facilities maintenance. If a pesticide is labeled for both types of treatments (uses), then record separate data for H and CF applications.

Common chemical name(s): Record the common name(s) listed on the pesticide label or material safety data sheet (MSDS) for an active ingredient. The common name of a pesticide is listed as the active ingredient on the title page of the product label immediately following the trade name, and the MSDS, Section 2: Composition/ Information on Ingredients. A Chemical Profile is completed for each active ingredient.

Pesticide Type: Record the type of pesticide for an active ingredient as one of the following: herbicide, dessicant, fungicide, fumigant, growth regulator, insecticide, pisicide, or rodenticide.

EPA Registration Number(s): This number (EPA Reg. No.) appears on the title page of the label and MSDS, Section 1: Chemical Product and Company Description. It is not the EPA Establishment Number that is usually located near it. Record the EPA Reg. No. for each trade name product with an active ingredient based upon PUPs.

Pesticide Class: List the general chemical class for the pesticide (active ingredient). For example, malathion is an organophosphate and carbaryl is a carbamate.

CAS (Chemical Abstract Service) Number: This number is often located in the second section (Composition/Information on Ingredients) of the MSDS. The MSDS table listing components usually contains this number immediately prior to or following the % composition.

Other Ingredients: From the most recent MSDS for the proposed pesticide product(s), Service personnel will include any chemicals in the pesticide formulation not listed as an active ingredient that are described as toxic or hazardous, or regulated under the Superfund Amendments and Reauthorization Act (SARA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Toxic Substances Control Act (TSCA), Occupational Safety and Health Administration (OSHA), State Right-to-Know, or other listed authorities. These are usually found in MSDS sections titled “Hazardous Identifications”, “Exposure Control/Personal Protection”, and “Regulatory Information”. If concentrations of other ingredients are available for any compounds identified as toxic or hazardous, then Service personnel will record this information in the Chemical Profile by trade name. MSDS(s) may be obtained from the manufacturer, manufacturer’s website or from an on-line database maintained by Crop Data Management Systems, Inc. (see list below).

F.7.1.2 Toxicological Endpoints Fields

Toxicological endpoint data will be collected for acute and chronic tests with mammals, birds, and fish. Data will be recorded for species available in the scientific literature. If no data are found for a particular taxonomic group, then “No data available is references” will be recorded as the data entry. Throughout the Chemical Profile, references (including toxicological endpoint data) will be cited using parentheses (#) following the recorded data.

Mammalian LD50: For test species in the scientific literature, record available data for oral lethal dose (LD_{50}) in mg/kg-bw (body weight) or ppm-bw. Most common test species in scientific literature are the rat and mouse. The lowest LD_{50} value found for a rat will be used as a toxicological endpoint for dose-based RQ calculations to assess acute risk to mammals (see Table 1 in Section F.6.2).

Mammalian LC50: For test species in the scientific literature, record available data for dietary lethal concentration (LC_{50}) as reported (e.g., mg/kg-diet or ppm-diet). Most common test species in scientific literature are the rat and mouse. The lowest LC_{50} value found for a rat will be used as a toxicological endpoint for diet-based RQ calculations to assess acute risk (see Table 1 in Section F.6.2).

Mammalian Reproduction: For test species listed in the scientific literature, record the test results (e.g., Lowest Observed Effect Concentration [LOEC], Lowest Observed Effect Level [LOEL], No Observed Adverse Effect Level [NOAEL], No Observed Adverse Effect Concentration [NOAEC]) in mg/kg-bw or mg/kg-diet for reproductive test procedure(s) (e.g., generational studies [preferred], fertility, new born weight). Most common test species available in scientific literature are rats and mice. The lowest NOEC, NOAEC, NOEL, or NOAEL test results found for a rat will be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table 1 in Section F.6.2).

Avian LD50: For test species available in the scientific literature, record values for oral lethal dose (LD_{50}) in mg/kg-bw or ppm-bw. Most common test species available in scientific literature are the bobwhite quail and mallard. The lowest LD_{50} value found for an avian species will be used as a toxicological endpoint for dose-based RQ calculations to assess acute risk (see Table 1 in Section F.6.2).

Avian LC50: For test species available in the scientific literature, record values for dietary lethal concentration (LC_{50}) as reported (e.g., mg/kg-diet or ppm-diet). Most common test species available in scientific literature are the bobwhite quail and mallard. The lowest LC_{50} value found for an avian species will be used as a toxicological endpoint for dietary-based RQ calculations to assess acute risk (see Table 1 in Section F.6.2).

Avian Reproduction: For test species available in the scientific literature, record test results (e.g., LOEC, LOEL, NOAEC, NOAEL) in mg/kg-bw or mg/kg-diet consumed for reproductive test procedure(s) (e.g., early life cycle, reproductive). Most common test species available in scientific literature are the bobwhite quail and mallard. The lowest NOEC, NOAEC, NOEL, or NOAEL test results found for an avian species will be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table 1 in Section F.6.2).

Fish LC50: For test freshwater or marine species listed in the scientific literature, record a LC_{50} in ppm or mg/L. Most common test species available in the scientific literature are the bluegill, rainbow trout, and fathead minnow (marine). Test results for many game species may also be available. The lowest LC_{50} value found for a freshwater fish species will be used as a toxicological endpoint for RQ calculations to assess acute risk (see Table 1 in Section F.6.2).

Fish Early Life Stage (ELS)/Life Cycle: For test freshwater or marine species available in the scientific literature, record test results (e.g., LOEC, NOAEL, NOAEC, LOAEC) in ppm for test procedure(s) (e.g., early life cycle, life cycle). Most common test species available in the scientific literature are bluegill, rainbow trout, and fathead minnow. Test results for other game species may also be available. The lowest test value found for a fish species (preferably freshwater) will be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table 1 in Section F.6.2).

Other: For test invertebrate as well as non-vascular and vascular plant species available in the scientific literature, record $LC_{50,}$ $LD_{50,}$ LOEC, LOEL, NOAEC, NOAEL, or EC_{50} (environmental concentration) values in ppm or mg/L. Most common test invertebrate species available in scientific literature are the honey bee and the water flea (*Daphnia magna*). Green algae (*Selenastrum* *capricornutum*) and pondweed (*Lemna minor*) are frequently available test species for aquatic non-vascular and vascular plants, respectively.

Ecological Incident Reports: After a site has been treated with pesticide(s), wildlife may be exposed to these chemical(s). When exposure is high relative to the toxicity of the pesticides, wildlife may be killed or visibly harmed (incapacitated). Such events are called ecological incidents. The USEPA maintains a database (Ecological Incident Information System) of ecological incidents. This database stores information extracted from incident reports submitted by various federal and state agencies and non-government organizations. Information included in an incident report is date and location of the incident, type and magnitude of affects observed in various species, use(s) of pesticides known or suspected of contributing to the incident, and results of any chemical residue and cholinesterase activity analyses conducted during the investigation.

Incident reports can play an important role in evaluating the effects of pesticides by supplementing quantitative risk assessments. All incident reports for pesticide(s) with the active ingredient and associated information will be recorded.

F.7.1.3 Environmental Fate Fields

Water Solubility: Record values for water solubility (S_w), which describes the amount of pesticide that dissolves in a known quantity of water. S_w is expressed as mg/L (ppm). Pesticide S_w values will be categorized as one of the following: insoluble <0.1 ppm, moderately soluble = 100 to 1000 ppm, highly soluble >10,000 ppm (US Geological Survey 2000). As pesticide S_w increases, there will be greater potential to degrade water quality through run-off and leaching.

Sw will be used to evaluate potential for bioaccumulation in aquatic species [see Octanol-Water Partition Coefficient (K_{ow}) below].

Soil Mobility: Record available values for soil adsorption coefficient (K_{oc} [µg/g]). It provides a measure of a chemical's mobility and leaching potential in soil. K_{oc} values are directly proportional to organic content, clay content, and surface area of the soil. K_{oc} data for a pesticide may be available for a variety of soil types (e.g., clay, loam, sand).

K_{oc} values will be used in evaluating the potential to degrade groundwater by leaching (see Potential to Move to Groundwater below).

Soil Persistence: Record values for soil half-life ($t_{½}$), which represents the length of time (days) required for 50% of the deposited pesticide to degrade (completely or partially) in the soil. Based upon the $t_{½}$ value, soil persistence will be categorized as one of the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days (Kerle et. al. 1996).

<u>Threshold for Approving PUPs</u>: If soil $t_{½} \leq 100$ days, then a PUP will be approved without additional BMPs to protect water quality. If soil $t_{½} > 100$ days, then a PUP will only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following will be included in the Specific Best Management Practices (BMPs) section to minimize potential surface run-off and leaching that can degrade water quality:

- Do not exceed one application per site per year.

-
- Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.
- Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.

Along with K_{oc}, soil $t_{1/2}$ values will be used in evaluating the potential to degrade groundwater by leaching (see **Potential to Move to Groundwater** below).

Soil Dissipation: Dissipation time (DT_{50}) represents the time required for 50% of the deposited pesticide to degrade and move from a treated site; whereas, soil $t_{1/2}$ describes the rate for degradation only. As for $t_{1/2}$, units of dissipation time are usually expressed in days. Field dissipation time will be the preferred data for use to estimate pesticide concentrations in the environment because it is based upon field studies compared to soil $t_{1/2}$, which is derived in a laboratory. However, soil $t_{1/2}$ is the most common persistence data available in the published literature. If field dissipation data is not available, soil half-life data will be used in a Chemical Profile. The average or representative half-life value of most important degradation mechanism will be selected for quantitative analysis for both terrestrial and aquatic environments.

Based upon the DT_{50} value, environmental persistence in the soil also will be categorized as one of the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days.

<u>Threshold for Approving PUPs</u>: If soil DT50 ≤100 days, then a PUP will be approved without additional BMPs to protect water quality. If soil DT50 >100 days, then a PUP will only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following will be included in the Specific Best Management Practices (BMPs) section to minimize potential surface run-off and leaching that can degrade water quality:

- Do not exceed one application per site per year.
- Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.
- Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.

Along with Koc, soil DT50 values (preferred over soil t½) will be used in evaluating the potential to degrade groundwater by leaching (see Potential to Move to Groundwater below), if available.

Aquatic Persistence: Service personnel will record values for aquatic t½, which represents the length of time required for 50% of the deposited pesticide to degrade (completely or partially) in water. Based upon the t½ value, aquatic persistence will be categorized as one of the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days (Kerle et. al. 1996).

<u>Threshold for Approving PUPs</u>: If aquatic t½ ≤100 days, then a PUP will be approved without additional BMPs to protect water quality. If aquatic t½ >100 days, then a PUP will only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following will be included in the Specific Best Management Practices (BMPs) section to minimize potential surface run-off and leaching that can degrade water quality:

- Do not exceed one application per site per year.
- Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.
- Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.

Aquatic Dissipation: Dissipation time (DT50) represents the time required for 50% of the deposited pesticide to degrade or move (dissipate); whereas, aquatic t½ describes the rate for degradation only. As for t½, units of dissipation time are usually expressed in days. Based upon the DT50 value, environmental persistence in aquatic habitats also will be categorized as one of the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days.

Threshold for Approving PUPs: If aquatic DT50 ≤100 days, then a PUP will be approved without additional BMPs to protect water quality. If aquatic DT50 >100 days, then a PUP will only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following will be included in the Specific Best Management Practices (BMPs) section to minimize potential surface run-off and leaching that can degrade water quality:

- Do not exceed one application per site per year.
- Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.
- Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.

Potential to Move to Groundwater: Groundwater Ubiquity Score (GUS) = log10(soil t ½) x [4 – log10(Koc)]. If a DT50 value is available, it will be used rather than a t ½ value to calculate a GUS score. Based upon the GUS value, the potential to move toward groundwater will be recorded as one of the following categories: extremely low potential<1.0, low - 1.0 to 2.0, moderate - 2.0 to 3.0, high - 3.0 to 4.0, or very high>4.0.

Threshold for Approving PUPs: If GUS ≤4.0, then a PUP will be approved without additional BMPs to protect water quality. If GUS >4.0, then a PUP will only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following will be included in the Specific Best Management Practices (BMPs) section to minimize potential surface run-off and leaching that can degrade water quality:

- Do not exceed one application per site per year.
- Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.
- Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.

Volatilization: Pesticides may volatilize (evaporate) from soil and plant surfaces and move off-target into the atmosphere. The potential for a pesticide to volatilize is a function of its vapor pressure that is affected by temperature, sorption, soil moisture, and the pesticide’s water solubility. Vapor pressure is often expressed in mm Hg. To make these values easier to compare, vapor pressure will be recorded by Service personnel in exponential form (I x 10-7), where I represents a vapor pressure index. In general, pesticides with I<10 will have low potential to volatilize; whereas, pesticides with

I >1,000 will have a high potential to volatilize (Oregon State University 1996). Vapor pressure values for pesticides are usually available in the pesticide product MSDS or the USDA Agricultural Research Service (ARS) pesticide database (see References).

Threshold for Approving PUPs: If I ≤1000, then a PUP will be approved without additional BMPs to minimize drift and protect air quality. If I >1000, then a PUP will only be approved with additional BMPs specifically to minimize drift and protect air quality. One or more BMPs such as the following will be included in the Specific Best Management Practices (BMPs) section to reduce volatilization and potential to drift and degrade air quality:

- Do not treat when wind velocities are <2 or >10 mph with existing or potential inversion conditions.
- Apply the large-diameter droplets possible for spray treatments.
- Avoid spraying when air temperatures >85°F.
- Use the lowest spray height possible above target canopy.
- Where identified on the pesticide label, soil incorporate pesticide as soon as possible during or after application.

Octanol-Water Partition Coefficient (Kow): The octanol-water partition coefficient (Kow) is the concentration of a pesticide in octanol and water at equilibrium at a specific temperature. Because octanol is an organic solvent, it is considered a surrogate for natural organic matter. Therefore, Kow will be used to assess potential for a pesticide to bioaccumulate in tissues of aquatic species (e.g., fish). If Kow >1000 or Sw<1 mg/L AND soil t½>30 days, then there will be high potential for a pesticide to bioaccumulate in aquatic species such as fish (US Geological Survey 2000).

Threshold for Approving PUPs: If there is not a high potential for a pesticide to bioaccumulate in aquatic species, then the PUP will be approved. If there is a high potential to bioaccumulate in aquatic species (Kow>1000 or Sw<1 mg/L AND soil t½>30 days), then the PUP will not approved, except under unusual circumstances where approval will only be granted by the Washington Office.

Bioaccumulation/Bioconcentration: The physiological process where pesticide concentrations in tissue will increase in biota because they are taken and stored at a faster rate than they are metabolized or excreted. The potential for bioaccumulation will be evaluated through bioaccumulation factors (BAFs) or bioconcentration factors (BCFs). Based upon BAF or BCF values, the potential to bioaccumulate will be recorded as one of the following: low – 0 to 300, moderate – 300 to 1000, or high >1000 (Calabrese and Baldwin 1993).

Threshold for Approving PUPs: *If BAF or BCF≤1000, then a PUP will be approved without additional BMPs. If BAF or BCF>1000, then a PUP will not approved, except under unusual circumstances where approval will only be granted by the Washington Office.*

F.7.1.4 Worst-Case Ecological Risk Assessment Fields

Max Application Rates (acid equivalent): Record the highest application rate of an active ingredient (ae basis) for habitat management and cropland/facilities maintenance treatments in this data field. These rates can be found in Table CP.1 under the column heading "Max Product Rate – Single Application (lbs/acre – AI on acid equiv basis)". This table will be prepared for a chemical profile from information specified in labels for trade name products identified in PUPs. If these data are not available in pesticide labels, then write "NS" for "not specified on label" in this table.

EECs: An estimated environmental concentration (ECC) represents potential exposure to fish and wildlife (birds and mammals) from using a pesticide. EECs will be derived by Service personnel using an USEPA screening-level approach (US Environmental Protection Agency 2004). For each max application rate [see description under Max Application Rates (acid equivalent)], Service personnel will record 2 EEC values in a Chemical Profile; these will represent the worst-case terrestrial and aquatic exposures for habitat management and croplands/facilities maintenance treatments. For terrestrial and aquatic EEC calculations, see description for data entry under Presumption of Unacceptable Risk/Risk Quotients, which is the next field for a Chemical Profile.

Presumption of Unacceptable Risk/Risk Quotients: Calculate and record acute and chronic risk quotients (RQs) for birds, mammals, and fish using the provided tabular formats for habitat management and/or cropland/facilities maintenance treatments. RQs recorded in a Chemical Profile will represent the worst-case assessment for ecological risk. See Section F.6.2 for discussion regarding the calculations of RQs.

For aquatic assessments associated with habitat management treatments, RQ calculations will be based upon selected acute and chronic toxicological endpoints for fish and the EEC will be derived from Urban and Cook (1986) assuming 100% overspray to an entire 1-foot deep water body using the max application rate (ae basis [see above]).

For aquatic assessments associated with cropland/facilities maintenance treatments, RQ calculations will be completed based upon selected acute and chronic toxicological endpoints for fish and an EEC will be derived from the aquatic assessment in AgDRIFT® model version 2.01 under Tier I ground-based application with the following input variables: max application rate (acid basis [see above]), low boom (20 inches), fine to medium/coarse droplet size, 20 swaths, EPA-defined wetland, and 25-foot distance (buffer) from treated area to water.

See Section F.6.3.2 for more details regarding the calculation of EECs for aquatic habitats for habitat management and cropland/facilities maintenance treatments.

For terrestrial avian and mammalian assessments, RQ calculations will be determined based upon dietary exposure, where the “short grass” food item category will represent the worst-case scenario. For terrestrial spray applications associated with habitat management and cropland/facilities maintenance treatments, exposure (EECs and RQs) will be determined using the Kanaga nomogram method through the USEPA’s Terrestrial Residue Exposure model (T-REX) version 1.2.3. T-REX input variables will include the following: max application rate (acid basis [see above]) and pesticide half-life (days) in soil to estimate the initial, maximum pesticide residue concentration on general food items for terrestrial vertebrate species in short (<20 cm tall) grass.

For granular pesticide formulations and pesticide-treated seed with a unique route of exposure for terrestrial avian and mammalian wildlife, see Section F.6.3.1 for the procedure that will be used to calculate RQs.

All calculated RQs in both tables will be compared with Levels of Concern (LOCs) established by USEPA (see Table 2 in Section F.6.5). If a calculated RQ exceeds an established LOC value (in brackets inside the table), then there will be a potential for an acute or chronic effect (unacceptable risk) to federally listed (T&E) species and nonlisted species. See Section F.6.3 for detailed descriptions of acute and chronic RQ calculations and comparison to LOCs to assess risk. <u>Threshold for approving PUPs</u>: If RQs≤LOCs, then a PUP will be approved without additional

BMPs. If RQs>LOCs, then a PUP will only be approved with additional BMPs specifically to minimize exposure (ecological risk) to bird, mammal, and/or fish species. One or more BMPs such as the following will be included in the Specific Best Management Practices (BMPs) section to reduce potential risk to non-listed or listed species:

- Lower application rate and/or fewer number of applications so RQs≤LOCs
- For aquatic assessments (fish) associated with cropland/facilities maintenance, increase the buffer distance beyond 25 feet so RQs≤LOCs.

Justification for Use: Service personnel will describe the reason for using the pesticide based control of specific pests or groups of pests. In most cases, the pesticide label will provide the appropriate information regarding control of pests to describe in the section.

Specific Best Management Practices (BMPs): Record specific BMPs necessary to minimize or eliminate potential effects to non-target species and/or degradation of environmental quality from drift, surface runoff, or leaching. These BMPs will be based upon scientific information documented in previous data fields of a Chemical Profile. Where necessary and feasible, these specific practices will be included in PUPs as a basis for approval.

If there are no specific BMPs that are appropriate, then Service personnel will describe why the potential effects to refuge resources and/or degradation of environmental quality is outweighed by the overall resource benefit(s) from the proposed pesticide use in the BMP section of the PUP. See Section F.5 for a complete list of BMPs associated with mixing and applying pesticides appropriate for all PUPs with ground-based treatments that will be additive to any necessary, chemical-specific BMPs.

References: Service personnel will record scientific resources used to provide data/information for a chemical profile. Use the number sequence to uniquely reference data in a chemical profile.

The following on-line data resources are readily available for toxicological endpoint and environmental fate data for pesticides:

- California Product/Label Database. Department of Pesticide Regulation, California Environmental Protection Agency. (http://www.cdpr.ca.gov/docs/label/labelque.htm#regprods)
- ECOTOX database. Office of Pesticide Programs, US Environmental Protection Agency, Washington, DC. (http://cfpub.epa.gov/ecotox/)
- Extension Toxicology Network (EXTOXNET) Pesticide Information Profiles. Cooperative effort of University of California-Davis, Oregon State University, Michigan State University, Cornell University and University of Idaho through Oregon State University, Corvallis, Oregon. (http://extoxnet.orst.edu/pips/ghindex.html)
- FAO specifications and evaluations for plant protection products. Pesticide Management Unit, Plant Protection Services, Food and Agriculture Organization, United Nations. (http://www.fao.org/WAICENT/FAOINFO/AGRICULT/AGP/AGPP/Pesticid/)
- Human health and ecological risk assessments. Pesticide Management and Coordination, Forest Health Protection, US Department of Agriculture, US Forest Service. (http://www.fs.fed.us/foresthealth/pesticide/risk.htm)
- Pesticide Chemical Fact Sheets. Clemson University Pesticide Information Center. (http://entweb.clemson.edu/pesticid/Document/Labels/factshee.htm)

- Pesticide Fact Sheets. Published by Information Ventures, Inc. for Bureau of Land Management, Dept. of Interior; Bonneville Power Administration, U.S. Dept. of Energy; and Forest Service, US Department of Agriculture. (http://infoventures.com/e-hlth/pesticide/pest-fac.html)
- Pesticide Fact Sheets. National Pesticide Information Center. (http://npic.orst.edu/npicfact.htm)
- Pesticide Fate Database. US Environmental Protection Agency, Washington, DC. (http://cfpub.epa.gov/pfate/home.cfm).
- Pesticide product labels and material safety data sheets. Crop Data Management Systems, Inc. (CDMS) (http://www.cdms.net/pfa/LUpdateMsg.asp) or multiple websites maintained by agrichemical companies.
- Registered Pesticide Products (Oregon database). Oregon Department of Agriculture. (http://www.oda.state.or.us/dbs/pest_products/search.lasso)
- Regulatory notes. Pest Management Regulatory Agency, Health Canada, Ontario, Canada. (http://www.hc-sc.gc.ca/pmra-arla/)
- Reptile and Amphibian Toxicology Literature. Canadian Wildlife Service, Environment Canada, Ontario, Canada. (http://www.cws-scf.ec.gc.ca/nwrc-cnrf/ratl/index_e.cfm)
- Specific Chemical Fact Sheet – New Active Ingredients, Biopesticide Fact Sheet and Registration Fact Sheet. U.S Environmental Protection Agency, Washington, DC. (http://www.epa.gov/pestidides/factsheets/chemical_fs.htm)
- Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas. The Invasive Species Initiative. The Nature Conservancy. (http://tnsweeds.ucdavis.edu/handbook.html)
- Wildlife Contaminants Online. US Geological Survey, Department of Interior, Washington, D.C. (http://www.pwrc.usgs.gov/contaminants-online/)
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Hunting Plan

for

the Willamette Valley National Wildlife Refuge Complex

UNITED STATES FISH AND WILDLIFE SERVICE

date

Recommended by ______________________ Date: 9-7-2011
Project Leader

Reviewed by ______________________ Date: 9-12-11
Refuge Supervisor

Concurrence by ______________________ Date: 9-12-11
Regional Chief, NWRS

Approved: ______________________ Acting Date: 9/26/11
Regional Director

G.1 Introduction

The Willamette Valley National Wildlife Refuge Complex was created in the 1960s primarily for the benefit of wintering dusky Canada geese and other migratory waterfowl and birds. The three refuges that comprise the Complex are spread north to south through the Valley with the northernmost being Baskett Slough NWR located near Salem; Ankeny NWR located near Jefferson; and William L. Finley NWR to the south of Corvallis. Map 1 in the CCP/EA shows the location of the refuges within the Valley.

The hunt programs addressed in this plan incorporate the hunt features (spatial layout, timing, types of hunts, etc.) as designed in Preferred Alternative 2 of the CCP/EA. Under this Alternative, hunting would be allowed only on W.L. Finley and Baskett Slough NWRs.

This hunt plan has been prepared as a step-down plan to the CCP for the Willamette Valley Refuge Complex. Further descriptions of refuge history, programs, and habitats can be found in Chapters 1-6 of the Draft CCP/EA. A detailed analysis of effects of the hunt program is found in the Compatibility Determinations for Waterfowl Hunting and Deer Hunting (Appendix C). Additional analysis is found in Chapter 6 of the CCP/EA. Pertinent conclusions of these analyses are presented below in section G.6 (Assessment).

G.1.1 Species Covered By This Plan

The species listed below have populations sufficient to allow for recreational harvest. No commercial harvesting of wildlife or use of hunting guides would be allowed to assure continued healthy populations and general public opportunity.

Species That Can Be Hunted On Baskett Slough NWR

- Ducks (All Species) only during the Youth Duck Hunt (generally last weekend of September).
- Geese (Western or Great Basin Canada) (*Branta canadensis moffitti*) only during the Early September Goose Hunt.

Species That Can Be Hunted On W.L. Finley NWR

- Deer (Black-tailed deer) (*Odocoileus hemionus*).

G.1.2 Game Species Not Hunted

Due to conflicts with refuge purposes and other forms of wildlife-dependent recreation, hunting of any other game species is not allowed on the refuges.

G.2 Conformance with Statutory Authority

G.2.1 Conformance with Statutory Objectives

Any use of a national wildlife refuge must be compatible with resource protection and conform to applicable laws, regulations, and Service policies. Recreational use, in this case hunting, is allowed under the Refuge Recreation Act of 1962 (16 U.S.C. 460K, amended), which authorizes the

Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use. The Refuge Recreation Act requires: 1) that any recreational use permitted will not interfere with the primary purpose for which the refuge was established; and 2) that funds are available for the development, operation, and maintenance of the permitted forms of recreation.

Likewise, statutory authority for Service management and associated habitat/wildlife management planning on units of the National Wildlife Refuge System (NWRS) is derived from the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd-668ee). The National Wildlife Refuge System Improvement Act provided a mission for the NWRS and clear standards for its management, use, planning, and growth. The National Wildlife Refuge System Improvement Act recognizes that wildlife-dependent recreational uses—hunting, fishing, wildlife observation and photography, environmental education, and interpretation—when determined to be compatible with the mission of the NWRS and the purposes of the refuge—are legitimate and appropriate public uses of National Wildlife Refuges. Sections 5(c) and (d) of the National Wildlife Refuge System Improvement Act states "compatible wildlife-dependent recreational uses are the priority general public uses of the NWRS and shall receive priority consideration in planning and management; and when the Secretary [of the Interior] determines that a proposed wildlife-dependent recreational use is a compatible use within a refuge, that activity should be facilitated, subject to such restrictions or regulations as may be necessary, reasonable, and appropriate."

G.2.2 Conformance with Refuge Purposes

Conformance of refuge uses with refuge purposes is determined through a formal compatibility determination process. Compatibility means that the use would not materially interfere with or detract from the fulfillment of the purposes of the refuge(s) or mission of the National Wildlife Refuge System (603 FW2).

Both the waterfowl hunt and the deer hunt, as described below in Section G.4, were determined to be compatible with refuge purposes, with stipulations. See the compatibility determinations in Appendix C for more detail.

G.3 Statement of Goals and Objectives

G.3.1 Refuge Goals

Thirteen goals were developed for the Willamette Valley Refuges during the Comprehensive Conservation Planning process. They include:

1. Provide agricultural crops for all Canada geese, especially duskys, which, together with wetland management and sanctuary, ensures a healthy, viable wintering goose population in support of Pacific Flyway management and depredation control plans.

2. Maintain, enhance, and restore a diversity of wetland habitats characteristic of the historic Willamette Valley.

3. Maintain and restore native Willamette Valley wet prairie habitats, with an emphasis on management for rare and listed plant species, native species diversity, and functional attributes for declining grassland birds.

4. Restore and enhance the native upland prairie/oak savanna habitats characteristic of the historic Willamette Valley, with an emphasis on management for rare and listed plant species, native species diversity and functional attributes for declining grassland birds.

5. Protect and maintain oak woodland habitats representative of the historic Willamette Valley.

6. Maintain and enhance mixed deciduous/coniferous habitats characteristic of the historic Willamette Valley.

7. Maintain and restore a diversity of native riparian floodplain habitats characteristic of the historic Willamette Valley.

8. Protect and maintain natural riverine habitats representative of the historic Willamette Valley.

9. Contribute to the protection and recovery of Federally threatened and endangered species and their habitats within the Willamette Valley.

10. Provide compatible, wildlife-dependent recreation opportunities for visitors, fostering appreciation and understanding of the refuges' fish, wildlife, plants, and their habitats.

11. Protect, preserve, evaluate, and interpret the cultural heritage and resources of the refuges while consulting with appropriate Native American groups and preservation organizations and complying with historic preservation legislation.

12. Protect, restore, and maintain off-refuge habitats to achieve conservation goals at the landscape level throughout the Willamette Valley.

13. Collect scientific information (inventories, monitoring, research, or scientific assessments) necessary to support refuge management.

G.3.2 Refuge Objectives for Hunting

Goal 10 pertains directly to the provision of wildlife dependent recreational opportunities on the refuges. Two refuge hunt program objectives were developed as part of the CCP development process and are repeated below. The objective numeric identifier (e.g. 10d, 10f) is consistent with the objective numbering system in the CCP/EA. The more complete program description is found in Section G.4 of this hunt plan.

Objective 10d. Provide expanded opportunities for quality deer hunting

Maintain existing and provide expanded opportunities for the public to participate in a quality deer hunt on William L. Finley Refuge that:

- Places a priority on safety (> 95% of all hunters and other refuge visitors report feeling safe during hunting season).
- Includes clear and concise regulations readily available at the refuge website and posted clearly in the field.
- Poses minimal conflict with wildlife/habitat objectives.
- Poses minimal conflict with other Big Six activities.
- Poses minimal conflict with neighboring lands.
- Accessible to a broad spectrum of visitors.
- Promotes stewardship & conservation.
- Promotes understanding and appreciation of natural resources and the Service's role.
- Provides reliable / reasonable opportunity to experience wildlife.
- Uses accessible facilities that blend into landscape.
- Uses visitor satisfaction to define and evaluate programs.

Objective 10f: Provide opportunities for quality waterfowl hunting

Provide new opportunities for the public to participate in quality waterfowl hunting at Baskett Slough Refuge while minimizing impact to wintering geese, other wildlife and other recreational users. Provide a quality hunting experience that:

- Places a priority on safety (hunters are spaced appropriately, spatial separation exists between hunt areas and areas open to other recreational use, having adequate law enforcement presence, etc.).
- Includes clear and concise regulations readily available at the refuge website and posted clearly in the field.
- Poses minimal conflict with wildlife/habitat objectives.
- Poses minimal conflict with other Big Six activities.
- Poses minimal conflict with neighboring lands.
- Is accessible to a broad spectrum of visitors.
- Promotes stewardship & conservation.
- Promotes understanding and appreciation of natural resources and FWS role.
- Provides reliable / reasonable opportunity to experience wildlife.
- Uses accessible facilities that blend into landscape.
- Uses visitor satisfaction to define and evaluate programs.

G.4 Description of Hunting Program

The areas open to waterfowl and big game hunting for the Willamette Valley Refuge Complex are shown on Maps 10 and 14.

G.4.1 Waterfowl Hunting – Proposed Program

Table G-1. Early Season Goose Hunt Proposed Program

Aspect	Description
Location	Baskett Slough Refuge – within the Dusky, Vancouver and Cackler Marshes, and some adjacent fields south of Coville Road. Also within Aleutian Marsh and adjacent field north of Smithfield Road. A total of 856 acres (34% of the refuge) would be open to goose hunting (See Map 10).
Season	Opening weekend and closing weekend of the State September season, for a total of four open days.
Blinds	Temporary blinds may be constructed or brought in, and must be removed at the end of the day.
Fees	None
Permits	Up to ten hunt parties would be allowed with a maximum of three hunters permitted per party. Hunt parties would be required to space themselves no less than 200 yards apart from each other. Hunters would be selected through a drawing prior to the hunt dates (See section on application procedures).
Other hunt regulations	All hunters must have a valid state hunting license. Hunters 16 years of age or older must have a valid federal waterfowl stamp in possession. Hunters 14 years of age or older must have a state waterfowl validation in possession. The taking of white-fronted, Aleutian, or cackling Canada geese would be prohibited. Other hunt regulations per state (ODFW) rules apply.

Table G-2. Youth Duck Hunt Proposed Program

Aspect	Description
Location	Baskett Slough Refuge - within the Dusky, Vancouver and Cackler Marshes south of Coville Road and in adjacent fields. A total of 716 acres (29% of the refuge) would be open to Youth Duck Hunting (See Map 10).
Season	As designated by ODFW (usually the last weekend in September).
Blinds	Blind sites would be determined prior to the hunt by refuge staff. Hunting would be restricted to the designated blind sites.
Fees	None
Permits	Up to five designated hunt sites would be available with a maximum of two youths and one parent or guardian permitted to occupy each site. Youths would be selected through a drawing.
Other hunt regulations	Open to youths 15 years of age and younger. A parent or guardian (age 21 and above) must accompany up to two youths. The parent or guardian may not hunt. Youths participating in the hunt must have both a Hunter Education Certificate and a valid hunting license in possession. Hunters 14 years of age or older must have a state waterfowl validation in possession. All goose hunting is closed in Polk County where Baskett Slough Refuge is located during the September Youth Hunt. Other hunt regulations per state (ODFW) rules apply.

The refuge would conduct these hunts to coincide with the State early September goose season and the State youth waterfowl hunt weekend. The early goose season generally starts the first weekend in

September and extends for nine to ten days. The State youth waterfowl hunt is generally scheduled during the last weekend in September. The refuge would maintain the discretion to develop the framework of these hunts within this timeframe.

Facilities: The refuge office would serve as the check station where hunters would be required to check in and check out. refuge staff would operate the check station and check in/check out procedures.

The refuge will evaluate the number and location of hunt sites each year and make any changes or adjustments to the program each season based on these evaluations.

G.4.2 Big Game Hunting – Proposed Program

Table G-3. Deer Archery Hunt Proposed Program

Aspect	Description
Location	Finley main unit – selected locations. See Map 14.
Season	Approximately last weekend in August until approximately September 30.)
Sex	Either
Days/Week	Seven
Fees	None
Possession Limit	1 deer
Permits	On-site self-registration required
Other hunt regulations	Per state (ODFW) rules

Table G-4. Restricted Firearms Hunt Proposed Program

Aspect	Description
Location	W.L. Finley main unit. During the first week, this hunt would be located within mostof the main unit of W.L. Finley Refuge except for two closed areas near refuge facilities (See Map 14). During the second week of this hunt, Bald Top and Mill Hill trail areas would be the only areas open to hunting, and these areas would be closed to all other public use activities during this week.
Season	Approximately last week of October through the first week of November.
Sex	Either
Days/Week	Seven
Fees	None
Possession Limit	1 deer
Permits	On- site self-registration required
Other hunt regulations	Per state (ODFW) rules. In addition, only shotguns using buckshot or slugs and muzzleloaders are allowed.

G.4.3 Justification for a Permit-Only Hunt Program

The small sizes of the refuges create the need for a permit program in certain areas to avoid conflicts between hunters and potential safety issues. An established number of permits (as described above for the waterfowl hunt program) would allow desired hunter density, so as to provide un-crowded and safe hunting conditions.

G.4.4 Procedures for Consultation and Coordination with ODFW

Service staff will coordinate with ODFW staff regarding annual hunt season dates, areas open to hunting, etc. The Service would request that ODFW publish information on the refuge deer hunt and waterfowl hunt annually in the State hunting regulations.

G.5 Measures Taken to Avoid Conflicts with Other Management Objectives

G.5.1 Measures to Avoid Biological Conflicts

Disturbance to wintering geese would be minimized due to the following provisions. Waterfowl hunting would not be permitted on any refuge lands after October 1, which marks the beginning of the wintering season for migratory waterfowl in the Willamette Valley. Disturbance to wintering geese from deer hunters would be minimized after November 1, by ensuring that the deer hunting zone is located well away from wintering goose areas and that deer hunting would only occur for the first week of November and only at Finley Refuge. See Map 14.

Harm to other biological resources would be avoided, since hunters would only be allowed in designated areas and will be limited to a short time period in early-mid fall.

G.5.2 Measures to Avoid Public Use Conflicts

Various aspects of the proposed hunt programs, including temporal restrictions and spatial restrictions, combined with the seasonal nature of recreational activities on the refuges, would reduce the potential for conflict. Other measures taken to avoid or reduce potential conflicts with these programs include posting hunt signs to maintain public awareness during hunting periods, and posting information about hunt periods on the refuge website. The restrictions on weapon type - archery and restricted firearms only for the deer hunt program - reduces trajectory and lowers the risk of third- party injury.

G.5.3 Measures to Avoid Administrative Conflicts

The hunt program has the potential to conflict with some of the normal management, maintenance, and biological monitoring activities that might be occurring in the same vicinity as the hunt program. Safety briefings for staff working in hunt areas would occur. Hunters would be warned of refuge activities that might be occurring in the hunt units. These measures would ensure the safety of refuge staff and Service authorized agents and allow the completion of refuge management activities as well as other refuge uses. The project leader would retain the discretion to close areas to hunting when necessary for the protection of refuge staff and authorized agents who are conducting refuge management activities or for the safety of hunters who could be at risk from refuge management activities (e.g., prescribed fire). Overall, there would be minimal administrative conflicts expected.

Outreach about the new hunting programs will require minimal reprogramming of existing resources.

G.6 Assessment

G.6.1 Compatibility with Refuge Objectives

Hunting is one of the six wildlife-dependent recreational uses included in the National Wildlife Refuge System Improvement Act of 1997. Conducting well-managed hunts on Baskett Slough and W.L. Finley Refuges will assist the refuges in meeting one of the Refuge System's primary goals (providing the public opportunities to participate in compatible wildlife-dependent recreational programs). The special youth-only hunt also provides a unique opportunity for the refuge to introduce young hunters to the National Wildlife Refuge System and educate them on the importance of wildlife conservation.

Compatibility with other refuge programs is addressed below.

G.6.2 Biological and Other Considerations

Waterfowl (Ducks – All Species; Geese – Western Canada goose)

Potential effects of waterfowl hunting to target populations, non-target species, listed species, refuge habitats, and other public use programs are summarized below. Section G.5 examines measures to avoid conflicts with these resources. See also the Compatibility Determination for Big Game Hunting (Appendix C).

Black-tailed Deer

Potential effects of deer hunting to target populations, non-target species, listed species, refuge habitats, and other public use programs are summarized in Table G-6. Section G.5 examines measures to avoid conflicts with these resources. See also the Compatibility Determination for Big Game Hunting (Appendix C).

G.6.3 Funding and Staffing Requirements for the Hunt

The proposed deer hunt program at W.L. Finley Refuge would require administrative staff time from a visitor services manager, maintenance staff, and a law enforcement officer. Approximately $6,000 in one-time costs are projected, and the total annual cost to administer the hunt with the changes proposed is projected to be approximately $5,000 per year. There are currently enough funds in refuge operations to implement this program.

The proposed waterfowl hunt at Baskett Slough Refuge would require staff time by the Refuge Manager, maintenance staff, and the law enforcement officer. Approximately $56,000 in one-time costs are projected, and the total annual cost to administer the hunt with the changes proposed is projected to be approximately $13,000 per year. Additional operational funding would be requested in order to administer this hunt.

Table G-5. Anticipated Effects of the Waterfowl Hunt

Effects	Conclusion*
Effects to target populations	The September goose hunt would confine harvest to Western Canada geese, which are currently above population objectives in the Pacific Flyway (see Chapter 1, Section 1.14.1 and Chapter 4, Section 4.10 for more information on goose composition and population objectives in the Willamette Valley). Less than 100 ducks and geese per year are estimated to be taken under the refuge waterfowl hunts. Hunting would not have a significant impact on local, regional, or Pacific Flyway waterfowl populations because the percentage taken on the refuge, though possibly additive to existing hunting take, would measure a fraction of a percent of the estimated duck and goose populations. Dusky Canada geese are not expected to be impacted by the harvest as they would not yet have arrived on their wintering grounds during the season of this hunt. In addition to direct mortality, hunting could result in some redistribution of Western Canada geese at Baskett Slough Refuge due to disturbance.
Effects to non-target species	Potential minor disturbance to other foraging or resting birds from dogs, human activity, and noise associated with hunting. Hunter education courses are required by ODFW for youths. Orientation would be provided to all duck and goose hunters before the start of each hunting day. These measures would help to reduce effects to non-target species. At this time, dusky Canada geese would not be impacted as they arrive later in the fall. If dusky arrival time shifted to earlier in the fall, these hunts would be re-evaluated.
Effects to refuge habitats	Effects confined to wetland and cropland habitat types. Approximately 29-34% of Baskett Slough Refuge would be open to hunting during the specified seasons (6 days/year). Negligible effect expected to vegetation from trampling, because of the low number of users and days of use expected. Some potential conflicts with the cooperative farming program at Baskett Slough could occur but would be minimized by limiting waterfowl hunting to the 6 days mentioned above.
Effects to listed species	Negligible impact; potential for minor trampling but any listed plants in the area will have senesced by the start of the season. No impact to Fender's blue butterfly habitat or listed fish.
Effects to other priority public uses	Minor effects to other users because of the short season. Minor potential for a perception of favoritism for one user group over another, because other users are not allowed into the Baskett Slough wetlands at any time. However, providing opportunities for youth is an important initiative in the Fish and Wildlife Service and helps address a public desire to see more hunting opportunities for youth.

* (see Waterfowl Hunting Compatibility Determination and Chapter 6 of the CCP/EA for more detail).

Table G-6. Anticipated Effects of the Deer Hunts

Effects	Conclusion*
Effects to target populations	Negligible; unlikely that more than 20 deer would be taken annually which equates to 0.2% of 2008 deer harvest in the Willamette Unit.
Effects to non-target species	Negligible to minor. Hunting occurs outside of the breeding season and the low level of hunting expected would be unlikely to pose any significant impacts to foraging or resting activities of resident or migratory species. The timing and locations of the deer hunt is designed to avoid disturbance to waterfowl, especially geese. Existing sanctuary areas would be maintained for the full wintering period under all alternatives.
Effects to refuge habitats	Approximately 85% of W.L. Finley Refuge would be open to hunting. However, because deer hunting is expected to remain a low intensity use with < 100 participants per year during a period when the vegetation is no longer actively growing, only temporary and minor effects are expected to vegetation from trampling. Riparian habitat may receive more visitation related disturbance from hunting than other habitat types.
Effects to listed species	Negligible impact; potential for minor trampling but any listed plants in the area will have senesced by the start of the season. No impact to Fender's blue butterfly habitat or listed fish.
Effects to other priority public uses	Approximately 85% of Finley's main unit would be open for hunting during archery season and during the first week of restricted firearms season. The impact to other priority public uses is expected to be minor, because the majority of other refuge users typically concentrate along trails and roads in the western part of the main unit, where hunting would remain closed. During the second week of the shotgun season season, the Bald Top area and Mill Hill Trail would be closed for approximately 7 days each year to allow hunting in this area. Although other refuge users engaged in other priority public uses will experience some new restrictions, this effect is considered minor in the context of trail availability at the three refuges over the year.

* (see Deer Hunting Compatibility Determination and Chapter 6 of the CCP/EA for more detail).

G.7 Conduct of the Hunt

Location-specific regulations would provide for the safety of visitors and the accommodation of many uses.

G.7.1 Anticipated Public Reaction to the Hunt

The existing hunting program is generally accepted locally and does not typically generate anti-hunting controversy. Nationally, there is a component of the population that is opposed to hunting, and some organizations are opposed to hunting, or at least the expansion of hunting, on national wildlife refuges and other public lands. During the review of the Draft CCP/EA during May-June 2011, some members of the public voiced objections to some or all of the hunts within this plan. Although we anticipate that some will continue to express disappointment at the decision, we do not anticipate large public demonstrations.

There are some local hunters who strongly support expanded access and who would have liked to have seen an even larger expansion of the hunt program. See Appendix L for more details.

G.7.2 Hunter Application Procedures

Youth Duck Hunt: Youths wishing to hunt would be required to fill out and send a post card, for each of the available days they wish to hunt, with their name, address, and the words "Baskett Slough Youth Hunt" (see Hunter Selection Process).

Early Season Goose Hunt: Hunters would be required in advance to fill out and submit a post card to the refuge for each of the days they wish to hunt (see Hunter Selection Process).

G.7.3 Description of Hunter Selection Process

Youth Hunt: Youth hunt permits would be selected using a random drawing conducted by refuge staff. Those that are selected would be notified prior to the hunt days. Those that are not selected would not be notified.

Early Season Goose Hunt: Hunt permits would be selected using a random drawing conducted by refuge staff. Those that are selected would be notified prior to the hunt days. Those that are not selected would not be notified.

G.7.4 Media Selection for Publicizing the Hunt

Newspapers and television stations throughout Oregon would be provided copies of an annual news release covering the hunts. Descriptive tearsheets would be printed and dispensed at refuge offices, brochure boxes at refuge parking lots, and available online at the refuge web site.

G.7.5 Description of Hunter Orientation

Hunter orientations would be provided to all duck/goose hunters daily at the Baskett Slough Youth and Early Goose Season Hunts. Check station attendants would publicly review hunt regulations and permit requirements before issuing hunt permits to advanced reservation holders for each day. The check station would open 1 ½ hours before established State shooting times each day of a hunt. Hunters would be given their permits at this time. Deer hunters at Finley would be required to complete a Big Game Harvest Report (FWS Form 3-2359) at designated self-serve hunt kiosks where hunt maps and regulations would be available.

G.7.6 Hunter Requirements and Regulations

(1) Age: Federal criteria only allows hunters 15 years of age and younger to participate in the Youth Waterfowl Hunt. Youths must be accompanied by an adult 21 years of age or older.

(2) Allowable equipment (Early Season Goose and Youth Waterfowl Hunts): Blinds, decoys, and other personal property must be removed at the end of each day's hunt. Vehicles are restricted to designated public use roads and designated parking areas. Dogs are allowed for hunting ducks and geese. Toxic shot is prohibited for the early September Goose Hunt and the Youth Duck Hunt.

Allowable equipment (Deer Hunt): Deer hunters may use portable or climbing deer stands. Stands must be removed daily. Driving or screwing nails, spikes, or other objects into trees or hunting from any tree into which such an object has been driven is prohibited. Limbing of trees is prohibited.

(3) Wearing hunter orange is required for youth hunters as per State regulations.

(4) Open fires are not allowed.

(5) License and permits: Hunting permits are required. The license requirements are those required by the State of Oregon and the Federal duck stamp for waterfowl hunting.

(6) Reporting harvest: Waterfowl and goose permit hunters must check back in to the check station at Baskett Slough. Deer hunters would be required to complete a Big Game Harvest Report (FWS Form 3-2359) at designated self-serve kiosks where hunt maps and regulations would be available.

(7) Hunter safety requirements: Goose hunters would be required to space themselves no less than 200 yards apart from each other during the early September Goose Hunt. Designated hunt sites would be established for the Youth Duck Hunt. Wearing hunter orange would be required for all youth hunters as per State regulations..

(8) Restricted firearms and archery deer hunting would be allowed on designated dates from ½ hour before sunrise until ½ hour after sunset.

(9) Only shotguns using buckshot or slugs and muzzleloaders would be allowed for the deer hunt.

(10) No overnight camping or after-hours parking is permitted on the refuges.

(11) No hunting is permitted from refuge structures, observation blinds, boardwalks, etc.

(12) All vehicles must remain parked in designated areas.

(13) Persons possessing, transporting, or carrying firearms on national wildlife refuges must comply with all provisions of State and local laws. Persons may only use (discharge) firearms in accordance with refuge regulations (50 CFR 27.42 and specific refuge regulations in Part 32).

Appendix H


Photo © McBeth Photography

Wilderness Review

- Background
- Conclusion

H.1 Background

The Wilderness Act became Federal law in 1964 (16 U.S.C. 1131-1136). In section 2(a) of the Act, the U.S. Congress expressed concern that, "…an increasing human population, accompanied by expanding settlement and growing mechanization…[should not be allowed to]…occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition…." The Act also established the National Wilderness Preservation System (Wilderness System) and stated that areas in the Wilderness System, "…shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness…".

Section 2(c) of the Act defined a wilderness area as one which, "…in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this chapter an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."

Section 3 of the Act required a review of Federal lands to determine their suitability for designation as a unit(s) of the Wilderness System. The U.S. Congress reserved to itself the authority to officially designate wilderness areas.

A wilderness review is the process used by the Service to determine whether or not to recommend lands or waters in the National Wildlife Refuge System to Congress for designation as wilderness. A wilderness review is required for refuges as part of the CCP process. Land or waters that meet the minimum criteria for wilderness (610 FW 4) are identified in a CCP and further evaluated to determine whether they merit recommendation for inclusion in the Wilderness System.

In order for a refuge to be considered for wilderness designation, all or part of the refuge must:

- Be affected primarily by the forces of nature, with the human imprint substantially unnoticeable;
- Have outstanding opportunities for solitude or primitive and unconfined type of recreation;
- Have at least 5,000 contiguous acres or be sufficient in size to make practical its preservation and use in an unimpaired condition, or be capable of restoration to wilderness character through appropriate management, at the time of review; or
- Be a roadless island.

H.2 Conclusion

Ankeny: Ankeny National Wildlife Refuge is not recommended for further study for inclusion in the Wilderness System because it does not meet the above criteria. The Refuge comprises only 2,796 acres (see Table 1-1 in Chapter 1)and the largest roadless block is approximately 1,006 acres. The size of this block is insufficient to make practicable its preservation and use as wilderness. The refuge also has considerable evidence of past human use; does not have outstanding opportunities for solitude or primitive recreation; and is not a roadless island.

Baskett Slough: Baskett Slough National Wildlife Refuge is not recommended for further study for inclusion in the Wilderness System because it does not meet the above criteria. The Refuge comprises only 2,492 acres (see Table 1-1 in Chapter 1) and the largest roadless block is approximately 939 acres. The size of this block is insufficient to make practicable its preservation and use as wilderness. The refuge also has considerable evidence of past human use; does not have outstanding opportunities for solitude or primitive recreation; and is not a roadless island.

W.L. Finley: W.L. Finley National Wildlife Refuge is not recommended for further study for inclusion in the Wilderness System because it does not meet the above criteria. The Refuge comprises only 5,706 acres (see Table 1-1 in Chapter 1) and the largest roadless block is approximately 1,524 acres. The size of this block is insufficient to make practicable its preservation and use as wilderness. In addition, the refuge has considerable evidence of past human use; does not have outstanding opportunities for solitude or primitive recreation; and is not a roadless island.

Appendix I


Photo USFWS

Contributors

- Core Planning Team
- Extended Planning Team and Reviewers

I.1 Core Planning Team

This CCP is the result of extensive, collaborative, and enthusiastic efforts by the members of the core planning team below.

Name	Title	Organization
Jock Beall	Wildlife Biologist, Willamette Valley National Wildlife Refuge Complex (WVNWRC)	U.S. Fish and Wildlife Service (USFWS)
John Gahr	Refuge Manager, Ankeny and Baskett Slough Refuges	USFWS
Sallie Gentry	Park Ranger, WVNWRC	USFWS
Jim Houk	Deputy Project Leader, WVNWRC	USFWS
Chantel Jimenez	Former Park Ranger, WVNWRC	USFWS
Sharon Selvaggio	Planner, National Wildlife Refuges, Division of Planning and Visitor Services, Region 1	USFWS
Doug Spencer	Project Leader, WVNWRC	USFWS

I.2 Extended Planning Team and Reviewers

In addition to the core planning team, many others contributed insight and support. Extended team members who participated in reviews and provided assistance to specific topics are listed below.

Name	Area of Assistance	Organization
Ed Alverson	Native habitats, rare species	The Nature Conservancy
Brian Bainnson	Landscape architecture	Quatrefoil, Inc.
Brad Bales	Waterfowl	Oregon Department of Fish and Wildlife (ODFW)
Gary Ball	Water rights	USFWS
Carolyn Bohan	General review	USFWS
Brad Bortner	Migratory birds	USFWS
Deborah Clark	Prairie habitats	Oregon State University (OSU)
Jorie Clark	Cultural and historic resources	USFWS
Liz Cruz	Mapping and analysis	USFWS
Bruce Dugger	Waterfowl, wetlands	Oregon State University
Ivan Hartert	Biological information	USFWS
Joan Hagar	Oak habitats	U.S. Geological Survey, Biological Resources Division

Name	Area of Assistance	Organization
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Chuck Houghten	CCP quality and consistency	USFWS
Brandy Humphreys	Tribal interests	Confederated Tribes of the Grande Ronde
Tom Kaye	Native habitats, rare species	Institute for Applied Ecology
Kay Kier-Haggenjos	Writing, editing	USFWS
Kevin Kilbride	Biological goals and objectives, IPM	USFWS
Lynne Koontz	Economic analysis	U.S. Geological Survey, Policy Analysis and Science Assistance
Ann Kreager	Prairie habitats	ODFW
Steve Mamoyac	Hunting, waterfowl, elk	ODFW
Steve Marx	Hunting, waterfowl, elk	ODFW
Mike Marxen	Visitor service goals and objectives	USFWS
Tim Mayer	Water quality	USFWS
Scott McCarthy	CCP quality and consistency	USFWS
Randy Moore	Streaked horned larks	OSU
Molly Monroe	Biological topics	USFWS
Chris Pearl	Red-legged frog	USGS, Biological Resources Division
Fred Paveglio	Biological goals and objectives	USFWS
Chris Seal	General review	USFWS
Paul Sheerer	Oregon chub	ODFW
Steve Smith	General review	USFWS
Lou Ann Speulda	Cultural and historic resources	USFWS
Nancy Taylor	Hunting, waterfowl, elk	ODFW
Robin West	General review	USFWS
Mark Wilson	Prairie habitats	OSU
Jim Young	Hunting, waterfowl, elk	ODFW

Appendix J

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Acronyms, Abbreviations, and Glossary

- Acronyms and Abbreviations
- Glossary

J.1 Acronyms and Abbreviations

Act	National Wildlife Refuge System Improvement Act of 1997 (also Improvement Act or NWRSIA)
ABC	American Bird Conservancy
ADA	Americans with Disabilities Act
AHPA	Archaeological and Historic Preservation Act
ARPA	Archaeological Resources Protection Act
AUD	Appropriate Use Determination
BCHS	Benton County Historical Society
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BIDEH	Biological Diversity, Integrity and Environmental Health
BMPs	Best Management Practices
BP	Before Present
BPA	Bonneville Power Administration
CCP	Comprehensive Conservation Plan
CD	Compatibility Determination
CEQ	White House Council on Environmental Quality
CFR	Code of Federal Regulations
COE	U. S. Army Corps of Engineers
CSU	Corvallis State University Station
CWCS	Comprehensive Wildlife Conservation Strategy
EDA	Elk De-emphasis Area
DBH	Diameter at breast height
DEQ	Department of Environmental Quality
DO	Dissolved oxygen
DPS	Distinct Population Segment
DSL	Department of State Lands
EA	Environmental Assessment
EE	Environmental Education
ENSO	El Nino/Southern Oscillation
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	Ecological Significant Unit
FBB	Fender's blue butterfly
FONSI	Finding of No Significant Impact
FWS	U.S. Fish and Wildlife Service (also, Service, USFWS)
GAO	General Accounting Office
GHS	Green House Gases
GIS	Geographic Information System
IBA	Important Bird Area
Improvement Act	National Wildlife Refuge System Improvement Act of 1997 (also Act, NWRSIA)
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
LCC	Landscape Conservation Cooperative

LE	Law Enforcement
LGP	Low Ground Pressure
MAPS	Monitoring Avian Productivity System
MBCC	Migratory Bird Conservation Commission
MMS	Maintenance Management System
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NAGPRA	Native American Graves Repatriation Act
NAS	National Audubon Society
NAWCA	North American Wetlands Conservation Act
NAWMP	North American Waterfowl Management Plan
NEPA	National Environmental Policy Act
NGO	Non-Governmental Organization
NHPA	National Historic Preservation Act
NNL	National Natural Landmark
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
NWRSIA	National Wildlife Refuge System Improvement Act of 1997
ODFW	Oregon Department of Fish and Wildlife
PCB	Polychlorinated Biphenyls
PCJV	Pacific Coast Joint Venture
PDO	Pacific Decadal Oscillation
PIF	Partners in Flight
R1	Region 1 of the FWS (WA, OR, ID, HI, PI)
RAPP	Refuge Annual Performance Plan
RNA	Research Natural Area
ROC	Resource of Concern
RONS	Refuge Operating Needs System
ROS	Recreational Opportunity Spectrum
SCORP	Statewide Comprehensive Outdoor Recreation Plan
Service	U.S. Fish and Wildlife Service (also FWS, USFWS)
SNE	Snow Water Equivalents
SQI	Soil Quality Indicators
TES	Threatened and Endangered Species
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
UNEP	United Nations Environmental Program
USACE	U.S. Army Corps of Engineers
USCB	U.S. Census Bureau
USDOI	U.S. Department Of the Interior
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USSCP	U.S. Shorebird Conservation Plan

VOC	Volatile Organic Compounds
WCS	Water Control Structure
WDFW	State of Washington Department of Fish and Wildlife
WMO	World Meteorological Organization
WNHP	Washington Natural Heritage Program
WQMP	Water Quality Management Plan
WSA	Wilderness Study Area
WV-LCR	Willamette Valley-Lower Columbia River
WVNWR	Willamette Valley National Wildlife Refuge

J.2 Glossary

Accessible. Without fences or vegetative barriers (tall, dense vegetation) at its margins.

Adaptive Management. The rigorous application of management, research, and monitoring to gain information and experience necessary to assess and modify management activities. A process that uses feedback from refuge research and monitoring and evaluation of management actions to support or modify objectives and strategies at all planning levels. (Service Manual 602 FW 1.4)

Alternative. Different sets of objectives and strategies or means of achieving refuge purposes and goals, helping fulfill the Refuge System mission, and resolving issues. (Service Manual 602 FW 1.6). The “no action” alternative is current refuge management, while the “action” alternatives are all other alternatives.

Anadromous Fish. Fish that are born in fresh water, migrate to the ocean to grow into adults, and return to fresh water to spawn. (NOAA Fisheries)

Appropriate Use. A proposed or existing use on a refuge that meets at least one of the following four conditions:
(1) The use is a wildlife-dependent recreational use as identified in the Improvement Act.
(2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law.
(3) The use involves the take of fish and wildlife under State regulations.
(4) The use has been found to be appropriate as specified in section 1.11 of the USFWS Appropriate Use Policy (603FW1).

Approved Refuge Boundary. A National Wildlife Refuge boundary approved by the National or Regional Fish and Wildlife Service Director. Within this boundary, the Service may negotiate with landowners to acquire lands not already owned by the Service. (Modified from Region 1 Landowner Guide, USFWS Division of Refuge Planning)

Approved Acquisition Boundary. National Wildlife Refuge boundary approved by the National or Regional Fish and Wildlife Service Director for potential acquisition of lands by the Service.

Archaeology. The scientific study of material evidence remaining from past human life and culture. (Webster’s II)

B.P. (Before Present). Used as a designation following radiocarbon dates to express the point from which radiocarbon years are measured. This measuring point is arbitrarily taken to be 1950. A date of 5,200±200 B.P. means that it dates to 5,200 (plus or minus 200) years before 1950.

Benefiting Resources. Those species, species groups, or resources expected to benefit from actions taken for a Resource of Concern.

Big Six. Wildlife-dependent recreational uses under Refuge System Improvement Act includes hunting, fishing, wildlife observation, photography, environmental education and interpretation.

Birds of Conservation Concern. A category assembled by the U.S. Fish and Wildlife Service Division of Migratory Birds identifying the migratory and non-migratory species (beyond those already designated as Federally threatened or endangered) that represent the Division's highest conservation priorities. (FWS, Division of Migratory Birds)

Biological Diversity (also Biodiversity). The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and communities and ecosystems in which they occur (FWS Manual 601FW3). The System's focus is on indigenous species, biotic communities, and ecological processes.

Biological Integrity. Biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities. (FWS Manual 601FW3)

Bi-Seasonal Subsistence Pattern. Occurring every two months and reflects the seasonal cycle of harvestable resources.

Candidate Species. Plant or animal species for which FWS or NOAA Fisheries has on file sufficient information on biological vulnerability and threats to support a proposal to list as endangered or threatened. (FWS, Endangered Species Glossary, http://www.fws.gov/endangered/glossary.html)

Categorical Exclusion. A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a Federal agency pursuant to the National Environmental Policy Act (40 CFR 1508.4).

Compatible Use. A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the Mission of the System or the purposes of the refuge (Service Manual 603 FW 3.6). A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.

Compatibility Determination. A written determination signed and dated by the refuge manager and regional chief signifying that a proposed or existing use of a national wildlife refuge is a compatible use or is not a compatible use. The director makes this delegation through the Regional Direction (Service Manual 603 FW 2)

Composition (Plant). The inventory of plant species found in any particular area.

Comprehensive Conservation Plan. A document that describes the desired future conditions of a refuge or planning unit and provides long-range guidance and management direction to achieve the purpose(s) of the refuge; helps fulfill the mission of the System; maintains and, where appropriate, restores the biological integrity, diversity, and environmental health of each refuge and the System; helps achieve the goals of the National Wilderness Preservation System, if appropriate; and meets other mandates. (FWS Habitat Management Planning Policy, 602 FW 1.4)

Concern. See Issue

Connectivity. The arrangement of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors of appropriate vegetation. The opposite of **fragmentation.**

Conservation Targets (also see **Resources of Concern; Priority Species, Species Groups,** and **Communities).** Term used by land management agencies and conservation organizations to describe the resources (ecological systems, ecological communities, species, species groups, or other natural resources) selected as the focus of conservation actions. (Adapted from Low, Functional Landscapes, 2003)

Consumptive Use. Recreational activities, such as hunting and fishing that involve harvest or removal of wildlife or fish, generally to be used as food by humans.

Contaminants or **Environmental Contaminants.** Chemicals present at levels greater than those naturally occurring in the environment resulting from anthropogenic or natural processes that potentially result in changes to biota at any ecological level. (USGS, assessing EC threats to lands managed by USFWS) Pollutants that degrade other resources upon contact or mixing. (Adapted from Webster's II)

Cooperative Agreement. An official agreement between two parties.

Cover. The estimated percent of an area, projected onto a horizontal surface, occupied by a particular plant species.

Cultural Resources. The physical remains, objects, historic records, and traditional lifeways that connect us to our nation's past. (USFWS, Considering Cultural Resources)

Cultural Resource Inventory. A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 CFR 60.4. (Service Manual 614 FW 1.7)

Decadence. Marked by decay or decline. For plants, showing little or no new growth. (Adapted from Merriam-Webster online dictionary.)

Deciduous. Describes trees and shrubs which shed all of their leaves each year.

Depredation. Causing serious damage to agricultural, horticultural, and fish cultural interests. (Adapted from 50 C.F.R. 21.42)

Direct Loss. Loss of food or loss of habitat as non-native species out-compete natives.

Dissolved Oxygen. The concentration of oxygen dissolved in water, expressed in mg/l or as percent saturation, where saturation is the maximum amount of oxygen that can theoretically be dissolved in water at a given altitude and temperature. (http://www.biology-online.org/dictionary/Dissolved_oxygen)

Distinct Population Segment (DPS). A subdivision of a vertebrate species that is treated as a species for purposes of listing under the Endangered Species Act. To be so recognized, a potential distinct population segment must satisfy standards specified in a FWS or NOAA Fisheries policy statement (See the February 7, 1996, Federal Register, pages 4722-4725). The standards require it to be separable from the remainder of and significant to the species to which it belongs. (FWS, Endangered Species Glossary, http://www.fws.gov/endangered/glossary.html)

Disturbance. Significant alteration of habitat structure or composition or of the behavior of wildlife. May be natural (e.g., fire) or human-caused events (e.g., aircraft overflight).

Ecosystem. A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.

Ecosystem Management. Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely.

Effect (Impact). A direct result of an action which occurs at the same time and place; or an indirect result of an action which occurs later in time or in a different place and is reasonably foreseeable; or the cumulative results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions (40 CFR 1508.8).

El Niño/Southern Oscillation (ENSO). Characterized by unusually warm temperatures and La Niña by unusually cool temperatures in the equatorial Pacific.

Endemic. In the conservation context, exclusively native to a place. For example, kangaroos are endemic to Australia. (Wikipedia)

Environmental Assessment. A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).

Environmental Impact Statement. A detailed written statement required by section 102(2) (C) of the National Environmental Policy Act, analyzing the environmental impact of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short term uses of the environment versus the maintenance and enhancement of long-tern productivity and any irreversible and irretrievable commitment of resources (40 CFR 1508.11).

Endangered Species (Federal). An animal or plant species in danger of extinction throughout all or a significant portion of its range. (FWS, Endangered Species Glossary)

Endangered Species (State). A plant or animal species in danger of becoming extinct or extirpated in a State within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.

Environmental Education Study Sites. Outdoor locations where groups of students engage in hands-on activities within an environmental education curriculum.

Environmental Health. Composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment (FWS Manual 601FW3).

Enhance. To improve the condition of an area or habitat, usually for the benefit of certain native species.

Ethnographical. The study and systematic recording of human cultures; also, a descriptive work produced from such research.

Executive Order. A President's or Governor's declaration which has the force of law, usually based on existing statutory powers, and requiring no action by the Congress or state legislature.

Exotic. See **Non-native species**

Experimental Population. A population (including its offspring) of a listed species designated by rule published in the Federal Register that is wholly separate geographically from other populations of the same species. An experimental population may be subject to less stringent prohibitions than are applied to the remainder of the species to which it belongs (FWS, Endangered Species Glossary).

Finding of No Significant Impact (FONSI). A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a Federal action will have no significant effect on the human environment and for which an environmental impact statement, therefore, will not be prepared (40 CFR 1508.13).

Focal Species (also Priority Resources of Concern or Focal Conservation Target). A suite of conservation targets that for purposes of planning are sorted and condensed to represent threats to biological integrity, diversity, and environmental health at the refuge level.

Geocaching. Known also as letter boxing, an outdoor activity in which participants use a global positioning system (GPS) to recover techniques to hide and seek containers.

Goal. Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units. (Service Manual 620 FW 1.6.)

Habitat. Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.

Habitat Management Plan. A plan that provides refuge managers a decision-making process; guidance for the management of refuge habitat; and long-term vision, continuity, and consistency for habitat management on refuge lands. (FWS Habitat Management Planning policy 620FW1.4)

Habitat Restoration. Management emphasis designed to move ecosystems to desired conditions and processes, and/or to healthy ecosystems.

Historic Conditions. Composition, structure, and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to substantial human-related changes to the landscape (FWS Manual 601FW3).

Hydrograph. A graph of water flows in a river or stream. A hydrograph provides a way of seeing seasonal and yearly changes in the flow or discharge of a waterway.

Important Bird Areas. A site, designated by the National Audubon Society, that provides essential habitat for one or more species of birds and that is recognized as being important on a global, continental, or state level.

Indicator. A measurable characteristic of a key ecological attribute that strongly correlates with the status of the key ecological attribute. Something that serves as a sign or symptom.

Inholding. Refers to lands within an Approved Refuge Boundary that are not owned by the U.S. Fish and Wildlife Service. These can be private lands or lands owned by city, county, state, or other federal agencies.

Integrated Pest Management (IPM). The use of pest and environmental information in conjunction with available pest control technologies to prevent unacceptable levels of pest damage by the most economical means and with the least possible hazard to persons, property and the environment. (U.S. EPA Pesticide Glossary)

Interpretation. A teaching technique that combines factual information with stimulating explanation (yourdictionary.com). Frequently used to help people understand natural and cultural resources.

Invasive. An exotic species whose introduction causes or is likely to cause economic or environmental harm or harm to human health (Executive Order 13122).

Inventory. A survey of the plants or animals inhabiting an area.

Inviolate Sanctuary. The original intent of the term *inviolate sanctuary* is found in the Migratory Bird Conservation Act (first passed in 1918 as the Migratory Bird Treaty Act and amended in 1934 and 1938). This Act originally required that all refuges be inviolate sanctuaries and deemed refuges' primary purposes were as breeding grounds and habitat for migratory birds. Migratory bird hunting was prohibited on migratory waterfowl areas by the Act, but most other human uses were not addressed. The 1938 amendment to the Act gave refuge managers authority to decide if, when, and how bird hunting would be allowed. After World War II, public demand for opening refuges to recreation increased. The 1949 Duck Stamp Act allowed waterfowl hunting on refuges, but restricted the percentage of each refuge open to hunting. Current policy states that portions of a refuge are considered "inviolate sanctuaries" if they were (a) acquired with the approval of the Migratory Bird Conservation Commission (MBCC) for the purpose of an inviolate sanctuary; (b) acquired with MBCC approval or Land and Water Conservation Funds to protect a threatened or endangered species; or (c) established by an instrument or document which states the intent to manage the area as an "inviolate sanctuary for migratory birds" or to fulfill the purpose of the Migratory Bird Conservation Act. Policy further allows migratory game bird hunting on no more than 40 percent of the area considered inviolate sanctuary if compatible with a refuge's purposes and mission. Inviolate sanctuary classification imposes no limits on hunting non-migratory birds, fur bearers, or other game species.

Issue. Any unsettled matter that requires a management decision, e.g., an initiative, opportunity, resource management problem, threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition. (Service Manual 620 FW 1.6)

Key Ecological Attributes. Those aspects of the environment, such as ecological processes or patterns of biological structure and composition, that are critical to sustain the long-term viability of the target. These key ecological attributes are further divided into measurable indicators.

Keystone Species. Species who enrich ecosystem functions in a unique and significant manner through their activities, and the effect is disproportionate to their numerical abundance. Their removal initiates changes in ecosystem structure and often loss of diversity. These keystones may be habitat modifiers (i.e., cottonwoods or beavers), predators (i.e., puma and coyote), or herbivores (i.e., prairie dog). (Sonoran Desert Conservation Plan)

Kalapuya. *It-galapu ywi-yu-ks,* A Chinookan term for the Willamette Valley people, consisting of eight tribes speaking three different languages, formerly inhabiting the valley of the Willamette River in Oregon; south were the Luckiamute on the river which bears their name; the Santiam around present Lebanon, spoke the southern dialect.

Land Protection (LPP). The acquisition of fee-title, easement, or lease of a given land parcel to protect important natural resource values on the land from incompatible land uses. An LPP is a land protection plan prepared by the Service that evaluates the need for implementing land protection strategies.

Listed Species (Federal). Species that have been formally listed under the Endangered Species Act as threatened or endangered. Also includes candidate and proposed species. An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future. Proposed species include taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register. Candidate species include those taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened. (Oregon Fish and Wildlife Office)

Maintenance. The upkeep of constructed facilities, structures, and capitalized equipment necessary to realize the originally anticipated useful life of a fixed asset. Maintenance includes preventative maintenance; cyclic maintenance; repairs; replacement of parts, components, or items of equipment, periodic condition assessment; periodic inspections, adjustment, lubrication and cleaning (non-janitorial) of equipment; painting, resurfacing, rehabilitation; special safety inspections; and other actions to assure continuing service and to prevent breakdown.

Maintenance Management System (MMS). A national database of refuge maintenance needs and deficiencies. It serves as a management tool for prioritizing, planning, and budgeting purposes. (RMIS descriptions)

Migration. The seasonal movement from one area to another and back.

Migratory birds. Those species of birds listed under 50 CFR section 10.13 (as defined by various treaties). (FWS Manual 720FW 1, Policies and Responsibilities of the Migratory Bird Program)

Mixed Deciduous/Coniferous Forest. A habitat type with a mixture of Douglas-fir, oak, and maple trees with a shrub understory.

Moist Soil Management. A collection of management practices (largely seasonal drawdown of water levels) that promote the germination and growth of wetland plants on exposed mudflats. "Moist soil" plants refers to species that grow on exposed mudflats. (Fredrickson and Taylor 1982). Moist soil plants have the potential to produce high seed yields that serve as an important food source for waterfowl and other wildlife.

Monitoring. The process of collecting information to track changes of selected parameters over time.

National Environmental Policy Act of 1969. A federal law which requires all Federal agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision making. (40 CFR 1500)

Native. With respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem. (FWS Manual 601FW3)

National Natural Landmark (NNL). A nationally significant natural area that has been designated by the Secretary of the Interior. To be nationally significant, a site must be one of the best examples of a type of biotic community or geologic feature in its physiographic province.

National Register of Historic Places. The Nation's master inventory of known historic properties administered by the National Park Service. Includes buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archeological, or cultural significance at the national, state, and local levels. (USFWS, Considering Cultural Resources)

National Wildlife Refuge. A designated area of land, water, or an interest in land or water within the Refuge System, excluding coordination areas. (FWS Manual 601FW1.3)

National Wildlife Refuge System. Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction; all lands, waters, and interests therein administered by the Secretary as wildlife refuges; areas for the protection and conservation of fish and wildlife that are threatened with extinction; wildlife ranges; game ranges; wildlife management areas; or waterfowl production areas.

National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). A federal law that amended and updated the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668).

Nonconsumptive recreation. Recreational activities that do not involve harvest, removal or consumption of fish, wildlife or other natural resources.

Non-native species. A species that is present in the planning area but was not known to exist prior to Euroamerican settlement of the Americas.

Noxious Weed. A plant species designated by Federal or State law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or non-native, new, or not common to the United States. According to the Federal Noxious Weed Act (PL 93-639), a noxious weed is one that causes disease or had adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health.

Oak Woodland. A habitat type characterized by more oak trees per acre than oak savanna. The understory may be shrub dominated rather than completely herbaceous.

Objective. A concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments, and evaluating the success of strategies. Objectives should be attainable, time-specific, and measurable. (Service Manual 620 FW 1.6)

Operations. Activities related to the normal performance of the functions for which a facility or item of equipment is intended to be used. Costs such as utilities (electricity, water, sewage) fuel, janitorial services, window cleaning, rodent and pest control, upkeep of grounds, vehicle rentals, waste management, and personnel costs for operating staff are generally included within the scope of operations.

Outreach. The process of providing information to the public on a specific issue through the use of the media, printed materials, and presentations.

Pacific Decadal Oscillation (PDO). Described as a long-lived El Niño-like pattern of Pacific climate variability (Zhang et al. 1997). As seen with the better-known El Niño/Southern Oscillation (ENSO), extremes in the PDO pattern are marked by widespread variations in the Pacific Basin and the North American climate.

Pacific Flyway. One of several major north-south travel corridors for migratory birds. The Pacific Flyway is west of the Rocky Mountains.

Permanent Wetland. Wetlands, or portions of refuge that retain water throughout the year. Permanently flooded waters are generally occupied by submergent wetland plants such as pondweeds.

Planning Team. The primary U.S. Fish and Wildlife staff and others who played a key role in developing and writing the CCP. Planning teams are interdisciplinary in membership and function. Teams generally consist of a Planning Team Leader, Refuge Manager, staff biologists, public use personnel, a state natural resource agency representative, and other appropriate program specialists (e.g., social scientist, ecologist, recreation specialist). We also will ask other Federal and Tribal natural resource agencies to provide team members, as appropriate. The planning team prepares the CCP and appropriate NEPA documentation. (Service Manual 620 FW 1.6)

Plant Association. A classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community (e.g. Oregon white oak/ovalleaf viburnum/poison oak plant association).

Plant Community. An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community (e.g., Oregon white oak woodland).

Polychlorinated biphenyls (PCBs). A group of synthetic, toxic industrial chemical compounds once used in making paint and electrical transformers, which are chemically inert and not biodegradable. PCBs were frequently found in industrial wastes, and subsequently found their way into surface and ground waters. As a result of their persistence, they tend to accumulate in the environment. In terms of streams and rivers, PCBs are drawn to sediment, to which they attach and can remain virtually indefinitely. Although virtually banned in 1979 with the passage of the Toxic Substances Control Act, they continue to appear in the flesh of fish and other animals (USGS Water Science Glossary).

Preferred Alternative. This is the alternative determined [by the decision maker] to best achieve the Refuge purpose, vision, and goals; to best contribute to the Refuge System mission; to best address the significant issues; and to be consistent with principles of sound fish and wildlife management.

Preplanning. The first phase of comprehensive conservation planning process. It includes identifying the planning area and data needs; establishing the planning team and planning schedule; reviewing available information; preparing a public involvement plan and conducting internal scoping.

Priority Public Uses. Hunting, fishing, wildlife observation and photography, environmental education and interpretation, where compatible, are identified under the National Wildlife Refuge System Improvement Act of 1997 as the six priority public uses of the National Wildlife Refuge System.

Priority Resources of Concern. See **Resources of Concern** and **Focal Species** definitions.

Public. Individuals, organizations, and groups; officials of Federal, State, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the planning team. It includes those who may or may not have indicated an interest in Service issues and those who may be affected by Service decisions.

Public Land Order. Public lands consist of that class of land remaining from the original public domain that was acquired by the United States by treaty, purchase, or cession from a foreign power.

Quality Hunt. As defined by Service Policy at Part 605, chapters 1-7, section 1.6, of the Fish and Wildlife Service Manual a quality hunt is defined by the following attributes:
1) Promotes safety of participants, other visitors, and facilities:
2) Promotes compliance with applicable laws and regulations and responsible behavior;
3) Minimizes or eliminates conflict with fish and wildlife population or habitat goals or objectives in an approved plan;
4) Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation;
5) Minimizes conflicts with neighboring landowners;
6) Promotes accessibility and availability to a broad spectrum of the American people;
7) Promotes resource stewardship and conservation;
8) Promotes public understanding and increases public appreciation of America's natural resources and our role in managing and conserving these resources;
9) Provides reliable/reasonable opportunities to experience wildlife;
10) Uses facilities that are accessible to people and blend into the natural seeting; and
11) Uses visitor satisfaction to help define and evaluate programs.

Refuge Operating Needs System (RONS). A national database of unfunded refuge operating needs required to meet and/or implement station goals, objectives, management plans, and legal mandates. It is used as a planning, budgeting, and communication tool describing funding and staffing needs of the Refuge System.

Refuge Purpose(s). The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit. For refuges that encompass congressionally designated wilderness, the purposes of the Wilderness Act are additional purposes of the refuge. (Service Manual 620 FW 1.6).

Research Natural Area (RNA). Special designation areas on NWRs established to: (1) Preserve examples of major ecosystem types or other outstanding physical or biological phenomena; (2) Provide research and educational opportunities; and (3) Preserve a full range of genetic and behavioral diversity for native plants and animals, including endangered or threatened species. (USFWS 1981).

Resource of Concern (ROC). All plant and/or animal species, species groups, or communities specifically identified in refuge purpose(s), System mission, or international, national, regional, State, or ecosystem conservation plans or acts. For example, waterfowl and shorebirds are resources of concern on a refuge whose purpose is to protect "migrating waterfowl and shorebirds." Federal or State threatened and endangered species on that same refuge are also a resource of concern under terms of the respective endangered species acts. (FWS Habitat Management Planning policy, 620 FW1.4).

Restore. To bring back to a former or original condition. (Webster's II).

Riparian Habitat. Refers to an area of habitat that is transitional from terrestrial to aquatic ecosystems; including streams, lakes, wet areas, and adjacent plant communities and their associated soils which have free water at or near the surface; an area whose components are directly or indirectly attributed to the influence of water; of or relating to a river; specifically applied to ecology, "riparian" describes the land immediately adjoining and directly influenced by streams. For example, riparian vegetation includes any and all plant life growing on the land adjoining a stream and directly influenced by the stream.

Riverine. Flowing perennial to intermittent waters bounded by a channel. This habitat encompasses a river or stream, its channel, and the associated aquatic vegetation.

Sanctuary. At the Willamette Valley Refuge Complex, the term sanctuary is used colloquially to mean areas that are closed to all public uses during a portion or all of the year. Also see **Inviolate Sanctuary.**

Semi-Permanent Villages. Lasting or intended to last for a long time but not permanent.

Seasonal Wetlands. Areas that are periodically inundated or have soils saturated to the surface at some time during the growing season (but not year round). Adapted from U.S. Army Corps of Engineers Wetlands Delineation Manual.

Scoping. Early in the planning process, the phase of notifying the public of the opportunity to participate in the planning process to help identify issues, concerns, and opportunities related to the project.

Significant Effect. Use in NEPA requires consideration of both context and intensity (40 CFR 1508.27): Context: significance of an action must be analyzed in its current and proposed short-and long-term effects on the whole of a given resource (e.g., affected region). Intensity: the severity of the effect.

Snow Water Equivalents. A common snowpack measurement. It is the amount of water contained within the snowpack. It can be thought of as the depth of water that would theoretically result if you melted the entire snowpack instantaneously. (http://www.or.nrcs.usda.gov/snow/about/swe.html)

Species of Concern (Federal). Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing. (FWS, Oregon Fish and Wildlife Office)

Step-down Management Plan. A plan that provides specific guidance on management subjects (e.g., habitat, public use, fire, safety) or groups of related subjects. It describes strategies and implementation schedules for meeting CCP goals and objectives. (Service Manual 620 FW 1.6)

Strategy. A specific action, tool, technique, or combination of actions, tools, and techniques used to meet unit objectives. (Service Manual 620 FW 1.6)

Thatch. The dense covering of cut grass that remains after mowing. Thatch inhibits growth of new grass and also inhibits goose foraging.

Threatened Species (Federal). An animal or plant species, listed by the U.S. Fish and Wildlife Service, as likely to become endangered within the foreseeable future throughout all or a significant portion of its range. (FWS, Endangered Species Glossary)

Threatened Species (State). A plant or animal species identified by a state wildlife agency as likely to become endangered in a State within the near future if factors contributing to population decline or habitat degradation or loss continue.

Upland Prairie/Oak Savanna. A habitat type characterized by widely spaced Oregon oak trees with grassland habitats (upland prairie) occurring between them.

Vegetation Type (Also **Habitat Type**, **Forest Cover Type**). A land classification system based upon the concept of distinct plant associations.

Vision Statement. A concise statement of what the planning unit should be, or what we hope to do, based primarily upon the Refuge System mission and specific refuge purposes, and other mandates. The vision statement for the refuge is tied to the mission of the Refuge System; the purpose(s) of the refuge; the maintenance or restoration of the ecological integrity of each refuge and the Refuge System; and other mandates. (Service Manual 620 FW 1.6)

Volatile Organic Compounds (VOC). Any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions. (http://www.epa.gov/ttn/naaqs/ozone/ozonetech/def_voc.htm)

Water Control Structure. A structure in a water management system that conveys water, controls the direction or rate of flow, maintains a desired water surface elevation or measures water. (ftp://ftp-fc.sc.egov.usda.gov/NHQ/practice-standards/standards/587.pdf)

Waterfowl. Resident and migratory ducks, geese, and swans.

Water Quality. A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.

Watershed. The land area that drains water to a particular stream, river, or lake. It is a land feature that can be identified by tracing a line along the highest elevations between two areas on a map, often a ridge. Large watersheds, like the Mississippi River basin contain thousands of smaller watersheds.

Wetlands. Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water at some time during the growing season of each year. (Service Manual 660 FW 2; Cowardin *et al.* 1979)

Wildlife-Dependent Recreational Use. A use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation. These are the six priority public uses of the Refuge System as established in the National Wildlife Refuge System Administration Act, as amended. Wildlife-dependent recreational uses, other than the six priority public uses, are those that depend on the presence of wildlife. The Service will also consider these other uses in the preparation of refuge CCPs; however, the six priority public uses always will take precedence. (Service Manual 620 FW 1.6)

Appendix K

Photo USFWS

Environmental Education Center: Site Location Selection and Site Map

- Introduction
- Site Map

K.1 Introduction

While developing the Draft Comprehensive Conservation Plan (CCP), the Willamette Valley National Wildlife Refuge Complex conducted an extensive evaluation associated with the possibility of constructing an Environmental Education (EE) building on the William L. Finley National Wildlife Refuge. Although funding for construction of an EE building is not secure, site selection and preliminary design were considered important steps in planning for the building. The development of an EE building on Finley Refuge is identified as one of the primary strategies within the environmental education section under Goal 10 of the Draft CCP.

In addition, the refuge worked closely with Regional Office Visitor Services staff and a consulting firm (Quatrefoil, Inc.) hired by Visitor Services to assist with site planning options at Finley Refuge. Quatrefoil helped prepare conceptual maps that proposed how the EE building might be situated within the various alternative locations.

The team developed the following set of guiding principles, or decision criteria, to help determine the best possible location for the EE building:

- Safe, accessible, promotes visitor understanding, and increases visitor appreciation for America's natural resources.
- Promotes NWRS and WVNWRC mission, goals, and objectives with emphasis on the 'Wildlife First' principle.
- Consistent with other elements of the CCP.
- Results in high quality facilities that meet Service standards.
- Minimizes conflicts with wildlife/habitat-related goals and objectives.
- Minimizes conflicts with visitors participating in wildlife-dependent recreation activities.
- Minimizes disturbance to refuge staff.
- Demonstrates sustainability and 'greening' practices.
- Minimizes footprint, is aesthetically pleasing, and blends into the landscape as much as possible.
- Utilizes existing facilities/infrastructure as much as practical.
- Promotes the historical aspect or character of the refuge.
- Is based on demonstrated need as well as future expectations.
- Is cost effective and efficient.
- Ease of visitor access to site.
- Ease of visitor access to trails.
- Wildlife viewing opportunities from site.
- No displacement of other uses/buildings.
- Sufficient size of area.
- Proximity to office.
- Proximity to all major habitat types.

The Refuge Team identified eight different locations for constructing the EE building on Finley Refuge: the Mill Hill parking area, the current Refuge residence area, the area adjacent to the current Headquarters building, the Cabell Lodge area, Woodpecker Loop (old barn site), Field 29 southwest corner, Turtle Flats, and the area north of the current mobile homes near the Headquarters (the homes would be relocated). These were the sites that the Team felt had the best potential for addressing the guiding principles listed above. A scoring matrix was developed to evaluate each of the sites on the principles (decision criteria) described above. Some of the principles were weighted more heavily than others, recognizing that all of them are not considered equally in our decision making. For example, minimizing conflicts with wildlife/habitat was weighted the heaviest, given that the Refuge Administration Act, as amended, clearly establishes that wildlife conservation is the singular National Wildlife Refuge System mission.

At the conclusion of the exercise, the site next to the present office facility was the highest-ranked site for constructing the EE building. The key factors considered as positives for this site included that it would minimize the footprint of buildings on the refuge; it would be the least expensive of the sites to develop (many of the necessary utilities and infrastructure are already in place); its proximity to the office would facilitate coordination with refuge staff; visitor access to the site is already developed; the site provides easy access to trails on the refuge for visitors; and the site provides an ideal opportunity for wildlife viewing. In addition, a great deal of planning has already occurred associated with developing this site further for public use, such as design and construction of an overlook structure and interpretive displays, etc. Finally, this site provides an ideal setting to help accomplish the likely environmental education curriculum objectives. The exact placement of the EE building within the surrounding oaks is critical in order to minimize the disruption of the oak habitat at this site and reduce the operational costs associated with the EE building.

The new EE building itself would include (in its interior) interpretive exhibits, classroom areas which would also serve as an expanded conference room facility for refuge staff, the Friends Nature Store, some office space, and restrooms. In order to accommodate the additional refuge staff as outlined within this CCP, the administrative office building would be expanded on the south end to accommodate more offices.

Residential Area Note:
The Refuge has interest in developing a bunkhouse within the Headquarters Area at a site to be determined and would try to consolidate all housing needs (i.e., residential trailers and R.V. spaces) and associated support facilities (i.e., common building, laundry, restroom, etc.) at that time.

Quatrefoil Inc.
Design • Landscape Architecture • Space Planning
404 SE 80th Ave. Portland, Oregon 97215
Tel: (503) 256-8955 Fax: (503) 256-3460

REGISTERED 352 BRIAN E. BAINNSON OREGON 07/26/1996 LANDSCAPE ARCHITECT

William L. Finley National Wildlife Refuge

26208 Finley Refuge Road, Corvallis, Oregon 97333

Headquarter's Area Master Plan

Site Plan

REVISIONS:
February 15, 2011
May 3, 2011
May 19, 2011
August 31, 2011
September 2, 2011

DATE: February 14, 2011

SCALE: 1" = 100'-0"

SHEET: MP.1

Building Room Key:

O	Office
WR	Work Room
FO	Friend's Office
BR	Break Room
GIS	Geographic Information System
IT	Information Technology
S	Storage
U	Utility Closet
M	Men's Restroom
W	Women's Restroom

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REGISTERED 352 BRIAN L. BAINNSON OREGON 07/26/1996 LANDSCAPE ARCHITECT

William L. Finley National Wildlife Refuge

26208 Finley Refuge Road, Corvallis, Oregon 97333

Headquarter's Area Master Plan

Detail Site Plan

REVISIONS:
February 15, 2011
May 3, 2011
May 19, 2011
August 31, 2011
September 2, 2011

DATE: February 14, 2011

SCALE: 1" = 20' – 0"

SHEET: MP.2

Appendix L

Photo by Doug Spencer/USFWS

Comments on Draft CCP/EA and Service Responses

- Summary of Comments Received on Draft CCP/EA
- Comments Received Related to Canada Geese and Farming
- Comments Received Related to Habitat Management and Restoration
- Comments Received Related to Fish Passage
- Comments Received Related to Climate Change
- Comments Received Related to Non-Consumptive Uses
- Comments Received Related to Hunting
- Comments Received Related to Elk
- Comments Received Related to Fishing
- Comments Received Related to Cultural Resources

Comments Received Related to Protecting, Restoring, and Maintaining Off-Refuge Habitats

- Comments Received Related to Volunteers, Visitor Fees, and Budgets
- Comments Received Related to Compliance with Laws Governing Threatened and Endangered Species and Water Quality
- Comments Received Related to Refuge Purposes
- Comments Received Related to the Various Alternatives and the CCP in General

L.1 Summary of Comments Received on Draft CCP/EA

The Draft Comprehensive Conservation Plan/Environmental Assessment (CCP/EA) for the Willamette Valley National Wildlife Refuges was issued in May 2011 and was made available for review during a 30-day public comment period that extended from May 30 to June 30, 2011. Copies of the planning documents were available for review at several local libraries. A planning update announcing the availability of the CCP/EA was distributed on May 30 to everyone on the CCP mailing list which totaled approximately 650 individuals and organizations. In addition, copies of the planning update were made available at the various kiosks located on the three Refuges. The USFWS also posted a link to the CCP on both the Refuge Complex and Regional Planning Office websites.

A total of 27 separate comments from 25 different commenters (two commenters submitted two letters) were received regarding the Draft CCP/EA. All written comments were reviewed and organized such that an objective analysis could be made. All comments were assigned a number and identified with the last name and first initial of the individual commenter. The comments are on file at both the Refuge Complex and Regional Planning Offices.

Of the 27 comments received, 12 were submitted on the Public Comment Form that was contained within the May 30 Planning Update, 11 were received at FW1PlanningComments@fws.gov, 1 was received at willamettevalley@fws.gov, 1 letter was sent to the Refuge Complex, and 2 letters were sent to the Regional Director of the USFWS.

The 25 different commenters were located within close proximity of the refuges as follows: Corvallis (5), Dallas (4), Junction City (3), Salem (3), Albany (2), Eugene (2), unknown (2), Alsea (1), Jefferson (1), Philomath (1), and Springfield (1).

The majority of the comments received were from the general public (23) with one comment sent from a private organization, one comment received from a state task force, and two letters submitted from a state agency (Oregon Department of Fish and Wildlife).

A total of 11 of the 25 commenters did not indicate which of the alternatives they preferred. Of the 14 commenters who indicated a preference for one of the three alternatives, 10 of them favored the Services Preferred Alternative (#2) including comments received from the Oregon Department of Fish and Wildlife. One commenter expressed their support for Alternative 2 or 3 and three commenters indicated their support for Alternative 1.

All of the comments received are shown below in italics organized by subject matter. The identification number of each comment is shown at the end of the comment. The text of the various comments are shown as submitted with no attempt to correct spelling or punctuation.

The Service's response to the comments separated by subject matter is shown below. Similar comments on a topic were grouped together and the Service response applies to the comments as a group.

L.2 Comments received related to Canada Geese and Farming

Concern about increasing irrigation
Concern about adding increased irrigation as we are in an area (Ankeny) of water concern. We operate our fields and crops without additional water rights – irrigation. Understandably fields are expensive to maintain but seem to encourage thousands of duskies – on refuge and our pastures every year. So hate to see that change. Lack of maintenance – weedy fallow – would not only discourage geese but be a detriment to the well maintained farms bordering the refuge. DCCP8

Service Response: The Service proposes to enhance irrigation capabilities at Ankeny and possibly Finley Refuges for several reasons. Enhanced irrigation capabilities would help maintain cooperative farming by providing additional water supplies that would improve crop production. Increased crop yields should help sustain cooperative farming and could also increase goose use by enhanced forage or grain supplies. Additional water via irrigation would also increase the production of moist soil seeds within wetland habitats thus, improving food supplies for Canada geese and other wildlife. Improved agricultural crops and wetland habitat conditions should enhance visitor use as a result of the increased response by wildlife. The Service has been working with all of the appropriate parties on this matter for a number of years in order to obtain additional water and the associated water rights. Refuge monitoring has shown that this practice provides tremendous benefits to goose management as well as other refuge programs. The discussion under Goals 1 and 2 elaborate further on the benefits from irrigation.

Concern about how past goose use data was used
As identified in Table 2.1, the major basis in Alt 2/3 for removing fields from farming and restoring them to native habitat is the level of goose use (Low) on individual fields. There are several issues that arise for how this criterion has been applied in Alt 2/3 as consideration for continuing farming (i.e. providing goose forage) or conversion to native habitats.

1. *The criterion of basing goose use (high, medium, low) on the past 15 year history was a late adjustment to the CCP. Due to the dramatic changes in goose use of refuge agricultural fields in recent years (both from numbers and seasonal use patterns), the 15 year average is irrelevant. It would be more prudent to analyze goose use over the past five years. The CCP did not reference nor present any summary of data that documents refuge goose use by field over the last 15 years.*
2. *There are a number of fields identified for conversion to native habitats in Alt 2/3 that, when analyzed using existing refuge goose use data and observations, would be considered moderate to high goose use fields.*
3. *The criteria (High, Medium, Low) does not always take in to consideration field use by Dusky Canada geese, which is often in low numbers and low intensity. Dusky Canada geese often separate from the other sub-species, are very traditional in their field use (marked birds returning annually to the same fields), and have forage preferences that are somewhat different than the large numbers of cacklers. Goal 1 specifically emphasizes providing for Dusky Canada geese.*
4. *The criteria (High, Medium, Low) does not always account for fields that have had historically low goose use, but may receive short term intense use during periods of cold*

weather. In times of extended cold periods, the geese generally move away from annual ryegrass to perennial and fescue. This is an important consideration when planning for goose forage throughout the wintering period.

5. *The criteria (High, Medium, Low) does not make allowances for fields that have had historically low goose use, but crop type is likely the main reason. In some locations, a change in crop type would immediately increase the goose use. However, the previous criterion may be an overriding factor to making those crop type changes. DCCP13*

Alternatives that remove "low goose use fields" may not be consistent with the Purpose of the refuge as stated in your document. High goose use is likely a result of Cackling Canada goose use. Goose use should not be aggregated as this may cause adverse impacts to dusky Canada geese that prefer to use smaller fields, separate themselves from the more numerous Cackling geese, and are very traditional in field selection. The data should separate where dusky use occurs and maintain those areas as a first priority and not remove them from potential dusky use. This does not mean they need to be farmed annually since duskys evolved in the Willamette Valley when fire, not farming, was the primary disturbance factor. DCCP22

Service Response: The Service has elaborated further on the criteria used for basing past goose use within Goal 1, Objective 1a of this CCP. Both recent (past 5 years) and historical (past 15-20 years) goose use patterns were considered when developing the habitat maps. Generally speaking, if a farm field has been receiving moderate to high goose use or it has been a traditional dusky goose use area, the field would be maintained in an agricultural status as potential goose habitat. There were a few occasions when the farm field would be restored to native habitat although it may not fall into the low goose use category or it may be receiving some use by dusky Canada geese. These areas such as the farm fields on Baskett Butte at Baskett Slough Refuge were determined to be better suited for native habitat than as an agricultural crop as they provide an opportunity to help meet other high priority objectives such as T&E species recovery. Although there would be a reduction in the amount of farmed acres under Alternative 2, overall goose use should be similar to Alternative 1 and could increase if specific goose management strategies were implemented.

The Service has included the criteria that were used to determine whether a specific farm field should be maintained in an agricultural crop status or converted to native habitat (see Table 2-1). This set of criteria includes such factors as overall goose use, dusky goose use, cooperative farmer interest in continuing to farm the field, cost to the Refuge to farm the field, location and size of the field, topography, etc.

The Service has also included the set of criteria that were used to determine what type of native habitat an area should be restored to once it has been decided to no longer farm the area (see Table 2-1). This set of criteria includes such factors as historical habitat type, soils, hydrology, location, proximity to adjacent habitat, potential opportunity to meet T & E recovery goals, size, etc.

Concern about impact to cooperative farming

The summary statement in Table 2.1 is that Alt 2 will have no significant adverse impact to cooperative farming. In order to confirm this assumption, the plans for the potential removal of specific fields from cooperative farming in Alt 2 over the life of the CCP would be presented to the existing cooperative farmers. To my knowledge this has not been done. It would appear, especially on Baskett Slough NWR, that removal of the majority of the currently profitable agricultural fields *over the life of the CCP would in fact have an adverse impact to the viability of cooperative farming. DCCP13*

Service Response: The CCP has been modified to recognize that there could be some impacts to cooperative farmers as the amount of farmed acres are reduced under Alternative 2 (see Table 2-1 and section 6.18.5 in the CCP. However, Alternative 2 also states that the Refuge would pursue measures to retain cooperative farmers such as the Refuge assisting cooperative farmers with certain practices (fertilizing, liming, disking, weed control) or even the Refuge farming certain high goose use fields that do not yield much for the farmer.

Concern about heavy reliance on agricultural crops
We would still like to see a shift away from agricultural crops and instead more emphasis on restoring native plant communities that will support more biodiverse ecosystems (plant diversity >> insect diversity >> food diversity >> animal diversity). EA Chapter 6 could do a better job describing the trade-offs between different proportional mixes of native vegetation and agricultural crops. DCCP16

We offer the following EA comments in addition to the scoping comments we submitted March 24, 2008 (pasted below). DCCP16

We urge that CCP Goal 1 be amended. It currently says "Provide agricultural crops for Canada geese ..." As written it includes both a goal (food for geese) and a decision how to meet that goal (agricultural crops, as opposed to other foods). We do not think agricultural crops are properly stated as a goal. They are merely a means to an end. If the goal were framed correctly, it may open up more possibilities for meeting the goal. The goal of providing food and sanctuary for Canada geese can (and we think should) be met using mostly native vegetation. DCCP16

We urge the FWS to consider a comprehensive approach so that these refuges are managed not just for a few charismatic megafauna like geese and elk (though those are certainly important), but are managed as an integrated whole ecosystem including native plants and insects, and natural processes like flooding and fire. DCCP16

We agree that it is time to explicitly examine the "tradeoffs between maximizing habitat potential for dusky Canada geese and restoring or enhancing rare native habitats." We might reframe the question as geese generally (not just dusky geese) vs. native ecosystems generally (not just rare ones). The refuges long-term goal should be to reduce monocrop agricultural management while increasing native habitats that provide similar benefits for geese, plus broader ecological benefits, including far greater benefits to wildlife other than geese. Recognizing that the cooperative farming probably provides greater goose forage per acre than native habitat, the refuges should plan to acquire additional land to add to the refuges in order to meet the integrated goals of geese forage and native habitats. DCCP16

Service Response: Goal 1 has not been modified as it recognizes the importance of providing agricultural crops as well as wetland habitat and sanctuary on the refuges in order to support Pacific Flyway goose and depredation control plans.

In the Willamette Valley, native grasses do not provide anywhere near the quality or quantity of forage (food) supplies as do planted grass crops for Canada geese. The majority of native grasses found on the refuges wet and upland prairie habitats are generally dormant and become rank during the winter months when the geese are present. Planted grasses such as annual and perennial ryegrass and fescue are more active during this time of year and provide much better green forage for geese.

Concern about utilizing a variety of techniques for goose management
The draft CCP presents an all or nothing approach to using cooperative farming. Yet, this is by far the most economical approach to providing goose forage. The management strategies and actions need to do a more thorough job of considering the numerous combinations of crop rotation, pasture management, fire and other techniques that could provide an integrated approach to goose management. The refuge should not fully consider options that do not rely on costly, high input systems that have potential adverse economic and environmental effects. Rather than alternatives, these efforts should be integrated into all alternatives or whatever alternative is selected. DCCP22

Service Response: The Service employs many different management techniques on the refuges to assist with Canada goose management including: providing green browse through planted grasses and pasture mixes; providing grain crops; utilizing a variety of other habitat management practices including mowing, burning, grazing, weed control, etc. The Refuges also provide wetland habitats that serve as feeding, loafing, and roosting areas. All of these practices are listed as strategies within Goal 1, Objectives 1a and 1b and in Goal 2, Objectives 2a, 2b, and 2c.

Concern about goose depredation
[The Goose Depredation Task Force prepared 14 Final Recommendations and requested the Service include them as public comment at their July 13, 2010 meeting. The Service is actively engaged with the Task Force and all other appropriate parties on goose management within Northwest Oregon and southwest Washington, however, only two of the recommendations relate directly to the Willamette Valley National Wildlife Refuge Complex and as such are responded to below. Those two recommendations are directly below (DCCP26). Following those are two comments received from ODFW on the same topic.]

6. ODFW and the USFWS should use agricultural practices on lands under their control, which are similar to those used on private agricultural land in the area where geese are causing agricultural depredations. This includes the planting of goose forage crops, which are available to geese during multiple seasons. Agencies should consult with the OSU agricultural extension service to determine effective farming practices. Supplemental feeding of geese on state and federal areas should be utilized when needed to reduce goose depredation on private farmlands. DCCP26

12. USFWS and ODFW should begin discussions with the Natural Resource Conservation Service to incorporate food plots that would benefit geese in any federal wetland projects on private lands. These food plots would be designed to attract geese away from agricultural croplands. No future publicly funded wetland projects should be implemented without provisions to provide food resources to help reduce agricultural depredations by geese. DCCP26

Address increasing goose populations on the refuges and off site damage caused by the waterfowl. Increased utilization of refuge habitats by geese affects ability for WVRC to meet its dusky objective and exasperates the ongoing goose damage problems on private lands. ODFW *encourages hunting and/or habitat improvement options such as easements, hazing, off-site enhancement, etc. that result in bird redistribution or reductions in concentrations. DCCP27*

Consider partnership funding of landowner incentives through Natural Resource Conservation Service (NRCS) Farm Bill to offset private land agricultural losses and increase agricultural producer tolerance of goose use. Current and future goose depredation problems off the refuge are not adequately addressed under Objectives 1 or 11 in the draft CCP. DCCP27

Service Response**:** The Service appreciates the level of interest about the management of Canada geese on the Willamette Valley Refuges. Goose management on these refuges has been and certainly will continue to be a priority as illustrated within this CCP. The farming operation that occurs on the Willamette Valley Refuges to provide agricultural crops for Canada geese is conducted in a fairly similar fashion as farming programs on nearby private lands. Crop types (primarily planted grasses) are similar and typical practices such as weed control, fertilization, liming, etc, are used to improve crop production as this in turn increases goose use. The Willamette Valley Refuges receive more Canada goose use than any other fish and wildlife managed lands within the Lower Columbia River/Willamette Valley geographical area. The farming program on the Willamette Valley Refuges is one of the primary reasons why goose use is so high on these areas.

Supplemental feeding of geese on Refuges has not been employed and is not a strategy within this CCP as this practice is generally discouraged on national wildlife refuges. Other methods (such as farming and wetland management) are employed to provide food resources for Canada geese.

The Service has initiated discussions with the NRCS regarding Canada goose use on certain lands being restored under Farm Bill programs such as the Wetland Reserve Program. This subject is outside the scope of this CCP however, discussions between the Service and NRCS on this matter will continue.

Concern about reduction in goose carrying capacity

Continue management of the Willamette Valley Refuge Complex (WVRC) based upon the original intent and purpose of protecting dusky Canada geese and other migratory birds. Concern that the three alternatives presented in the draft CCP does not adequately address current and future use of the refuges by all species and subspecies of wintering geese. Of particular interest are the conunitments to Alaskan subsistence users which mandate an increase of wintering goose populations in the Willamette Valley. Alternatives 1 and 2 are similar and do not appear to significantly change management objectives enough to address expected increases in goose usage. Alternative 3 shifts the management emphasis to native habitats with farming operations being conducted by refuge staff. Doing so may not only reduce goose carrying capacity but also shift large amounts of refuge personnel time and operational funding from other priority programs.

Service Response: The chosen alternative for the future is Alternative 2. While Alternative 3 could decrease goose use as discussed in Chapter 2 and Chapter 6, the decision has been made to implement Alternative 2

The strategies listed under Goal 1, Objectives 1a and 1b are designed to be able to provide for an estimated 60,000-100,000 Canada geese. Implementing these strategies would increase goose use days on the Refuges but would probably not increase peak use at any one time. One of the desired outcomes is maintaining the presence of the 60,000-100,000 geese over a longer period of time.

Additional measures beyond the scope of this plan are needed to provide for the entire goose population that winters in the Willamette Valley. One of those measures would be to evaluate the potential to increase off-Refuge efforts/programs to address the expanding goose population on private lands (see Goal 12 for further discussion)..

Service Response: The Service appreciates the level of interest about the management of Canada geese on the Willamette Valley Refuges. Goose management on these refuges has been and certainly will continue to be a priority as illustrated within this CCP. Specific comments received on Canada geese and farming included many different aspects of these two topics such as: concerns raised about increasing irrigation; criteria used for basing goose use; converting specific agricultural fields to native habitat; ensuring that use by dusky Canada geese is taken into consideration; impacts to cooperative farmers; support for converting more agricultural fields to native habitat; suggestion on modifying Goal 1; support for increasing the amount of farmed land for geese through conservation easements; management strategies related to cooperative farming and geese; a recommendation that Refuge agricultural lands should be managed similar to those on private lands; a recommendation to work with the Natural Resource Conservation Service on goose management; etc.

L.3 Comments received related to Habitat Management and Restoration

Comments on the extent, location, and focus of restoration
Were within ¼ mile of Baskett Slough and would like you to continue oak savannah restoration, getting rid of invasive species… DCCP2

Either Alt. 2 or 3 looks ok. I like the idea of more area into native habitat, but not if weeds and berry brush are allowed to encroach. DCCP6

Oak trees are relatively drought tolerant species and is expected to increase in response to climate change. The EA should discuss the need to conserve and restore oak. DCCP16

<u>Service Response</u> The Service agrees that habitat restoration work needs to continue and has included numerous strategies within the various habitat related goals that specify plans for continued restoration work on the Willamette Valley Refuges.

The Service has placed a high level of emphasis on the need to address weed control throughout the CCP. For example, reducing, controlling, or eliminating invasive plants is listed as a strategy under each of the habitat related goals within Chapter 2 and is also addressed in more detail within Appendix F Integrated Pest Management Plan..

Concern that certain attributes of native habitats to be restored can't be met
Some of the parcels identified for native habitat restoration, especially to prairie, that are either currently in agriculture or non-agricultural grassland (NAG), would not be able to meet the attributes for the respective native habitat (as listed under Goals 3 and 4). The reasons are varied but include small size, isolation, soil types, past land use practices, vegetation cover, or other factors. In particular as an example, the majority of NAG lands on Baskett Slough under Alt 1 are designated as Upland Prairie restoration in Alt 2. As stated above, a number of these parcels can not

reasonably meet the attributes for that habitat type and are best remaining categorized as NAG . DCCP13

Service Response: The Service recognizes that not all of the existing areas designated as non-agricultural grasslands on the Willamette Valley Refuges should be restored to native habitat since they would not be able to meet all of the attributes for a specific type of native habitat. Table 2-2 indicates that there are 616 acres of existing non-agricultural grasslands and that there would be 167 acres still remaining within this category under Alternative 2 with the other 449 acres proposed to be restored to native habitat.

Recommendation for a prioritization process with respect to habitat management and restoration
The CCP designates several hundred acres for restoration to native habitats. Due to the difficulty and high cost of restoring several of these habitats, the Refuge should commit to a prioritization process in the CCP. This would be a step-down plan to assure the restoration focus is on the most ecologically appropriate restoration sites. This prioritization would include NAG, agriculture, and existing low quality native habitats. DCCP13

The following two items are referenced from Appendix E.

1. The maintenance of upland prairie/oak savannah (Goal 4) was given a Medium priority. This should be changed to High, the same as wet prairie (Goal 3), as upland prairie is as rare a habitat type as wet prairie, and actually supports a higher diversity of listed species than wet prairie.

2. The maintenance of oak woodland with fir removal is ranked as a Low priority. This should be changed to High. The threat from Douglas fir to oak woodlands is so great that without treatment, upwards of 50% of the existing oak woodland habitat on the Refuge Complex could be lost within the life of the plan. The potential for loss of a rare and declining habitat such as oak woodland should elevate the priority for management." DCCP13

Service Response: The Service has assigned priorities in Appendix E regarding all of the habitat management (maintenance) and restoration strategies specified in this CCP. Comments received on this subject were carefully considered when assigning these priorities. Modifications to the priority categories and to various habitat management and restoration strategies have been made from the Draft CCP (see Table E-2).

Concern about weed management
It is important to avoid weeds, especially reed canary grass, through early detection and control. Chemicals should be used only as a last resort. DCCP16

Service Response: Invasive species is one of the biggest challenges facing refuge managers and as such considerable discussion on this subject was included within this CCP. Many different strategies that address invasive species control work were listed in the various habitat and population related goals (#'s 2-9) within the CCP. In addition, Appendix F is an Integrated Pest Management Plan that also describes how the Willamette Valley Refuges would respond to invasive species threats.

The Service employs an integrated approach to weed control that includes using mechanical, cultural, biological, and chemical control methods. The control strategies used depends upon the targeted pest species and are shown in Appendix F Integrated Pest Management Plan.

Concern about the effectiveness of some of the past restoration work at Baskett Slough Refuge
All my comments are about Baskett Slough. I live in Dallas, Oregon, and the refuge is easily accessible to me.

Since moving to Dallas six years ago, I've made several visits per month to Baskett Slough, to watch wildlife and enjoy the beauty of nature. I'd drive down the dirt road to where the road splits the pond into two parts, park next to the water and watch for interesting things to happen. For three years there was always something interesting going on- nearby. DCCP20

Summer or winter I'd see great blue herons and great egrets every day- close enough to watch them fishing- and without the need to use my binoculars. There were almost always sandpiper-like shore birds probing the pond edges close by. Often I'd see several different species of diving ducks, plus hundreds of butts-up ducks and several hundred geese at a time (on the water) in winter, also close by. Ospreys would occasionally drop in for a quick meal. I'd almost always see an eagle or two perched on the snags in the middle of the larger pond, and sometimes I'd see adults or juveniles going after ducks. DCCP20

The edges of the dirt road were a scenic enhancement to my enjoyment. The great variety of low-growing plants and grasses provided habitat for dozens of small birds who nested, perched and fed there.

All that is gone now.

About three years ago things at the refuge changed:

1- The smaller pond was drained to kill all the carp. I was told by the guy running the pump that the reason was so plants would grow on the bottom and provide food for the ducks.

2- That horrible weed-whacker thing went down the edges of the dirt road and tore the plants off all the way down to the ground. The big bush next to the parking area was 90% destroyed by the whacker. All the habitat for small birds was destroyed.

3- The small islands were scraped down to the dirt and are now so low that a couple days of rain puts them under water.

4- Twice a year the weed whacker comes and destroys all the roadside plant life down to the ground. It has been three years since any small birds have nested along the edges of the road. Twice a year the small islands are scraped down to the dirt- also eliminating habitat.

Since that destructive activity began:

1- All the fish-eating birds have gone elsewhere and are seldom seen by visitors like myself. Not in summer and not in winter.

2- Even in winter I seldom see more than a couple dozen geese on the water within easy sightseeing range. They feed in the fields, but I don't know where they rest.

3- Even in winter, I seldom see more than a couple dozen ducks within easy sightseeing range.

4- Small birds? I feel lucky now if I see anything more than a few redwing blackbirds eating food that people put out for them at the parking area.

In short, as a frequent visitor to Baskett Slough, and a great appreciator of nature and watching wildlife, the place has been ruined. DCCP20

And I am not alone with this. I frequently ask others if they've noticed the changes. The regulars have, and they are no happier about it than I am. You probably don't hear many complaints like mine because we citizens have gradually become accustomed to being ignored by government agencies- so why bother to complain? Well, I'm not that shy, and I'm complaining bitterly about what you have done to our sanctuary. DCCP20

Service Response: Many different habitat restoration projects have occurred on Baskett Slough Refuge over the past 15 years including restoring several hundred acres of wetland habitat and restoring upland prairie/oak savanna habitat on Baskett Butte. The wildlife response to this work has been nothing short of remarkable as waterfowl, shorebird, waterbird, raptor and other wildlife use has increased tremendously within the restoration areas. Wetlands that are now restored have become popular wildlife viewing areas for visitors. Habitat restoration work on Baskett Butte has resulted in increases in Fender's blue butterfly populations as well as with many other prairie related species. At times, the Refuges utilize heavy equipment when undertaking some types of restoration work and this may cause some temporary disruption of habitat or wildlife use but the long-term results of all of the habitat restoration work at Baskett Slough has led to remarkable improvements in habitat quality and wildlife use.

L.4 Comments received related to Fish Passage

Fish passage /entrapment laws: Fish bearing streams are present on all refuge units and are impacted by historic emphasis on farming & waterfowl management. Fish listed as Threatened and Endangered are known to use waterways on all refuge units. Use by fish and effects associated with current and proposed actions are poorly described and assessed in all the alternatives considered. The CCP does not deal with resolving impacts or evaluating how dealing with fish and water quality issues would change duck and goose management systems. This should have been part of the Alternative development and assessment and would have contributed to a significant range of alternatives. Developing an Alternative(s) that addressed these "changes" in public policy and mandates should have been done to bring the refuge system into the 21st Century rather relying on priorities that reflect the Service's Mission as defined in 1960. DCCP22

Adopt management actions that maintain or restore passage for native fish in the Willamette River subbasin including federally threatened winter steelhead. State statute (ORS 509.585) requires that fish passage be provided for all artificial obstructions, therefore, habitat projects designed to create seasonal aquatic habitat for waterfowl must accommodate the passage needs of native fish species. ODFW proposes to work collaboratively to identify solutions that meet connectivity requirements of fish in recognition of other management objectives for the impoundments. Earthen berms have been used extensively on many refuges and on some private land projects to capture and hold seasonal water for the purpose of providing waterfowl habitat. If not properly designed, there is potential for native fish species to become entrapped in these artificial habitats. Habitat projects designed to create seasonal aquatic habitat for waterfowl should accommodate the passage needs of native fish species. ODFW recommends using the CCP planning process as an opportunity to assess passage needs and include appropriate corrective actions as priorities within the plan. DCCP27

Service Response: The CCP indicates that the Service plans to continue to work with all of the involved parties in addressing fish passage and entrapment issues (see Goal 2, Objective 2a, Strategy

14; Goal 2, Objective 2b, Strategy 2; Goal 2, Objective 2c, Strategy 8, and Goal 8, Objective 8a, Strategy 3. The Service has been working with the appropriate parties over the past several years to address any possible fish passage and entrapment concerns and has made modifications to water level management and water control structures in recent years to address these concerns.

L.5 Comments received related to Climate Change

Climate change is another important issue to consider in this conservation plan. What changes are likely as a result of climate change? (e.g. More storms and drought. Changing conditions for native species.) How will the Willamette Valley be affected? (e.g. Added ecological stress. Different species facing pressure to move in or move out of these refuges. Problems with opportunistic weedy species.) The EA should anticipate and develop contingency plans for these changes. Since these refuges have a strong focus on Dusky Canada geese, what are the chances that their preferred wintering habitat will move north and the birds with them? DCCP16

These refuges might also help incremetnally mitigate climate change by storing more carbon. Grasses are known to allocate a significant portion of the photosynthate below ground. Soil tilling is known to increase oxidation of soil carbon and the release of CO2. The EA should discuss these issues. DCCP16

Service Response: The Service is committed to examining everything we do, every decision we make, and every dollar we spend through the lens of climate change, fully confident in our workforce to rise to this challenge. The Service has elaborated on how it is addressing climate change within the CCP (see Chapter 2, Section 2.5 and Chapter 3, section 3.5.4).

L.6 Comments received related to Non-Consumptive Uses (Environmental Education, Interpretation, Wildlife Observation, and Wildlife/Nature Photography)

I prefer the alternate plan 2 for the following reasons. Starting with outdoor classrooms. Subjects I would like to include in the classrooms are 1. Plant, tree, and vegetation identification. 2. Animal identification and habitation. 3. Outdoor survival. A practical class on what to do when you are lost in the woods….. DCCP4

My priorities are: Public use and access. CCP Goals 4, 5, and 10. DCCP5

This plan (Alternative 1) does not seem to have enough for students or the public to encourage viewing of wildlife, etc. DCCP6

I like this one (Alternative 2) because 1) there would be outdoor shelters, 2) there would be monthly walks, 3) there would be an environmental education center, and 4) historic houses at Finley would be restored. DCCP7

We love and value the Ankeny bird refuge we border. More attention especially for school age kids is highly encouraged. So many people do not know of this treasure so close to our state capital. DCCP8

I like the set of proposed improvements in this alternative (#2), especially for educating youngsters, our future environment curators (and thanks for your excellent work). DCCP10

Public recreation is an important goal of the refuges, but should not interfere with the primary objective of providing refuge for wildlife. Where conflicts may arise, non-consumptive recreation uses such as bird watching, should prevail over consumptive recreation uses such as hunting. DCCP16

Snag Boat Bend: It is not supposedly managed for geese? If not, why not open it for all hunting, fishing, hiking, canoeing, jogging, geo-caching or other outdoor recreation allowed under the State regulations for the Greenways? DCCP22

*Expand public education and outreach opportunities in *a) focal species and assemblages of interest and *b) invasive species identified in the Oregon Conservation Strategy (OCS). The OCS includes a summary list of strategy species and documented invasive species in the Willamette Valley Eco-region.*
**a) Focal species include: western pond turtles, winter steelhead, riparian birds, coastal cutthroat trout, western gray squirrel and northern red legged frogs.*
**b) Invasive species include: reed canary grass, nutria, and eastern gray squirrel. DCCP27*

<u>Service Response</u>: The Service appreciates the level of interest in having public recreation activities on the Willamette Valley Refuges. Goal 10 of the CCP emphasizes the need and specifies how the Service would improve all of the Big 6 wildlife-dependent recreational uses (wildlife observation, wildlife/nature photography, interpretation, environmental education, hunting, and fishing) on the Willamette Valley Refuges. Objectives 10a, 10b, and 10c include the specific Strategies or improvements that would be made with respect to non-consumptive uses including wildlife observation and photography, interpretation, and environmental education. Table 2-1 within Chapter 2 illustrates the increased number of new observation structures, miles of trails, number of special events, interpretive walks, number of students that would be served annually, etc, within all of the alternatives. Alternative 2 (Service's Preferred Alternative) provides the greatest increase in these types of facilities and programs. While wildlife observation would still be the cornerstone of the public use program, improvements are proposed within all of the other wildlife-dependent recreation programs especially with respect to increasing environmental education opportunities.

The one major change related to non-consumptive use from the Draft CCP is in reference to opening the Snag Boat Bend Unit of Finley Refuge year-round for certain wildlife-dependent recreational uses. Under Alternative 1 (current condition), major portions of the Snag Boat Bend Unit have been closed to public use during the winter sanctuary season. After careful consideration of the comments received, the Service proposes to open major portions of Snag Boat Bend year-round as management of the Unit doesn't focus on providing winter sanctuary for Canada geese similar to how the three main Willamette Valley Refuges are managed. This proposed change should provide increased recreational opportunities for wildlife photography, interpretation, environmental education as well as for fishing.

Outreach and public education opportunities would both be expanded under Alternative 2 (see section 2.5 and Chapter 2, Goal 10. Conservation of focal species and invasive species control would be just a couple of the items that would be a part of this expanded effort.

L.7 Comments received related to Hunting

Concern about expanding hunting at the Refuges

No hunting period at any of our three Refuges. None. Let nature get back to original idea. DCCP1

We must support Alternative #1 – see general comments. We would love to enjoy more trails and have more of the land restored to habitat but not at the cost of turning the refuges into hunting clubs. You need to rethink where your support is coming from. It's from the birders and hikers. The hunters have plenty of private land surrounding the refuges to use. According to my dictionary the definition of refuges is: 1. Protection or shelter, as from danger or hardship. 2. A place providing protection or shelter; haven or sanctuary. 3. Anything to which one may turn for help, relief, or escape. Apparently your dictionary has an alternative definition which includes guns and killing? Some refuge. DCCP3

I don't like the hunting on such wildlife lands, but that appears to be part of all plans. Could that part be eliminated? DCCP6

Yes- this (Alternative 1) has my vote. I live at edge of Baskett Slough (12 years). I hate the thought of hunting. So do many people I've talked to. Refuge should be a refuge, not game preserve, etc. We love the peaceful atmosphere of Baskett Slough. Hunting would change everything. Alternative 2 – Terrible – due to the hunting. Alternative 3 – This works – no hunting. Please don't change our refuges to game preserves. Many bird watchers and hikers agree – no hunting please. DCCP12

Although I have not been able to read your entire plan for the Pacific wildlife refuges, I have been made aware of provisions for youth hunting and antlerless deer harvesting (what horrible terminology) in certain of your proposals. I thought I knew the definition of refuge. Since my understanding of a refuge would not allow hunting in any way, shape or form, I did look the word up in my dictionary just to be certain that I wasn't misinformed. Refuge: 1) a sheltered or protected state safe from something threatening, harmful, or unpleasant. 2) a place offering protection or safe shelter from something. Opening the refuges to hunting would remove the wildlife protection that the very word refuge implies. I think everyone would agree that hunting on refuge grounds would certainly fall into the threatening, harmful or unpleasant category (not for the humans who consider hunting great sport but definitely for the wildlife). There are plenty of lands available for these sporting individuals to get the gratification that only killing a living creature seems to provide. Let's keep these refuges a safe place for wildlife and allow no hunting, period. DCCP14

Hunting of deer and elk should not be allowed in the Refuges. This is in violation of Goal 10 of the Willamette Valley National Wildlife Refuges CCP Goals and not compatible with the meaning of the term refuge itself. There are other means of controlling these animal's interaction with neighboring private properties. DCCP18 *an cheap sloppy ea is not sufficient to satisfy nepa. you need to prepare a correct and full eis. does anyone in this word inviolate. letting in gun wackos to murder and kill wildlife is uneconomical. the numbers of those who kill wildlife are diminishing every single years. we dont need to introduce kids to guns at all. that just introduc murder into their world. they need alot more in their lives than violence, murder, brutality and killing of wildlife. money and greed from the nra and nobody elected the nra to any national office. this money mad organization because they are hurting our nation of 300 million people. they are a very small group in that huge population bunch of gun wacko murdereers is not appreciated. they all need to be banned. DCCP19*

My husband and I have lived next to the basket Slough (our property backs up to the west end of slough) for almost 12 years. We have no problem with any of the proposed changes except the youth waterfowl hunt and deer hunting. I believe the founders of the Wildlife Refuge did not have future plans for hunting on the refuge. I can't imagine the quiet refuge setting being overrun with children shooting guns at ducks, geese, etc. When we hike the trailhead, we see a handful of deer. Why is this small area being opened for deer hunting, when there are so many other more remote areas available. When we bought our home next to the Baskett Slough, we were thrilled with the beauty and peaceful setting of the refuge. We do not look forward to such a drastic change in your policy that will shatter the peacefulness of the slough. All other proposals sound great. Leave the Wildlife Refuge a Wildlife Refuge – No hunting Please! I pray we never see the sign, Baskett Slough Game Preserve. I hike the trails often, and couldn't figure out how they could deer hunt when those deer don't even run when you approach them on the trail. The handful of deer that live around the Baskett Slough trails are quite tame. Maybe the deer hunting wouldn't be near the trails. I'm losing sleep over this proposed huge change from refuge to game preserve. DCCP 23 (same commenter as DCCP 12).

Service Response: The National Wildlife Refuge System Improvement Act, passed in 1997, recognizes that wildlife-dependent recreational uses including hunting - when determined to be compatible with the mission of the NWRS and the purposes of the Refuge – are legitimate and appropriate uses of national wildlife refuges.

Hunting on the Willamette Valley Refuges was given careful consideration during the preparation of this CCP and as such, improved deer hunting opportunities at Finley and developing youth and September goose hunting programs at Baskett Slough are included as part of Alternative 2. These hunts were proposed within the CCP as they will not create unreasonable conflicts with other management programs. No other type of hunting is included within the CCP.

A few comments expressed concern about deer hunting at Baskett Slough although the CCP did not propose any such hunt at that Refuge. The Rationale under Goal 10, Objective 10d in Chapter 2 indicates that an option to provide deer hunting was considered at both Snag Boat Bend and Baskett Slough however, it was determined that these hunts would create conflicts with other programs and as such deer hunting is not being proposed beyond the existing program at W.L. Finley Refuge.

Support for increasing hunting at the Refuges

I prefer the alternate plan 2 for the following reasons… Second, the new option for hunting either sex of deer and closing trails for hunters is an exciting option. This is a more balanced approach compared to what is presently in place. Third, I like the opportunity of a youth waterfowl hunt. There is so little available public hunting land in the valley; they may never get otherwise. DCCP4

This plan (Alternative 2) does seem balanced. I especially like the new deer hunting plan with closure of hiking trails at that time. DCCP9

Open the refuge to duck and goose and elk hunting. Management will not allow elk hunting because the elk will move across Bellfountain Road and into the Coast Range! DCCP 11

I prefer Alternative 2, the improved balance approach for the Willamette Valley Wildlife Refuges. I believe that increased opportunities for use by hunters will result not only in an increase in use of the facilities, but also an increase in the appreciation of the NWR system by many people that might not otherwise visit the site. While I applaud the increases in deer hunting opportunities, youth waterfowl hunts and improving onsite fishing, I think even more could be done. How about a primitive weapons season for upland game like rabbits, where only hand propelled devices could be used (spear, gig, throwing stick, etc.). DCCP15

Service Response: The Service recognizes the interest in providing additional hunting opportunities on the Willamette Valley Refuges and has included a new youth waterfowl related hunt at Baskett Slough Refuge, a new September goose hunt at Baskett Slough Refuge, and has revised the deer hunting program at Finley Refuge in an effort to provide additional hunting opportunities on these areas under Alternative 2. The Service has determined that these hunts will be compatible with the purpose of the refuges and will not pose major conflicts with other goals and objectives of this CCP.

Concern about shortening of the deer archery and firearm seasons

Why is the deer archery season on Finley NWR shortened to two weeks under Alt 2, a change from Alt 1 where the dates match the State of Oregon season? Why is the deer firearm season on Finley NWR delayed in opening by two weeks under Alt 2, a change from Alt 1 where the opening coincided with the State of Oregon general season? DCCP13

Service Response: Since the Draft CCP, the Service has changed the dates of the deer archery hunting season at Finley Refuge to what they were under Alternative 1 whereby the season would extend from approximately late August until approximately late September under all of the alternatives. The basis for changing the dates of the restricted firearm deer hunt at Finley were to: 1) reduce the potential conflict between hunters and non-consumptive users being in the same area at the same time, and 2) potentially improve hunter success by concentrating hunter use within a shorter season and thus increasing deer movement during hunt days. See Rationale under Chapter 2, Goal 10, Objective 10d and Appendix G. Hunt Plan for additional discussion.

Concern that CCP is biased against hunting and fishing

The entire CCP presents a strong bias against hunting and fishing without providing a creditable analysis of data used to explain the rationale that severely limits access for this type of traditional use, yet allows for increasing other public use opportunities.

- *What is the biological rationale used in compatible use determinations that supports the limitations placed on public use of the NWR units, particularly for hunting and fishing but also jogging, bike riding, geo-caching or numerous other activities that people enjoy while observing wildlife?*
- *All alternatives appear to present a strong bias against hunting and fishing opportunities on all NWR Complex lands without presenting the scientific rational to support continued reduction in hunting opportunities. What is the "scientific documentation" supporting such*

broad closure of hunting/fishing on public lands? I remember when the refuges were open to most types of hunting and fishing activities.

- *All Willamette Valley Refuge Complex lands lie within the same State Wildlife Management Unit (Willamette). Why is there so much inconsistency among the FWS hunting and fishing regulations for each refuge unit? This is confusing to users and does not seem to be based on any scientific premise.*
- *How much of the compatible use determinations considered during alternative/strategy development represents "professional judgment" of current staff vs. input from State agencies, university scientists, hunting or fishing organizations, or literature pertinent to the Willamette Valley species and seasons?*
- *Do the alternatives provide a real range of opportunity and reflect an objective analysis of public use potential using scientific data rather than "professional judgment".*
- *Why limit youth waterfowl hunting opportunity to Basket Slough NWR when Ankeny NWR is managed for and holds the highest concentration of ducks, especially early in the migratory bird and resident goose seasons?*
- *Impoundments (moist soil units) are obviously managed for holding ducks on refuge by limiting disturbance, managing for high quality feed, and supplementing water levels early in the year. How does this effect dispersal of ducks to other lands open for hunting? Why are these areas not managed to provide uses compatible with the hunting bag limits and strategies of the Pacific Flyway?*
- *If the FWS wants to assist in recruitment of future hunters, why not provide a quality area and provide a variety of opportunity? Why are many significant opportunities available at Snag Boat Bend and WL Finley not considered as a "balanced" use and thus included into the preferred alternative?*
- *Numerous private hunt areas hunt 2-3 days a week and yet still are used and monitored by FWS because of their intensive use by geese, what are they doing that the refuge cannot? What documentation/monitoring data did the planning staff use to determine that hunting and goose use are incompatible?*
- *What documentation did lobby groups or landowners provide indicating that they support the "no hunting" approach to dealing with goose populations. Why not consider an alternative that opened up goose/duck hunting and take public comment on that as a real change in management philosophy to be evaluated and monitored? DCCP22*

Service Response: The Service believes that Alternative 2 provides a balanced approach towards providing for all of the various wildlife, habitat and wildlife-dependent recreation goals including hunting on the Willamette Valley Refuges. Additional hunting opportunities are being provided under Alternative 2 including new youth waterfowl and September goose hunting at Baskett Slough Refuge. The CCP also includes a strategy to develop a fishing program on the Snag Boat Bend Unit of Finley Refuge. These consumptive uses have been determined to be compatible with the purpose of the Refuges as they should not conflict with providing habitat for wintering Canada geese and other migratory birds. The Service considered providing additional hunting opportunities on the Willamette Valley Refuges when developing this CCP, however, it was determined that any hunts beyond what are being proposed at this time could conflict with the purpose of the refuges and as such would not be compatible. See Chapter 2, Goal 10, Objectives 10d and 10f and Appendix G Hunt Plan for additional information.

Concern that Refuge hunting should be consistent with State seasons and regulations

All Alternatives that allow hunting or fishing should be consistent with the State regulations and opportunities of the surrounding Management Unit to reduce user confusion and management inconsistencies.

- *What is the rationale for setting limited open season access for hunting and fishing that do not match the State's bag limits and seasons for the State's Management Unit?*
- *The NWR already has the means to adjust access and seasons and has done so several times under the existing management plan. Thus how do the approaches presented in the Draft CCP represent a range of actions among Alternatives?*
- *How many times have changes hunting regulations and access for hunting and fishing been made under the No Action alternative?*
- *What scientific data supported those changes? How do these past actions reflect a different strategy in any future alternative considered?*
- *Deer season open access dates among refuge units do not match sex, bag or season dates for game species of the Willamette Unit. Even if the argument is used that this is a conflict with Goose sanctuary needs, geese do not even use many of the areas that are closed during these seasons.*
- *Upland game birds: What is the biological basis for these differences? It just makes it confusing for potential users apparently conflicts with State management objectives, Why not attempt to resolve these issues now and give the public an opportunity to comment on the process and data used set these closures?*
- *Snag Boat Bend: It is not supposedly managed for geese? If not, why not open it for all hunting, fishing, hiking, canoeing jogging, geo-caching or other outdoor recreation allowed under the State regulations for the Greenways? DCCP22*

ODFW is concerned, however, that Alternative 2 strategies could result in a substantial loss of recreational deer hunting and fishing opportunity. In order to maintain quality hunting and angling experiences for families using the refuge complex and ensure consistency with state fish and wildlife laws, regulations, and management plans, ODFW recommends the following modifications:
Objective 10d -

- *Strategy 1 - Modify Alternative 2 to allow archery hunting at Finley during through the General Deer Bow Season as identified in the Oregon Big Game Regulations (approximately the last weekend in August through the last weekend in September).*
- *Strategy 3 - Modify Alternative 2 to allow shotgun deer hunting though the General Western Oregon Deer Season as identified in the Oregon Big Game Regulations (approximately Oct 1 through early Nov).*
- *Strategy 4 - Modify shotgun season hunt area to include all areas currently available in Alternative 1, Bald Top and Mill Hill trail areas through October and restrict hunting to Bald Top and Mill Hill areas beginning Nov 1 to avoid wintering geese conflicts.*
- *Restore the proposed hunt at Snagboat Bend that was included in earlier drafts of the plan. ODFW recommends allowing a season concurrent with the General Western Oregon Deer Season. If safety is an issue during peak use periods, USFWS may want to initially consider hunting only during weekdays and expanding full week hunting at a later date.*
- *Include a new Strategy for Alternative 2 that would establish safety zones around parking or other high use areas. DCCP25*

Coordinate expansion of hunting opportunity outlined in Objective 10d for the public to participate in quality deer hunting. Allowing antlerless harvest using 600 series tags is one strategy identified to achieve this objective. The Willamette unit is designated as a deer "deemphasis" management area, so there are many hunting tags available to the public. It may be difficult for the WVRC to manage a "quality" hunt for 615 tag holders unless restrictions are placed on open days, type of firearms and number of hunters. ODFW appreciates USFWS ongoing commitment to provide deer hunting opportunities on the refuge. DCCP27

Service Response: The Service appreciates the comments received indicating that hunting regulations should be consistent with state of Oregon seasons and bag limits. Refuge hunting regulations can and often do differ from state regulations regarding specific season dates (sometimes Refuges are more restrictive than state seasons to reduce or eliminate conflicts with other users). However, since the Draft CCP, the Service has modified the dates of the Finley deer hunting seasons in order to be more consistent with state seasons. The Service has also changed the bag limit on deer hunting at Finley to include either sex similar to what it is allowed within this unit in the state of Oregon. The Service has also changed the hunter orange requirement for the Finley deer hunt to be consistent with state regulations.

One commenter asked why upland game bird hunting is not included as part of the CCP for the Willamette Valley Refuges. Appendix C (Compatibility Determinations) and Appendix G (Hunting Plan) indicate that hunting of other species is not allowed on the Refuges due to conflicts with Refuge purposes and other forms of wildlife-dependent recreation. Most hunting seasons generally occur during the same months that geese are concentrated on the Refuges and thus, would be in conflict with the major purpose of these areas.

The Service will continue to coordinate hunting programs on the Willamette Valley Refuges with the Oregon Department of Fish & Wildlife.

Desire for more waterfowl hunting than what is suggested in the plan
Attached is a brief letter with my recommendation to include waterfowl hunting, specifically for ducks, in the mix of programs offered at the three Willamette Valley Wildlife Refuges. I also pasted the contents of this letter in the on-line feedback form. DCCP24

I'm writing to provide input on the Comprehensive Conservation Planning Process for the Valley's National Wildlife Refuge complex. In my view, one of the most important dimensions of these public lands that needs to be developed is waterfowl hunting. As a biologist and resident of western Oregon you know the potential of the area to produce ducks and geese. You also know of the scarcity of hunting opportunities on public land. I believe it is in the best long-term interests of the Refuge complex to expand its program to provide a high-quality hunting experience for Valley residents. I'm sure you can appreciate how valuable it is to engage people in recreational activities as a way of developing their love for the natural world and a concern for its well-being. To date, the Willamette Valley Refuge complex has been very successful with its habitat management and wildlife viewing programs: I personally have led several Cub Scout groups on nature walks on this refuge and know these kids had a memorable time. Unfortunately, wildlife viewing only reaches one user group. DCCP24

I would like to see you develop and test a waterfowl hunting program on one or more of the Valley's federal refuges. You obviously have a mandate to protect dusky Canada geese, but this seems easy to *accomplish using wise hunting program management and the strong regulations and public awareness of this need in the surrounding area (i.e., Northwest Permit Zone). I see hunting on the refuges as complimentary, not detrimental to achieving these goose protection goals. You could prohibit the taking of geese on the refuge, and monitor the trends in dusky geese harvest outside the refuges before and after hunting is allowed. You could restrict the days, and times during the days, that hunting can occur, much like is done on nearby Fern Ridge wildlife area. You could start with a youth-only hunting program and expand to adults if the results are favorable. Regardless of the details of the hunting program, I urge you to include it in your Comprehensive Conservation Plan. Consult your fellows elsewhere in the region and the nation that have had success with hunting on refuges. There are many examples of the high quality public hunting experience that could be equaled, or bested, here in western Oregon. DCCP24*

I suspect that if hunting were allowed on the refuges there would be measurably greater public support for the refuges and a wealth of untapped volunteer effort available to assist with refuge maintenance and habitat programs. I personally would contribute my time to helping with this effort, if desired. There is much more to discuss on this topic. I am thrilled that the U.S. Fish and Wildlife Service is willing to look over its refuge management plan, and I appreciate the opportunity to comment. DCCP24

ODFW would like to emphasize our strong support for Alternative 2 objectives and strategies under Goal 10 that restore waterfowl hunting seasons. DCCP25

Implement waterfowl hunting on Ankeny, Basket, and Finley NWRs (including Snagboat Bend unit). ODFW supports initial hunts proposed within the draft CCP but recommends implementing additional hunting opportunities to restore and expand waterfowl hunting for ducks and western Canada geese during early season periods and in locations where discharge of firearms will not compromise conservation or result in harassment of dusky Canada geese. DCCP27

<u>Service Response</u>: Comments were received that indicated the desire for additional waterfowl hunting on the Willamette Valley Refuges. The Rationale under Goal 10, Objective 10f indicates that waterfowl hunting on the Refuges during the winter season is not proposed because of the potential impact to duskys and other wintering geese. Goal 1 of the CCP discusses the need for providing sanctuary or the lack of disturbance during the winter months for Canada geese using the Willamette Valley Refuges. Sanctuary areas, along with providing food and water on the Refuges are the three primary strategies employed to manage Canada goose populations on the Refuges. The provision of sanctuary increases goose use on the Refuges, thereby reducing goose use and thus, potential agricultural crop depredation on private lands.

L.8 Comments received related to Elk

I prefer the alternate plan 2 for the following reasons… finally, an Elk management plan that includes hunting is essential. In my forty two years of visiting and enjoying the refuge, I have watched the elk herd expand to the point of over population. I believe the elk should be harvested and monitored on yearly basis. DCCP4

25 years ago there were no elk on the refuge. Finley has provided a safe place (no hunts), water and some food. Management has created a problem by nurturing the herds on Finley. My fences get broken, the elk eat my corn crop and damage irrigation equipment. Poor management! Open the Finley Wildlife Refuge to elk hunting. Build fences to keep the elk on the refuge or pay farmers to build fences to keep elk off my property. Pay me for over $6,000 of elk damage to fences, crops and irrigation equipment… Federal elk, state elk, no matter. I have purchased permits, licenses and LOP tags since returning to the family farm in 2005. Please work with the Willamette Valley farmers to find a solution to this problem. DCCP 11

The Elk Management Plan is an identified key issue in this CCP, but elk management is being deferred to a separate process driven by ODFW and it's entrenched constituencies who mainly see elk as hunting opportunities, instead of as ecological players and wildlife viewing opportunities. Elk management is something that FWS should assert control over, rather than ODFW. Deferring elk management to a separate process also renders this CCP, not comprehensive, so does the plan still meet the intent of the comprehensive planning requirement?" Since elk are native to the Willamette Valley and likely far below natural levels, we urge FWS to continue to support a healthy elk herd at Finley. Viewing elk is a popular recreation activity. Elk hunting should be considered a rarely used management tool, but not an objective for the refuges. DCCP16

ELK HUNTING: There should not be any elk hunt (archery or firearm, adult or youth) allowed at any time on any of the Willamette Valley National Wildlife Refuges. Elk hunting is an activity that conflicts with the priorities of wildlife observation and photography, as well as hiking. The motivation for considering an elk hunt on the Refuges is political from external sources, not biological, and should be rejected by the U.S. Fish & Wildlife Service in accordance with court interpretation as set forth in Defenders of Wildlife v. Andrus [Ruby Lake Refuge]. Elk on the Willamette Valley National Refuges do not conflict with Canada goose management. The presence of elk enhances visitor experience and is not detrimental to carrying capacity of Refuge lands. Elk are the main reason I first visited Finley. Mike Rivers of the Oregon Parks and Recreation Department suggested I visit Finley to photograph elk. In early 2009 that state agency asked me to photograph wildlife for promotional materials for Beaver Creek State Natural Area, the 2010 Park of the Year. Mr. Rivers recommended Finley as a location known for its elk observation opportunities. DCCP21

If off-refuge interests and the Oregon Department of Fish and Wildlife want to reduce the number of elk that frequent the Refuges, let those entities do what they are legally allowed to do on lands under their jurisdiction outside Refuge boundaries, including expanded hunter access to the private lands near the Refuges, where the elk damage occurs. There are ample areas open to elk hunting throughout Oregon on other lands managed Federally and by the State of Oregon. Opening an elk season on the Refuges would not meet a public recreational demand that cannot be more than adequately met in other locations, such as on National Forest and BLM lands. DCCP21

Measures to prevent damage to privately owned property near the Refuges, such as electric fencing, hazing (barking dogs), repellents and other legal methods, should be employed by non USFWS service personnel and private citizens outside Refuge boundaries so as to avoid further dilution of severely limited USFWS budgetary & staff resources. DCCP21

During the times that my wife and I volunteer at the Wild Goose Store on the Finley Refuge, there is hardly a day go by without a visitor inquiring: "Where are the elk?". I have yet to receive one inquiry saying "Where can I hunt elk?". This affirms reports of a growing demand for wildlife viewing *nationally and statewide in Oregon by double digits each decade. According to the 2003-2007 Oregon Statewide Comprehensive Outdoor Recreation Plan (Oregon Parks and Recreation Department 2003), Nature/Wildlife Observation activity grew by 170% statewide from 1987-2002. Within the region encompassing the Refuges (SCORP Regions 2 and 3), participation in Nature/Wildlife Observation activity grew by 254% during a 15 year period and was the activity with the single highest growth rate. To provide quality wildlife viewing, wildlife needs to be present and free from disturbance, like hunting .... particularly elk hunting. DCCP21*

A book titled Wildlife Viewing: A Management Handbook edited by Michael J. Manfredo and published by Oregon State University Press, says: "Wildlife viewing is an increasingly popular form of outdoor recreation, yet despite growing public interest, little attention has been directed toward developing professional planning and management tools for this activity." When this book was published in 2002, a classmate of mine from the University of Arizona's Wildlife Research Unit, Bob Hernbrode Jr, wrote the following comment about this book, when he was the Chief of Education at the Colorado Division of Wildlife: "In many ways this book is ahead of its time. . . . It contains much original work and original thought and integrates appropriate work from many disciplines." --Bob Hernbrode, Chief of Education, Colorado Division of Wildlife." DCCP21

Past reluctance of the U.S. Fish & Wildlife Service to advocate the continued presence of Roosevelt elk on the Willamette Valley National Wildlife Refuge Complex includes limiting quarterly newsletter content that favorably depicts elk and also limiting merchandise in the Wild Goose Store to items that do not show elk ... such as not allowing clothing (T-shirts and caps) with elk on them to be carried in the Store. Thankfully, that reluctance changed recently, at least for store merchandise. Given ubiquitous visitor inquiries regarding elk observation, it is important that the USFWS consider visitor priorities by continuing the present policy of no elk hunting on the Refuges and by expanding viewing opportunities, as well as encouraging store merchandise pertaining to elk, all of which will enhance this significant aspect of the Refuges and will appropriately respond to growing public demand for wildlife viewing. The recent additions of baseball caps and T-shirts with elk art to the inventory at the Wild Goose Store merchandise are wonderful and replace what I consider to be unfortunate bureaucratic censorship with an appropriate, objective and beneficial policy that recognizes Roosevelt elk as an integral part of the Refuges. DCCP21

The Merriam-Webster Definition of REFUGE is: shelter or protection from danger or distress; a place that provides shelter or protection. Hunting is a danger to the hunted species and creates distress for the wildlife being hunted. Furthermore, hunting in areas frequented by hikers, photographers and wildlife observers creates a danger for these types of visitors and certainly distresses me as a hiker, photographer and wildlife observer when I am on Refuge land during any hunt. If I want to hunt elk, I will go to one or more of the numerous areas off the Refuges. Limiting access to the parts of the Refuges that would be open for hunting to only hunters is not acceptable and creates a danger to members of the public who venture onto Refuges without being aware of hunt closures to non hunters. Hunting is a declining use throughout the United States, while wildlife observation & photography are growing uses. DCCP21

Talking about developing an elk management has been on-going for at least ten years. Why not show that as the No Action and show some action in Alternative 2 or 3. At least discuss the issues and opportunities. Closed for elk season? Why and why defer public resolution to another plan. This plan should evaluate how the FWS will address State management issues related to hunting and *fishing as well as public access opportunities that could be provided while helping resolve those issues. This plan appears so kick the can down the road so as not to deal with a significant issue or hunt opportunity. DCCP22*

Initiate management actions that provide opportunities to reduce private land big game damage caused by expanding elk populations within and adjacent to William Finley, Basket Slough, and Ankeny NWR's. Cooperative elk management strategies for USFWS refuge properties are needed to ensure that Willan1ette Valley elk populations are sustained in a manner that is compatible with adjacent private land use and refuge objectives. As proposed in the draft alternatives, ODFW would like to work with WVRC managers to develop a refuge management plan for elk that addresses damage issues on adjacent private lands, provides hunting opportunity, uses hazing as a damage management tool and recognizes elk viewing as an important public attraction to the refuge.

ODFW is encouraged by initial coordination with USFWS to develop a WVRC elk management plan (objective lIe). However, consideration must be given to the fact that the Willamette Wildlife Management Unit is managed as an elk "de-emphasis" area because of depredation problems and public direction. This does not preclude establishing an elk herd objective for the refuge, however, ODFW recommends that "on refuge" management be developed to compliment unit-wide management goals for elk. Attempting to achieve specific bull cow ratios by individual herd maybe difficult depending on habitat quality and time the animals are on the refuges. A WVRC Elk Management Plan should include objectives that: a) reduce damage on private lands, b) conserve dusky Canada goose habitat, c) provide viewing opportunities, and d) establish elk populations compatible with adjacent agriculture, forestry, and refuge uses. Elk hazing and elk hunting opportunities are tools that can be used to reach damage and population goals, and should be considered in locations and during times that will not adversely affect dusky Canada geese. Planning the planting of ryegrass, improved pasture mixes or grains and cereal crops to benefit goose populations should consider the proximity of private landowners and how these activities many affect elk damage to their pastures, grain fields or duck clubs. DCCP27

Service Response: The Service appreciates the concern and interest in the management of elk on Finley as well as at the other Willamette Valley Refuges. Comments received range from those who have concerns about the presence of elk with respect to potential damage to agricultural crops on private land to those who enjoy seeing elk roam on the Refuges. Under Goal 10, Objective 10e of this CCP, the Service indicates its plan to address elk management issues on the three Willamette Valley Refuges. The Service has committed to initiating an elk management plan in coordination with the Oregon Department of Fish & Wildlife upon approval of this CCP and will complete the elk management plan within 1-2 years of CCP implementation. The elk management plan will establish target elk herd sizes within/adjacent to each Refuge; consider adjacent landowner concerns, i.e., damage; consider the recreational value of elk such as watchable wildlife, hunting, etc, to Refuge users and nearby landowners; be consistent with other wildlife, habitat, and public use objectives of the Refuges; include sound monitoring strategies for measuring population trends, herd ratios, and hunting success; and consider implementing elk hunts on the Refuges to meet objectives in the elk management plan. A draft of the elk management plan will be available for public review and comment.

Comments were received asking why elk hunting is not allowed on the Willamette Valley Refuges. As discussed under Goal 10, Objective 10e of this CCP, the management of elk on the Willamette Valley Refuges will be addressed within a subsequent elk management plan to be prepared in coordination with ODFW. Hunting of elk will be considered during the preparation of the elk management plan.

L.9 Comments received related to Fishing

I prefer the alternate plan 2 for the following reasons… promoting fishing opportunities at Snag Boat Bend is a good idea. You may also consider building a ramp/deck at this location for people with physical disabilities so they can fish. DCCP4

Why is the fishing season on Snag Boat Bend closed Sept 30, when public access is allowed across the unit until Oct 31 and again from Feb 1 on? DCCP13

All alternatives that allow hunting or fishing should be consistent with the State regulations and opportunities of the surrounding Management Unit to reduce user confusion and management inconsistencies. DCCP22

Objective 10g – Strategy 2 – Expand season dates in Alternative 2 to include the period from April 1 through Oct 31 which encompasses the general trout season for streams that runs from the fourth Saturday in April through the end of October. DCCP25

Objective 10g – Strategy 6 – Modify Alternative 2 to maintain fishing opportunity in Muddy Creek consistent with Alternative 1 (note incorrect numbering sequence for Objective 10g in plan. DCCP25

ODFW supports proposal to promote fishing at Snagboat Bend Unit. However, we recommend reconsideration of the proposal to eliminate fishing at Muddy Creek (alternatives 2 and 3) for the following reasons: 1) no compelling social or biological reasons have been presented which warrant the proposed action, 2) existing opportunities, while limited, are significant, and 3) elimination would require enacting new angling regulations and the associated administrative processes, regulation complexity, etc. for the affected section(s) of stream. DCCP27

Service Response: The Service appreciates the interest on providing fishing opportunities as has recognized this as shown within Goal 10 of the CCP. Under Alternative 1 (current condition), the only fishing opportunity on the Willamette Valley Refuges is during a part of the year on Muddy Creek at Finley Refuge. The Service proposal under Alternative 2 of this CCP is to eliminate fishing on the main unit of Finley Refuge for many reasons and develop a higher quality fishing program on the Snag Boat Bend Unit of Finley Refuge. The Rationale under Objective 10g within Chapter 2 of this CCP indicated the basis for eliminating the fishing program on Muddy Creek which included low usage, poor water quality, no existing facilities, lack of a quality fishery, and the inaccessibility to boats. Over the past 15 years, observed fishing use on Muddy Creek has been less than 10 total use days. Objective 10g includes strategies or improvements to develop safe bank access; pursue cooperative funding opportunities to provide access for non-motorized boats by developing a canoe launch ramp; and to develop the necessary plans to open Snag Boat Bend to fishing. The Service contends that fishing along the Willamette River and associated backwaters at Snag Boat Bend will provide better fishing opportunities than at Muddy Creek on Finley. In response to comments received on the Draft CCP, the Service is proposing that the Snag Boat Bend Unit be open to fishing year-round consistent with state regulations. Objective 10g, Strategy 2 has been modified (from April 1-September 30) to provide fishing year-round at Snag Boat Bend. The basis for this change is that the Service has determined that providing wildlife-dependent recreational uses such as fishing will not conflict with other wildlife or habitat management objectives at Snag Boat Bend and thus can be provided year-round.

L.10 Comments received related to Cultural Resources

Every effort should be made to remodel and preserve the historic buildings on Finley. Programs that enhance volunteer and philanthropic participation in restoring historic buildings should be applied. The Feichter House and Cabell Lodge are important parts of Oregon's history that expand visitor experiences. The more time that passes without restoration, the more repairs will cost in the future. It may be productive to seek special consideration, such as special tax credits, for contractors to complete restoration work on a semi-donation basis, along with special grants and endowments to pay contractors for their work. A publicity campaign might be applied to attract attention to and funding for the restoration of these historic structures. Upon restoration, the use of these buildings might include a few rooms dedicated to housing resident volunteers. DCCP21

Service Response: Goal 11 illustrates that the Service is committed to protecting, preserving, evaluating, and interpreting the cultural resources of the Refuges. A variety of strategies are listed under Goal 11, Objectives 11a and 11b that detail how the Service would accomplish this goal. Strategy 5 under Objective 11a within the Draft CCP that stated "Where funding is limited, low priority and unsafe buildings should be catalogued and considered for removal within 10 years" has been deleted from the Final CCP after reviewing the comments received and determining that emphasis should be placed on repairing and restoring these structures as each of them offers unique value to the Refuges interpretation and other management programs.

L.11 Comments received related to Protecting, Restoring and Maintaining Off-Refuge Habitats

Every effort should be made to increase the land for farming of goose crops through conservation easements and other available strategies so that the Refuges can augment restoring natural habitats (Goals 1-9). DCCP18

FmHA CONSERVATION EASEMENTS & WVCSA: Expansion of the number of off-site conservation easements that will benefit wildlife should be a priority. Using all available geographic locations within the Willamette Valley for the benefit of wildlife deserves intensified effort and should include promoting conservation groups participation in all planning pertaining to the Willamette Valley Conservation Study Area. In the event that a significant quantity of private land and areas under other agencies' jurisdictions become available for farming goose food crops and for goose resting areas, then working to expand native habitats within Refuge boundaries by conversion of currently *farmed areas to native habitat should be pursued to enhance endangered species recovery in native habitats. DCCP21*

The document lays out a compelling case on what factors limit the NWR Complex from contributing significant lands and resources to landscape level conservation issues in the Willamette Valley. Whether it should have deferred discussion of the habitat resource needs for meeting those objectives to a future plan is questionable. It would have led to a much stronger range of alternatives and a vision for the future role of the refuge system. DCCP22

Initiate management alternatives that recognize the value of providing migration and dispersal linkages between important habitat areas identified in the COAs. The WVRC (Finley, Ankeny and Basket Slough), ODFW's EE Wilson and Fern Ridge Wildlife Areas, several large private timber land holdings and numerous small interlaced parcels of private land are integral wildlife habitat components on the landscape. The juxtaposition and wildlife values of these areas are important in fostering cooperation, enhancement, protection and use of critical Willamette Valley fish and wildlife resources. DCCP27

Coordinate with ODFW on private lands programs that seek collaborative solutions to habitat conservation and restoration. The USFWS Partner's Program and NRCS' Wetland Reserve and Wildlife Habitat Improvement Program focus efforts toward stewardship and wildlife enhancement projects that protect sensitive species, provide production and create harvest areas for sport species. Coupling these with ODFW's Wildlife Habitat Conservation Management Program and Oregon Conservation Strategy agreements can facilitate restoration efforts, improve cost-benefit ratios, and are essential to long-term sustainability of native fish and wildlife species. DCCP27

Service Response: Goal 12, Objective 12a focuses on the Service's Partners for Fish and Wildlife program within the Willamette Valley. Specified strategies listed include: continue and expand implementation of the Partners program; and continue to develop and maintain partnerships with Federal and state agencies (such as ODFW), and private stakeholders. The Service values its close working relationship with ODFW on the Partners program and intends to continue this partnership into the future.

Goal 12, Objective 12b of this CCP includes a strategy for the Service to develop a Land Protection Plan (LPP) to protect, restore, and maintain additional lands in the Willamette Valley. Assisting in the achievement of Canada goose flyway objectives and reducing crop depredation on private lands is listed as one of the preliminary focus areas of the LPP. Other potential focus areas for the LPP include conserving priority habitats; threatened and endangered species protection and recovery; climate change; enhancing wildlife-dependent recreation; etc. The Service recognizes that it will not be able to achieve many of the major conservation goals within the Willamette Valley by just working on existing Refuge lands. The three existing Refuges are key habitats within this geographical area and each of them provides significant conservation benefits. However, endangered species will not be adequately recovered, migratory birds would not be adequately protected, climate change could not be adequately addressed, etc., by the Service focusing its efforts solely on the existing refuge lands or by just utilizing the Service's Partners program. The development of an LPP could both complement and fill in biological and geographical gaps within existing land protection schemes within the Willamette Valley.

L.12 Comments received related to Volunteers, Visitor Fees and Budgets

Intensify focus on volunteers
Considering the budget cuts that the USFWS faces for the foreseeable future, there should be intensified focus on attracting more volunteers, including development of resident volunteer housing facilities, such as construction of RV hook ups on the Refuges. These sites ought to be located with minimal impact on wildlife by placing them in locations near existing structures. An enhanced resident volunteer program might include using portions of Finley's existing historic buildings (after restoration) for resident volunteer lodging. To enhance volunteerism, it is important that the USFWS encourage the national Friends organization to provide support services to local Friends groups, including group purchasing benefits for newsletter publication (bulk mail, volume color printing discounts, electronic delivery), Internet web site creation and E&O insurance umbrella policies. DCCP21

To attract more volunteers and to generate public support for programs that benefit the Refuges, I encourage development of a speakers / publicity bureau to include USFWS staff and volunteers who would make presentations to groups in local communities. The target groups might include service clubs like Rotary & Kiwanis, conservation groups, photography clubs, chambers of commerce, local government boards and commissions, school boards, talk radio, TV news and others. At the same time, regular news releases to local media could enhance volunteerism, philanthropic participation in programs and political support / funding. DCCP21

Service Response: Volunteers are a vital resource for the National Wildlife Refuge System including at the Willamette Valley Refuges. Volunteers help to accomplish many refuge programs including outreach, environmental education, facility management, habitat management, etc. The same statements apply to Friends organizations and their contributions to the NWRS including the Willamette Valley Refuges. The Service is committed to maintaining close working relationships with its volunteers and the Friends of the Willamette Valley Refuges. Many improvements in the volunteer program are specified in section 2.5 of the CCP.

Recommend implementing a visitor fee
Due to budget cuts, I support a visitor fee to help fund restoration of historic buildings, pay cooperative farmers, fund invasive plant & animal control and other programs for the direct benefit of wildlife. Monitoring visitor compliance with paying a fee might be enhanced by special volunteers, such as retired law enforcement officers on the busiest days, thereby mitigating the cost of USFWS administering a visitor fee. DCCP21

Service Response: Section 2.5 of the CCP also includes discussion regarding possible visitor use fees on the Willamette Valley National Wildlife Refuge Complex (WVNWRC). This section was modified slightly to indicate that a future evaluation needs to be conducted to determine the feasibility of establishing a visitor use fee on the Willamette Valley Refuges especially in light of declining federal budgets and increasing maintenance costs.

Ideas for dealing with budget constraints
Incorporate operational strategies that facilitate the use of inter-agency and nongovernmental organization (NGO) funding sources such as the Rocky Mountain Elk Foundation, Ducks

Unlimited, Oregon Watershed Enhancement Board, Oregon Conservation Strategy, etc. and integrate alternative assistance resources such as volunteer programs to make up for budgetary and personnel shortfalls. DCCP27

Service Response: Budgets are discussed within section 2.5 and Appendix E of the CCP. The Service, including the Willamette Valley Refuge Complex, has placed priority on developing and maintaining partnerships in order to help achieve conservation related goals and objectives. The WVNWRC will continue to maintain existing partnerships and explore developing new ones in order to help accomplish the goals and objectives of this CCP.

L.12 Comments received related to Compliance with Laws Governing Threatened and Endangered Species and Water Quality

Should impoundments originally built and managed for ducks and geese be allowed to have adverse impacts to Federal and State listed fish and wildlife? I do believe a higher priority should now be placed on meeting T&E de-listing objectives and managing habitats that may pre-empt future federal species listings. This would serve the public well and reduce potential impacts to private landowners.

The refuge should disclose where impacts to State and Federal "listed" species are occurring and discuss what actions are proposed to bring refuge lands to levels that model what we expect private landowners and public entities to do. The analysis of alternative should describe what the trade-offs in founding priorities might be needed to do so - Further alternative development and assessment is needed. What current priorities would need to be changed and what changes in resource allocations need to be made to accomplish full compliance and contribution to ESA issues in the Willamette Valley? DCCP22

Compliance with Federal and State Laws - Clean Water Act: Many water quality concerns have been documented by the Environmental protection Agency (EPA) and State Department of Environmental Quality (DEQ) concerning water quality in Willamette Basin streams and rivers. How does discharge of water from impoundments that have been heavily used by ducks and geese, then held to warm up for moist soil units impact down stream water quality. What monitoring effort is in place or proposed to ensure compliance with water discharge guidelines? Should the refuges pump water from water limited streams to flood up for ducks or produce food crops for wintering ducks rather than support in-stream resources? Each refuge contains waterfowl impoundments that were created and now cause numerous impacts to federally protected fish species as well as native resident fish. What efforts is the refuge proposing to reduce impacts to waterways that support fish listed species and address water quality concerns on the waterways present on all refuge lands? Do existing or proposed management actions comply with State and Federal Law or Best Management Practices? How does refuge farming/irrigation/water storage/water release (now and future) comply with State water law and Senate Bill 1010 rule for water quality improvement? These issues are not well discussed, analyzed or considered in the proposed alternatives. DCCP22

Management actions on refuge lands to meet duck and goose objectives should comply with State and Federal fill removal permits and fish passage requirements. Management actions impacting waters of the State should include a full disclosure and notification to regulatory agencies and be *discussed in this CCP. The Refuge should serve as the model of what the federal and state governments want private landowners to do on their lands. DCCP22*

Service Response: In developing a CCP, refuges must be consistent with all of the appropriate laws and regulations. The Service will comply with all applicable laws and regulations with respect to implementing the CCP. This is referenced numerous times in the CCP such as in section 1.7 Refuge System Laws and Directives, section 2.5 under Endangered Species Act Section 7 Consultation, Section 106 Compliance, Water Quality, etc. Chapter 3 (Section 3.7) addresses the water quality concerns that have been studied on the Refuges, as well as the TMDL that has been approved and governs Refuge lands. Chapter 4 (Section 4.12) discusses current threatened and endangered species management in some detail, while Goal 9 in Chapter 2 specifically addresses the future actions that will be undertaken for threatened and endangered species. Goal 2 in Chapter 2 addresses fish passage issues within the context of wetland management.

The Service believes that Alternative 2 does provide a balanced approach towards providing for Canada geese and other migratory birds, endangered species recovery, management and restoration of unique and rare habitats, providing wildlife-dependent recreational opportunities, and many other aspects of refuge management. Alternative 2 includes goals, objectives, and strategies for all of these items and as such does represent a balanced approach among the many competing needs at the Refuges.

L.14 Comments received related to Refuge Purposes

While all waterfowl were considered when the Service was locating refuge units, it was concern for the Dusky Canada goose that was the highest priority at the time. Today, this priority has been extended to Cackling Canada geese. One could argue that they are not native to the Willamette Valley nor did they spend significant time here when the refuges were created. The first priority should thus remain concern for dusky Canada goose habitat. Maximizing wintering duck habitat was not a primary objective, it was breeding waterfowl habitat. The refuge was even criticized for acquiring non-wetland habitat. So the world has changed since 1964. The Fish and Wildlife Service should be evaluating alternative approaches of managing these public lands in the most cost effective way that meets environmental law, species habitat needs, and wildlife oriented recreation needs in the 21st century. This would represent an effort at considering a balanced approach rather than just completing a mandated plan update. DCCP22

My primary concern is whether or not the founding purpose of the refuges in the 1960's should still be the over riding priority for public land and drive all alternative and management strategies in the 21st Century. These founding objectives, (migratory waterfowl) and alternatives developed around maintaining them are framed as the primary reason for the refuges to exist now and into the future. Other uses are all placed as secondary to this purpose. Even so, the interpretation of what that means does not appear objective. Even the purpose for the refuge has been somewhat misinterpreted. As a result, all waterfowl objectives appear to outweigh priorities outlined in Federal Laws and Regulations associated with a list of Environmental Laws implemented since the Refuges in the Willamette Valley were established. I think this is a biased interpretation of the history of the refuge purpose. DCCP22

Service Response: The purpose for which a refuge was established or acquired is of key importance in refuge planning. Purposes must form the foundation for management decisions. The purposes of a refuge are specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit. By law, refuges are to be managed to achieve their purposes. Within a CCP, refuge purposes are the driving force in the development of the vision statements, goals, objectives, and strategies and are critical to determining the compatibility of all existing and proposed refuge uses. The purposes of the Willamette Valley Refuges were used as the foundation for the development of this CCP.

As discussed in Section 1.8, the Refuges were created to support migratory birds. Feeding and nesting areas for migratory waterfowl, as well as wintering habitat primarily for the dusky Canada goose, were primary management direction items highlighted in the original MBCC acquisitions. The Service feels that the management actions identified in the CCP strongly support the Refuge purposes as well as the original management direction for the three refuges. The Service has also taken on a strong role in recovery of threatened and endangered species and associated habitats at the Willamette Valley Refuges over the years, which supports Refuge System goals.

L.15 Comments received related to the various Alternatives and the CCP in general

Alternative #2, I have reviewed and think that that is the best plan for Ankeny, Baskett Slough, and William L. Finley. DCCP17

I do not favor any one of the three "Alternatives" over another, because my comments pertain to specific aspects that either are or may become parts of each of the three, as well as parts of subsequent step-down plans. DCCP21

Overall, the U.S. Fish & Wildlife Service is the best Federal agency that exists today. Most programs set forth in the CCP/EA are excellent. However, my top priority is the upcoming elk management step down plan. I do not want the elk that frequent the Refuges to be hunted within Refuge boundaries. Elk hunting would conflict with every other type of public use and has no biological justification. Consequences of censoring elk oriented merchandise sold in the Wild Goose Store and of establishing an elk hunt are diminished participation by volunteers in programs that are important for the success of the Willamette Valley National Wildlife Refuge Complex and adverse general public response to such a hunt, which will lead to an overall diminished political support for the Service. DCCP21

The document does a good job describing the History, Background, and Affected Environments found within the current refuge boundary and Willamette Valley. It also provides a strong section on techniques and management actions used to achieve management objectives. DCCP22

It strikes me that the Fish & Wildlife Service placed planning constraints on the public process that limits development of a meaningful range of alternatives that the CCP could or should have considered. This has the affect of limiting a good discussion of environmental effects and *development of alternative management goals and objectives. My primary concern is whether or not the founding purpose of the refuges in the 1960's should still be the over riding priority for public land and drive all alternative and management strategies in the 21st Century. DCCP22*

The alternatives considered do meet NEPA requirements for a "range of actions considered":

- *The No Action alternative, by definition, represents what the refuge complex can do now. Why are so many if not most of the changes/strategies identified in Alternatives 2 & 3 being or have been implemented without a public NEPA process? Specifically:*

  - Increasing outdoor education events, interpretive facilities, viewing platforms at all FWS refuges and management units.

  - FWS farming, or contribution to farming, efforts at Finley and Ankeny. How much of the existing refuge budget has already been shifted to this activity?

  - Removal of agricultural fields from historic farming contracts. How many total acres have already been removed from ag use under the current management plan?

  - Significant restoration efforts being applied to fields that have historically been part of the farm/ag efforts to support geese or profitable contract farming. How many acres of ag field have been removed from agricultural use under the existing plan and how many of those acres have already had restoration activities initiated." DCCP22

  "If what is presented in the Draft CCP are considered viable alternatives, then are many of the actions being implemented pre-decisional? If so, do they comply with federal requirements under NEPA? How does proposing new management alternatives/strategies/implementing actions that are already being implemented broaden the scope of Alternatives considered as required by NEPA? It appears anything proposed in Alternatives 2 &3 can be or are being done under the No Action alternative. DCCP22

ODFW would like to extend our support for Alternative 2 and its emphasis on providing habitat for wintering geese, management and enhancement of native habitats, and conservation of native wildlife. Alternative 2 incorporates a number of unique goals, objectives, and strategies that enhance native habitats while achieving the primary purpose of the refuge complex of goose management. We also support strategies under Alternative 2 that enhance staff support to facilitate implementation of the plan. DCCP25

Service Response**:** The Service reviewed and considered a variety of resource, social, economic, and organizational aspects important for managing the Refuges. The Planning Team reviewed scientific reports and studies to better understand ecosystem trends and the latest scientific recommendations for species and habitats. The Service met with staff from State and Federal agencies and elected officials to ascertain priorities and problems as perceived by others. Service staff also met with Refuge users, representatives of nonprofit groups, and community organizations to ensure that their comments and ideas were considered during CCP development. The alternatives developed for the CCP meet all NEPA requirements. See section 2.1 for additional information regarding alternatives.

The Service appreciates all of the feedback on the various alternatives whereby the majority of those who commented indicated their support for Alternative 2 (Service's Preferred Alternative).

Appendix M

Photo by Jarod Jebousek/USFWS

Statement of Compliance

The following executive orders and legislative acts have been reviewed as they apply to the implementation of the Comprehensive Conservation Plan (CCP) for Ankeny, Baskett Slough, and W.L. Finley National Wildlife Refuges, located in the State of Oregon.

National Environmental Policy Act (1969). (42 U.S.C. 4321 et seq.). The planning process has been conducted in accordance with National Environmental Policy Act Implementing Procedures, with Department of Interior and Fish and Wildlife Service procedures, and in coordination with the affected public. The requirements of the National Environmental Policy Act (42 U.S.C. §4321 et seq.) and its implementing regulations in 40 C.F.R. Parts 1500-1508 have been satisfied in the procedures used to reach this decision. These procedures included the development of a range of alternatives for the CCP; analysis of the likely effects of each alternative; and public involvement throughout the planning process. The Draft CCP/EA was released for a 30-day public comment period. The affected public was notified of the availability of the document through a Federal Register notice, news releases to local newspapers, the Service's refuge planning website, and a planning update. Copies of the Draft CCP/EA and/or planning updates were distributed to an extensive mailing list. In addition, the Service participated in a variety of public outreach efforts throughout the planning process (see Appendix A).

National Historic Preservation Act (1966). (16 U.S. C.470 et seq.). The management of the archaeological and cultural resources of Ankeny, Baskett Slough, and W.L. Finley Refuges will comply with the regulations of Section 106 of the National Historic Preservation Act. Under the proposed action, historic properties would be maintained and repaired, as funding becomes available. Maintenance and improvement of historic resources would result in positive impacts to cultural resource; however, determining whether a particular action has the potential to affect cultural resources is an ongoing process that occurs as step-down and site specific project plans are developed. Should additional historic properties be identified or acquired in the future, the Service will comply with the National Historic Preservation Act if any management actions have the potential to affect any these properties.

Endangered Species Act. (16 U.S.C. 1531-1544). This Act provides for the conservation of threatened and endangered species of fish, wildlife, and plants by federal action and by encouraging the establishment of state programs. Documentation is required under Section 7 of the Act. Refuge policy requires the Refuge Manager to document issues that affect or may affect endangered species before initiating projects. At this time, there are several species listed as endangered or threatened inhabiting the Refuges. Effects to listed species have been considered and are described in Chapter 6 of the CCP/EA and in the Compatibility Determinations (Appendix C). Consultation on specific projects will be conducted prior to implementation to avoid any adverse impacts to these species and their habitats.

Executive Order 12372. Intergovernmental Review. Coordination and consultation with affected tribal, local, and state governments, other federal agencies, and local interested persons has been completed through personal contact by Refuge staff and Refuge Supervisors and/or inclusion of the appropriate entities on the CCP mailing list.

Executive Order 11988. Floodplain Management. Under this order, federal agencies "shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains." The CCP is consistent with Executive Order 11988 because CCP implementation would maintain and enhance riverine, riparian, wetland, and wet prairie habitats located within floodplains on the

Refuges, which will minimize flood impacts and continue to contribute to the natural and beneficial fish and wildlife resource values unique to the area.

Wilderness Preservation Act of 1964. The Service has evaluated the suitability of the Refuges for wilderness designation (Appendix H) through the "Inventory" phase according to the guidelines of the Wilderness Review process as described in 610 FW 4. In this inventory no areas on the Refuges were found to meet the minimum wilderness criteria for size, naturalness or outstanding opportunities for solitude and primitive/ unconfined recreation.

Executive Order 11990. Protection of Wetlands. The CCP is consistent with Executive Order 11990 because CCP implementation would enhance and restore wetland resources on the Refuges.

National Wildlife Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd-668ee). The National Wildlife Refuge System Improvement Act (Public Law 105-57, Improvement Act) requires the Service to develop and implement a comprehensive conservation plan for each refuge. The CCP identifies and describes Refuge purposes; the vision and goals for the Refuges; fish, wildlife, and plant populations and related habitats on the Refuges; archaeological and cultural values of the Refuges; issues that may affect populations and habitats of fish, wildlife, and plants; actions necessary to restore and improve biological diversity on the Refuges; and opportunities for wildlife-dependent recreation, as required by the Act.

During the CCP process, the Project Leader evaluated all existing and proposed Refuge uses at Ankeny, Baskett Slough, and W.L. Finley Refuges. Priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education and interpretation) are considered automatically appropriate under Service policy and thus exempt from appropriate uses review. The following other uses were found to be appropriate: bicycling, farming, forest management and research. Uses found not appropriate include: geocaching, horseback riding, collection of fruits or mushrooms, jogging, all-terrain vehicles, and dog trials.

Compatibility determinations have been prepared for all uses found appropriate as well as the following wildlife-dependent uses: wildlife observation, interpretation, and photography; waterfowl hunting, deer hunting, fishing, and environmental education.

Executive Order 12898. Federal Actions to Address Environmental Justice in Minority and Low-Income Populations. All federal actions must address and identify, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations, low-income populations, and Indian Tribes in the United States. Actions in all alternatives were evaluated and no adverse human health or environmental effects were identified for minority or low-income populations, Indian tribes, or anyone else.

Executive Order 13186. Responsibilities of Federal Agencies to Protect Migratory Birds. This Order directs agencies to take certain actions to further implement the Migratory Bird Treaty Act. A provision of the Order directs federal agencies to consider the impacts of their activities, especially in reference to birds on the Fish and Wildlife Service's list of Birds of Conservation Concern. It also directs agencies to incorporate conservation recommendations and objectives in the North American Waterbird Conservation Plan and bird conservation plans developed by Partners in Flight into agency

Executive Order 13175. Consultation and Coordination with Indian Tribal Governments. As required under the Secretary of the Interior Order 3206—American Indian Tribal Rights, Federal-Tribal Responsibilities, and the Endangered Species Act—the Project Leader notified and consulted interested tribes. The Service consulted with representatives of the Confederated Tribes of the Grand Ronde at various junctures in the planning process.

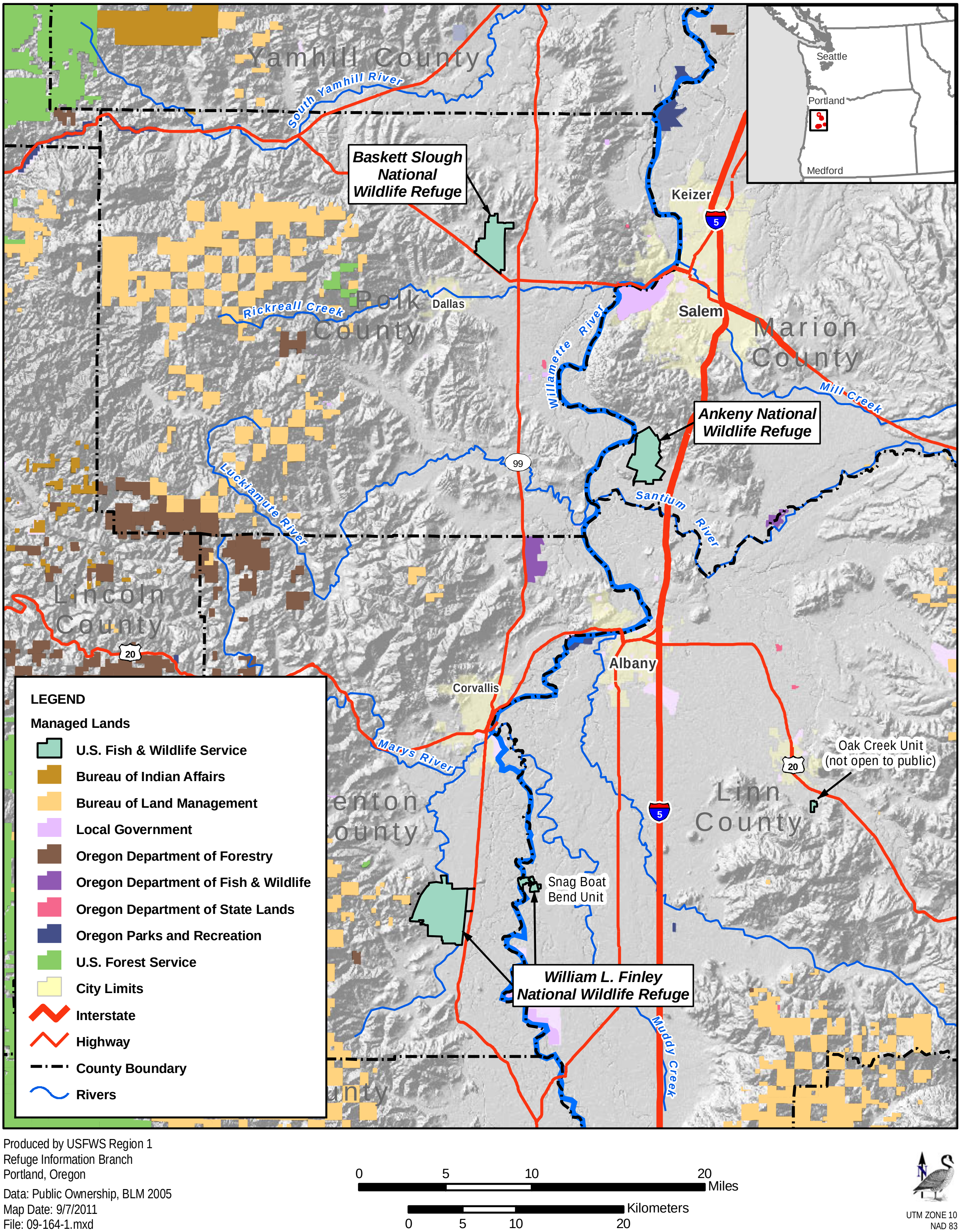
Americans with Disabilities Act of 1990. This Act requires access to federal facilities for people with disabilities. Access for persons with disabilities has been considered during the planning process and decisions related to access are found in Chapter 2 of the CCP/EA.

Integrated Pest Management (IPM). This plan conforms to Department of the Interior Pesticide Use Policy as described in 517 DM 1.1 and the new Service Manual Chapter on Integrated Pest Management (569 FW 1). An integrated pest management (IPM) approach has been adopted to eradicate, control, or contain pest and invasive species on the Refuges. In accordance with 517 DM 1, only pesticides registered with the U.S. Environmental Protection Agency (USEPA) in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and as provided in regulations, orders, or permits issued by USEPA may be applied on lands and waters under Refuge jurisdiction.

Chief, Division of Planning, Visitor Services and Transportation	9-12-11 Date

Willamette Valley National Wildlife Refuge Complex
Benton, Linn, Marion, and Polk Counties, Oregon

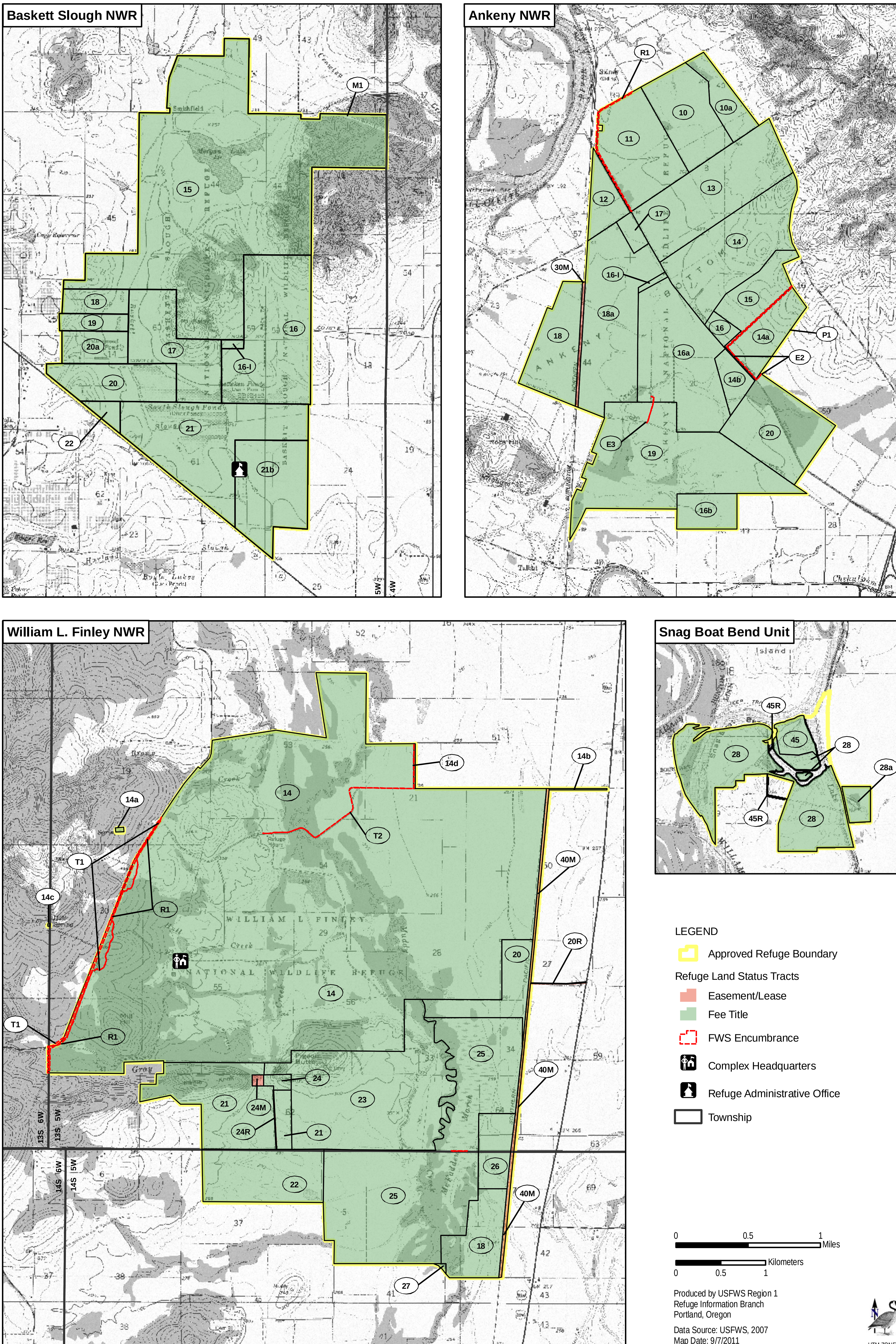
Willamette Valley NWRC Local Area Map 1



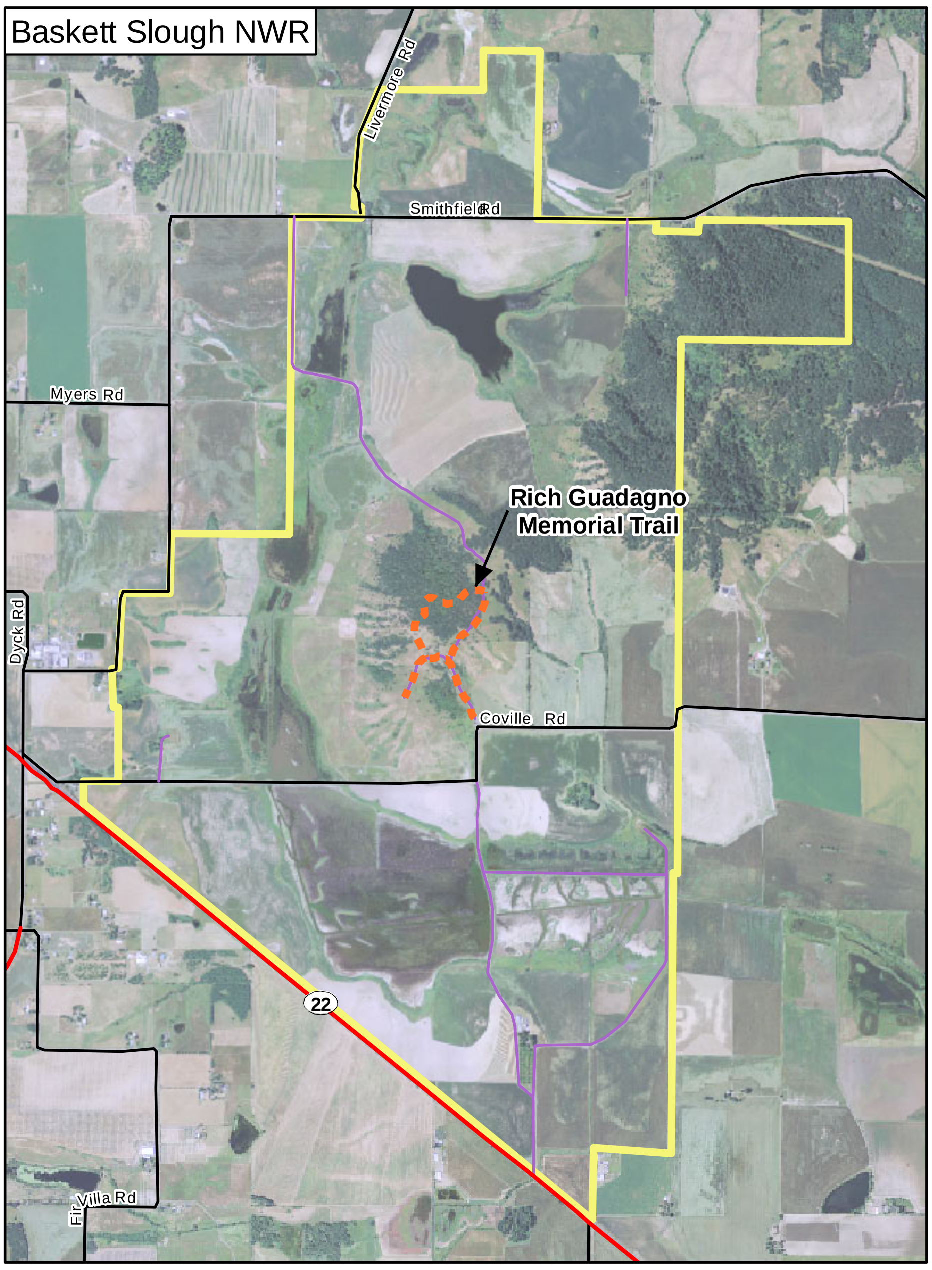
Produced by USFWS Region 1
Refuge Information Branch
Portland, Oregon

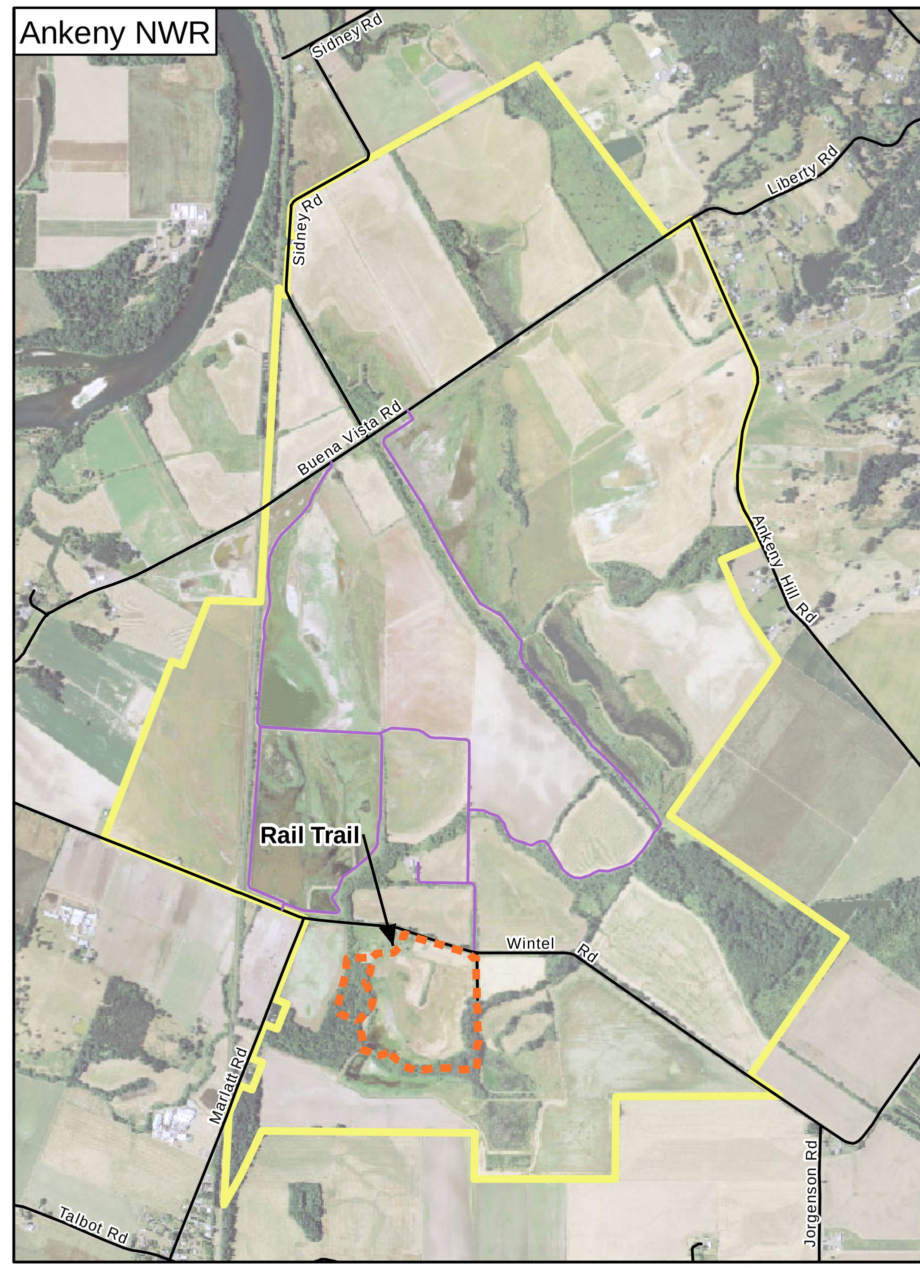
Data: Public Ownership, BLM 2005
Map Date: 9/7/2011
File: 09-164-1.mxd

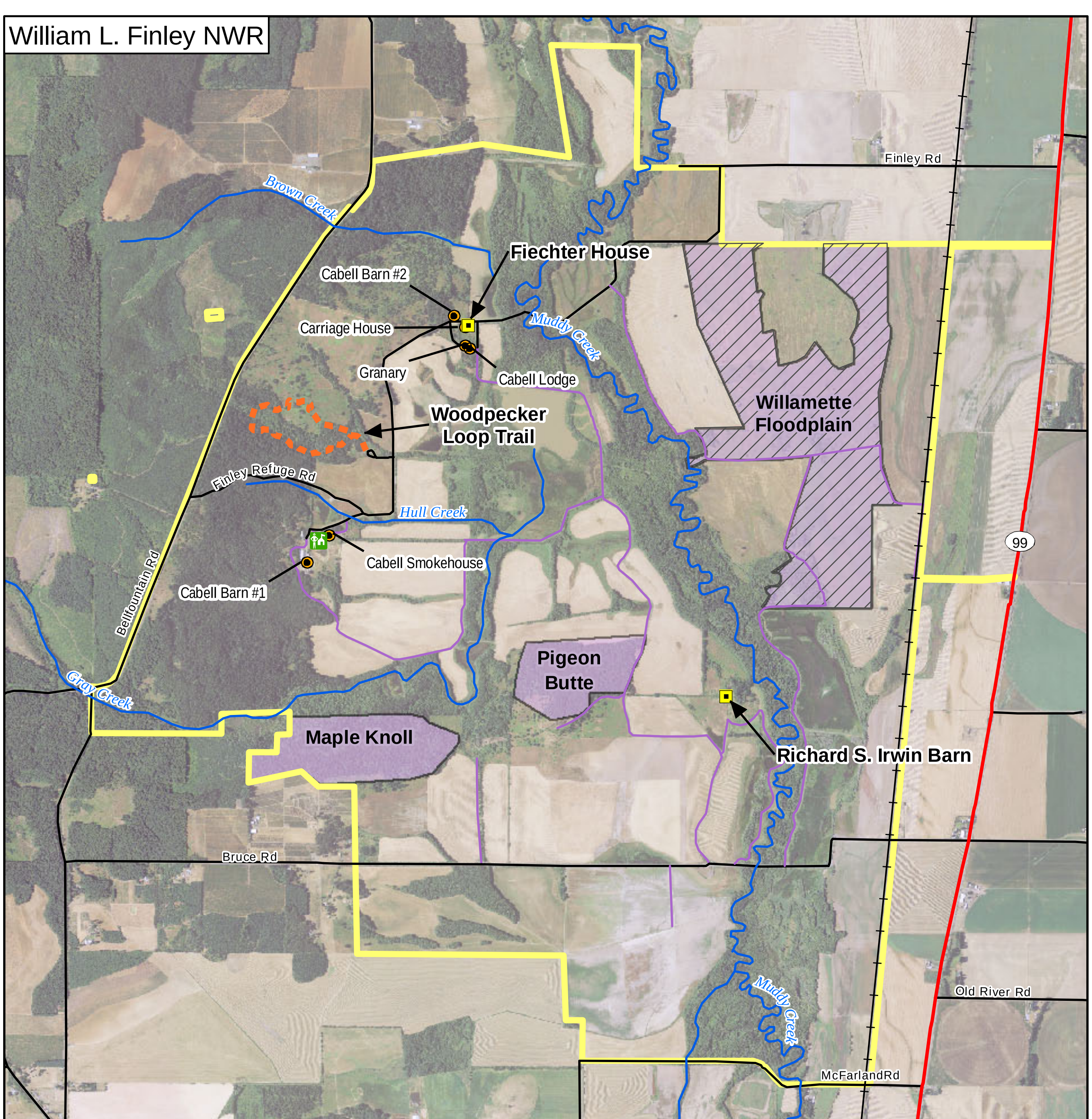
Refuge Land Status
Map 2



Special Designations and Historical Features
Map 3







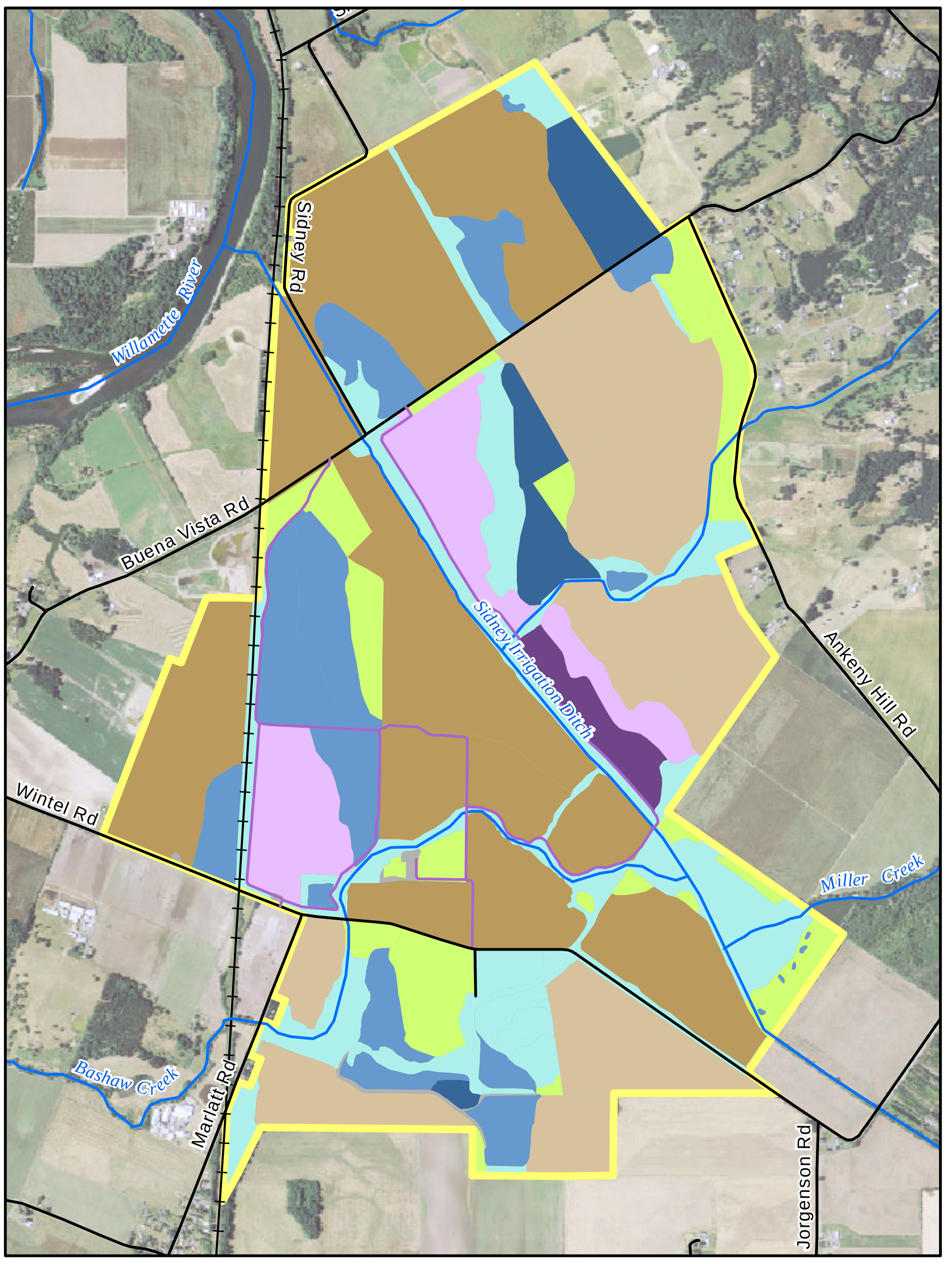
LEGEND
- Refuge Ownership Boundary
- Complex Headquarters
- National Register of Historic Places
- Historic Building
- National Recreation Trail
- National Natural Landmark
- Research Natural Area
- County Roads
- State Route
- Refuge Service Roads
- Railroad Tracks
- Rivers and Streams - Riverine

0 0.5 1 Miles
0 0.5 1 Kilometers

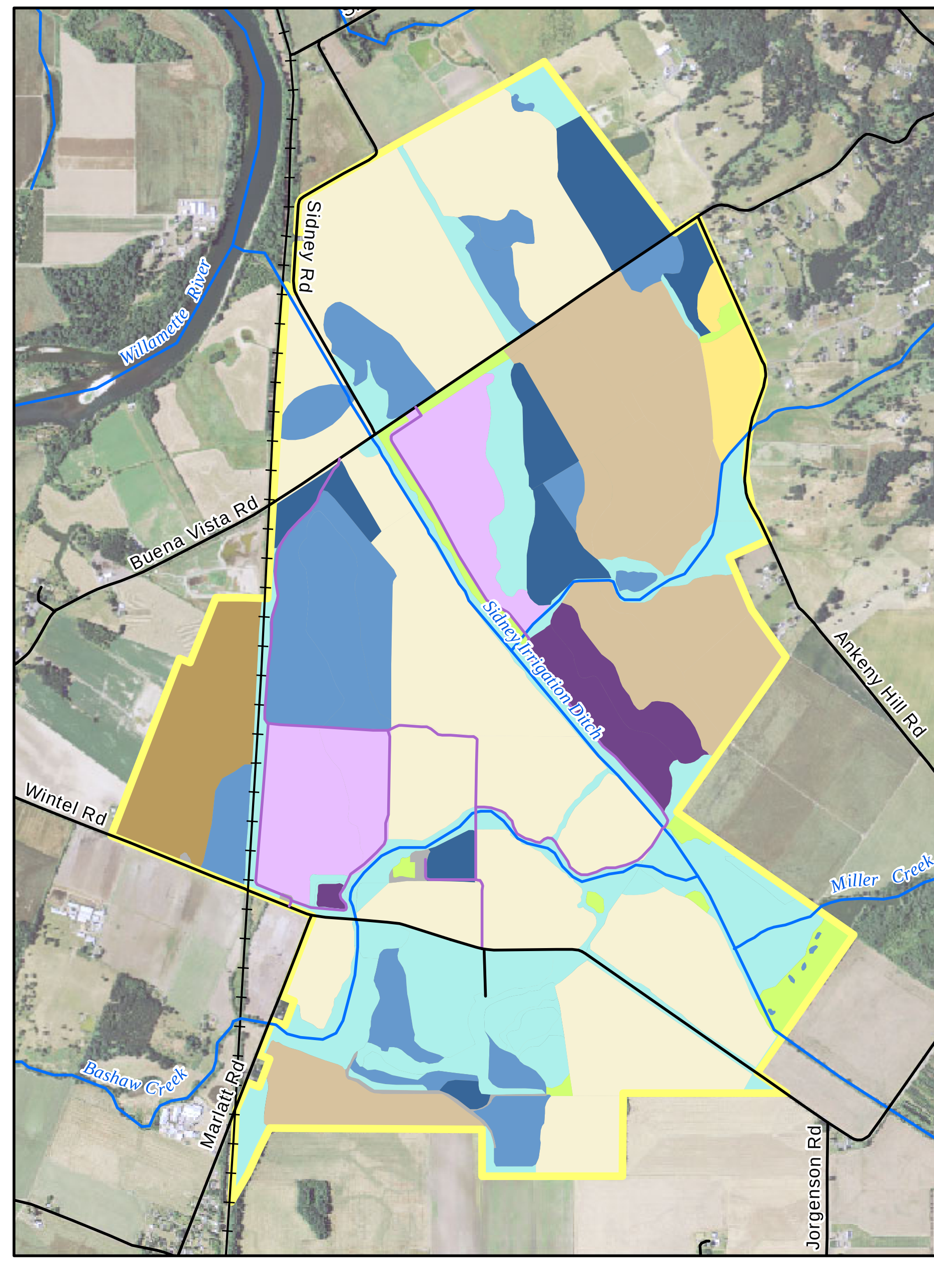
Produced by USFWS Region 1
Refuge Information Branch
Portland, Oregon
Map Date: 9/7/2011
Data: USFWS (WVNWRC), 2007
Photo Credit: Oregon NAIP 2009
File: 09-171-2.mxd

UTM ZONE 10
NAD 83

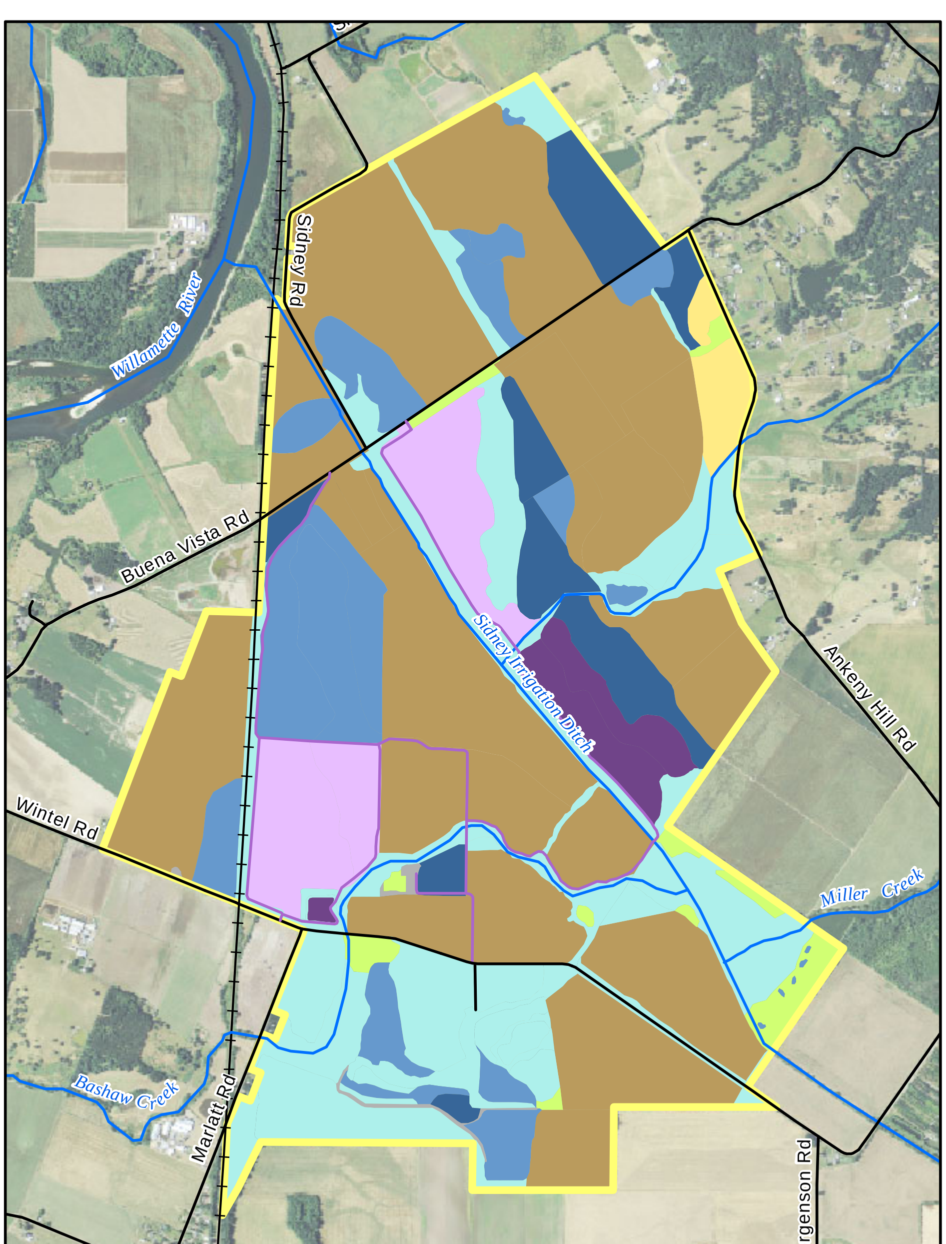
Ankeny NWR Habitat Alternatives
Map 4



Alternative 1 - No Change



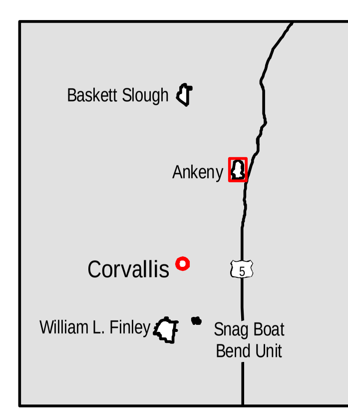
Alternative 2 (Service Preferred) – Improved Balanced Approach



Alternative 3 – Restore Selected Agricultural Fields to Native Habitats as Resources Permit; Provide Limited Improvements in Public Use Programs

LEGEND

- Refuge Ownership Boundary
- Agriculture- Cooperative or Refuge Farming
- Agriculture- Cooperative Farming
- Agriculture- Refuge Farming
- Seasonal or Permanent Wetland
- Non-agricultural grassland
- Administrative/Developed
- Permanent Wetland
- Riparian
- Seasonal Wetland
- Upland Prairie/Oak Savannah
- Wet Prairie
- County Roads
- Refuge Service Roads
- Rivers and Streams - Riverine
- Railroad Tracks



Overview Map

NOTE: Implementation of objectives under Alternatives 2 and 3 are subject to funding availability.

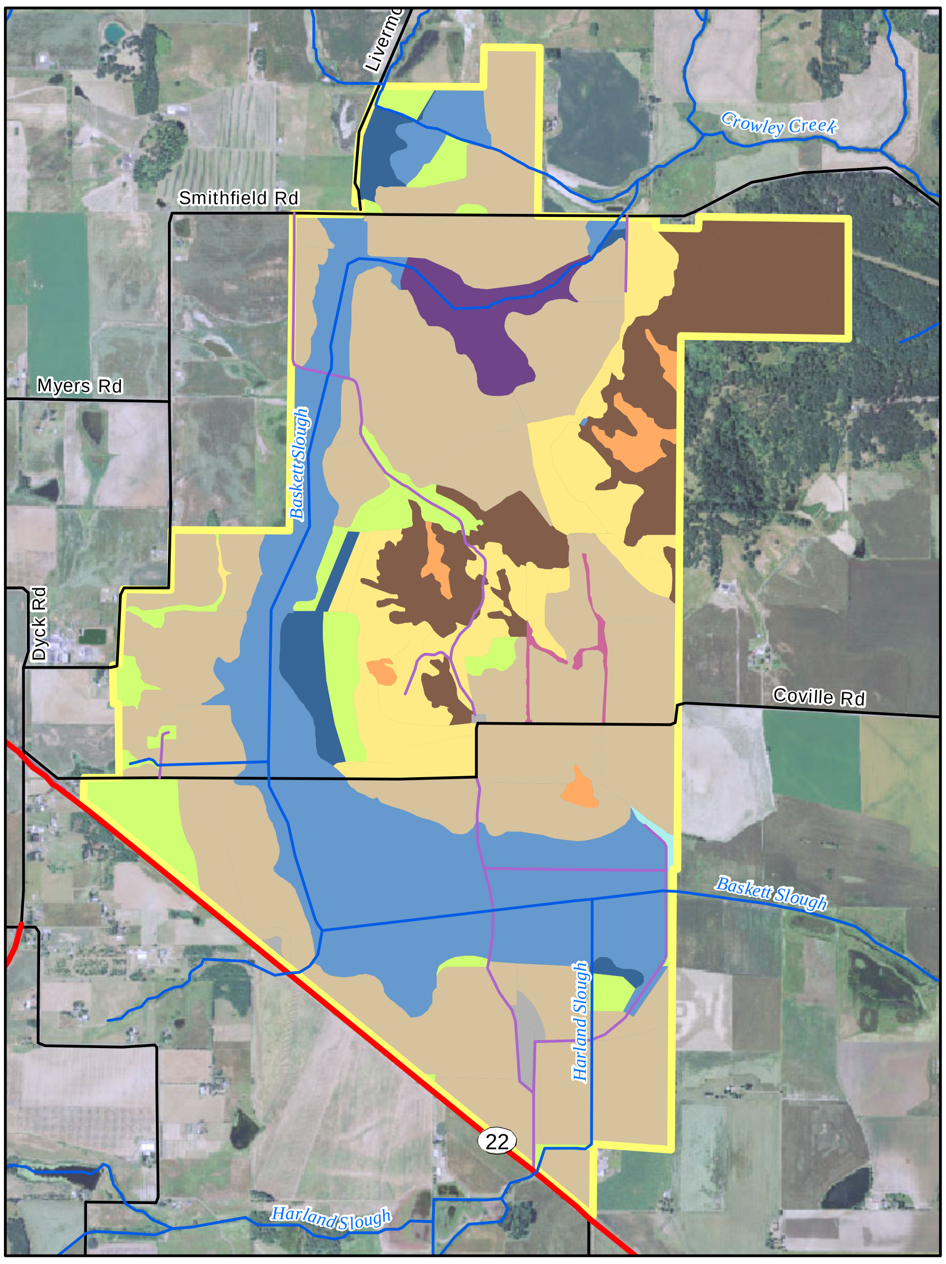
Produced by USFWS Region 1
Refuge Information Branch
Portland, Oregon

Map Date: 8/18/2011
Data: USFWS (WVNWRC), 2010
Photo Credit: Oregon NAIP, 2009
File: 10-042-1.mxd

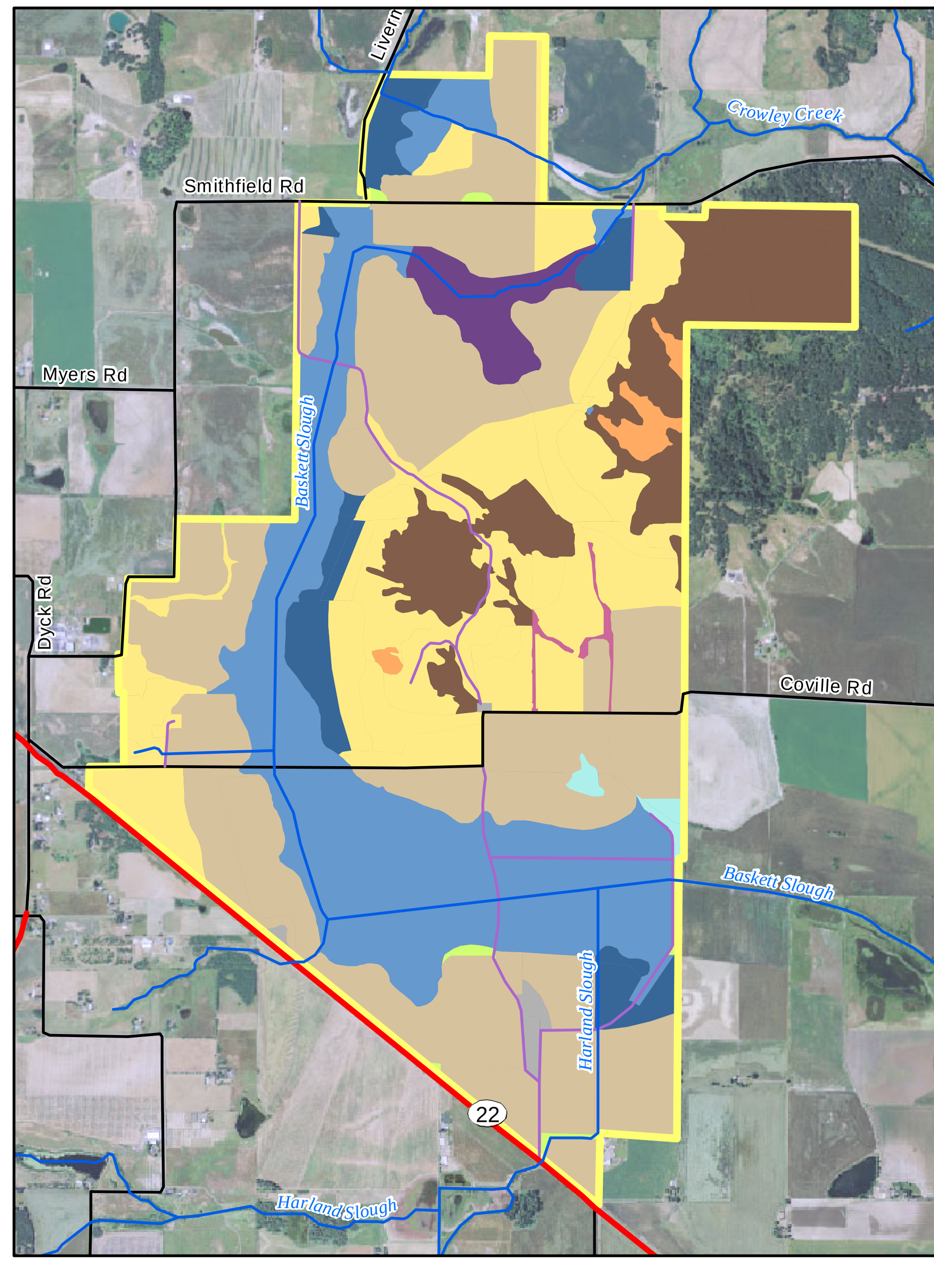
0 0.5 1 Miles
0 0.5 1 Kilometers

UTM ZONE 10
NAD 83

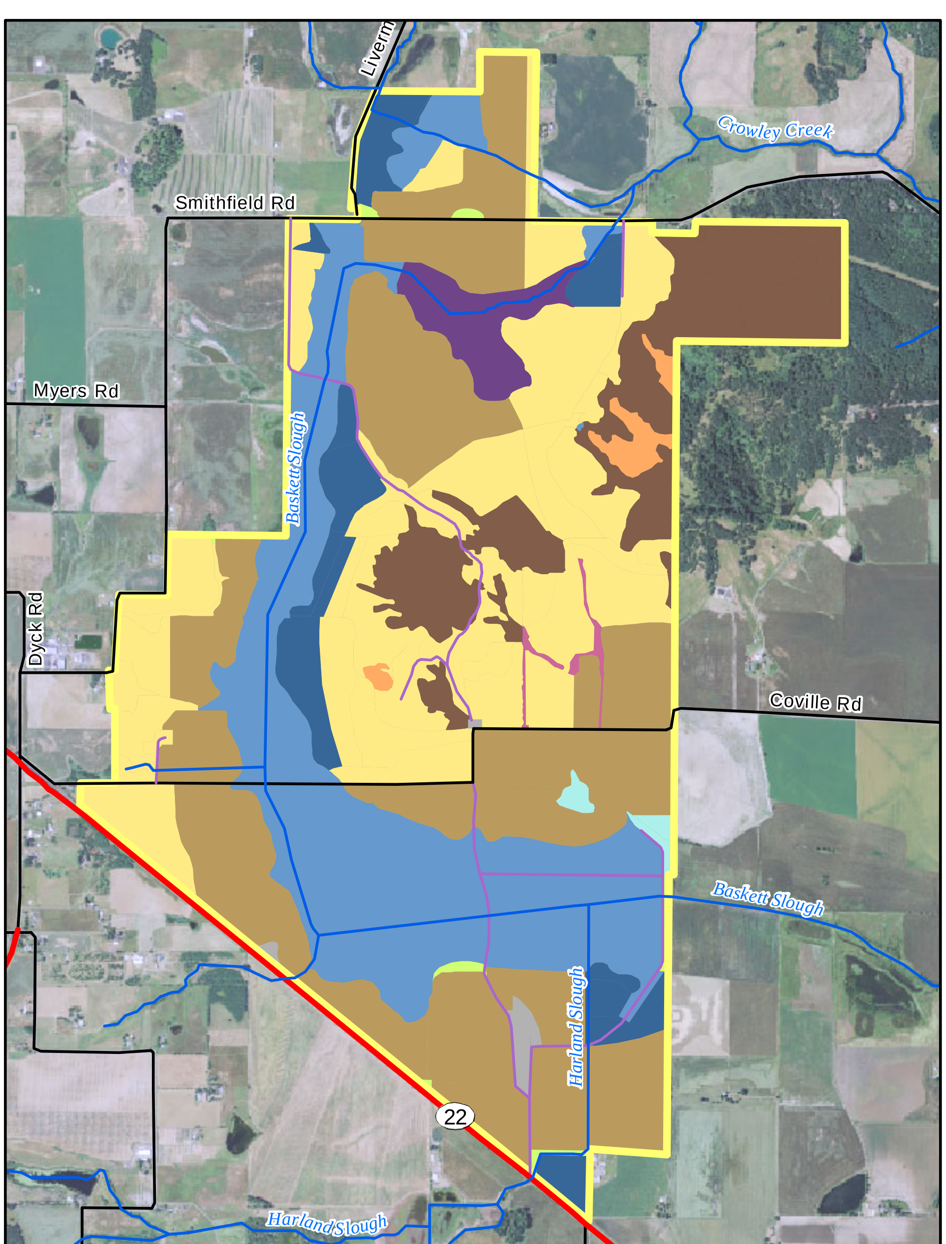
Baskett Slough NWR Habitat Alternatives
Map 5



Alternative 1 - No Change



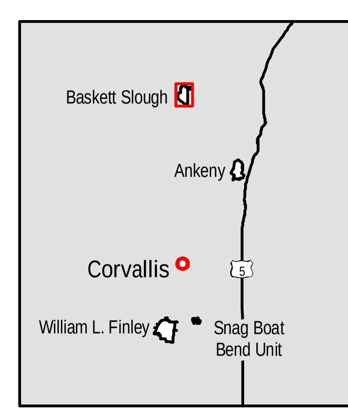
Alternative 2 (Service Preferred) – Improved Balanced Approach



Alternative 3 – Restore Selected Agricultural Fields to Native Habitats as Resources Permit; Provide Limited Improvements in Public Use Programs

LEGEND

- Refuge Ownership Boundary
- Agriculture- Cooperative Farming
- Agriculture- Refuge Farming
- Hedgerow
- Mixed Deciduous-Coniferous Forest
- Non-agricultural grassland
- Oak Woodland
- Administrative/Developed
- Permanent Wetland
- Riparian
- Seasonal Wetland
- Upland Prairie/Oak Savannah
- Wet Prairie
- County Roads
- State Route
- Refuge Service Roads
- Rivers and Streams - Riverine



Overview Map

NOTE: Implementation of objectives under Alternatives 2 and 3 are subject to funding availability.

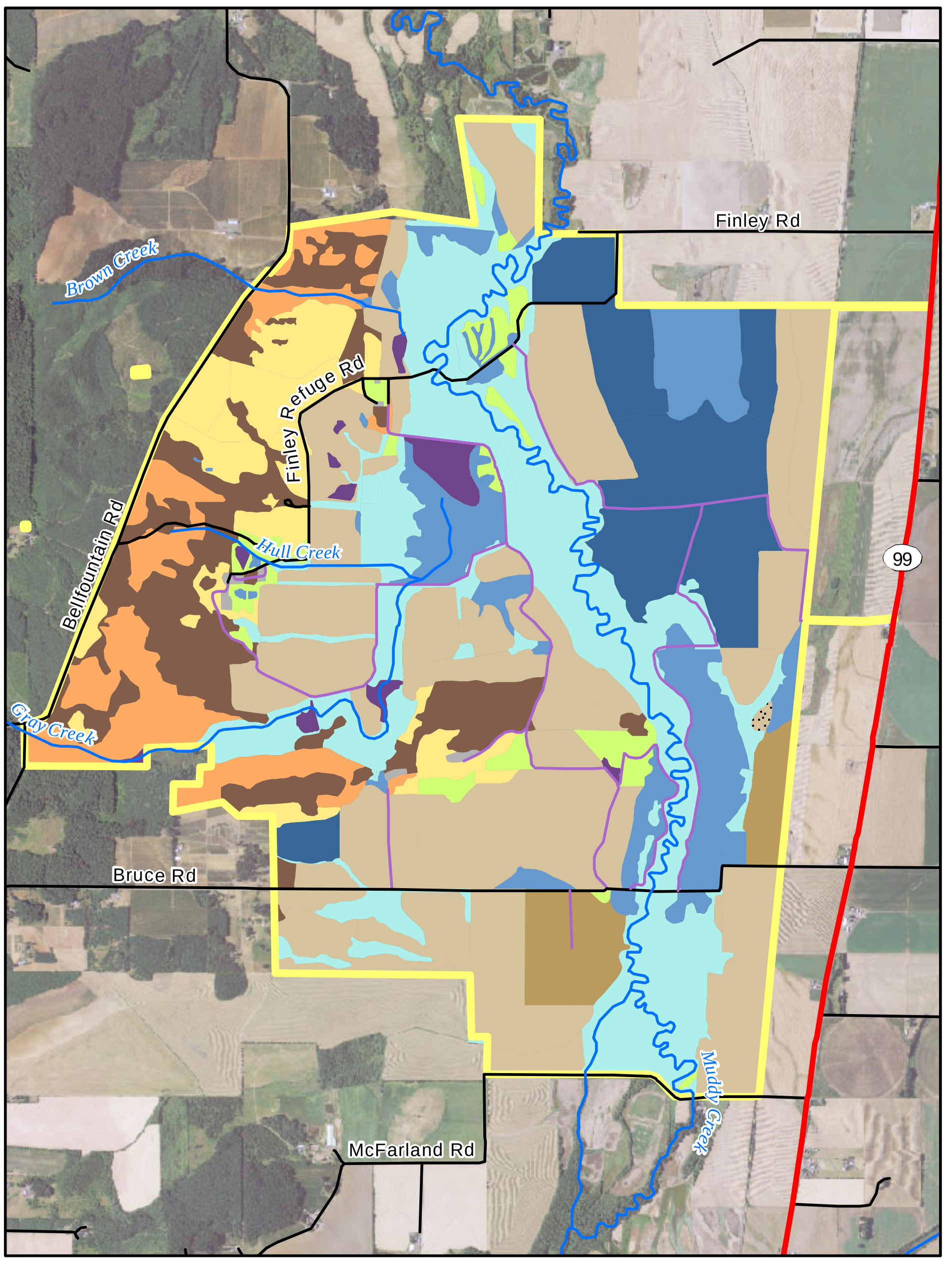
Produced by USFWS Region 1
Refuge Information Branch
Portland, Oregon

Map Date: 8/18/2011
Data: USFWS (WVNRWC), 2010
Photo Credit: Oregon NAIP, 2009
File: 10-042-2.mxd

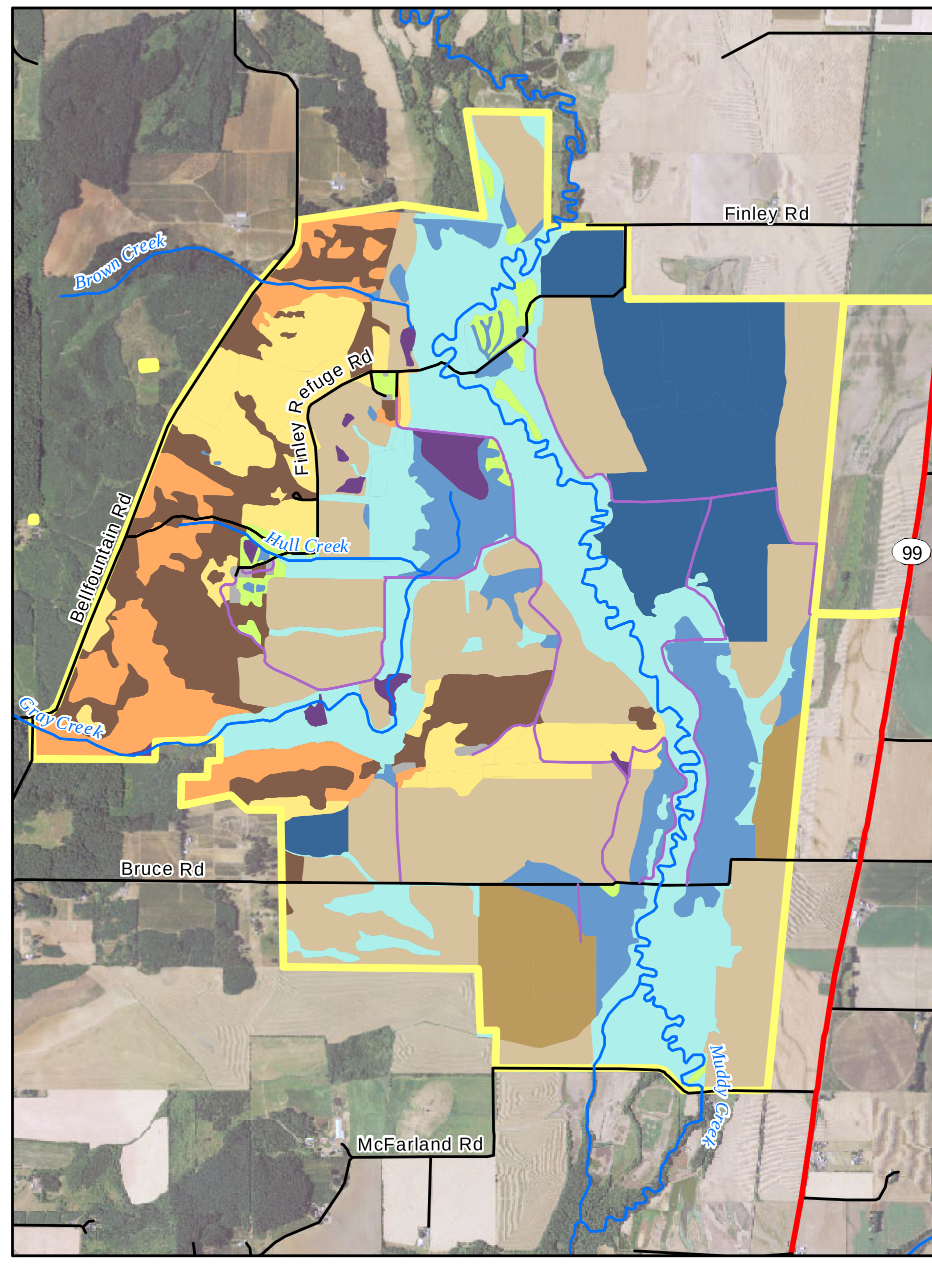
0 0.5 1 Miles
0 0.5 1 Kilometers

UTM ZONE 10
NAD 83

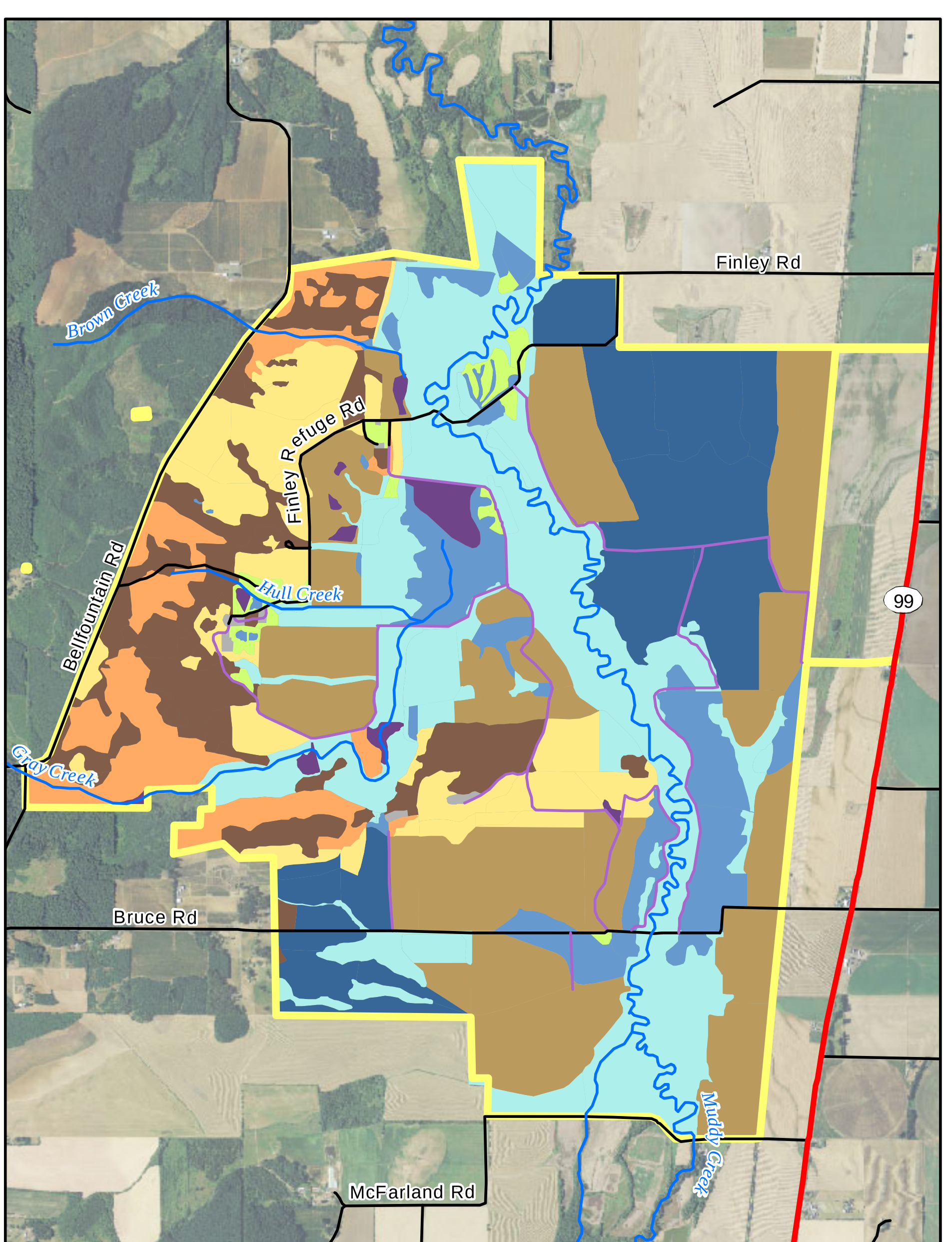
William L. Finley NWR Habitat Alternatives
Map 6



Alternative 1 - No Change



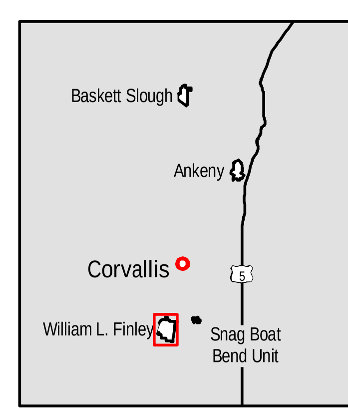
Alternative 2 (Service Preferred) – Improved Balanced Approach



Alternative 3 – Restore Selected Agricultural Fields to Native Habitats as Resources Permit; Provide Limited Improvements in Public Use Programs

LEGEND

- Refuge Ownership Boundary
- Agriculture- Cooperative Farming
- Agriculture- Refuge Farming
- Mixed Deciduous-Coniferous Forest
- Non-agricultural grassland
- Oak Woodland
- Administrative/Developed
- Permanent Wetland
- Riparian
- Seasonal Wetland
- Upland Prairie/Oak Savannah
- Wet Prairie
- Complex Headquarters
- County Roads
- State Route
- Refuge Service Road
- Rivers and Streams-Riverine



Overview Map

NOTE: Implementation of objectives under Alternatives 2 and 3 are subject to funding availability.

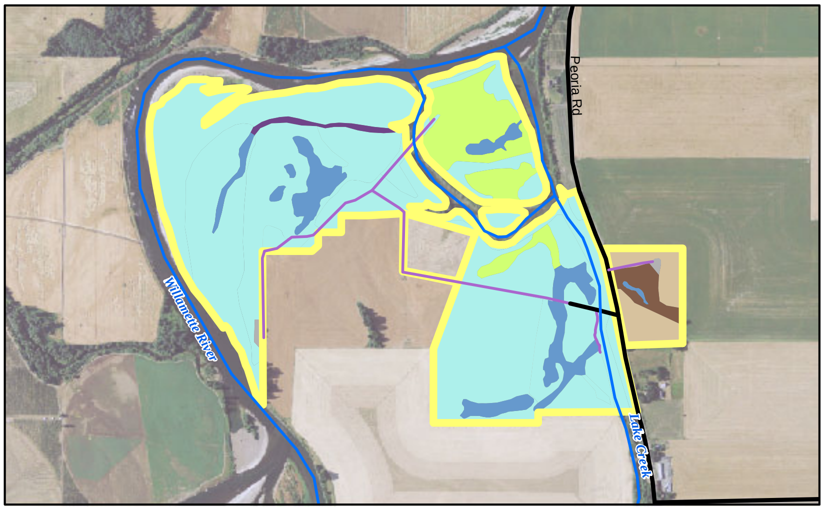
Produced by USFWS Region 1
Refuge Information Branch
Portland, Oregon

Map Date: 8/18/2011
Data: USFWS (WVNWRC), 2010
Photo Credit: Oregon NAIP, 2009
File: 10-042-3.mxd

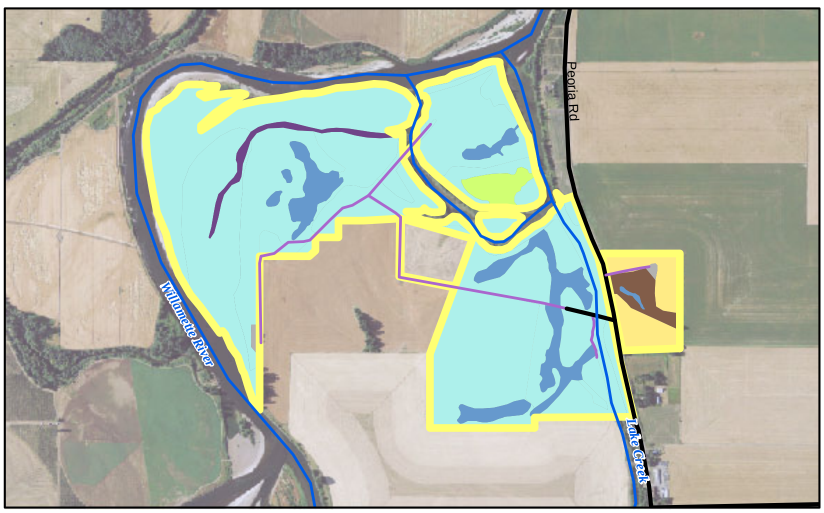
0 0.5 1 Miles
0 0.5 1 Kilometers

UTM ZONE 10
NAD 83

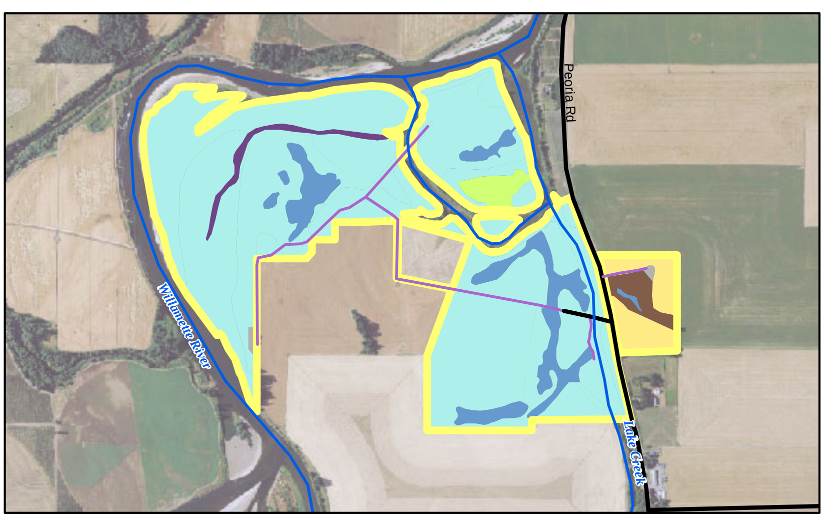
Snag Boat Bend Unit Habitat Alternatives
Map 7



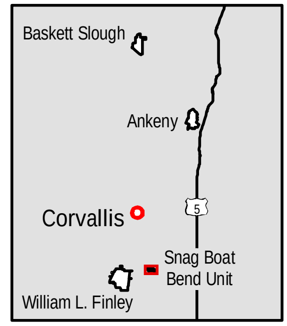
Alternative 1 - No Change



Alternative 2 (Service Preferred) - Improved Balanced Approach



Alternative 3 - Restore Selected Agricultural Fields to Native Habitats as Resources Permit; Provide Limited Improvements in Public Use Programs



Overview Map

LEGEND

- Refuge Ownership Boundary
- Agriculture- Cooperative Farming
- Non-agricultural grassland
- Oak Woodland
- Administrative/Developed
- Permanent Wetland
- Riparian
- Seasonal Wetland
- Upland Prairie/Oak Savannah
- County Roads
- Refuge Service Roads
- Rivers and Streams - Riverine

NOTE: Implementation of objectives under Alternatives 2 and 3 are subject to funding availability.

The Snag Boat Bend Unit boundary shown here is the best available, however, it may not be accurate when compared to survey documents, and the current and fluctuating water line.

0 0.5 1 Miles

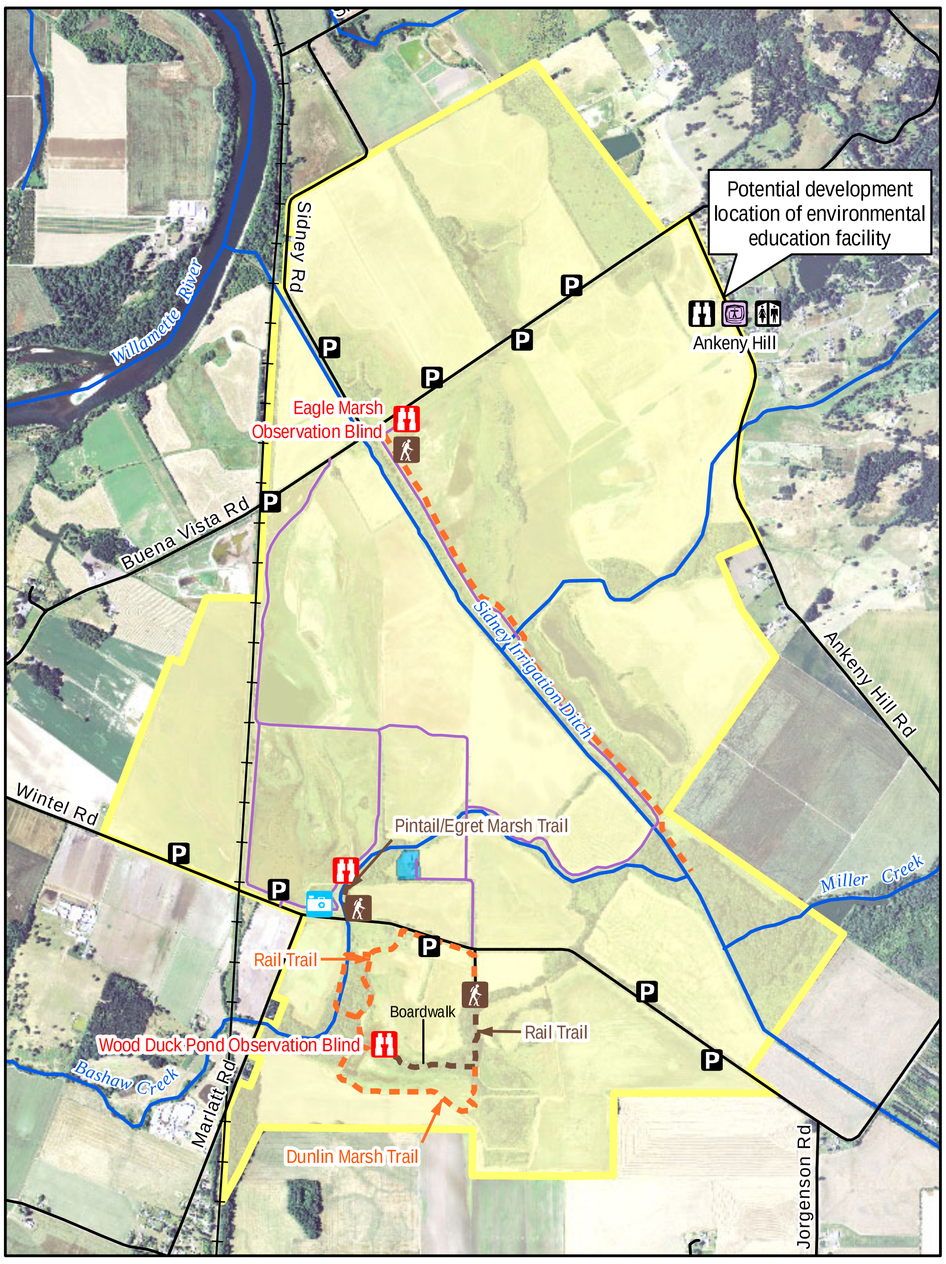
0 0.5 1 Kilometers

Produced by USFWS Region 1
Refuge Information Branch
Portland, Oregon

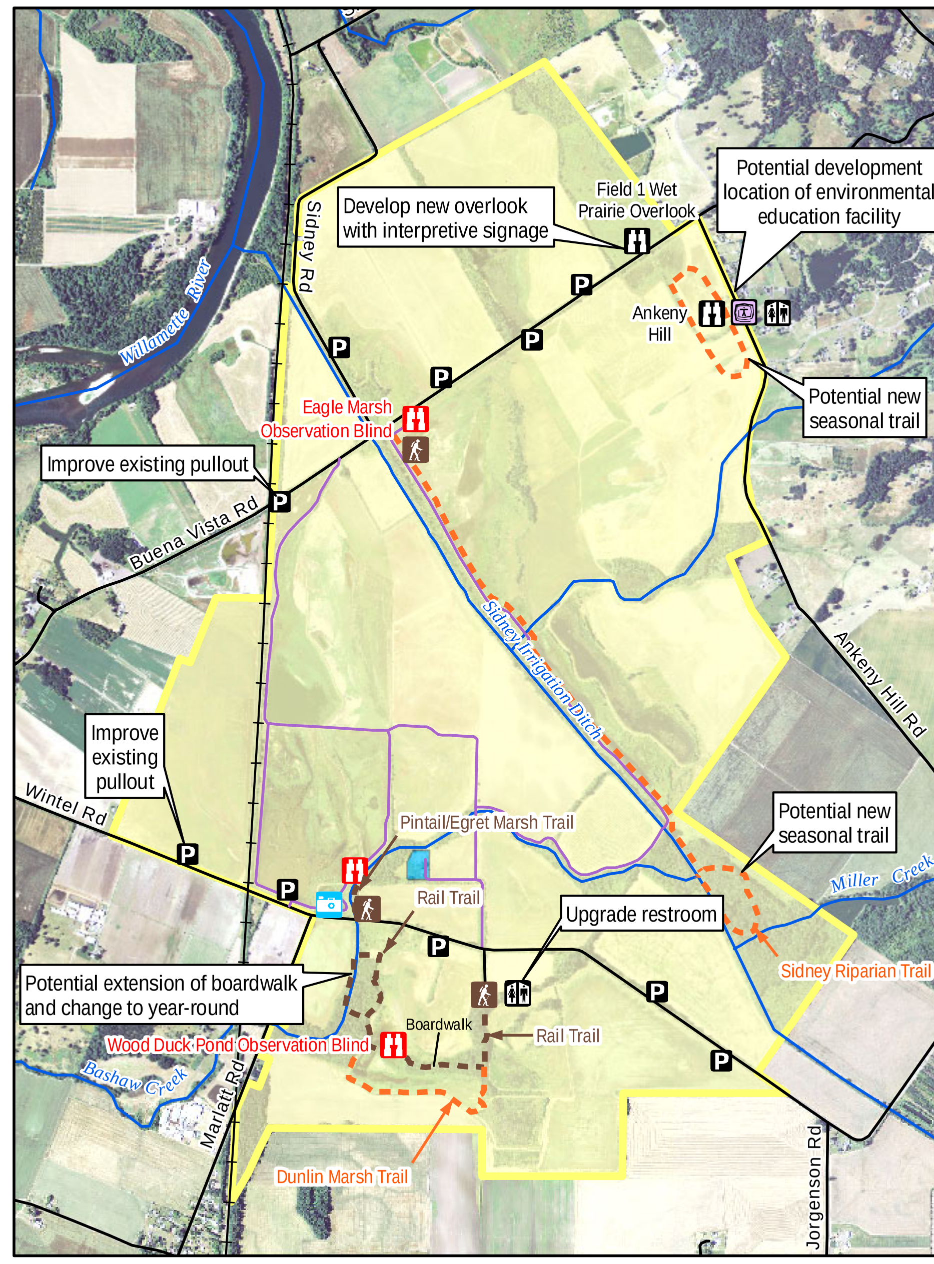
Map Date: 8/18/2011
Data: USFWS (WVNWRC), 2010
Photo Credit: Oregon NAIP, 2009
File: 10-042-4.mxd

UTM ZONE 10
NAD 83

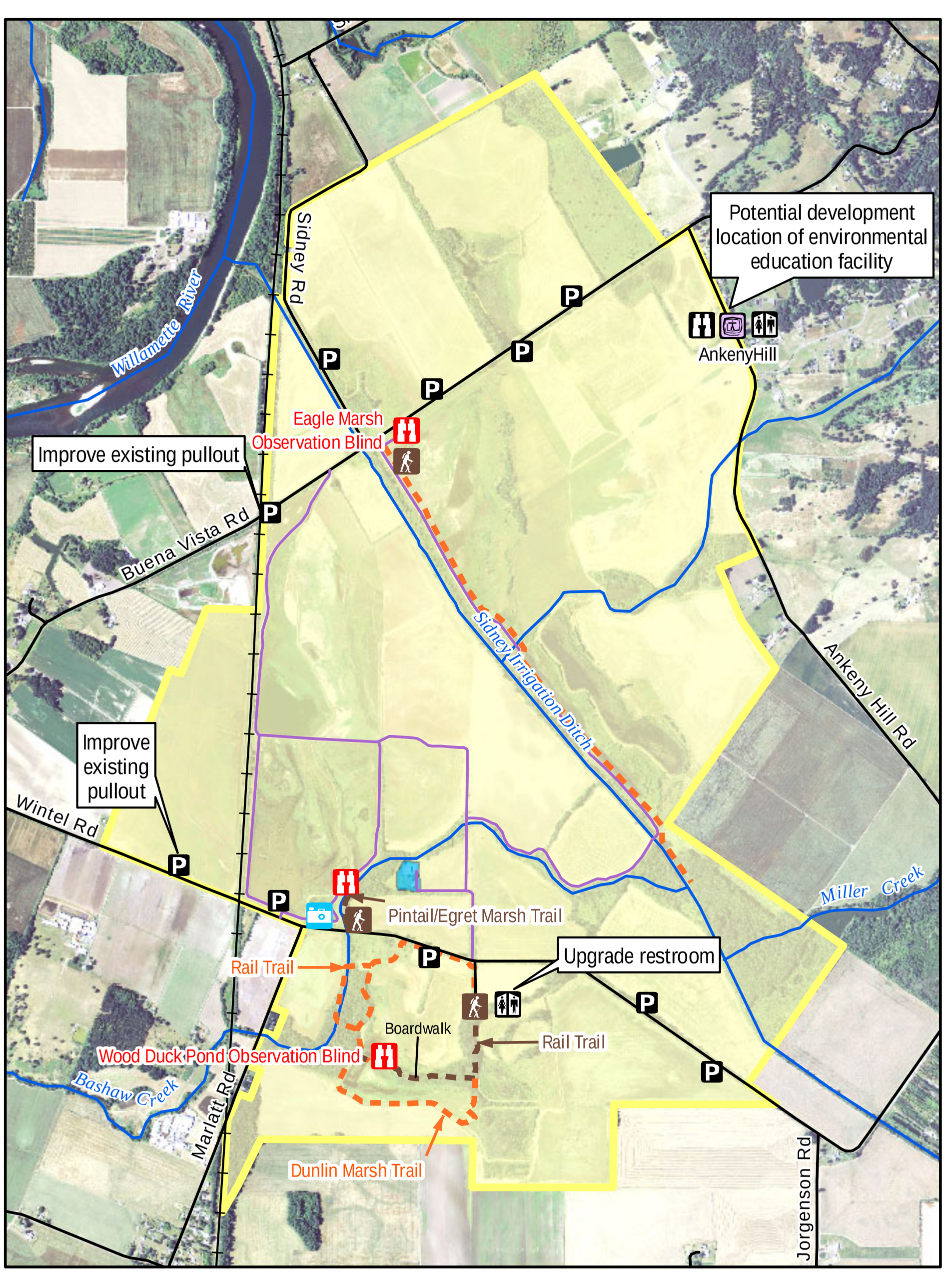
Ankeny NWR Public Use Alternatives
Map 8



Alternative 1 - No Change



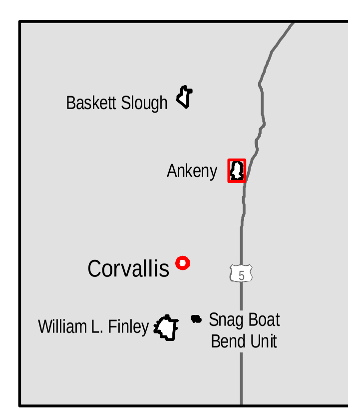
Alternative 2 (Service Preferred) - Improved Balanced Approach



Alternative 3 - Restore Selected Agricultural Fields to Native Habitats as Resources Permit; Provide Limited Improvements in Public Use Programs

LEGEND

- Refuge Ownership Boundary
- Area Closed All Year
- Area Closed Oct. 1- Mar. 31 Except on Trails Designated for All Year Use.
- Enviromental Education Facility
- Overlook
- Photo Blind
- Restroom
- Trailhead
- Viewing Blind
- Roadside Pullout
- Seasonal Use Trail (Open Apr. 1 - Sept. 30)
- All Year Use Trail
- Rivers and Streams - Riverine
- County Roads
- Refuge Service Roads (seasonally open for hiking)
- Railroad Tracks



Overview Map

NOTES: Implementation of objectives under Alternatives 2 and 3 are subject to funding availability.

The photo blind, overlook, restrooms, trailheads, and viewing blinds all have associated parking. All parking areas are open throughout the year.

Some public use facilities have been offset from their true location for the purpose of map legibility.

Produced by USFWS Region 1
Refuge Information Branch
Portland, Oregon

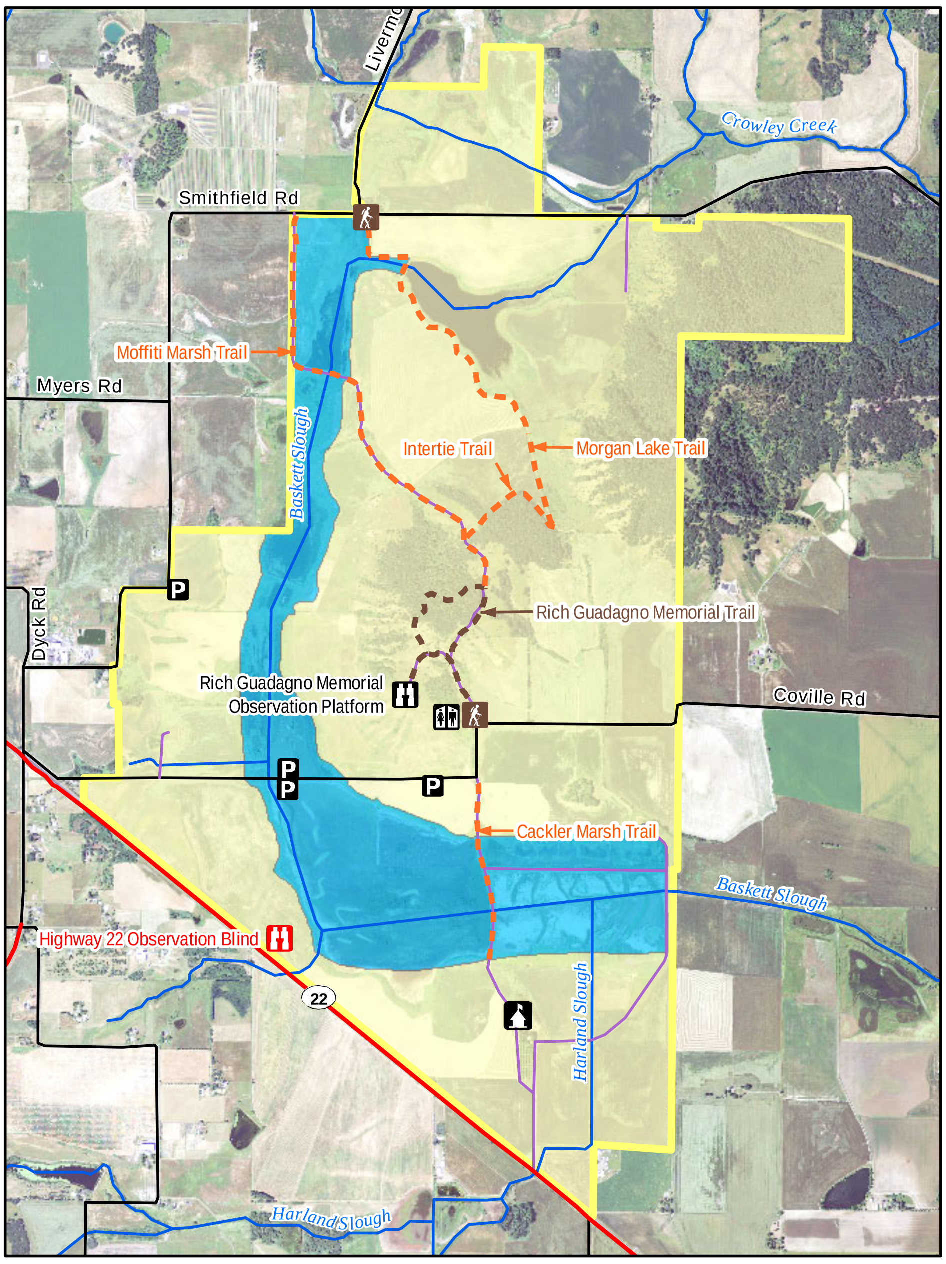
Map Date: 9/2/2011
Data: USFWS (WVNWRC), 2010
Photo Credit: Oregon NAIP, 2009
File: 09-170-1.mxd

0 0.5 1 Miles
0 0.5 1 Kilometers

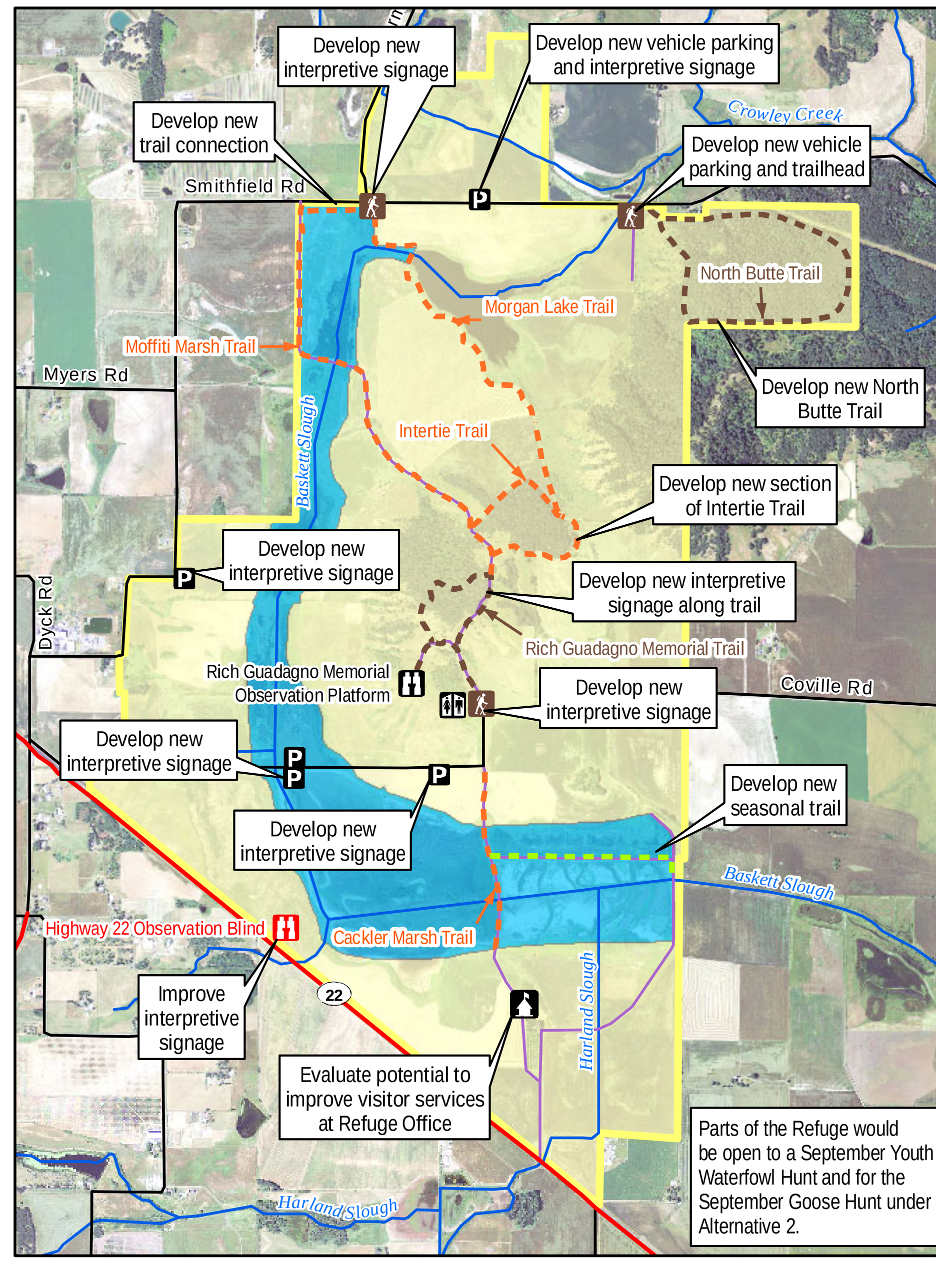
UTM ZONE 10
NAD 83

Willamette Valley National Wildlife Refuge Complex

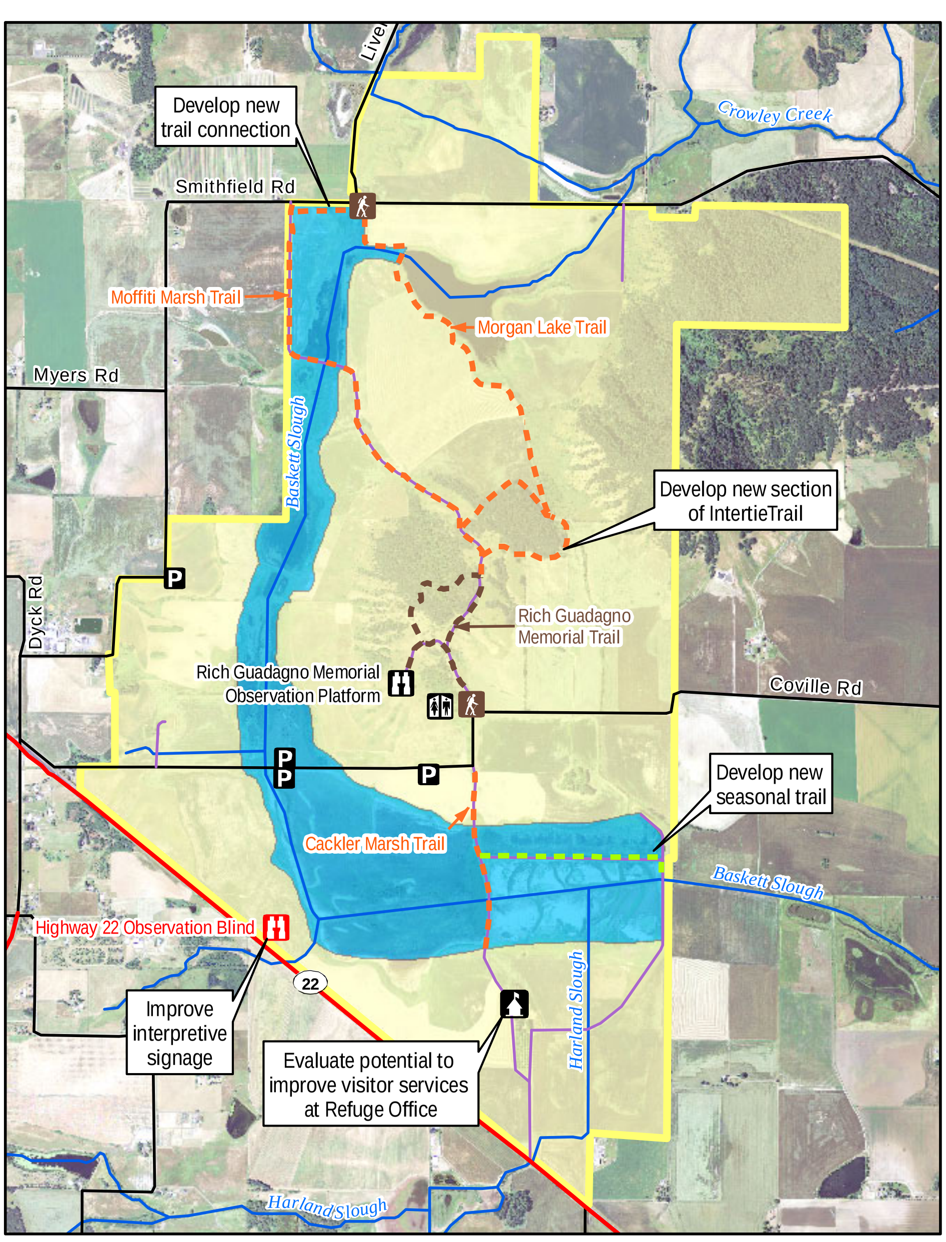
Baskett Slough NWR Public Use Alternatives
Map 9



Alternative 1 - No Change



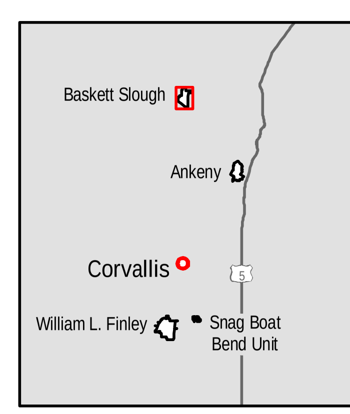
Alternative 2 (Service Preferred) - Improved Balanced Approach



Alternative 3 - Restore Selected Agricultural Fields to Native Habitats as Resources Permit; Provide Limited Improvements in Public Use Programs

LEGEND

- Refuge Ownership Boundary
- Area Closed All Year
- Area Closed Oct. 1- Mar. 31 Except on Trails Designated for All Year Use.
- Refuge Administrative Office
- Restroom
- Overlook
- Photo Blind
- Trailhead
- Viewing Blind
- Roadside Pullout
- Seasonal Use Trail (Open Apr.1 - Sept. 30)
- Seasonal Use Trail (Open July 15 - Sept. 30)
- All Year Use Trail
- Rivers and Streams - Riverine
- County Roads
- State Route
- Refuge Service Roads



Overview Map

NOTES: Implementation of objectives under Alternatives 2 and 3 are subject to funding availability.

The photo blind, overlook, restrooms, trailheads, and viewing blinds all have associated parking. All parking areas are open throughout the year.

Some public use facilities have been offset from their true location for the purpose of map legibility.

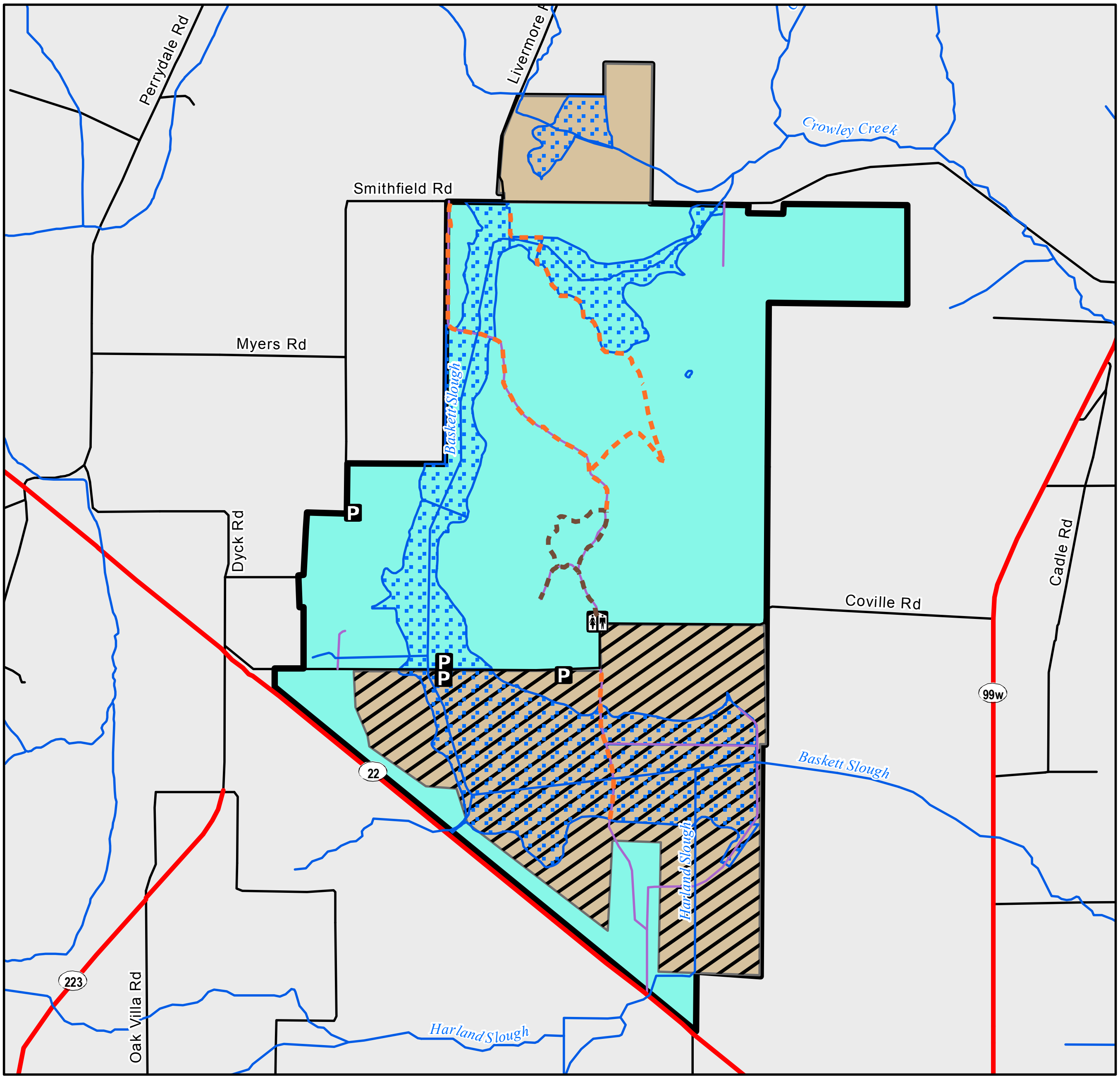
Produced by USFWS Region 1
Refuge Information Branch
Portland, Oregon

Map Date: 9/2/2011
Data: USFWS (WVNWRC), 2010
Photo Credit: Oregon NAIP, 2009
File: 09-170-2.mxd

0 0.5 1 Miles
0 0.5 1 Kilometers

UTM ZONE 10
NAD 83

Baskett Slough Hunt Plan
Map 10



Alternative 2 (Service Preferred)- Improved Balanced Approach

There will be no hunting at Baskett Slough NWR under Alternatives 1 and 3. Under Alternative 2, the Youth Waterfowl Hunt period is for two days, typically on the last weekend of September. The Early Season Goose Hunt will be conducted on the opening and closing weekends of the State September Season. Dates fluctuate annually and are set by ODFW.

LEGEND

- Refuge Ownership Boundary
- Youth Waterfowl Hunting
- Early Goose Season Hunting
- Area Closed to Hunting
- Wetland
- Restroom
- Roadside Pullout
- Existing Seasonal Use Trail (Open April 1 - Sept 30)
- All Year Use Trail
- County Roads
- State Route
- Refuge Service Roads
- Rivers and Streams - Riverine

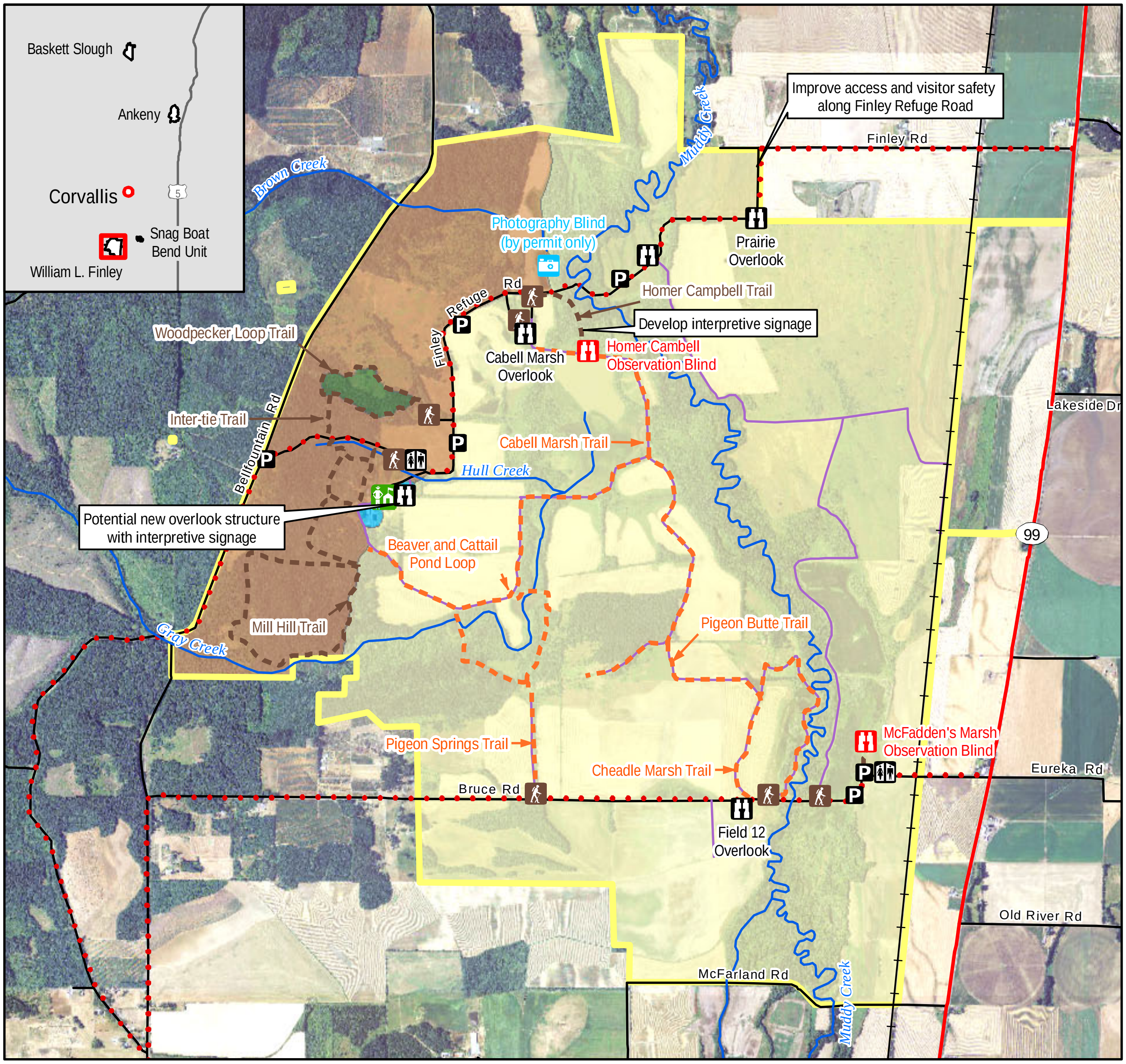
0 0.5 1 Miles
0 0.5 1 Kilometers

Produced by USFWS Region 1
Refuge Information Branch
Portland, Oregon

Map Date: 8/18/2011
Data: USFWS (WVNWRC), 2010
Photo Credit: Oregon NAIP 2009
File: 10-113-1

UTM ZONE 10
NAD 83

William L. Finley NWR Public Use Alternatives
Map 11



Alternative 1 - No Change

LEGEND

- Refuge Ownership Boundary
- Area Open to Public for All but First Week of November for Deer Hunting
- Area Closed All Year
- Area Open to Public All Year
- Area Closed Nov. 1 - Mar. 31, Except on Trails Designated for All Year Use.
- Complex Headquarters
- Restroom
- Environmental Education
- Roadside Pullout
- Overlook
- Photo Blind
- Viewing Blind
- Trailhead
- Seasonal Use Trail (Open Apr. 1 - Oct. 31))
- All Year Use Trail
- Auto Tour Route
- Railroad Tracks
- County Roads
- State Route
- Refuge Service Roads (seasonally open for hiking)
- Rivers and Streams - Riverine

NOTES: Implementation of objectives under Alternatives 2 and 3 are subject to funding availability.

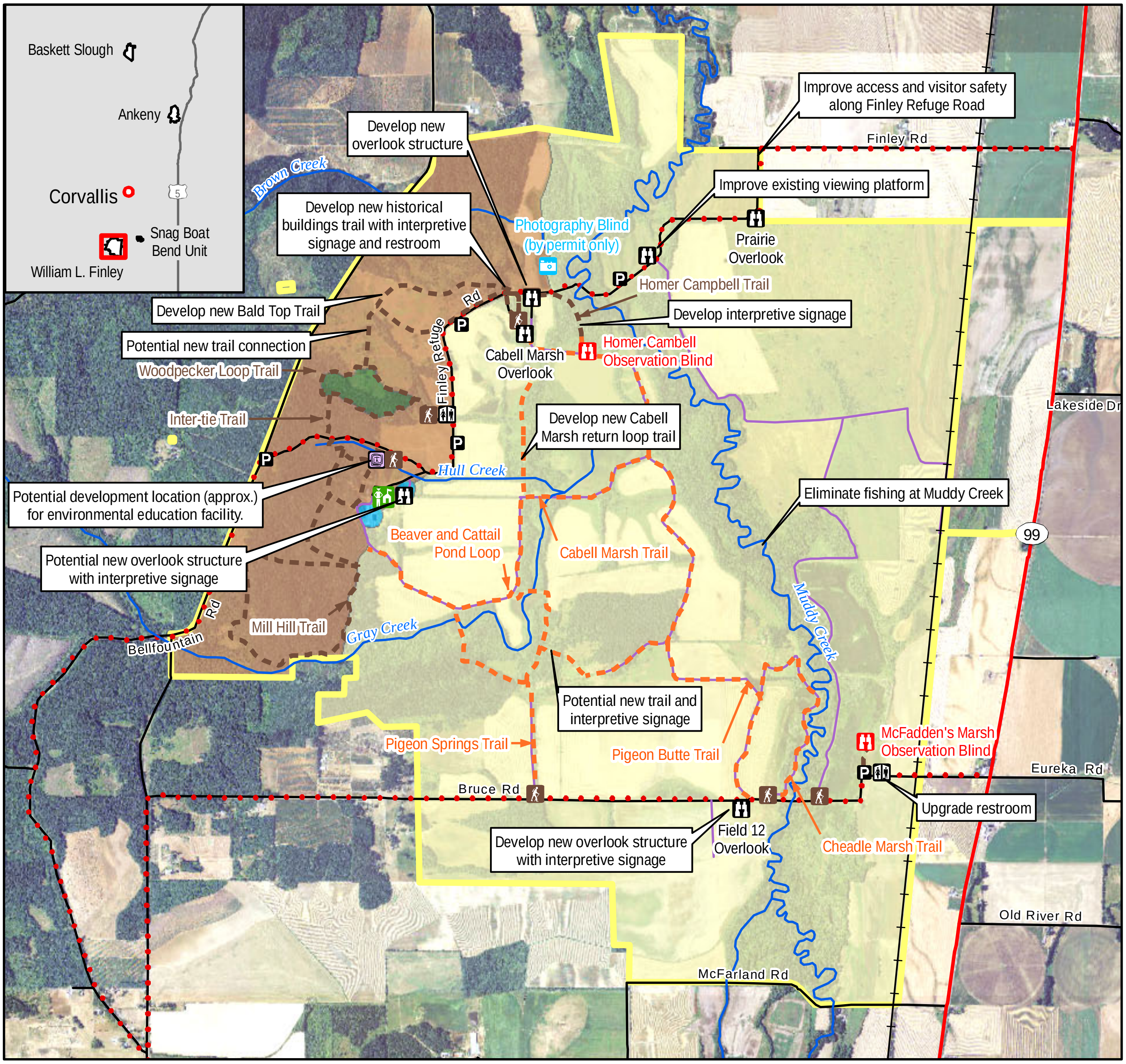
The photo blind, overlook, restrooms, trailheads, and viewing blinds all have associated parking. All parking areas are open throughout the year. Some public use facilities have been offset from their true location for the purpose of map legibility.

Map Date: 8/18/2011
Data: USFWS (WVNWRC), 2010
Photo Credit: Oregon NAIP 2009
File: 09-170-3-1.mxd

0 0.25 0.5 Miles
0 0.5 1 Kilometers

UTM ZONE 10
NAD 83

William L. Finley NWR Public Use Alternatives
Map 12



Alternative 2 (Service Preferred) - Improved Balanced Approach

LEGEND

- Refuge Ownership Boundary
- Area Open to Public for All but First Week of November for Deer Hunting
- Area Closed All Year
- Area Open to Public All Year
- Area Closed Nov. 1 - Mar. 31, Except on Trails Designated for All Year Use.
- Complex Headquarters
- Restroom
- Environmental Education
- Roadside Pullout
- Overlook
- Photo Blind
- Viewing Blind
- Trailhead
- Seasonal Use Trail (Closed Nov. 1 - Mar. 31)
- All Year Use Trail
- Auto Tour Route
- Railroad Tracks
- County Roads
- State Route
- Refuge Service Roads (seasonally open for hiking)
- Rivers and Streams - Riverine

NOTES: Implementation of objectives under Alternatives 2 and 3 are subject to funding availability.

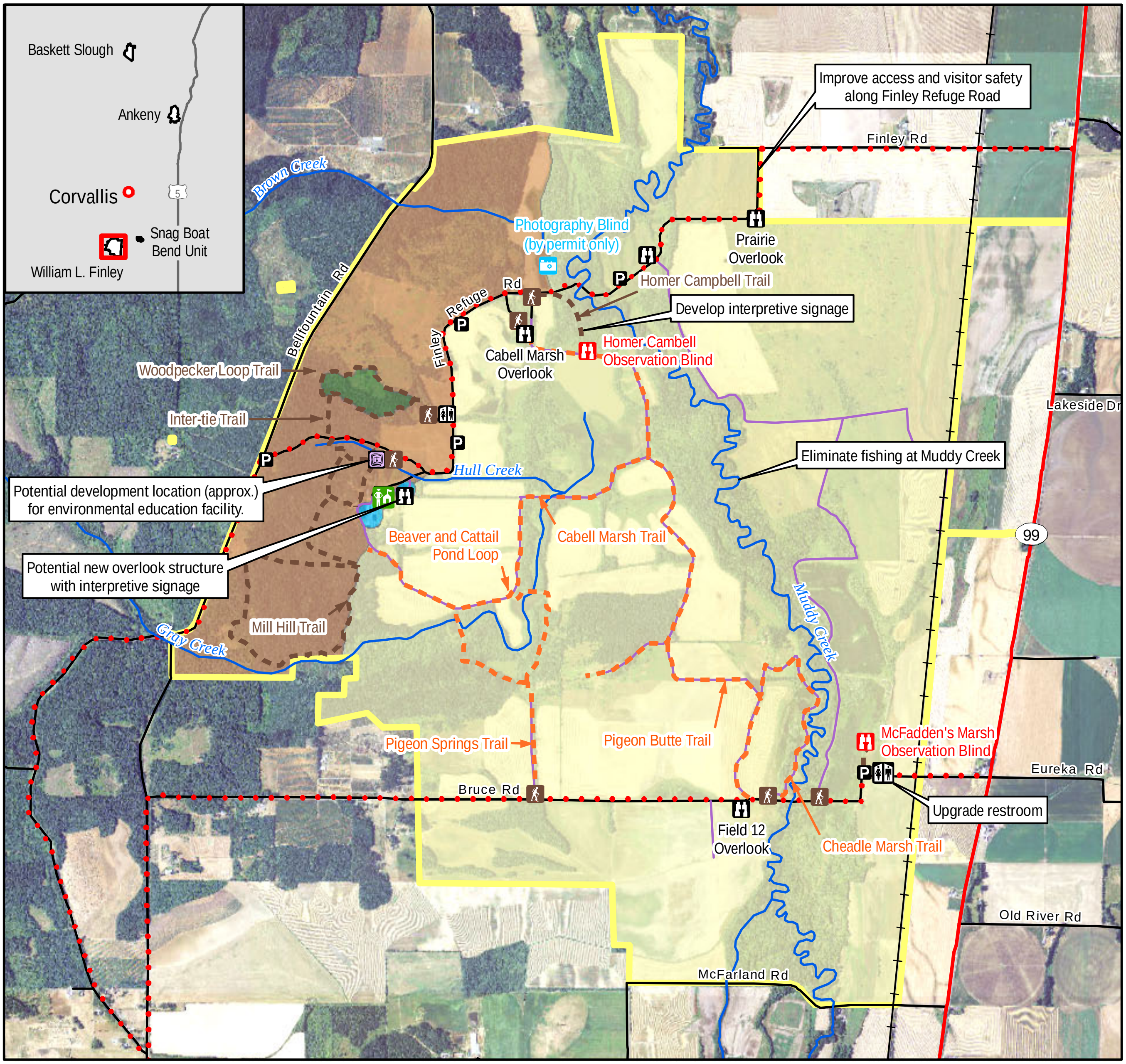
The photo blind, overlook, restrooms, trailheads, and viewing blinds all have associated parking. All parking areas are open throughout the year. Some public use facilities have been offset from their true location for the purpose of map legibility.

Map Date: 8/18/2011
Data: USFWS (WVNWRC), 2010
Photo Credit: Oregon NAIP 2009
File: 09-170-3-2.mxd

0 0.25 0.5 Miles
0 0.5 1 Kilometers

UTM ZONE 10
NAD 83

William L. Finley NWR Public Use Alternatives Map 13



Alternative 3 - Restore Selected Agricultural Fields to Native Habitats as Resources Permit: Provide Limited Improvements in Public Use Programs

LEGEND

- **Refuge Ownership Boundary**
- **Area Open to Public for All but First Week of November for Deer Hunting**
- **Area Closed All Year**
- **Area Open to Public All Year**
- **Area Closed Nov. 1 - Mar. 31, Except on Trails Designated for All Year Use.**
- **Complex Headquarters**
- **Restroom**
- **Environmental Education**
- **Roadside Pullout**
- **Overlook**
- **Photo Blind**
- **Viewing Blind**
- **Trailhead**
- **Seasonal Use Trail (Closed Nov. 1 - Mar. 31)**
- **All Year Use Trail**
- **Auto Tour Route**
- **Railroad Tracks**
- **County Roads**
- **State Route**
- **Refuge Service Roads (seasonally open for hiking)**
- **Rivers and Streams - Riverine**

NOTES: Implementation of objectives under Alternatives 2 and 3 are subject to funding availability.

The photo blind, overlook, restrooms, trailheads, and viewing blinds all have associated parking. All parking areas are open throughout the year. Some public use facilities have been offset from their true location for the purpose of map legibility.

Map Date: 9/2/2011
Data: USFWS (WVNWRC), 2010
Photo Credit: Oregon NAIP 2009
File: 09-170-3-3.mxd

0 0.25 0.5 Miles
0 0.5 1 Kilometers
UTM ZONE 10
NAD 83

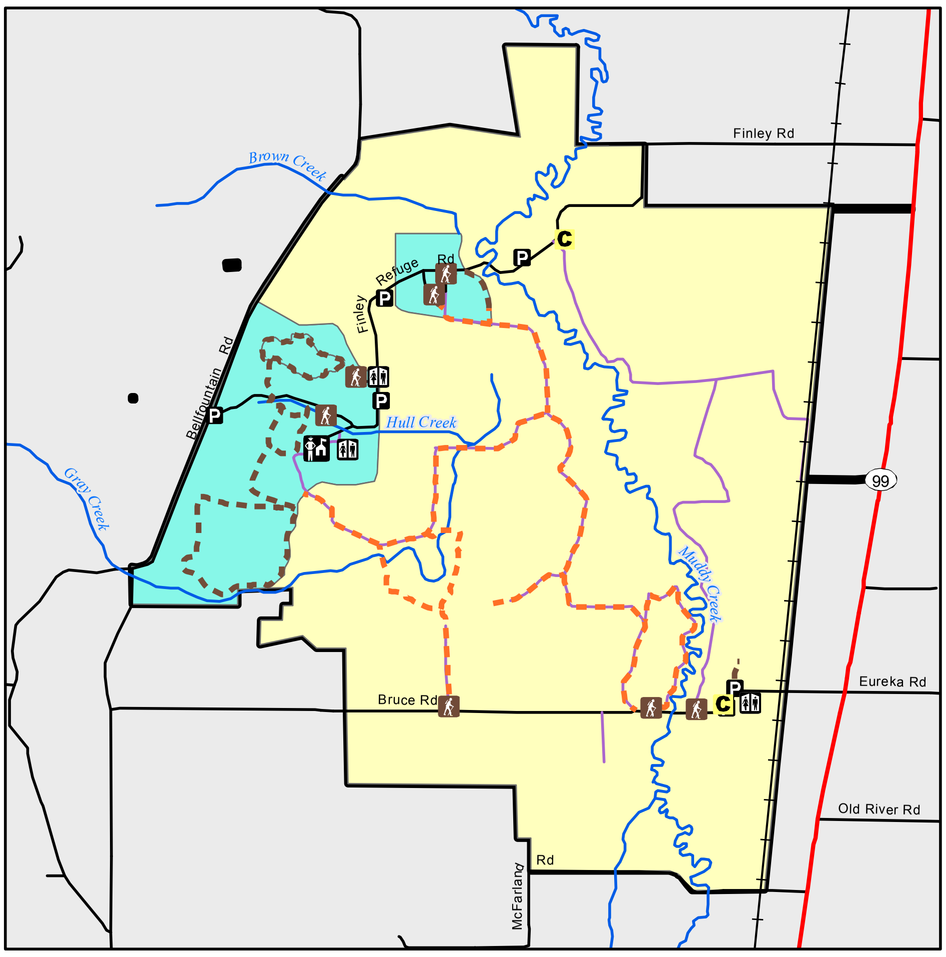
U.S. Fish & Wildlife Service

Willamette Valley National Wildlife Refuge Complex

Final CCP/EA

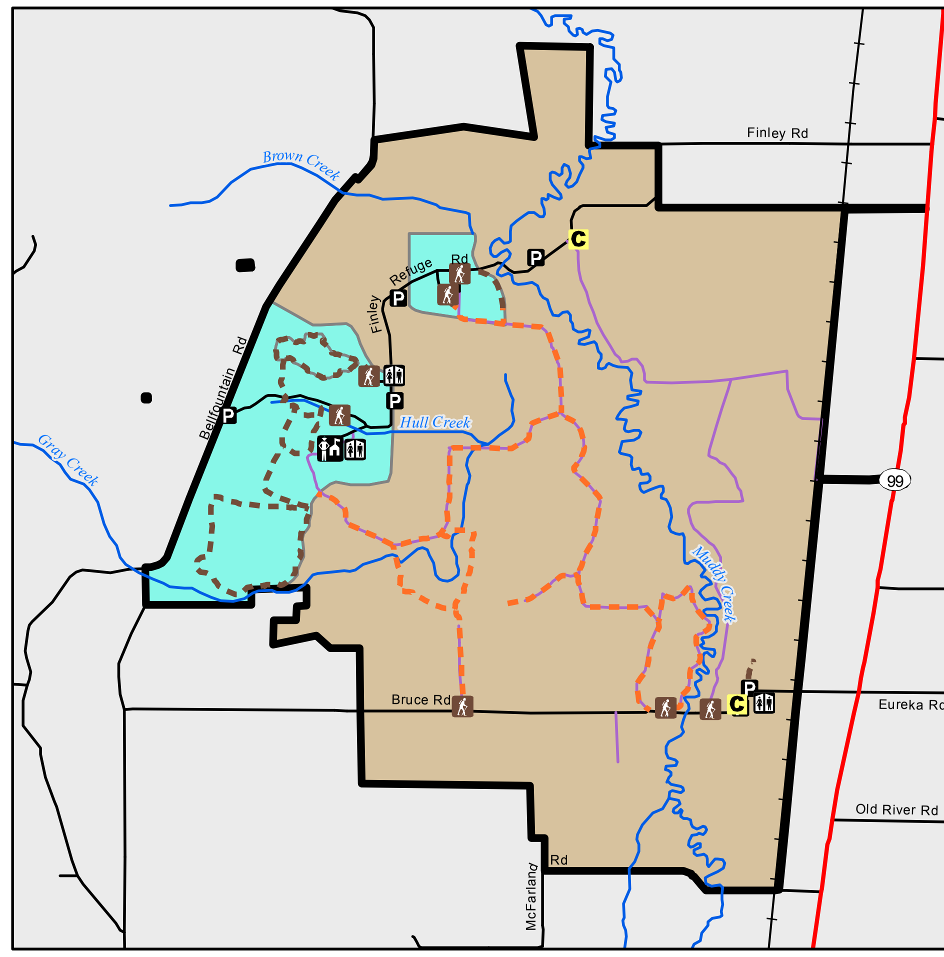
William L. Finley NWR Hunt Plan Alternatives

Map 14



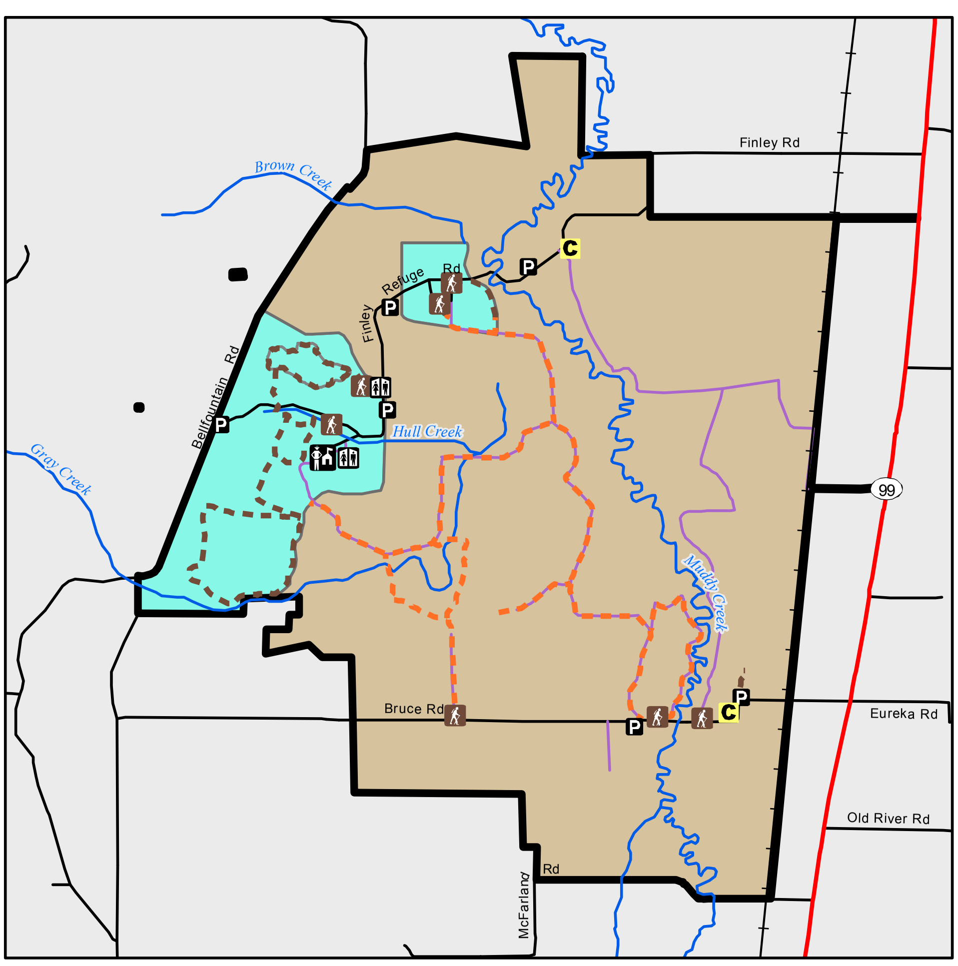
Deer Archery Hunt, All Alternatives

Season: Approximately late August through end of September



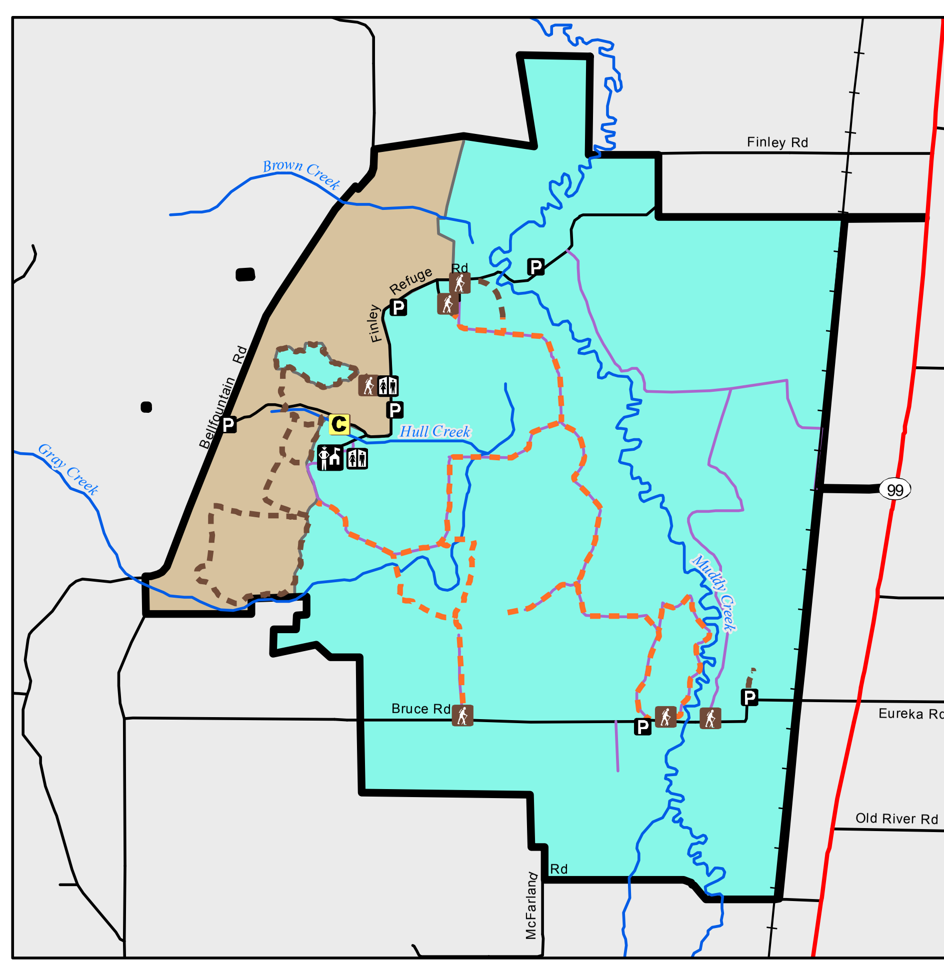
Deer Restricted Firearms Hunt, Alternative 1

Season: Approximately October 1 through October 31



Deer Restricted Firearms Hunt, Alternatives 2 and 3, Week 1

Season: Approximately the last week of October

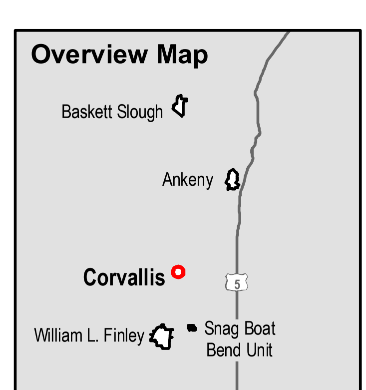


Deer Restricted Firearms Hunt, Alternatives 2 and 3, Week 2

Season: Approximately the first week of November

LEGEND

- Refuge Ownership Boundary
- Deer Hunt Area- Archery
- Deer Hunt Area- Restricted Firearms
- Closed to Hunting
- Complex Headquarters
- Check Stations
- Trailhead
- Roadside Pullout
- Existing Seasonal Use Trail (Open Apr.1 - Oct. 31)
- Existing All Year Use Trail
- Railroad Tracks
- County Roads
- State Route
- Refuge Service Roads
- Rivers and Streams - Riverine



0 0.5 1 Miles

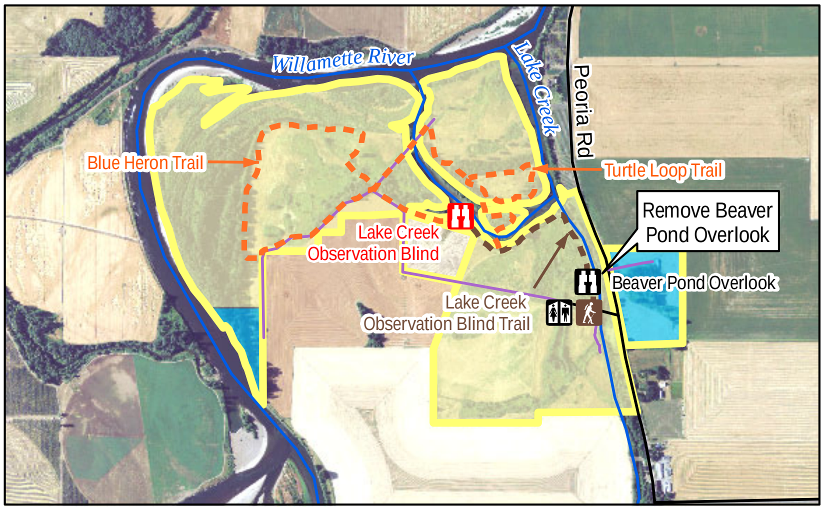
0 0.5 1 Kilometers

Produced by USFWS Region 1
Refuge Information Branch
Portland, Oregon

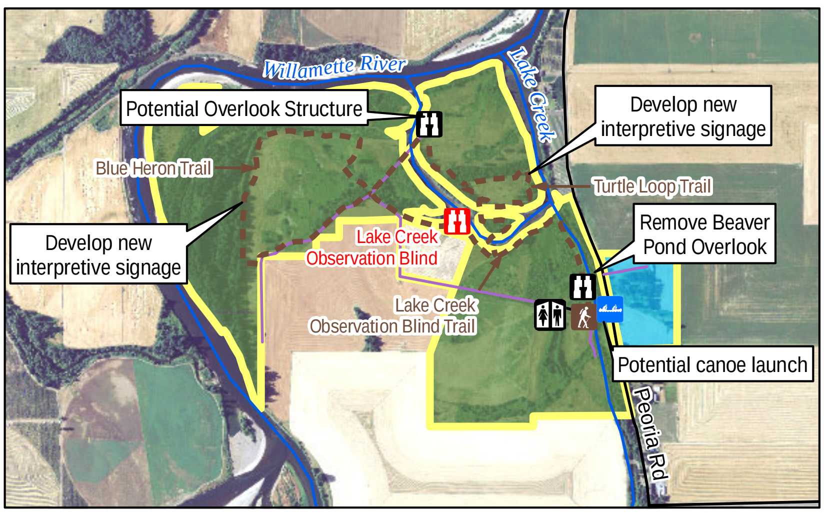
Map Date: 9/2/2011
Data: USFWS (WVNWRC), 2010
Photo Credit: Oregon NAIP, 2009
File: 10-113-2b.mxd

UTM ZONE 10
NAD 83

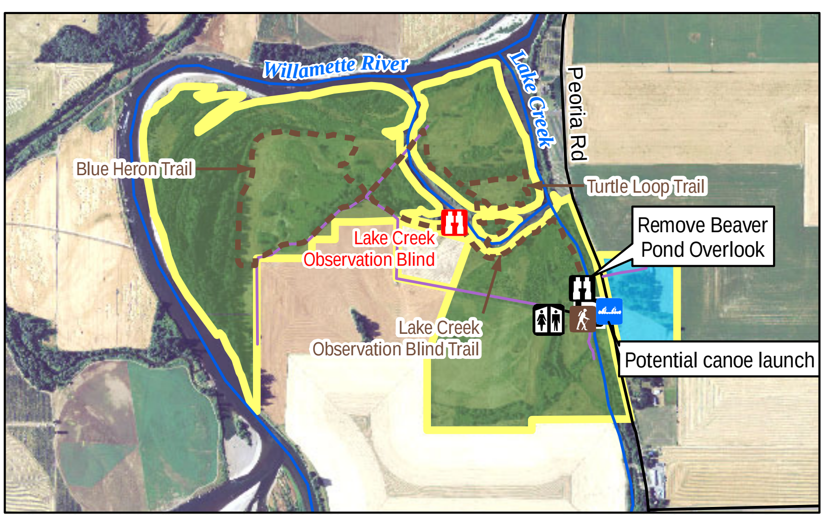
Snag Boat Bend Unit Public Use Alternatives Map 15



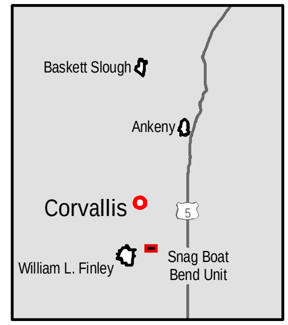
Alternative 1 - No Change



Alternative 2 (Service Preferred) - Improved Balanced Approach



Alternative 3 - Restore Selected Agricultural Fields to Native Habitats as Resources Permit; Provide Limited Improvements in Public Use Programs



Overview Map

LEGEND

- **Refuge Boundary**
- **Area Closed All Year**
- **Area Open to Public All Year**
- **Seasonally Closed Nov. 1- Jan. 31, Except on Trails Designated for All Year Use.**
- **Canoe Launch**
- **Overlook**
- **Trailhead**
- **Viewing Blind**
- **Restroom**
- **Seasonal Use Trail (Open Apr.1 - Oct. 31)**
- **All Year Use Trail**
- **Rivers and Streams - Riverine**
- **County Roads**
- **Refuge Service Roads**

Notes: Portions of the Snag Boat Bend Unit would be open to fishing under Alternatives 2 and 3. The photo blind, overlook, restrooms, trailheads, and viewing blinds all have associated parking. Some public use facilities have been offset from their true location for the purpose of map legibility.

Implementation of objectives under Alternatives 2 and 3 are subject to funding availability.

The Snag Boat Bend Unit boundary shown here is the best available, however, it may not be accurate when compared to survey documents, and the current and fluctuating water line.

0 0.5 1 Miles

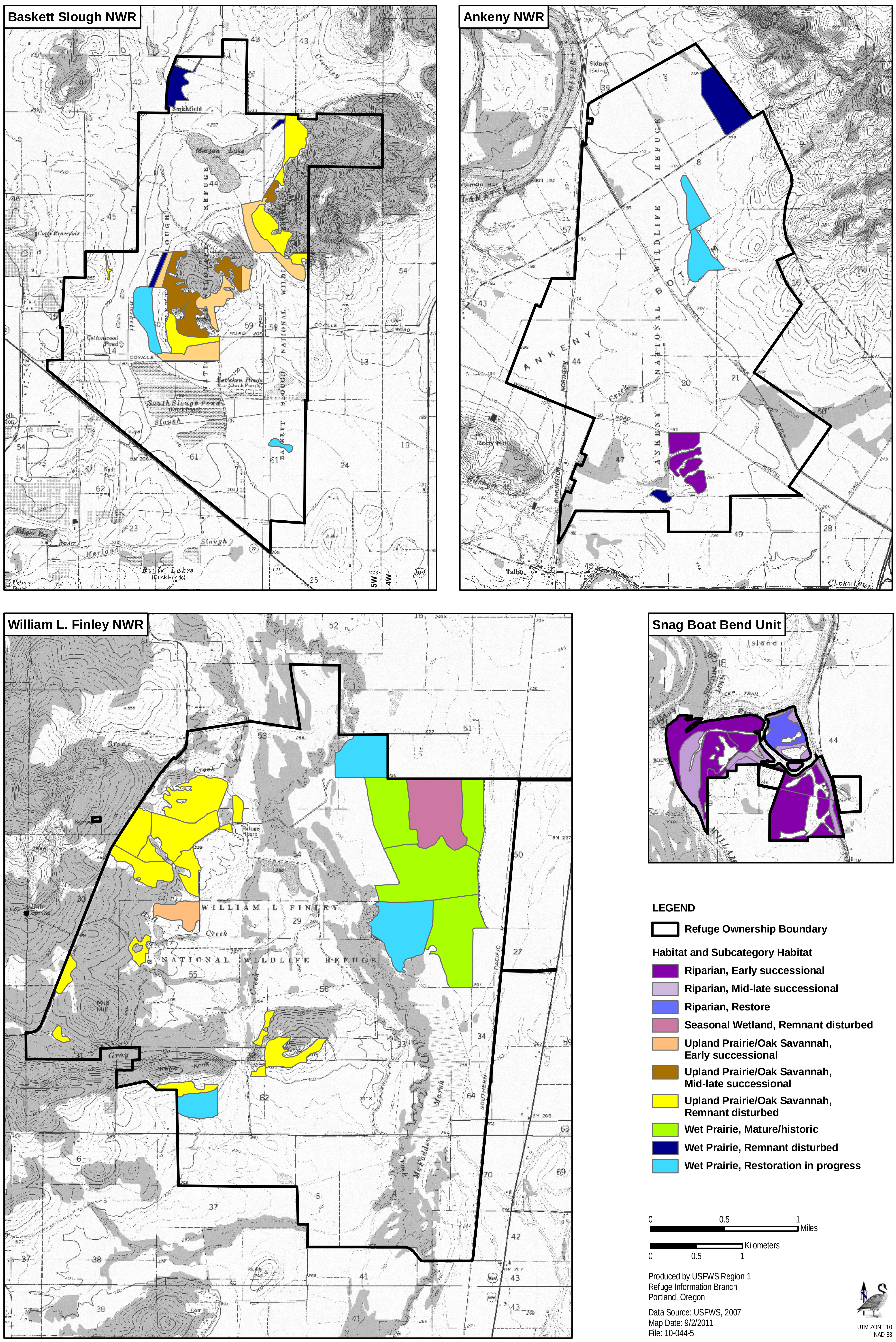
0 0.5 1 Kilometers

Produced by USFWS Region 1
Refuge Information Branch
Portland, Oregon

Map Date: 8/18/2011
Data: USFWS (WVNWRC), 2010
Photo Credit: Oregon NAIP, 2009
File: 9-170-4.mxd

UTM ZONE 10
NAD 83

Habitat Subcategories
Map 16



U.S. Department of the Interior
U.S. Fish & Wildlife Service
Willamette Valley National Wildlife Refuge Complex
26208 Finley Refuge Road
Corvallis, OR 97333

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http://www.fws.gov

National Wildlife Refuge System Information
1 800/344 WILD

September 2011

The mission of the U.S. Fish & Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

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