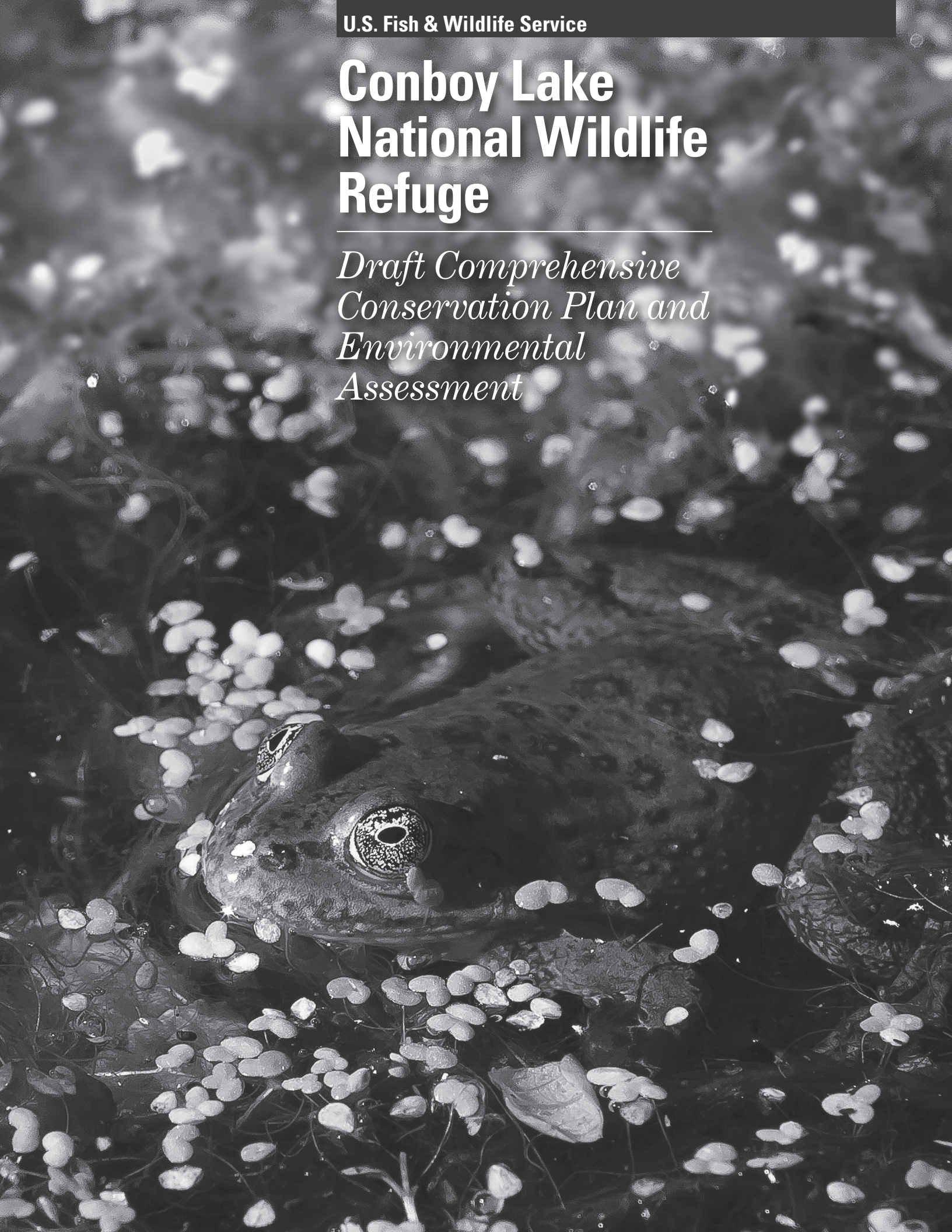
U.S. Fish & Wildlife Service

Conboy Lake National Wildlife Refuge

Draft Comprehensive Conservation Plan and Environmental Assessment



Our Vision for the Future

Conboy Lake National Wildlife Refuge's lush seasonal marshes and vibrant forested uplands gleam at the base of the iconic snow-capped Mount Adams. Camas and buttercup blossoms sway throughout a wet meadow canvas awash with vibrant colors. The trumpeting of Sandhill cranes echoes throughout the refuge as they descend homeward. As a national wildlife refuge, this living system will continue to satisfy our longing for splendor and serenity as it did for the indigenous peoples, explorers, loggers, and ranchers who were first drawn to the valley's plentiful resources. The rich habitat diversity will sustain thriving populations of migrating waterfowl and other wildlife. Refuge habitats will play a key role in the long-term recovery of greater Sandhill cranes and Oregon spotted frogs. Together with our friends, partners, and neighbors, and applying sound scientific principles, we will manage and protect the biological integrity of refuge wildlife and habitats. We envision the continued development and enhancement of inspiring wildlife-dependent recreation opportunities for our visitors, providing them with a window into this living heritage. The refuge will be a source of pride for the local community and instill a sense of ownership for all those who visit, forever underscoring the importance of protecting lands for wildlife conservation and the mission of the National Wildlife Refuge System.

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 & 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.

Aspen stand.
Lisa Wilson/USFWS

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Draft Comprehensive Conservation Plan and Environmental Assessment

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January 2014

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Chapter 1

Introduction and Background

Chapter 1. Introduction and Background

1.1 Introduction

Conboy Lake National Wildlife Refuge (CLNWR or refuge) was authorized in 1964 by the Migratory Bird Conservation Commission (MBCC), and the refuge was established in 1965 with the purchase of the 920-acre Dilling Tract. The approved acquisition boundary for CLNWR is 9,245 acres; the refuge currently encompasses approximately 6,500 acres in fee title ownership with a 700-acre easement. Located in Klickitat County, Washington, the refuge resides on the east slope of the Cascade Mountains at the base of Mount Adams. CLNWR manages approximately 3,500 acres of wet prairie, emergent marsh, and seasonally flooded scrub-shrub and forest land habitats, which is approximately 54% of the refuge. Land surrounding the refuge is managed by private landowners and the State of Washington. Water management is the single most important wildlife management issue on the refuge and within the Glenwood Valley.

Species with management emphasis at the refuge include greater Sandhill cranes, Oregon spotted frogs, Mardon skippers, Ames' milk-vetch, and Oregon coyote thistle. CLNWR provides migratory and breeding habitat for waterfowl of the Pacific Flyway.

Conboy Lake NWR is administered by the Mid-Columbia River National Wildlife Refuge Complex in Burbank, Washington. CLNWR is managed by the U.S. Fish and Wildlife Service (Service) as part of the National Wildlife Refuge System (NWRS or System). The mission of the NWRS 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." The Service, an agency of the Department of the Interior, is principally responsible for conserving, protecting, and enhancing fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

1.2 Significance of the Refuge

The refuge is a haven for plants and animals, supporting Washington's largest and healthiest populations of Oregon coyote-thistle, rosy owl-clover, Kellogg's rush, dwarf rush, and long-bearded sego lily. A blend of oak, pine, and aspen forests, wetlands, grassy prairies, and streams supports a diverse and plentiful wildlife community. The rich habitat diversity sustains thriving populations of migrating waterfowl and songbirds. The rare Oregon spotted frog breeds in wetlands throughout the refuge. Elk are plentiful and frequently seen along refuge roads. And CLNWR supports the only breeding population of greater Sandhill cranes in Washington, nearing 25 pairs.

History is also an important part of CLNWR. Native Americans have depended on the area's plentiful resources, collecting plants for food and religious purposes. These same resources drew settlers to the area, arriving in the 1870s. One of the early homes, the Whitcomb-Cole Hewn Log House, still stands on the refuge and is listed on the National Register of Historic Places (National Register).

1.3 Proposed Action

The Service manages national wildlife refuges as part of the NWRS. The NWRS is subject to the National Wildlife Refuge System Administration Act (Administration Act) of 1966 (16 U.S.C. 688dd-688ee), as amended by the National Wildlife Refuge System Improvement Act (Improvement Act) of 1997 (Public Law 105-57). The Administration Act mandates that a Comprehensive Conservation Plan (CCP) be developed for each refuge in the NWRS.

The Service is proposing to adopt and implement a CCP for CLNWR. The CCP sets forth management guidance for CLNWR for the next 15 years. The Administration Act requires CCPs to identify and describe:

- The purposes of the refuge;
- The fish, wildlife and plant populations; their habitats; and the archaeological and cultural values found on the refuge;
- Significant problems that may adversely affect wildlife populations and habitats and ways to correct or mitigate those problems;
- Areas suitable for administrative sites or visitor facilities and opportunities for wildlife-dependent recreation.

NWRS planning policy (Service Manual Part 602, 602 FW3, June 21, 2000) states that the purpose of CCPs is to describe the desired future conditions of a Refuge and provide long-range guidance and management direction to achieve refuge purposes; help fulfill the National Wildlife Refuge System mission; maintain and, where appropriate, restore the ecological integrity of each refuge and the Refuge System; help achieve the goals of the National Wilderness Preservation System; and meet other mandates.

In this draft CCP, the Service has developed and examined two alternatives that are considered reasonable for future management of CLNWR and disclosed anticipated effects for each alternative, pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321-4347). The CCP will implement a series of actions described under the selected alternative. The goals, objectives, and strategies under the selected alternative will best achieve the purpose and need for the CCP, while maintaining balance among the varied management needs and programs. The selected alternative will represent the most balanced approach for achieving CLNWR's purposes, vision, and goals; contributing to the NWRS mission; addressing relevant issues and mandates; and managing the refuge consistent with sound principles of fish and wildlife management.

The alternatives may be modified between the draft and final documents, depending upon comments received from the public or other agencies and organizations. The Service's Regional Director for the Pacific Region will decide which alternative will be implemented. 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 improving CLNWR's riparian, wetland, forest, and meadow habitats for the long-term conservation of native plants and animals and migratory birds. The CCP will identify appropriate actions for protecting and

sustaining the cultural and biological features of CLNWR; the refuge's waterfowl populations and habitats; and threatened, endangered, or rare species. A final purpose of the CCP is to provide guidance for providing high-quality public use programs in hunting, fishing, wildlife observation, photography, environmental education, and interpretation.

The CCP is needed for a variety of reasons. Primary among these are the need to establish improved habitat conditions on CLNWR's forest, riparian, wetland, and meadow habitats—many of which are degraded by invasive plants—and to identify and deal with key threats to these habitats, including altered fire regimes and fragmentation. There is a need to secure and control the water supply for the refuge. There is a need to address CLNWR's contributions to State-listed species that rely on the refuge, such as Oregon spotted frogs and greater Sandhill cranes. There is a need to analyze wildlife-dependent public use programs and to determine what improvements or alterations should be made in the pursuit of higher-quality programs. Finally, there is a need to describe the steps that should be taken to better protect and promote cultural resources.

A CCP, and the process used to complete it, also accomplishes other things:

1) Communicates with the public, partners, and other governments' efforts to carry out the mission of the NWRS;
2) Provides a clear statement of direction for managing the refuge;
3) Provides neighbors, visitors, and government officials with an understanding of the Service's management actions on and around the refuge;
4) Ensures that the Service's management actions support the goals and intent of the Administration Act;
5) Ensures refuge plans will be consistent with the fish and wildlife conservation plans of the state and the conservation programs within the ecosystem, to the extent practicable; and
6) Provides a basis for development of budget requests for the refuge's operation, maintenance, and capital improvement needs.

1.5 Legal and Policy Guidance

CLNWR is managed as part of the NWRS within a framework provided by legal and policy guidelines. The NWRS is the world's largest network of public lands and waters set aside specifically for conserving wildlife and protecting ecosystems.

1.5.1 The U.S. Fish and Wildlife Service

The refuge is managed by the Service, an agency within the Department of the Interior (DOI). The Service is the principal Federal agency responsible for conserving, protecting, and enhancing the nation's fish and wildlife populations and their habitats.

The mission of the 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." Although this is a shared responsibility with other Federal, State, tribal, local, and private entities, the Service has specific trust responsibilities for migratory birds, endangered and threatened species, and certain anadromous fish and marine mammals. The Service has similar trust responsibilities for the lands and waters it administers to support the conservation and enhancement of fish, wildlife, plants and

their habitats. The Service also enforces Federal wildlife laws and international treaties for importing and exporting wildlife, assists with state fish and wildlife programs, and helps other countries develop wildlife conservation programs.

1.5.2 National Wildlife Refuge System

The needs of wildlife and their habitats come first on national wildlife refuges, in contrast to other public lands that are managed for multiple uses. Refuges are guided by various Federal laws and executive orders, agency policies, and international treaties. Fundamental are the mission and goals of the NWRS and the designated purposes of each refuge as described in its establishing legislation, executive orders, or other documents establishing, authorizing, or expanding the refuge.

Key concepts and guidance of the NWRS derive from the Administration Act (as amended), the Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4, as amended), Title 50 of the Code of Federal Regulations (CFR) and the Service Manual. The Administration Act is implemented through regulations covering the NWRS, published in Title 50, Subchapter C of the CFR. These regulations govern general administration of units of the NWRS.

National Wildlife Refuge System Mission and Goals

The mission of the NWRS 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.*" (Administration Act, as amended; 16 U.S.C. 668dd et seq.)

The goals of the NWRS, 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 under-represented 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.

National Wildlife Refuge System Administration Act

Of all the laws governing activities on national wildlife refuges, the Administration Act undoubtedly exerts the greatest influence. The Improvement Act amended the Administration Act in 1997 by including a unifying mission for all national wildlife refuges as a system, adding a new process for determining compatible uses on refuges and a requirement that each refuge will be managed under a CCP developed in an open public process.

The Administration Act states that the Secretary of the Interior shall provide for the conservation of fish, wildlife, and plants and their habitats within the NWRS, as well as ensure that its biological integrity, diversity, and environmental health (BIDEH) 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.'' BIDEH 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."

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

Additionally, the Administration Act identifies six wildlife-dependent recreational uses for the NWRS. These uses are hunting, fishing, wildlife observation and photography, environmental education and interpretation. Under the 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 NWRS. The overarching goal of wildlife-dependent public uses 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 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 refuge purposes, the NWRS mission, or goals and 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, fulfillment of the mission of the NWRS or the purposes of the refuge. Updated appropriate use and compatibility determinations are in Appendices A and B of this draft CCP/EA.

The 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 formal guidance, can play a role in selection of the selected 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 K outlines the public involvement that has been undertaken during the CCP process.

Public Use of CLNWR

The first priority of the NWRS is to protect the biological resources entrusted to the Service and the irreplaceable cultural resources found within the NWRS. Consistent with the Administration Act, the Service makes a special effort to provide wildlife-dependent public use opportunities across the NWRS. Balancing these often-conflicting goals is accomplished through a variety of means, including the development of CCPs.

To determine what uses can be allowed on a national wildlife refuge, the Service first determines whether the use is appropriate. For this CCP, refuge staff applied a series of questions/ standards to determine whether a use was appropriate (see Appendix A). If the activity was determined to be an appropriate use of CLNWR, the refuge developed what are known as compatibility determinations (CDs). These CDs determine whether the proposed activity is compatible with the refuge's purposes and the mission of the NWRS. Only if the activity is determined compatible with resource protection by the Mid-Columbia River National Wildlife Refuge Complex (MCRNWRC) Project Leader, with concurrence by the Region 1 Refuge Chief, may it occur. The CDs for CLNWR are presented in Appendix B.

1.5.3 Other Laws and Mandates

Many other Federal laws, executive orders, Service policies, and international treaties govern the Service and NWRS lands. Examples include the Migratory Bird Treaty Act of 1918, Refuge Recreation Act of 1962, National Historic Preservation Act of 1966 (NHPA), and the Endangered Species Act of 1973 (ESA). The more relevant of these are described in Appendix I. For further information on laws and other mandates of interest to the Service, a list and brief description can be found in the Laws Digest at 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 Administration Act. Some of these key policies include the Biological Integrity, Diversity and Environmental Health Policy (601 FW 3); Compatibility Policy (603 FW 2); 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 NWRS. These policies and others can be found at refuges.fws.gov/policymakers/nwrpolicies.html.

In developing a CCP, refuges must consider these broader laws and policies, as well as NWRS and ecosystem goals and visions. The CCP must be consistent with these and also with the refuge purpose(s).

1.5.4 Tribal Rights and Interests

It is possible that the application of tribal treaty rights will be discussed at many levels during meetings with tribes as part of the CCP process. Although the tribes and the Service may discuss tribal treaty rights, the Service believes that defining the application of treaty rights is outside the scope of this CCP. At their request, the Service will meet with area tribes independent of the CCP process to develop memorandums of understanding (MOUs) and other instruments that are respectful

of the rights and needs of the tribes, in accordance with Service tribal policies, and consistent with preserving the natural and cultural resources of CLNWR.

There is a unique and distinctive relationship between the United States and Native American governments—as defined by treaties, statutes, court decisions, and the United States Constitution—that differentiates Native American sovereign governments from other interests and constituencies. Several tribes have historically occupied or used portions of CLNWR. The Treaty of 1855 created the Yakama Indian Reservation (see Appendix I) and CLNWR is within the exterior boundary of the reservation.

Through this and other treaties, the Yakama Nation retained certain lands for exclusive use (the reservation) and also retained the rights to continue traditional activities outside the reservations. These reserved rights include those to hunt, gather food and medicines, and pasture livestock on open and unclaimed lands.

Tribal access to the refuge for gathering and other traditional practices is guided by the Service's Native American Policy. If needed, the Service will seek to develop agreements with each tribe for addressing tribal access to areas for foods, collection of medicines and other resources, traditional practices, and other tribal concerns.

The existing Service Native American Policy, Executive Order (EO) 13175, and legislation provides guidance for directing on-going consultation. The Native American Policy, in particular, assists the Service in accomplishing its mission of resource protection while also guiding the Federal government's interactions with tribes to:

> *. . . assist Native Americans in protecting, conserving, and utilizing their reserved guarantee of statutorily identified trust resources. The Service will consult with Native American governments on fish and wildlife resource matters of mutual interest and concern to keep Native American governments involved in such matters from initiation to completion of related Service activities. . . . The Service will continue to involve Native American governments in all Service actions that may affect cultural or religious interests, including archaeological sites. The Service is guided by such legislation as the American Indian Religious Freedom Act, the Native American Graves Protection Act, the National Historic Preservation Act, the Native American Graves Protection and Repatriation Act, and Archaeological Resources Protection Act.*

1.5.5 State of Washington Wildlife Management

The Service has primary jurisdiction of fish and wildlife on refuge lands as established through a variety of laws, policies, and directives related to migratory and resident fish and wildlife resources on Federal lands. However, the Administration Act states in part, "Nothing in this Act shall be construed as affecting the authority, jurisdiction, or responsibility of the several States to manage, control, or regulate fish and resident wildlife under State law or regulations in any area within the [NWRS]. Regulations permitting hunting or fishing of fish and resident wildlife within the [NWRS] shall be, to the extent practicable, consistent with State fish and wildlife laws, regulations, and management plans."

Federal management activity involving migratory birds and other wildlife residing on units of the NWRS is a Federal function specifically authorized by Congress. It is, therefore, for the Secretary of the Interior to determine whether units of the NWRS shall be open to public uses, such as hunting and fishing, and on what terms such access shall be granted. However, in recognition of the existing jurisdictional relationship between the states and the Federal government, Congress has directed that, to the maximum extent practicable, such public uses shall be consistent with state laws and regulations (43 CFR 24.4). Consistent with the Administration Act, the Director of the Service will "interact, coordinate, cooperate, and collaborate with state fish and wildlife agencies in a timely and effective manner on the acquisition and management of national wildlife refuges" (Director's Order Number 148).

1.6 Refuge Establishment and Purposes

The purposes for which a refuge was established or acquired is of key importance in refuge planning. Purposes must form the foundation for management decisions. Refuge purposes are the driving force in the development of refuge vision statements, goals, objectives, and strategies in a CCP and are critical to determining the compatibility of existing and proposed refuge uses.

1.6.1 Legal Significance of the Refuge Purpose

The purposes of a refuge are specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, administrative memorandum, etc., establishing, authorizing, or expanding a refuge.

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 refuge. 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 additional lands are acquired under an authority different from the authority used to establish the original unit, the addition takes on the purpose(s) of the original unit, but the original unit does not take on the purposes of the newer addition. When a conflict exists between the NWRS mission and the purpose of an individual refuge, the refuge purpose may supersede the mission.

1.6.2 History of Refuge Establishment and Purposes

CLNWR was established in 1965 with the purchase of the 920-acre Dilling Tract, although the authorization for its establishment was granted during the August 10, 1964, quarterly meeting of the Migratory Bird Conservation Commission (MBCC). The minutes of the MBCC is the sole establishing documentation for the CLNWR; there have been no public land orders, executive orders, etc., related to CLNWR.

General Refuge Establishment Authorities

Executive Order 9337 – April 24, 1943. This Executive Order of President Franklin Roosevelt authorized the Secretary of the Interior to withdraw and reserve lands of the public domain and other lands owned or controlled by the United States.

Executive Order 10355 – May 26, 1952. President Harry Truman's Executive Order delegated to the Secretary of the Interior the authority of the President to withdraw or reserve lands of the United States for public purposes. This Executive Order superseded Executive Order 9337 of April 24, 1943.

Migratory Bird Conservation Act (Public Law 70-770) – February 18, 1929. "A commission to be known as the Migratory Bird Conservation Commission . . . is created and authorized to consider and pass upon any area of land, water, or land and water that may be recommended by the Secretary of the Interior for purchase or rental [as sanctuaries for migratory birds]. The Secretary of the Interior may . . . purchase or rent such areas or interests therein as have been approved for purchase or rental by the Commission . . . [or] . . . acquire, by gift or devise, any area or interests therein . . . which he determines to be suitable for use as an inviolate sanctuary, or for any other management purpose, for migratory birds. . . ." The funds for the purchase of lands and interests in lands was subsequently greatly expanded through the Migratory Bird Hunting and Conservation Stamp Act (aka Duck Stamp Act) which requires that each waterfowl hunter over the age of 16 purchase a Federal hunting stamp, the proceeds of which fund the activities of the MBCC.

Fish and Wildlife Act (Public Law 84-1024) – August 8, 1956. Under this legislation, the Secretary of the Interior was granted the authority to ". . . take such steps as may be required for the development, management, advancement, conservation, and protection of wildlife resources through research, acquisition of refuge lands, development of existing facilities, and other means."

Land and Water Conservation Fund Act (Public Law 88-578) – September 3, 1964. The Land and Water Conservation Fund Act established mechanisms to collect funds for. . . preserving, developing, and assuring accessibility to all citizens of the United States . . . quality and quantity of outdoor recreation resources ... Moneys appropriated from the fund for Federal purposes shall, unless otherwise allotted in the appropriation Act making them available, be allotted by the President to the following purposes and subpurposes...National Wildlife Refuge System–Acquisition for (a) endangered species and threatened species authorized under section 5(a) of the Endangered Species Act of 1973;...(c) national wildlife refuge areas under section 7(a)(5) of the Fish and Wildlife Act of 1956 (16 U.S.C. 742f(a)(4); and wetlands acquired under section 304 of the Emergency Wetlands Resources Act of 1986; (d) any areas authorized for the National Wildlife Refuge System by specific Acts.

Endangered Species Act (Public Law 93-205) – December 28, 1973. "The Secretary [of the Interior] . . . shall establish and implement a program to conserve fish, wildlife, and plants, including those that are listed as endangered species or threatened species . . . To carry out such a program, the appropriate Secretary shall utilize the land acquisition authority under the Fish and Wildlife Act of 1956 . . . the Fish and Wildlife Coordination Act . . . and the Migratory Bird Conservation Act . . . and is authorized to acquire by purchase, donation, or otherwise, lands, waters, interests therein, and such authority shall be in addition to any other land acquisition authority vested in him."

Specific Refuge Establishment Authorities

It should be noted that below are citations from MBCC meeting minutes in describing CLNWR and not specifically identified as purposes. There are no known purposes specifically identified in any authorizing language, public land order, etc. However, since the MBCC exists specifically to provide for migratory birds, the inferred purposes are based in law.

Migratory Bird Conservation Commission – August 10, 1964, and March 22, 2000. Under the authorities of the Migratory Bird Conservation Act, the established MBCC agreed to create CLNWR for these reasons.

- Restoration of these lands [i.e., hay lands] to former wetland habitat and stabilization of spring and summer water levels in managed impoundments will ensure greater waterfowl nesting and production of aquatic vegetation for all seasons' use. (MBCC Meeting, August 10, 1964)
- Proposed water development and management will be based primarily on the needs for nesting waterfowl with secondary benefits to migrating ducks and geese. (MBCC Meeting, August 10, 1964)
- . . migration and nesting habitat for many waterfowl species, including mallard, pintail, cinnamon teal, and wood ducks, as well as Canada Geese. (MBCC Meeting, March 22, 2000)
- . . one of three known nesting sites for greater Sandhill cranes in Washington. (MBCC Meeting, March 22, 2000)
- . . important wetlands used by resident wildlife as well as migratory waterfowl. (MBCC Meeting, March 22, 2000)

The Service's National Wildlife Refuge System database states the purposes for CLNWR:

- . . for use as an inviolate sanctuary, or for any other management purpose, for migratory birds. 16 U.S.C. § 715d (Migratory Bird Conservation Act)
- . . suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species. 16 U.S.C. § 460k-1
- . . the Secretary . . . may accept and use . . . real . . . property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors. 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended)
- . . to conserve (A) fish or wildlife which are listed as endangered species or threatened species . . . or (B) plants . .. 16 U.S.C. § 1534 (Endangered Species Act of 1973)

1.7 Relationship to Ecosystem and Other Planning Efforts

When developing a CCP, the Service considers the goals and objectives of existing national, regional, and ecosystem plans; state fish and wildlife conservation plans; and other landscape-scale plans developed for the same watershed or ecosystem in which the refuge is located. To the extent possible, the CCP is expected to be consistent with the existing plans and assist in meeting their conservation goals and objectives (Part 602 FW 3.3). This section summarizes some of the key plans reviewed by members of the core team while developing the CCP.

1.7.1 Regional Plans

Northwest Power and Conservation Council Klickitat Subbasin Plans

The Northwest Power and Conservation Council (NPCC) 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 each year for the Bonneville Power Administration (BPA) by the fish and wildlife agencies and tribes, the Independent Scientific Review Panel, and the NPCC. All of CLNWR is situated within the Klickitat Subbasin. Focal habitats included in the subbasin plan occurring on CLNWR include montane coniferous wetlands, ponderosa pine/Oregon white oak forests and woodlands, interior grasslands and interior riparian areas. These habitats include a set of focal species selected for the subbasin plan. Quantitative objectives were written for each focal habitat, based on the needs of selected focal species. CLNWR will have the opportunity every 5 years to submit project proposals for BPA funding that are consistent with the subbasin plan.

The Nature Conservancy (TNC) East Cascades – Modoc Plateau and West Cascades Ecoregional Assessment

Ecoregional assessments offer a means to evaluate and implement biodiversity conservation at a regional scale. An ecoregional assessment identifies a portfolio of sites for conservation action with a goal of protecting biodiversity and ecologically significant populations. These assessments are the result of rigorous analysis that has been extensively reviewed by experts and represent a comprehensive effort to provide the widest variety of habitats within individual river drainage. TNC's intent is to create a shared vision for agencies and other organizations at the regional, state, and local levels which will ensure efficient allocation of conservation resources. Biodiversity conservation in these ecoregions will be most effective if all conservation organizations coordinate to protect and restore biodiversity according to the priorities identified by this process.

U.S. Forest Service and Bureau of Land Management Interior Columbia Basin Ecosystem Management Plan

This project was an ambitious effort covering the majority of the Inland Northwest and is one of the best sources of broad-scale ecosystem analysis for the region. The scientific assessment which underlies the plan identified numerous threats to the ecological integrity of the basin. It provides a planning model for ecosystem management that has four iterative steps—monitoring, assessment, decision-making, and implementation. The model proposed is an adaptive model and is based upon an appreciation that people are part of, not separate from, ecosystems. Its chief value to CLNWR is in identifying regional and local trends, and in proposed risk management options that will dovetail with the goals, objectives, and strategies outlined in this CCP.

1.7.2 Migratory Bird Plans

Birds of Conservation Concern

Based on the efforts and assessment scores of three major bird conservation efforts (Partners In Flight, the United States Shorebird Conservation Plan, and the North American Waterbird Conservation Plan), this report identifies, by Service Region and by Bird Conservation Region (BCR), the bird species most in need of conservation attention. CLNWR is located within BCR Region 9, for which 29 species are listed.

Partners in Flight (PIF), East Slope Cascade Mountains Plan

The primary goal of the *Conservation Strategy for Landbirds in the East Slope of the Cascade Mountains in Oregon and Washington* is to ensure long-term maintenance of healthy populations of native landbirds. Specific management activities and strategies are recommended to guide planning efforts and actions of land managers, direct expenditures of government and non-government organizations, and stimulate monitoring and research to support landbird conservation. The recommendations also are expected to be the foundation for developing detailed conservation strategies at multiple geographic scales to ensure functional ecosystems with healthy populations of landbirds.

North American Waterfowl Management Plan

The North American Waterfowl Management Plan, signed by the United States and Canada in 1986 and by Mexico in 1994, provides a strategy to protect North America's remaining wetlands and to conserve waterfowl populations through habitat protection, restoration, and enhancement. The plan contains population goals for several species and groups of species by season or life stage. The plan was updated in 2004 with an emphasis on strengthening the biological foundation, using a landscape approach, and expanding partnerships. Additional strategic guidance was provided in a 2004 update, with specific population objectives by species. Implementation of this plan is accomplished at the regional level through partnerships, within 11 Joint Venture areas. CLNWR is located within the area of the Intermountain West Joint Venture. The document, a 15-year plan, contains species-specific population objectives as a step-down from the North American Waterfowl Plan and evaluations of whether the continental population is currently short or over the target. There are also flyway goals for production by species. The Columbia Basin is recognized as one of 67 areas of continental significance to waterfowl, but the plan does not target population objectives for wintering or migratory waterfowl by area.

Pacific Flyway Plans

Flyway management plans are the products of Flyway Councils, developed to help state and Federal agencies cooperatively manage migratory game birds. These plans typically focus on populations. The Pacific Flyway Council has prepared 29 management plans to date in either draft or final form available at pacificflyway.gov/Abstracts.asp#rmts. The following flyway management plans pertain to CLNWR and the CCP:

- *Canada Geese:* Lesser and Taverner's, Pacific Western, Rocky Mountain, Western, Depredation Control
- *Greater White-fronted Geese:* Pacific, Tule
- *Snow Geese:* Wrangel Island Lesser, Western Canadian Arctic Lesser
- *Ross' Geese*
- *Swans:* Pacific Trumpeter, Rocky Mountain Trumpeter, Western Tundra, Eastern Tundra
- *Sandhill Cranes:* Pacific Coast, Central Valley
- *Mourning Dove:* National Mourning Dove Plan

Intermountain West Regional Shorebird Conservation Plan

According to this plan, the Intermountain West is North America's most important inland area for maintaining the continent's shorebird populations. The plan identifies major shorebird issues in the

region and outlines regional goals and objectives in the areas of habitat management, monitoring and assessment, research, outreach, and planning. Key issues identified in the plan include water quality and quantity; maintenance and enhancement of populations of long-billed curlew, mountain plover, and upland sandpiper; depredation of eggs and young; regional coordination; agriculture/shorebird interface; and wintering sites. Concern ranking scores are provided for each of the 15 shorebird species breeding or moving through the region. Species ranked as critically important include black-necked stilt, American avocet, long-billed curlew, long-billed dowitcher, and Wilson's phalarope.

Intermountain West Region Waterbird Conservation Plan

This plan identifies the 41 waterbird species inhabiting the Intermountain West. The plan provides detailed background information for each species by BCR, including population estimates, identification of important areas, and an itemization of threats. For each BCR, species were categorized as high, moderate, or low concern, or as not currently at risk. Specific objectives are provided, usually framed in terms of overall population goals. Some habitat objectives are provided as well. The plan provides a useful section on research and education/outreach needs as well. A detailed species account is included for each of the 41 species.

1.7.3 Other U.S. Fish and Wildlife Service Plans

Several Service plans address management on either the MCRNWRC or CLNWR.

CLNWR Hunting Plan

In 1992 a revised Hunting Plan was signed that allowed hunting of deer, geese, ducks, coots, and snipe. This revision eliminated hunting for band-tailed pigeons and upland game birds, primarily because none of these species exist in adequate numbers to allow hunting. Grouse hunting could potentially disrupt Sandhill cranes. The plan also does not allow for hunting of black bears or elk. Most of the provisions of the 1992 plan are carried forward into this CCP, although eliminating deer hunting and allowing elk hunting are being considered in this CCP. The areas open to hunting remain the same.

CLNWR Public Use Management and Development Plan

In 1984 a public use plan was adopted. Included in the plan were facilities such as a hunter boat launch, wildlife viewing platform, and new signs. It also included development of a teachers' guide, highway maps, refuge brochures, and kiosks. Wildlife-dependent recreational activities were addressed and supported, although the plan is short on details. In the intervening years, some of the items/actions have been implemented (e.g., refuge brochure), some not (e.g., teachers' guide). Despite its limited use and implementation, the existing plan has been useful as a starting point for actions proposed in this CCP and coincides with the actions in this CCP.

CLNWR Sport Fishing Plan

In 1984 a Sport Fishing Plan was signed that allowed fishing on the lower 0.25 mile of Outlet Creek. Although other areas of the refuge supported target fish species, the decision to limit the fishing area to a section of Outlet Creek was so that it would not interfere with waterfowl nesting along ditch banks. By limiting the fishing area to Outlet Creek, it was determined through a 1976 environmental

assessment that fishing would not have a significant impact on the environment. This scenario is being carried forward into this CCP.

CLNWR Visitor Experience Site Plan

In 2011 the Service contracted for a design plan to address landscaping, interpretation along trails, trail redesigns, informational and interpretive kiosks, wildlife observation sites, visitor and staff parking, and several other facilities considerations. Most of the proposed elements are included within this CCP in Goals 6-8 in Chapter 2. Other elements have already been implemented or are in the process of being implemented.

CLNWR Water Management Plan

The CLNWR Water Management Plan addresses the current water management needs and capabilities within the context of the existing infrastructure and landowner arrangements. Water management needs are defined by supporting refuge wildlife habitat goals and objectives. The plan prescribes specific water management procedures for 32 water management units within the refuge by monitoring 34 water gauges set on the various units and creek systems. Water management capabilities of the units vary, with a few having no current management capabilities. Water enters the refuge through precipitation and slope run-off, springs, Frasier Creek, Holmes Creek, Chapman Creek, and Bird Creek. All water ultimately flows into and exits the refuge through the Camas Ditch and Outlet Creek, then downstream (northeast) into the Klickitat River.

MCRNWRC Fire Management Plan

The *2009 Mid-Columbia River National Wildlife Refuge Complex Fire Management Plan* details how the refuge will respond to the threat of wildfire and determines under what circumstances to use fire as a management tool. This plan will remain as is, and no changes to fire management capabilities or opportunities are proposed in this CCP.

1.7.4 Washington State Plans

The Service is committed to participating in Washington State planning efforts and assisting in their implementation, where feasible and affordable.

Washington Natural Heritage Plan

This plan describes Washington State programs, especially the Natural Areas Program, for conservation of the state's biological diversity. Species and ecosystem types (habitat associations) are ranked in terms of conservation priority. Of approximately 800 plant and wetland communities located within the state, 250 are considered priorities for conservation. Lists of rare animals, rare plants, and priority communities are located at www.dnr.wa.gov/nhp/.

Washington Status Report for the Mardon Skipper

The Mardon skipper is a small, tawny-orange butterfly currently found at only four small, geographically unconnected areas in Washington, Oregon, and California. In Washington, nine of 18 historic sites are known to be occupied, including CLNWR. Based on several years of repeated survey

efforts, it has been concluded that populations at five historic sites have been extirpated, four in south Puget Sound and one in the southern Cascades. The current status of four other sites is uncertain. Grasslands of the Puget prairies and Washington's southern Cascades are believed to support just a few hundred individuals.

In the southern Cascades, the Mardon skipper is found in open, fescue grasslands within ponderosa pine savanna/woodland, at elevations ranging from 1,900' to 5,100'. South Cascade sites vary in size from small, 1/2-acre or less meadows to large grassland complexes, and site conditions range from dry, open ridgetops, to areas associated with wetlands or riparian habitats. A variety of nectar source plants are important to the butterfly; on CLNWR the short, open stature of native, fescue bunchgrass stands allows Mardon skippers to access nectar and a place to safely lay eggs (oviposition).

In the south Cascades, the Mardon skipper relies on grasslands. However, during the past 150 years, native grasslands have been developed, fragmented and degraded. More than 95% of the original prairie grasslands are gone from western Washington. One reason is likely due to fire suppression. Fire historically played an important role in maintaining grassland plant communities, and suppression has allowed woodlands to encroach. Mardon skippers were likely more widespread and abundant prior to large-scale loss of their open, fescue-dominated, grassland habitat.

The grassland and savanna landscapes upon which Mardon skippers depend are threatened today by forest encroachment, invasion by native and non-native plants, development, recreational activities, grazing, agricultural practices, and application of herbicides. The butterflies themselves are threatened by insecticides, control practices for invasive plants, military training, fire, and recreational activities. Of the population sites remaining, many are under assault from invasive non-native plants and have human uses which are incompatible with butterfly management. At none of the Mardon skipper sites does a mandate and dedicated funding occur for managing the site for Mardon skipper habitat. Due to the Mardon skipper's small population size, limited distribution, isolation, and the numerous factors threatening the species and its remaining habitat, the Washington Department of Fish and Wildlife (WDFW) believes the species is vulnerable to extirpation. As such, WDFW has recommended the Mardon skipper be classified as a state endangered species (WDFW 1999).

Washington Status Report for the Oregon Spotted Frog

The Oregon spotted frog (*Rana pretiosa*) is endemic to the Pacific Northwest. Historically, it ranged from southwestern British Columbia south to the northeast corner of California. In Washington, the Oregon spotted frog was historically found in the Puget Trough from the Canadian border to the Columbia River and east into the southern Washington Cascades.

Oregon spotted frogs breed in late winter or early spring. Females lay their eggs in communal oviposition sites; areas of shallow, still, or slow-moving water and sparse, emergent wetland vegetation. Eggs hatch in 18 to 30 days, and the tadpoles grow and develop for 13 to 16 weeks prior to metamorphosis in mid-summer. Oregon spotted frogs mature and begin breeding at 2 or 3 years of age.

Oregon spotted frogs are almost entirely aquatic in habit, leaving the wetlands only occasionally and for short duration. Wetlands associated with lakes, ponds, and slow-moving streams provide suitable habitat. However, these aquatic environments must include a shallow emergent wetland component to be capable of supporting an Oregon spotted frog population. Historically, this critical element was found in the floodplains of many larger water bodies. Various emergent wetland and floating aquatic

plants are found in abundance in Oregon spotted frog habitat. Adult female and juvenile frogs, in particular, spend summers in relatively warm water of this shallow emergent wetland environment.

Within Washington, Oregon spotted frog populations face a myriad of threats. Historically, the shallow floodplain pools that Oregon spotted frogs inhabited were drained, diked, and filled to accommodate human needs. Exotic plants like reed canarygrass (*Phalaris arundinacea*) have changed the character of many wetlands and reduced their value as habitat for Oregon spotted frogs. Oregon spotted frogs are preyed upon during all life stages by a wide variety of predators, ranging from invertebrates that prey on eggs, to garter snakes (*Thamnophis* spp.) and herons (family *Ardeidae*) that feed on adults. Among the most significant predators are various introduced species, most notably the numerous warmwater fish species (primarily of the families *Centrarchidae*, *Percidae,* and *Ictaluridae*) introduced for sport fishing and the bullfrog (*Rana catesbeiana*). Because of their life histories and habitat affinities, these introduced species pose serious threats to Oregon spotted frog populations. Based on an assessment of presence at historical localities, the species is estimated to have been lost from 78% of its former range. However, considering the broad former range suggested by the historic data, it is likely the species has actually been lost from over 90% of its former range.

The locations for 11 historic populations in Washington have been verified using museum specimen and published records. Only one historically known population and two recently discovered populations are known to remain in Washington. An additional 20 extant populations are known in Oregon and one in British Columbia. Due to the limited number of extant populations and the inadequacy of existing protection for these populations, the State of Washington has recommended that the Oregon spotted frog be listed as a state endangered species. Likewise, the Service is also evaluating listing the species as threatened or endangered in 2013 (WDFW 1997).

Washington Sandhill Crane Recovery Plan

The Sandhill crane has been listed as an endangered species by the State of Washington since 1981. Sandhill cranes are represented in Washington by a small number of greater Sandhill cranes that breed in Klickitat and Yakima Counties, about 23,000 lesser Sandhill cranes that stop in eastern Washington during migration and 3,000–4,000 cranes (Canadian and possibly some lesser and greater Sandhill cranes) that stop on lower Columbia River bottomlands. On CLNWR it is the greater Sandhill crane that is of management concern, although some lesser Sandhill cranes undoubtedly occasionally pass through. Greater Sandhill cranes nest on CLNWR.

The greater Sandhill cranes that breed in Washington are part of the Central Valley Population, so-called because they winter in California's Central Valley. Other members of this population nest in Oregon, California, Nevada, and interior British Columbia. The historical distribution of breeding cranes in Washington was poorly documented, but the few historical accounts mention breeding in south-central, northeastern, and southeastern regions, and the southern Puget Sound Basin. Sandhill crane numbers had been severely reduced due to widespread habitat destruction concurrent with human settlement, and perhaps more importantly, unregulated hunting which continued until passage of the Federal Migratory Bird Treaty Act in 1916. The species disappeared as a breeder from the state after 1941 when the last nest was documented at Signal Peak, Yakima County, in south-central Washington. They were again found summering in the Glenwood Valley on CLNWR in 1972, but it was not until 1979 that nesting was confirmed. Since then other nesting sites have been reestablished, including Yakama Nation lands in Yakima County; Panakanic Valley in Klickitat County, and on Washington Department of Natural Resource (WDNR) lands along Deer Creek in Yakima County. The nesting population on CLNWR is somewhere around 25 pairs. Factors currently

affecting Washington's breeding greater Sandhill cranes include predation, incompatible grazing and haying practices, water availability and management, and habitat loss.

The goal of the Washington recovery plan is to restore a healthy breeding population of cranes and to maintain the flocks that winter or stop in Washington. To reach this goal, the plan calls for expansion of the breeding range of greater Sandhill cranes into former breeding areas in eastern Washington and protection of habitat for crane wintering and staging during migration. The plan identifies recovery objectives that must be reached and outlines strategies to use in meeting them before down-listing of the species to threatened or sensitive can occur. The Sandhill crane will be considered for down-listing from state endangered to state threatened status when the state's overall breeding population reaches at least 65 territorial pairs with an average annual recruitment rate of >8 % and effective water management control is established at CLNWR. The Sandhill crane will be considered for down-listing to state sensitive when the state's breeding population reaches at least 130 territorial pairs with an average annual recruitment rate of >8 %, and habitat used by cranes at the major staging sites in eastern Washington is protected through management agreements or easements. Also, for down-listing to sensitive, habitat needed to maintain 2,000 migrant and 500 wintering cranes should be secured and managed for cranes on the lower Columbia River bottomlands in Washington (WDFW 2002).

Washington Western Gray Squirrel Recovery Plan

The western gray squirrel is an arboreal squirrel best known for its large size, gray pelage, and plumose, white-tipped tail. Western gray squirrels are often confused with introduced eastern gray squirrels that are increasingly common in Washington's urban areas. Historically, western gray squirrels in Washington were widely distributed in transitional forests of mast-(the fruit of woody plants used as food for wildlife) producing Oregon white oak, ponderosa pine, and Douglas-fir, such as those on CLNWR. Western gray squirrels play an important role in maintaining oak woodlands by planting acorns and disseminating spores of fungi that aid tree growth.

During the 20th century, the Washington population of western gray squirrels experienced great reductions in both numbers and distribution. The species now occurs as separate populations in the Puget Trough, Klickitat, and Okanogan regions that are estimated to total between 468 and 1,405 individuals. These three populations are genetically isolated from one another and have been isolated from those in Oregon and California for at least 12,000 years. None of the three current populations seems to be large enough to avoid a decline in genetic diversity, and at least two may suffer from the negative effects of inbreeding.

The western gray squirrel was listed as a threatened species in Washington in 1993 by the Washington Fish and Wildlife Commission (WFWC), and its native oak habitat is recognized as a WDFW Priority Habitat. The Service considers the western gray squirrel a species of concern in western Washington, and the U.S. Forest Service (USFS) recognizes it as a sensitive species and a management indicator species for oak-pine communities. Washington populations of the western gray squirrel have not recovered from past reductions in their range, and existing populations face significant threats to their survival. The western gray squirrel is vulnerable because of the small size and isolation of remnant populations. Major threats to the western gray squirrel in Washington include habitat loss and degradation, road-kill mortality, and disease. Populations of eastern gray squirrels, fox squirrels, California ground squirrels, and wild turkeys are expanding and may compete with, and negatively impact, western gray squirrel populations. Competition with eastern gray squirrels may be an important current issue for the population in southwestern Klickitat County. California ground

squirrels, which became established in Washington in the 20th century, may also compete with western gray squirrels in Klickitat County.

In Klickitat County, squirrels face a myriad of problems. Habitat has been lost to urbanization and other development. Conifer-dominated stands of large diameter and mast-producing trees of pine and oak with interconnected crowns are particularly important in the life history of the western gray squirrel; logging that removes the large mast-producing trees and results in evenly spaced trees with few or no canopy connections reduces habitat quality. Habitat also has been degraded by fire exclusion and historic over-grazing. Road-kill is a frequent source of mortality for western gray squirrels. Notoedric mange, a disease caused by mites, periodically becomes epidemic in western gray squirrel populations and appears to be the predominant source of mortality in some years. The incidence and severity of mange epidemics appears to be related to stresses in the local population precipitated by periodic food shortages.

Recovery actions are needed to maintain and restore western gray squirrel populations in Washington. The WDFW recovery plan identifies western gray squirrel recovery areas and interim recovery objectives for these areas. The recovery plan outlines strategies intended to restore a viable western gray squirrel population in the South Cascade Recovery Area. The western gray squirrel will be reclassified from state threatened to state sensitive status when management plans, agreements, regulations, and other mechanisms are in place that effectively protect the habitat values for western gray squirrel populations and the following population levels are maintained:

- A total population of 3,300 adult western gray squirrels in the South Cascades Recovery Area;
- A total population of 1,000 adult western gray squirrels in the North Cascades Recovery Area; and
- A population of >300 adults is restored and maintained in the Puget Trough Recovery Area.

Recovery objectives may be modified as more is learned about the habitat needs and population structure of this species. Increasing and maintaining a population in the Puget Trough and the North Cascades may require augmentation with individuals from healthier populations. Western gray squirrel recovery strategies include protecting and monitoring populations, restoring depleted populations and degraded habitat, and protecting suitable oak-conifer habitat from harmful timber practices, catastrophic fires, and loss to development. Research is needed on the habitat requirements and factors limiting western gray squirrel populations, the role of disease in dynamics of populations, and to refine survey and population monitoring methods. Successful recovery of the western gray squirrel in Washington will depend on cooperative efforts of large and small private landowners, Native American tribes, counties, and multiple public agencies (WDFW 2007).

1.8 Planning and Issue Identification

The Service evaluated the issues and concerns raised during public scoping. Issues are defined as matters of controversy, dispute, or general concern over resource management activities, the environment, land uses, or public use activities. Issues are important to the planning process because they identify topics to be addressed in the CCP, pinpoint the types of information to gather, and help define alternatives for the CCP. It is the Service's responsibility to focus planning and analysis on the major issues. Major issues typically suggest different actions or alternative solutions are within the refuge's jurisdiction and have a positive or negative effect on the resource. Major issues will influence the decisions proposed in the draft CCP.

1.8.1 Land Acquisition, Exchanges, Conservation Easements

- How will CLNWR acquire inholdings?
- If the refuge is unable to acquire inholdings, what actions will be pursued in order to provide suitable wildlife habitat, e.g., water management?

The approved acquisition boundary for CLNWR is 9,245 acres. The refuge currently encompasses approximately 6,500 acres in fee title ownership, plus a 700-acre easement. This easement restricts the development of the tract, but it does not allow Service management or monitoring of the site.

CLNWR is interspersed with private ranches and timberlands within the refuge boundary. This mixed ownership has resulted in negative impacts on some refuge resources due to: 1) early water drawdowns via private water control structures; 2) contiguous Service and private habitats that are subject to both documented and undocumented mutual agreements for drying, vegetation removal, and other mechanical disturbances for haying operations on both refuge and private lands; 3) agreements for ditch maintenance with the Klickitat Drainage District #1 (KDID); and 4) trespass cattle grazing. Acquisition or exchange of key inholdings continues to be crucial for fulfilling the long-term goals of CLNWR.

1.8.2 Water Rights

- Does CLNWR receive all of its allotted water?
- How will the refuge manage points of diversions within private lands?
- How will the refuge manage untimely water delivery actions by other users that affect refuge management?
- What are the water rights associated with springs?

There are three types of water rights on CLNWR—water right claims, state-appropriated water rights, and decreed water rights. A water right claim is for a water right or beneficial use that existed prior to 1917 and the establishment of Washington Water Code, but one that has not been adjudicated yet. Washington State appropriative water rights are rights that have been obtained through the usual permitting process established by the Washington Water Code. A decreed water right is determined to have existed prior to 1917 and the establishment of the Washington Water Code. Decreed water rights are determined through water rights adjudication.

As a result of Federal law and the treaty rights of several Pacific Northwest Indian tribes, the tribes are major stakeholders in water resource issues. Tribal treaty rights include fishing and hunting rights as well as rights to the protection of the water habitat necessary to realize those treaty rights. As of August 2011, Federally Reserved Rights for the tribal lands in the Upper and Middle Klickitat subbasin had not been quantified. The future of Tribal water rights in the Upper and Middle Klickitat is unknown. Within the Upper and Middle Klickitat, Bird Creek and Frasier Creek drainages were adjudicated by the State of Washington in 1918. The Hell Roaring Irrigation Company (HRIC) supplies over 116 cfs to the refuge through contributions of Bird, Muddy and, Hellroaring Creeks.

The volume of Bird Creek water delivered to the refuge from the HRIC is not a fixed quantity and varies depending on seasonal supplies. “Bird Creek water is controlled and regulated by the Hell Roaring Irrigation Company which was organized as a stock company which sold shares. Shareholders are allowed proportionate shares of the annually available water. The water is not tied to any given

land and shares in the irrigation company do not transfer with the land" (Langman D., Memo to the Refuge Manager, Conboy Lake NWR, Glenwood, WA, May 6, 1994). The refuge holds 26 of the 400 shares in the HRIC. Copies of the Hell Roaring Irrigation share certificates are on file in the Regional Office, Water Resources Branch.

Two water right claims on Holmes and Chapman Creek, both with priority dates of 1900, claim a total of 600 cfs over 5280 acres of refuge lands. Refuge staff indicate that these flows are limited to brief flow periods during snowmelt and high intensity storm events.

For the Water Resources Inventory and Assessment, the Service's Water Rights Evaluation Network (WREN) database was cross checked with the Washington Department of Ecology (WDOE) Water Resources Explorer (http://www.ecy.wa.gov/programs/wr/info/webmap.html) to ensure that the Service has current and updated water rights data. Place of Use (POU) and Point of Diversion (POD) from WDOE were limited to the township/range/section scale and as such, are spatially imprecise. GIS coordinates are not available for actual PODs. WREN has been updated to reflect all water rights on fee title and inholdings within the approved refuge boundary.

In general, natural water flows are sufficient from November through April to fill all the wetlands and prairies on CLNWR. Since the refuge is situated at the bottom of the basin, and ultimately receives almost all tailwaters from upstream users, it generally receives sufficient water. However, because the refuge is located at the end of the water delivery system, it has also received unexpected water flows which have compromised management actions (such as drawdowns, flooded hay bales).

There are four diversion points off the refuge. The significance of having points of diversion off the refuge is that the refuge may have to access private property to manage the diversion.

Documented temperature increases over the past 20 years, and anticipated water shifts in rain/snow cycles due to climate change, will lead to an earlier spring drying trend in the valley. Therefore, the need to resolve CLNWR water rights and efficiently utilize and manage water flows is critical to achieving refuge purposes.

1.8.3 Water Management

- How will CLNWR manage water to provide suitable wildlife habitat with respect to private lands?
- What is the most efficient use of delivery water within the refuge?
- How will CLNWR manage water delivery system maintenance?
- What actions should the refuge take to sustain and restore priority habitats over the next 15 years?

CLNWR manages approximately 3,500 acres of wet prairie, emergent marsh, and seasonally flooded scrub-shrub and forest land habitats, which encompass approximately 54% of the refuge. Water management is the single most important management issue on the refuge and within the Glenwood Valley. The habitat is important due to its biodiversity and its juxtaposition within the broader geographic landscape and to remaining populations of rare wildlife and plant species. In general, the goal is to manage wetlands that mimic the natural hydrology of the basin, where feasible. This includes maintaining the large contiguous wet prairie system (Camas Prairie) and the Conboy Lake wetland system.

The main hydrologic input to CLNWR is Bird Creek. Chapman, Holmes, and Frazier Creeks, along with several springs, provide additional seasonal flows. Chapman and Holmes Creeks provide early season water, whereas Bird Creek provides water later in the growing season due to the Hellroaring Irrigation District's ability to shunt irrigation water to valley users. The only output from the refuge is Outlet Creek, which was channelized (straightened, controlled) approximately 100 years ago. Water management on CLNWR requires using all creek and sheet water flows entering Glenwood Valley. All of these flows have been diverted and/or modified into delivery and drainage ditches with associated dikes, water control structures, spillways, and many miles of minor ditches. Water management on the refuge is constrained due to the inability to control water on private lands (inholdings), failing dikes, plugged ditches, undersized culverts, and lack of water control structures.

Challenges regarding water management on CLNWR include: 1) the KDID's annual draining and irrigation of the Camas Prairie, and to a lesser extent Conboy Lake, for cattle grazing and haying by private landowners in the valley; 2) the KDID authority to dredge specific waterways (such as Camas Ditch/Outlet Creek) on the refuge when they become choked with vegetation or silt; and 3) the refuge not having the complete infrastructure required to control water independently from the KDID and other landowners. Historically, Glenwood Valley was ditched and drained to promote agricultural practices (farming, haying, grazing). As a result, much of the Camas Prairie is still annually drained to facilitate the production of hay and provide grass pastures on inholdings. These early drawdowns directly affect refuge management and subsequently have negative impacts on wildlife and plant resources, particularly Sandhill crane and waterfowl production.

1.8.4 Wet Meadow, Riparian and Instream Habitat Management

- What actions should the refuge take to sustain and restore priority habitats over the next 15 years?
- What habitat conditions should be targeted and rehabilitated on wetland habitats?
- How will the refuge manage the long-term viability of wet meadows in response to pine encroachment?
- How will the refuge approach managing or controlling reed canarygrass?

These habitats are best characterized by the Camas Prairie and the areas including and surrounding the historic Conboy and Swan Lakes. Annual water inundation varies considerably depending on the unit location, rainfall, and snowpack, ability to flood/irrigate from the Bird Creek system, haying, and specific unit vegetation and management needs.

These areas are dominated by reed canarygrass, which may be differentially expressed annually depending on weather and water conditions. The Camas Prairie and other open sites are generally scoured of taller vegetation by winter ice and winds. Protected sites, however, often develop thick stands of canarygrass, which displace native species.

The prairie habitats support a diversity of wildlife species, including invertebrates, amphibians, marsh birds, waterfowl, and Sandhill cranes. This habitat supplies essentially all the breeding habitat for the state endangered Oregon spotted frog in the Glenwood Valley, as well as that of other amphibians. It is essential for Sandhill crane rearing/foraging habitat and supports nearly all breeding and active season habitat for rails, Wilson's snipe, and American bitterns, and it supplies brood habitat for waterfowl.

Management of the prairie habitat is complicated by five private inholdings. Because these inholdings are hayed and grazed, they require a water regime that conflicts with wildlife and habitat needs. The refuge's portion of the prairie (920 acres) is not hydrologically isolated from the private lands (320 acres), so early dewatering of inholdings concurrently dries up refuge lands. Initiation of drawdowns starts as early as April in some years and occurs during the breeding season of many of the wet prairie-dependent species. Documented impacts include drying of water around Sandhill crane nests and desiccation of Oregon spotted frog egg masses. These are the earliest breeding species, so it is assumed that other nesting species are impacted more severely.

Widespread encroachment of lodgepole pine and Douglas spiraea into wet meadow and prairie habitats on the refuge is a problem. Ponderosa pine can encroach into drier sites. This woody encroachment degrades prime breeding habitats for Sandhill cranes and Oregon spotted frogs. This condition could be caused by nearly a century of early dewatering and wild or manmade fires.

Riparian habitats occur primarily along Bird Creek and some of the smaller ditches on CLNWR. Aspens, alders, and willows are the dominant native woody species within the riparian corridors. The historical extent of riparian habitat likely was limited to stream systems that entered or exited the valley. More riparian habitat may exist today due to its association with the miles of constructed ditches and re-channelization of creeks that has occurred during the past century. The potential riparian habitat acreage is relatively small in the valley.

Woody vegetation along the constructed dike system poses maintenance, management, and access issues. Tree roots compromise dike integrity, and downed trees block waterways, making water management difficult. Beavers are attracted to riparian areas; their dams, bank burrows, felled trees, and runways cause additional management problems. Although canopy cover provides shade along water courses, it may also shade out submergent and floating plants which provide substrates for invertebrate food resources and predator escape cover for Oregon spotted frogs. Therefore, there is a need to balance riparian cover with other aquatic species requirements.

1.8.5 Short Grass (Wet Prairie and Upland Meadow) Management

- What actions should the refuge take to sustain and restore priority species and habitats over the next 15 years?
- What habitat conditions should be targeted and rehabilitated on wetland habitats?
- How should the refuge consider utilizing haying, grazing, or prescribed fire as a management tool?
- What alternative options exist in the absence of a haying program?
- How will the refuge approach managing or controlling reed canarygrass?

Reed canarygrass is widespread in wet meadows on CLNWR, and mowing and haying later in the growing season are utilized to reduce the reed canarygrass cover. These methods do not reduce infestations, but do serve to open up rank, densely vegetated areas, making them more useful for wildlife.

Haying is used to: 1) improve Oregon spotted frog breeding sites (short vegetation, warmer spring soil temperatures), especially where canarygrass is prevalent; 2) provide winter and spring green forage habitat for Canada geese; 3) enhance foraging opportunities for Sandhill cranes (access to invertebrates and small vertebrates); 4) reduce encroachment by woody species; and 5) provide open areas of water

for wintering and migrating waterfowl. There has been little change in the haying program since the refuge was established. There are 31 hay allotments that total approximately 2,325 acres of upland and wet meadows; however, less than one-half of that total is currently hayed. There are eight permittees that cut and harvest about 1,500 tons of hay annually on approximately 1,100 acres of the refuge. Recent surveys indicate there will be less of a demand for hay in the valley due to changing economic conditions. Haying operations begin August 1st to protect nesting and flightless migratory birds; all hay is required to be removed by September 15 to allow flood-up of wetland units.

Mowing has been used sporadically, but it has been under-utilized as a tool for short-grass management. Mowing does occur annually on dike tops that must be kept open for routine staff operations. Mowing can be an effective technique to maintain short vegetation along prairie and wetland margins within spotted frog breeding areas.

It is estimated that over 1,100 acres of reed canarygrass-infested wet meadows exist that are not currently treated on the refuge. The condition of these sites, and their suitability for haying or other management to produce short-grass habitat, is unknown. The haying program needs to be evaluated to ensure that short-grass management needs are being met without compromising native vegetation.

Prescribed fire can been utilized as an effective management tool to remove dense, rank vegetation, woody encroachment, and accumulated debris, particularly in areas that are unsuitable for machinery. From refuge establishment to date, there have not been any prescribed fires targeting prairie or meadow management. Fire is needed as an initial step to access and evaluate some of these wet prairie and upland grass units before they can be fully evaluated for other management regimes.

Grazing was also used until 1976, when it was found incompatible due to negative environmental effects to habitats and priority species. As a result, many of the grazing units were converted to haying units. Trespass grazing is an annual issue as fences frequently fail due to winter ice flows, elk damage, or fence and gate disrepair. A few areas of the refuge (southwest) are unfenced and subject to trespass (open-range) cattle grazing. High stocking-rate grazing has been used in a few circumstances where dense stands of canarygrass could not be accessed by mowers.

1.8.6 Upland Meadow Management

- What actions should the refuge take to sustain and restore priority species and habitats over the next 15 years?
- What habitat conditions should be targeted and rehabilitated on upland habitats?
- How will the refuge manage the long-term viability of upland meadows in response to pine encroachment?
- How should CLNWR consider utilizing haying, grazing, or prescribed fire as a management tool?

CLNWR contains approximately 1,125 acres of dry upland meadows providing a diverse transition zone between wet meadows and forested areas. The upland meadows range from saturated soil during the winter and spring months to very dry soils in summer.

Many of the upland meadows are threatened by encroachment of ponderosa and lodgepole pines. Cutting and removal of these pines has occurred, primarily the younger trees, and this control effort has increased in recent years and has targeted larger diameter pines. Upland meadows in this region are a

fire-dependent habitat, and fire can be used to maintain the vigor of native upland grasses and forbs. Prescribed fire can be used as a tool to reduce woody encroachment and improve native plant vigor, but has been under-utilized in the past.

1.8.7 Forest Management

- What actions should the refuge take to sustain and restore priority species and habitats over the next 15 years?
- What habitat conditions should be targeted and rehabilitated on forested habitats?
- How should CLNWR consider utilizing commercial thinning and prescribed fire as a management tool?

Forested habitat on CLNWR totals approximately 2,000 acres, primarily around the perimeter of the prairie and wetland units. CLNWR forest stands can be roughly lumped into five categories: ponderosa pine forest, lodgepole pine forest, mixed conifer stands, quaking aspen stands, and Oregon white oak woodlands. Although most of the refuge forest acreage is small, much of it abuts private and corporate timber lands and functions within the larger landscape. Scattered patches of forest also occur within the wetland units on higher ground.

Forests on and adjacent to the refuge were logged approximately 60 to 80 years ago and are relatively even-aged. Aside from a couple of small prescribed fires within the ponderosa pine habitat (1989 and 1991), there have been no forest management practices conducted on the refuge. The *Silvicultural Report and Recommendations for Conboy Lake National Wildlife Refuge Forest Stands* (White 2009) is an assessment of the forest habitats and silvicultural needs for each of these forest types on the refuge. This report found that forest stands generally are too densely populated due to lack of fire and/or thinning; forest canopy layers are lacking; snag density is low; and forest openings are lacking. Overall, CLNWR's forested habitats are still in relatively good health, but they are in need of management to attain the features and vegetative structure necessary for optimizing wildlife values.

1.8.8 Invasive and Non-Native Plants and Wildlife

- How will the refuge control invasive species and prevent new invasive species from becoming established?
- What are the most appropriate strategies for controlling invasive species on the refuge?

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. Although there are only a small number of invasive species on CLNWR, they are widespread and problematic. Refuge staff employ an integrated pest management (IPM) approach using mechanical, physical, chemical and, where appropriate, biological controls to control pest species. See Appendix H for a full description of IPM

Meadow knapweed is the most prevalent invasive plant occurring on the refuge. It invades upland and wet meadows on the refuge, as well as similar areas on adjacent private land. The seed head weevil, a biological control agent, was released over 20 years ago on the refuge to control meadow knapweed. This weevil is well-established and can be found in most stands of knapweed. Although this weevil is relatively effective in reducing reproduction, it does not kill the plant. Herbicides have also been used strategically in the past to help control infestations.

Other invasive but less prevalent non-native plants include bachelor buttons, diffuse knapweed, common St. John's wort, Scotch broom, and Canada thistle.

The non-native bullfrog is fairly common on the refuge. Studies indicate that bullfrogs can prey heavily on native frog species (including Oregon spotted frogs). Some ineffective control efforts have been carried out in the past on adults and juveniles. Water management can be used as an effective method to reduce tadpole survival by drying up seasonal wetlands completely by early fall. However, widespread drawdowns for tadpole control can conflict with the need to provide late-season waterbird brood habitat.

Brown bullhead fish are not native to the refuge, and they occur in virtually all permanent and seasonal wetlands. There is no information about the impacts of bullhead on the native wildlife or ecology of the prairie and wetlands. However, in other areas they are known to eat frog tadpoles.

1.8.9 Oregon Spotted Frog Management

- What is CLNWR's role in assisting Oregon spotted frog recovery, while at the same time meeting refuge purposes to provide migration habitat for waterfowl?
- What actions can be taken to protect and restore habitat values for Oregon spotted frogs?

The Oregon spotted frog is listed as endangered by the State of Washington and is a Federal candidate species. CLNWR and the surrounding private lands within the Glenwood Valley are one of the few areas where Oregon spotted frogs are known to remain in Washington. This population is the largest remaining across its historic geographic range.

Oregon spotted frogs are one of the most aquatic ranid (smooth and moist-skinned, with large, powerful legs and extensively webbed feet) frog species and the most aquatic native ranid frog in western North America. They require permanent waters (mainly creeks, ditches, and springs) of sufficient depth and flow to overwinter, presumably because such sites provide shelter from freezing with sufficient oxygenation. Breeding occurs within the seasonal wetlands (late February to April), and metamorphs start appearing in June. Physical barriers between permanent waters and breeding sites due to the diking system may hinder frog movements into appropriate breeding sites, as well as metamorph dispersal into the permanent waters.

Beaver activity creates considerable habitat for Oregon spotted frogs (and other wildlife). Beaver dams provide low-flow, stable water conditions that promote invertebrate populations, provide rearing areas, and enhance vegetative diversity within the pond system. Dams and lodges contain a complex matrix of logs and branches through which flow maintains high levels of dissolved oxygen. Dams and ponds also limit freezing in a microhabitat relatively secure from predators, and thus provide ideal frog overwintering sites. Beaver dams are also active seasonal refuges secure from most predators. However, beaver dams have historically been actively removed by refuge staff and private landowners to increase water flows.

Water control infrastructure, and the periodic dredging to remove silt, vegetation, and in-stream obstructions, often conflicts with the needs of Oregon spotted frogs, particularly at overwintering sites.

Despite considerable knowledge about the habitat and management requirements for Oregon spotted frogs, management remains complex, as habitat needs and the abatement of other stressors often

conflict with the conventional intensive wetland management that occurs on the refuge. Water management related to early drawdowns for private inholdings, dredging of overwintering creeks and ditches, continued failure of water control infrastructure, removal of beaver dams and the recently discovered presence of *Chytridiomycosis*—an infectious disease of amphibians—within the frog population are probably suppressing population recovery.

1.8.10 Rare Plant Management

- What is CLNWR's role in assisting in rare plant recovery, while at the same time meeting refuge purposes to provide migration habitat for waterfowl?
- What actions can be taken to protect and restore habitat values for rare plants?

CLNWR is botanically rich, lying in a transition zone between the lush high mountains surrounding Mt. Adams and the drier foothills to the east. The refuge supports known populations of two Washington State endangered and three threatened plant species. CLNWR also supports other state sensitive/rare plant species, which can be found in the several refuge plant species inventories that have been compiled by native plant groups.

Most of the unique and rare plants are wet prairie associates. The wet prairie species of primary management concern are Oregon coyote-thistle (state threatened), rosy owl-clover (state endangered), Kellogg's rush (state threatened), dwarf rush (state threatened), and long-bearded sego lily (state sensitive). The refuge is believed to support the largest and healthiest populations of these plants in the state, other than Kellogg's rush which may be extirpated. These plants are affected by permanent water management regimes, trespass cattle grazing, haying, and invasive species.

Two rare plant species are associated with openings within the ponderosa pine forests—Ames' milk-vetch (state endangered) and Pulsifer's monkey-flower (state sensitive). Ames' milk-vetch may be affected by fire suppression within the forest community, which has led to canopy closures not conducive for maintaining the shrub communities associated with this plant. Pulsifer's monkey-flower is primarily a grassland-forb community associate and may be impacted by non-native plant species and encroachment by shrub and tree species.

1.8.11 Sandhill Crane Management

- What is CLNWR's role in assisting in greater Sandhill crane recovery, while at the same time meeting refuge purposes to provide migration habitat for waterfowl and other birds?
- What actions can be taken to protect and restore habitat values for greater Sandhill cranes?

The greater Sandhill crane is listed as endangered by WDFW. Nesting was first confirmed on CLNWR in 1979, and the refuge supports 80-90% of the known nesting cranes in Washington. The number of breeding pairs on the refuge has increased from seven (1995) to 21 (2008). During that same time period, the number of individual cranes (breeding population) in Washington (on and off refuge) increased from 22 to 64. Despite this growth, the number of nesting pairs has remained relatively stable over the past five years.

Predation of crane eggs and colts is suspected to come primarily from predatory birds and coyotes; however, these causes have not been well documented. Water management (or lack of capability) can lead to nest loss by drying (increasing predation) or flooding. Water elevations need to remain fairly

stable during the nesting period (April–May), and drawdowns need to occur slowly to provide rearing habitat for colts. Ideally, wet meadows should retain some water for roosting and brood habitat through July.

Haying in the Glenwood Valley occurs predominantly from mid-July through September. Hay operations, and the resulting human disturbance, can drive cranes off territory and remove valuable portions of cover, endangering unfledged colts. There has not been any documented mortality of crane colts on the refuge directly attributable to haying operations, but this problem has been noted at other sites. To avoid potential issues during haying, there is an August 1 initiation date for haying on refuge lands.

1.8.12 Elk Management

- What is CLNWR's role in managing elk within the state's elk management unit?
- Is elk hunting a viable public use opportunity on the refuge?

Prior to 1980, elk were rarely observed in the Glenwood Valley and apparently arrived in the area following the Mount Saint Helens volcanic eruption. The refuge currently supports a population of elk during much of the year, and the population appears to be increasing annually. Multiple long-term factors appear to be driving the increasing elk use of the valley. For example, forage conditions seem to have improved on the refuge with improved wetland conditions and a concurrent increase in shrubs and small trees.

The elk population appears to be expanding its range and herd size, though there have been no long-term surveys conducted to assess population trends and range within the Glenwood Valley. From April 2005 to June 2006, Service and WDFW staff initiated monthly elk surveys to document population size and seasonal use of the valley. The total number of elk counted per survey varied from 0 (December 2005 and January 2006) to 359 (April 2005). The December and January low was expected and consistent with information that the elk herd moves out of the valley during the winter months. The peak counts occurred during April 2005 (n=359) and April 2006 (n=333). The refuge is used for calving, and the first calves are observed mid-May.

Habitat impacts in the form of elk trails in both wetlands and timbered areas appear to be increasing, and erosion of stream banks at elk crossings is evident throughout the refuge. Continual erosion at these sites ultimately leads to dike overtopping, which complicates water management.

Elk depredation has been a suspected periodic problem in nearby agricultural fields for many years. Elk damage generally occurs in grain fields starting in August. Conversely, elk depredation in Trout Lake is primarily on spring forage crops.

WDFW and local landowners have expressed interest in an elk hunt on CLNWR. However, elk hunting within and around the town of Glenwood has been controversial. Over the past several years, unethical and reckless hunting on private lands has prompted local concerns regarding safety. A lack of information on depredation complaints and herd data, herd management objectives, and safety issues pre-empts the development of a hunting program. There is general agreement that a refuge elk hunting program will not resolve the depredation issue and that a hunt may actually exacerbate the problem off-refuge by driving elk onto private lands. There is not sufficient habitat damage data to support pursuing a regular elk hunting season on the refuge, and it is felt that a more liberal hunt may be

problematic due to safety concerns (nearby residences and roads), disturbance to other refuge resources, and timing conflicts with management activities and other public uses. A specialized hunt—youth, Architectural Barriers Act (ABA)-accessible, or limited entry—may be an option.

Elk observation is a popular spring and fall pastime for CLNWR visitors; therefore, maintaining these viewing opportunities is important and should not be compromised by other refuge programs.

1.8.13 Waterfowl and Waterbirds

- Where should specific waterfowl management tools and techniques be utilized?
- What role should CLNWR play in providing migrating waterfowl habitat and hunting areas within the Pacific Flyway?

At least 25 species of waterfowl use the refuge during the year. Outside of species presence and seasonal use, little is known about population numbers, distribution, and productivity of migratory birds. There have been no formal surveys to quantify waterfowl or waterbird use or reproductive success on CLNWR. However, it is estimated that as many as 200,000 Taverner's/lesser/western Canada geese may pass through the refuge and the surrounding agricultural lands during the spring migration. Over 3,000 greater white-fronted geese have been noted in recent years, while Wrangle Island snow goose numbers generally average less than 200.

Marsh birds can be abundant, particularly during wet years; however, no quantifiable population information exists. Brood water on and off the refuge is generally lacking due to the valley-wide practice of private landowners draining lands for hay and pasture. In addition, permanent or late season waters for brood rearing can be restricted by efforts to control bullfrogs and wetland drawdowns necessary to promote native vegetation, such as sedges.

Winter bird use is generally low, as open waters often freeze by late November and remain so into March. As with breeding, there have not been any surveys to determine populations of wintering and migratory waterfowl. Annual winter and migratory waterfowl use can vary considerably depending on forage conditions both on and off the refuge, ice and snow cover, and timing of late winter storm events.

Annual variability (availability, depth, distribution, timing) of wetlands and meadows—in large part a function of early drawdowns for private lands—is believed to have significant impacts on recruitment of waterfowl and waterbirds in some years. However, the lack of both refuge and regional data makes it difficult to discern if these perceived population trends are a function of valley-specific or regional habitat conditions. In general, mid-summer through fall water availability is confined to the three creeks and the major ditches in the valley.

1.8.14 Wildlife-Dependent Public Uses

- What types of improvements to wildlife-dependent uses can be provided to enhance public enjoyment and ensure a quality experience for refuge visitors?
- How will CLNWR meet the increasing demand for safe, accessible, high-quality wildlife-dependent recreation opportunities in the future?
- How will the refuge provide visitors with safe and ABA-accessible access?
- How will the refuge improve the quality of the hunting program?

- How will CLNWR address the impacts of increasing visitation on wildlife and minimize impacts to priority species?

The Administration Act identified six priority refuge uses: hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation. These uses receive enhanced consideration in planning and management over all other general public uses on refuges. When compatible with refuge purposes, these wildlife-dependent recreational uses are to be strongly encouraged. Under the Service compatibility policy (603FW2), refuges with limited staffing and funding are required to make efforts to obtain additional resources or outside assistance to provide wildlife-dependent recreational uses and to document those efforts before determining that any of these uses are not compatible. These uses, as well as other current or proposed uses, receive an extensive compatibility review in the CCP before being allowed.

CLNWR must manage ever-increasing visitation and demand for visitor services programs with a small staff. This limits all visitor services programs; however, it is more problematic for certain programs (e.g., waterfowl hunting and environmental education) than others (wildlife observation.) To date, emphasis has been placed on maintaining facilities, welcoming and orienting visitors, answering information requests and dealing with law enforcement issues. The visitor services programs are mostly self-serve through informational kiosks and a walking trail. Currently, best guesses are being used to estimate visitation. Environmental education programs are delivered through the use of volunteers and partnerships with local groups.

Waterfowl hunting is allowed on CLNWR within the designated free-roam hunt area in accordance with Washington State seasons and regulations, 7 days a week, all day (dawn to dusk). Hunting pressure is light to moderate and is concentrated mainly in response to Canada goose activity late in the season.

Dove hunting is allowed on CLNWR, but very few, if any, harvests have been documented.

Deer hunting is allowed on a designated 100-acre unit, but is of questionable quality due to the area restriction and deer population.

1.8.15 Effective Law Enforcement

- How does CLNWR create a stronger law enforcement presence to better facilitate effective management, reduce law enforcement violations, and reduce user group conflicts?

Law enforcement is currently covered by refuge officers stationed out of MCRNWRC in Burbank, Washington. Because of the distance from the MCRNWRC office and the lack of waterfowl hunting pressure, law enforcement visits are limited to elk hunting season and a few sporadic visits throughout the year. Most law enforcement coverage is provided by WDFW officers based out of Trout Lake, Goldendale, and Vancouver, Washington.

Most reports of violations occur during elk season. Several incidences of elk poaching have occurred on the refuge in the recent past.

1.8.16 Impacts of Development and Climate Change

- How should CLNWR address the impact of increasing development, and ultimately a reduction in open space, of adjacent lands on its wildlife and habitat?
- How will the refuge address the potential impacts of climate change?

Temperature increases, documented over the past 20 years, and anticipated water shifts in rain/snow cycles due to climate change will likely lead to an earlier spring drying trend in the Glenwood Valley.

1.8.17 Staffing

- What staffing levels are needed to maintain current management operations at CLNWR?
- How will the refuge address the staffing limitations?

CLNWR is administered by MCRNWRC and the Refuge Manager is headquartered at Toppenish National Wildlife Refuge in Toppenish, Washington. A full-time, career-seasonal maintenance worker is stationed at the refuge. Typical staffing patterns include seasonal biologists and visiting crews of maintenance and fire personnel.

1.8.18 Issues Outside the Scope of the CCP

While CCPs are, by definition, comprehensive plans, no single plan can cover all issues. The issue identified below is currently considered to be outside the scope of this CCP.

Refuge Expansion

Because CLNWR is within the exterior boundary of the Yakama Nation Reservation, the CCP/EA will not identify specific actions or alternatives that would expand the refuge's acquisition boundary. The CCP may consider land exchanges and acquisition of interests in inholdings, either in fee title or through easements; however, this would not increase the area of the refuge-owned lands by more than 10%.

1.9 Planning Process

The draft alternatives may be modified between the draft and final CCPs, depending upon comments received from other governments, the public, other agencies, and organizations. The Service's Regional Director for the Pacific Region will decide which alternative will be implemented. For details on the specific components (i.e., goals, objectives, and strategies) and actions comprising the range of alternatives, see Chapter 2.

Chapter 2

Management Alternatives

Chapter 2. Management Alternatives

2.1 Alternatives Development

During development of the CCP alternatives presented in this chapter, the Service reviewed and considered a variety of resource, social, climatic, economic, and organizational aspects important for managing the refuge. These background conditions are described more fully in the following chapters. As is appropriate for a national wildlife refuge, resource considerations were fundamental in designing alternatives. House Report 105-106 accompanying the Administration Act states "...the fundamental mission of our System is wildlife conservation: wildlife and wildlife conservation must come first."

The refuge planning team reviewed and used available scientific information (reports and studies) to better understand ecosystem trends and the latest scientific recommendations for species and habitats. The team met with staff from local, State, and Federal agencies; the Confederated Bands and Tribes of the Yakama Nation (Yakama Nation); and elected officials to ascertain priorities and problems as perceived by others. Refuge staff also met with refuge users, nonprofit groups, and community organizations to solicit their comments and ideas, which were considered during CCP development. The details of public participation can be found in Appendix K.

After gathering as much information as possible, the planning team, with considerable assistance from the Service's Regional Office, combined this data with CLNWR's purposes and determined the conservation targets to be included in the CCP process, that is, those resources upon which the CCP would focus management attention (see Appendix E). From this flowed the goals, objectives, and strategies which the planning team felt should be included in the CCP. Each goal, objective, and strategy was carefully evaluated for how it benefitted, augmented, and fit with Service trust resources; CLNWR's purposes; identified conservation targets; key refuge and State species; and the principles of biological diversity, integrity, and environmental health (BIDEH). Once the range of acceptable management goals and objectives was determined, the objectives and strategies were logically organized into reasonable alternatives along coherent management directions, as described below. For CLNWR, the reasonable range of acceptable actions could be described and covered through two alternatives: the no-action alternative and an alternative involving changes in some programs.

2.2 Actions Considered But Not Developed

During development of the alternatives, the planning team considered the actions detailed below. All of these actions were ultimately eliminated for the reasons provided.

2.2.1 Full-scale Restoration of Creeks to Historic Channels/Oxbows

The entire valley has been modified due to the channelization of creeks and development of drainage canals. However, private land inholdings preclude hydrologic restoration. Even if inholdings on the refuge were acquired from willing sellers, it would be hydrologically impossible to restore just short, select portions of streams; what happens in one part of a stream impacts the stream both up and

downstream. Partial restorations might be possible, but would be analyzed on a case-by-case basis and then only after further study to determine historic conditions.

2.2.2 Lethal Control of Coyotes to Benefit Nesting Waterbirds

No assessment of the impacts of coyotes on waterbirds has been undertaken to determine the extent and severity of impacts to waterbirds. Consequently, a proposal for the lethal control of coyotes to benefit nesting waterbirds would be premature and not based on sound science. Although some coyotes appear to target certain Sandhill crane pairs, overall the refuge maintains high recruitment rates for cranes. Under both Alternatives 1 and 2, the Service would continue to monitor the nesting population of Sandhill cranes on the refuge.

2.2.3 Implementing an Elk Hunt

As discussed in Section 1.8.12, the elk population appears to be expanding its range and herd size, and there are some concerns over agricultural depredation and resource/infrastructure damage on the refuge. However, there have been no long-term surveys conducted to assess population trends and range within the Glenwood Valley, nor have resource impacts been well documented. The WDFW and local landowners have expressed interest in an elk hunt on CLNWR, but this is not an interest expressed throughout the valley. Over the past several years, unethical and reckless hunting on private lands has prompted local concerns regarding safety. In addition, there is a widely held opinion that a refuge elk hunting program would not resolve depredation issues and that a hunt may actually exacerbate the problem off-refuge by driving elk onto private lands.

A lack of information on depredation complaints, resource/infrastructure damage, herd data, herd management objectives, and safety issues preempts the development of an elk hunting program at this time. In addition, an elk hunt on the refuge may be problematic due to safety concerns (nearby residences and roads), a lack of assessment of elk movements in the event of a hunt, disturbance to other refuge resources, and timing conflicts with management activities and other public uses. For example, elk observation is a popular spring and fall pastime for CLNWR visitors, likely undertaken by more visitors in a day than the number of elk hunters that would use the refuge in an entire season; therefore, maintaining these viewing opportunities is important and should not be compromised by other refuge programs. For these reasons, an elk hunt is not proposed at this time, although the idea could be revisited in the future as more information becomes available.

2.3 Alternatives Descriptions

2.3.1 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.

Adaptive Management. Adaptive management is an approach to resource management that emphasizes adjusting management practices in response to what has been learned. Based on 522 DM 1 (Adaptive Management Implementation Policy), the refuge will utilize adaptive management for conserving, protecting, and, where appropriate, restoring lands and resources. Within 43 CFR 46.30, adaptive management is defined as a system of management practices based on clearly identified

outcomes, where monitoring evaluates whether management actions are achieving desired results (objectives). Adaptive management decisions are based on the best available science, common sense, experience, experimentation, new scientific discoveries, and monitoring.

The *Department of the Interior Adaptive Management Technical Guide* also defines adaptive management as a decision process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Adaptive management accounts for the fact that complete knowledge about fish, wildlife, plants, habitats, and the ecological processes supporting them may be lacking. The role of natural variability contributing to ecological resilience also is recognized as an important principle for adaptive management. It is not a trial-and-error process; instead adaptive management emphasizes learning-while-doing. It is based on available scientific information and the best professional judgment of refuge staff while considering site-specific biotic and abiotic factors on the refuge.

Avoidance of Sensitive Resources. Under all alternatives, visitor activity centers, visitor facilities, and both non-vehicular and vehicular travel routes will be sited to minimize effects by avoiding sensitive natural and cultural resources. Potential adverse effects from visitor use will be further minimized through closures or special restrictions at sites with seasonal protection needs or sites vulnerable to or experiencing resource damage. Group size limitations may be used for specific sites or activities as needed to protect sensitive resources. Visitor use will be managed using informational signs, educational materials, trails, protective devices, and law enforcement patrols. Because threatened, endangered, and sensitive (TE&S) species migrate through CLNWR, construction projects and public use patterns will be scheduled seasonally to avoid adverse effects.

Biological Integrity, Diversity, and Environmental Health. The Administration Act, as amended, directs the Service to ensure that the BIDEH of the NWRS are maintained for the benefit of present and future generations of Americans. Refuge Manual Chapter 601 FW 3 defines biological integrity as "... the 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." Historic conditions are "...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." Biological diversity is defined as "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." Environmental health is the "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." Simply stated BIDEH, are represented by native fish, wildlife, plants, and their habitats as well as those environmental conditions and processes that support them.

The BIDEH policy is an additional directive for the Service to follow while achieving CLNWR's purposes and the NWRS mission. When evaluating the appropriate management direction for CLNWR (e.g., in compatibility determinations), the Service will use sound professional judgment to determine the refuge's contribution to BIDEH at multiple landscape scales. Sound professional judgment will incorporate field experience, knowledge of refuge resources, an understanding of CLNWR's role within the ecosystem, applicable laws, and best available science, including consultation with others both inside and outside the Service. The policy states that 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.

There is one caveat, however. Management for a refuge's purpose(s) is the highest priority, so maintenance and/or restoration of biological integrity, diversity, and environmental health cannot compromise or conflict with refuge purpose(s).

Much of the wetland habitat in Washington has been lost during the last 100 years as a result of urban and commercial development, agricultural conversion, and drainage. CLNWR retains one of the largest remnant wet prairie/wetland systems remaining in the state. The dynamic complex of wetlands that historically occurred in Glenwood Valley was replaced by agricultural lands, primarily cattle pastures and hay crops. Wetland drainage and conversion commenced in the early 1900s and drainage for agriculture continues to this day. Consequently, one of the most important contributions the refuge can make for biological integrity at the local, regional, and flyway scales involves managing and restoring wet prairie and wetland habitats for migrating and nesting waterfowl and waterbirds, as well as listed amphibians and plants.

Cultural Resource Protection and Section 106 Compliance. Actions with the potential to affect cultural resources will undergo a thorough review before being implemented, as is consistent with the requirements of cultural resource laws. This investigation may entail a literature review, records search, field survey, and tribal consultation. All actions with the potential to impact cultural resources will undergo a review under Section 106 of the National Historic Preservation Act (NHPA). If cultural resources are present, appropriate procedures will be implemented to protect them per Federal laws and Service policies and guidelines.

Facility Design/Aesthetic Considerations. Landscape design standards will be developed to protect CLNWR's natural beauty, scenic vistas, and cultural heritage and to ensure that all site developments and facility improvements contribute to, rather than detract from, aesthetic appeal. Facility design and placement will be carefully planned with landscape integrity in mind. Future interpretive sites and signs will be designed to have an unobtrusive profile, with framing and supports that blend with the environment.

Fire Management. Fire management activities will conform to guidelines set forth in Service policy and the approved Fire Management Plan for the MCRNWRC (Service 2009). Wildland fire will be suppressed when possible; suppression techniques will be employed that minimize surface disturbance in the vicinity of sensitive resources. Fire control policies will be implemented to reduce the risk of human-caused wildland fire. Hazardous fuels will be addressed according to the Fire Management Plan. The Fire Management Plan will be updated as appropriate.

Implementation Subject to Funding Availability. Under any of the alternatives, actions will be implemented over a period of 15 years as funding becomes available. It is the intent of the planning team that annual priorities will follow the final CCP guidelines, although funding initiatives, unforeseeable management issues, and budgets may vary from year to year. The CCP will be reviewed every 5 years and updated as necessary throughout its life.

Invasive Species Control/Integrated Pest Management. Because invasive plants and animals currently represent one of the greatest threats to the refuge's wildlife and habitats, control of invasive species will be a high priority management activity in all alternatives. Invasive species, such as meadow knapweed, Scotch broom, and other State- and county-listed noxious weeds, will continue to be a primary management concern. Noxious weeds, such as reed canarygrass, and introduced animals, such as bullfrogs, also limit the refuge's ability to provide high-quality habitat for refuge

purpose and trust species and will be controlled to the degree that funding permits. Invasive species control will be initiated prior to or concurrently with habitat restoration efforts.

In accordance with 517 DM 1 and 569 FW 1, an Integrated Pest Management (IPM) approach will be utilized, where practicable, to eradicate, control, or contain pest and invasive species (herein collectively referred to as pests) on refuge lands. IPM will involve using methods based upon effectiveness, cost, and minimal ecological disruption, which considers minimum potential effects to non-target species and the refuge environment. Pesticides may be used where physical, cultural, and biological methods, or combinations thereof, are impractical or incapable of providing adequate control, eradication, or containment. If a pesticide would be needed on refuge lands, the most specific (selective) chemical available for the target species will be used unless considerations of persistence or other environmental and/or biotic hazards would preclude it. In accordance with 517 DM 1, pesticide usage will be further restricted because only pesticides registered with the United States Environmental Protection Agency (EPA) in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and as provided in regulations, orders, or permits issued by the EPA may be applied on lands and waters under refuge jurisdiction.

Environmental harm by pest species will refer to a biologically substantial decrease in environmental quality as indicated by a variety of potential factors, including declines in native species populations or communities, degraded habitat quality or long-term habitat loss, and altered ecological processes. Environmental harm may be a result of the direct effects of pests on native species, including preying and feeding on them; causing or vectoring diseases; preventing them from reproducing or killing their young; outcompeting them for food, nutrients, light, nest sites, or other vital resources; or hybridizing with them so frequently that within a few generations few if any truly native individuals remain. Environmental harm also can be the result of an indirect effect of pest species. For example, decreased waterfowl use may result from invasive plant infestations reducing the availability and abundance of native wetland plants that provide forage during the winter.

Appendix H contains the refuge's IPM program documentation to manage pests for this CCP. Along with a more detailed discussion of IPM techniques, this documentation describes the selective use of pesticides for pest management on refuge lands, where necessary. Throughout the life of the CCP, most proposed pesticide uses on refuge lands will be evaluated for potential effects to refuge biological resources and environmental quality. These potential effects will be documented in Chemical Profiles (see Appendix H). Pesticide uses with appropriate and practical best management practices (BMPs) for habitat management, as well as facilities maintenance, would be approved for use on refuge lands where there likely would be only minor, temporary, and localized effects to species and environmental quality, based on not exceeding the threshold values in the Chemical Profiles. However, pesticides may be used on refuge lands where substantial effects to species and the environment are possible (exceed threshold values) in order to protect human health and safety (e.g., mosquito-borne disease).

Land Acquisition Within the Approved Boundary. The Service has the authority to acquire land or negotiate agreements on behalf of the National Wildlife Refuge System only within an approved refuge boundary. The Service can make offers to purchase land, purchase conservation easements, or enter into management agreements with willing landowners within the approved boundary. Lands or interests therein do not become part of the National Wildlife Refuge System unless they are purchased from or are placed under a management agreement with the individual landowner. Service authority over any use of lands within an approved refuge boundary is limited to lands the Service has acquired in fee title, conservation easement, or a management agreement. Private landowners

within an approved refuge boundary retain all of the rights, privileges, and responsibilities of private land ownership and are under no obligation to sell their property to the Service. Service policy for land acquisition is to work on a one-on-one basis with a willing seller/interested landowner. Under all alternatives and based on the availability of funds, the Service will continue to negotiate with willing sellers to acquire lands, easements, or management agreements within the existing approved refuge boundary.

Maintaining/Upgrading Existing Infrastructure and Facilities. Periodic maintenance and upgrading of the refuge buildings and facilities will be necessary, regardless of the alternative selected. Water control structures, dikes, and ditches all require recurring annual maintenance to ensure integrity and functioning capabilities. Maintenance examples include water control structure repair or replacement, dike repair, and ditch cleaning. Additional maintenance activities will include filling in shallow feeder ditches, which will improve water management capability, and maintaining secondary arterials to provide flood relief and irrigation water for private landowners (irrigation tailwater). Annual maintenance will continue on roads, boundary and interior fencing, and firebreaks. Periodic maintenance and upgrading of facilities is necessary for safety and accessibility and to support staff and management needs.

Migratory Bird Treaty Act and Establishing Authority Compliance. If a refuge, or portion thereof, has been designated, acquired, reserved, or set apart as an inviolate sanctuary, hunting of migratory game birds can be allowed on no more than 40% of that refuge, or portion of refuge, at any one time unless there is a finding that taking of a species in more than 40% of the refuge would be beneficial to the species (16 U.S.C. 668dd(d)(1)(A), Administration Act; 16 U.S.C. 703 712, Migratory Bird Treaty Act; and 16 U.S.C. 715a 715r, Migratory Bird Conservation Act). Currently more than 40% of CLNWR is open to migratory bird hunting; the areas open to hunting will be adjusted to comply with the Migratory Bird Treaty Act.

Monitoring and Assessing Effects of Climate Trends and Climate Change. As stated in DOI's Secretarial Order 3226 and the Service's Climate Change Strategic Plan, the Service considers and analyzes climate change in its decisions, long-range plans, and other activities. Habitat conditions and wildlife populations are directly and indirectly sensitive to climatic conditions, namely precipitation and temperature. As described in greater detail in Chapter 3, the area's hydrology is particularly sensitive to changes in climate because snowmelt dominates seasonal runoff and the Klickitat River watershed's rain/snow balance is sensitive to temperature. For example, higher winter temperatures provide more rain instead of snow at low and mid-elevations. Although annual variation in temperatures and the amount and timing of precipitation is high in the Pacific Northwest (due to the El Niño Southern Oscillation and other large-scale climate patterns), long-term trends show significant changes in the timing of streamflows throughout the Pacific Northwest, and these trends are projected to accelerate. Research indicates that increased winter streamflows can be expected, and the timing of peak flows is projected to occur earlier in the spring in the future. In the longer-term future (i.e., 2080s), projections show that streamflow regimes could become rain-dominant in the Klickitat River watershed, meaning that they will peak with precipitation in the winter.

Increasing temperatures have also increased fire risk throughout the Pacific Northwest, and these trends may affect the refuge's forest, riparian, and upland habitats and their management.

Knowledge and monitoring of these regional and local trends will be used to assess potential changes or enhancements to CLNWR's management actions and techniques and timing, using the adaptive

management approach described above. The region's changing hydrology highlights the importance of the refuge's efforts to improve its ability to enhance water management capacity; restore/enhance its hydrology to meet wet meadow, marsh, and riparian/aquatic goals; and maintain secondary arterials to provide flood relief and irrigation water for private landowners. Increasing temperatures highlight the need for forest thinning and other management actions to meet refuge goals for forest, riparian, and upland habitats. The combined changes (temperature, precipitation, and hydrology) can affect CLNWR's habitats and species directly, such as the timing of migratory arrival and many other phenologic responses, and indirectly by adding vulnerability to other stressors, including invasive species and pathogens. This highlights the importance of monitoring habitat and species to establish potential correlations and adaptation options.

The Service will monitor wildlife corridor analyses, vulnerability assessments, and other efforts, including those underway at a landscape scale such as the Great Northern Landscape Conservation Cooperative (LCC). LCCs are formal, science-management partnerships between the Service, other Federal agencies, States, tribes, nongovernmental organizations, 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 CLNWR's resources' resiliency to climate change. The MCRNWRC will also continue to pursue and engage in mechanisms to conserve energy in refuge operations.

Monitoring Effects of Visitor Use on Wildlife. Monitoring to assess effects of visitor use on wildlife will be conducted. Monitoring will be needed to ensure that permitted uses remain compatible over time and that the use will not materially interfere with, or detract from, the biological integrity of CLNWR, meeting the refuge's purposes, and fulfilling the mission of the NWRS. Areas and/or timing of visitor use will be modified, or even eliminated if necessary to provide secure and adequately sized sanctuary areas for migratory birds and trust species.

Natural Resource Data Collection and Monitoring. Inventories will be conducted to obtain data related to habitat conditions; wildlife populations and habitat requirements; restoration treatment locations, timing, and effectiveness; resource protection measures; invasive species control; TE&S species; and other areas of management concern. Resource information will be collected using global positioning system (GPS) technology, permanent monitoring plots, point counts, pedestrian transect surveys, and other methods. The information collected will be used to improve existing data sets, mapping and scientific knowledge concerning species, habitats, restoration needs, treatment effectiveness, land disturbance events, and other areas of concern.

Existing and new fish, wildlife, water, and vegetation monitoring programs will be conducted by refuge staff, volunteers, or cooperators to support adaptive management. These programs will entail monitoring and evaluation of habitat management and restoration activities, TE&S species, and public uses. Periodic monitoring (every 5 to 7 years) of priority sensitive plant communities will be conducted in permanent monitoring plots.

Where possible, CLNWR management projects will be designed to contribute to the body of knowledge, as well as to meet specified resource objectives. For additional information, see Goal 5.

Participation in Planning and Review of Regional Development Activities. The Service will actively participate in planning and studies pertaining to future industrial and urban development, transportation, recreation, contamination, and other potential concerns that may affect CLNWR's

wildlife resources, habitats, or environmental quality. The Service will continue to cultivate working relationships with county, State, Federal agencies, and the Yakama Nation to stay abreast of current and potential developments. The Service will utilize outreach and education as needed to raise awareness of CLNWR's resources and dependence on the local environment.

Partnerships. Partnerships on the refuge are critical components in maintaining and continuing efforts to enhance recreation opportunities or implement resource management improvements, such as restoring habitat for threatened and endangered species. These partnerships typically involve joining forces with Federal, State, and local agencies and organizations. For example, under all alternatives, the refuge will continue to coordinate with the Klickitat Drainage District #1, Hell Roaring Irrigation District, and neighboring landowners on issues of mutual interest.

Regulatory Compliance. Prior to implementation, all activities in all alternatives will undergo appropriate reviews and consultations, and permits and clearances will be secured, as necessary, to comply with legal and policy requirements. This includes water quality permits required under Section 401 and dredge and fill permits required under Section 404 of the Clean Water Act of 1972, as amended (33 U.S.C. 1251-1382); appropriate evaluations and documentation under NEPA; evaluation and consultation required by Section 7 of the ESA; and review and consultation required by Section 106 of the NHPA.

Restoration Activities. Native seeds and plants derived from the area will be used as a priority for all planting/restoration projects on CLNWR. Providers of native seed or native plants to CLNWR will provide documentation for the origin of seed or plants and will also, in the case of seed, provide certification that the seed provided to CLNWR is free of noxious weed contamination. These requirements will be included in any scope of work prior to contracting the production and supply of plant materials. Plant materials may be refused if they do not meet these requirements. Occasionally, small amounts of seed may be collected from CLNWR to be provided to plant nurseries and grown into seedling plants to be replanted onto the refuge. In these cases, refuge staff will supervise the selection of species for collection and the actual collection of seed from plants on CLNWR. Seed collection needs for species and amounts will be based on annual restoration and rehabilitation needs. Seeds will be collected during the appropriate season as dictated by plant species phenology, and the parent plant will not be damaged or harmed in any way during seed collection. Seed will be collected from no more than 20 percent of individuals within a population, and no more than 50 percent of the total seed production from individual plants will be collected annually.

State Coordination. Under all alternatives, the Service will continue to maintain regular discussions with the WDFW, WDNR, Washington State Historic Preservation Office (SHPO), and other agencies with joint responsibility for resources on the refuge. This includes coordination to implement Washington State plans and programs as outlined above and in Chapter 1. Coordination with other agencies is a key component of successful management and is vital to CLNWR's programs, plans, and projects, especially in times of static or declining budgets.

State Plan Compliance and Cooperation. To the extent possible, the CCP will support and complement the Washington State recovery plans for greater Sandhill cranes and western gray squirrels as outlined in Chapter 1 and any other relevant species. Where feasible, the CCP and its implementation will coordinate with other Washington State plans and programs, e.g., hunting and fishing regulations.

Step-down Plans. The CCP provides guidance in the form of goals, objectives, and strategies for several refuge program areas but may lack some of the specifics needed for implementation. Regardless of the alternative selected as the final management plan for the refuge, several subsequent, or step-down, plans will be developed. For example, the CCP may note that a trail is needed to accomplish a certain management objective. However, it will take a Visitor Services Plan or a Trails Plan to specifically site the trail and define design standards.

All step-down plans require appropriate NEPA compliance and implementation may require additional county, State, and Federal permits. Project-specific plans, with appropriate NEPA compliance, may be prepared outside of these step-down plans. For CLNWR, the step-down plans we anticipate needing into the future include:

- Cultural Resources Management Plan.
- Habitat Management Plan or the Refuge Habitat Management Database.
- Hunting (i.e., Hunt Opening Package).
- Integrated Pest Management Plan (See Appendix H).
- Visitor Services Plan.

Tribal Coordination. The Service will continue to consult and coordinate with the Yakama Nation, including seeking assistance on issues related to cultural resources education and interpretation, special programs, repatriation, and the NHPA.

Volunteer Opportunities. Volunteer opportunities are key components of the successful management of public lands and are vital to CLNWR's programs, plans, and projects, especially in times of static or declining budgets. Currently, CLNWR makes extensive use of volunteers in activities like counting Oregon spotted egg masses. In the future, successful implementation of native habitat restoration, survey and monitoring activities, and environmental education and interpretation programs will require the use of partnerships and volunteers.

Water Rights. The need to document refuge water rights and efficiently utilize and manage water flows is critical to achieving refuge purposes. The Water Resources Inventory and Assessment summary report (USFWS 2013) documented all water rights claims and certificates on fee title and inholdings within the approved refuge boundary. Under all alternatives, documentation of water rights for CLNWR will continue to be researched and mapped by the Water Resources Branch of the Division of Engineering for any new land acquisitions. Any errors, omissions, or inconsistencies within the information in the water rights files in the Regional Office will be investigated and resolved.

Wilderness and Wild and Scenic Rivers Review. The Wilderness Act of 1964 (16 U.S.C. 1131-1136), as amended, provides the following description of wilderness:

A wilderness, 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 Act as 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.

The Wilderness Act directed the Secretary of the Interior, within 10 years, to review every roadless area of 5,000 acres or more within DOI lands and to recommend to the President the suitability of each qualifying area for inclusion in the National Wilderness Preservation System. This assessment is still in progress. Service policy (Part 602 FW 3.4 C (1)(c)) requires that wilderness reviews be completed as part of the CCP process. This review includes the re-evaluation of refuge lands existing during the initial 10-year review period of The Wilderness Act of 1964, as amended (16 U.S.C. 1131-1136), as well as new lands and waters added to the NWRS since 1974. If it is determined that the potential for wilderness designation is found, the process moves on to the wilderness study phase. As part of the process for this draft CCP/EA, the planning team completed an initial wilderness review and found that currently there are no lands on CLNWR that meet wilderness criteria (see Appendix D).

To arrive at this conclusion, refuge staff used the same process used for the Hanford Reach National Monument (Monument) in development of its CCP. Using criteria derived from the Wilderness Act, Service standards and protocols employed by the Bureau of Land Management's Colorado and Utah State Offices, Monument staff and contractors developed standards to be used in the wilderness assessment for the Monument. Using the same standards and a geographic information system (GIS) analysis of man-made infrastructure on CLNWR, coupled with in-the-field observations, it was readily apparent that there are no areas on CLNWR that meet the standards and are sufficiently large to support wilderness characteristics.

In addition, a Secretarial Directive requires that all DOI agencies complete a wild and scenic rivers eligibility assessment when conducting land planning and during pre-acquisition planning for new or expanded refuges (341 FW 2.4 B., Land Acquisition Planning). The only stream on CLNWR is Bird Creek, which does not meet the outstandingly remarkable value standards, as defined by Section 1 of the Wild and Scenic Rivers Act, and thus is not eligible for designation (see Appendix D).

2.3.2 Summary of Alternatives

Alternative 1: No Action (Current Management)

Rather than focusing on specific species, most management actions are aimed at protection, enhancement, and restoration of habitats under the principle that if the habitat is there, wildlife species would flourish. CLNWR would continue a flooding regime per the existing Water Management Plan. Haying to control reed canarygrass in meadow habitats would continue. Meadows would continue to benefit from active tree removal measures. Excess vegetation would continue to be removed in all aquatic habitats to directly benefit the habitat and to facilitate other management actions, such as disking. Prescribed fire and other IPM techniques would continue to be deployed to control invasive species.

In some instances, specific species would receive specific management attention. Openings would be created in pine forests to benefit Ames' milk-vetch. Surveys would be conducted, subject to funding availability, for Oregon spotted frogs, Mardon skippers, greater Sandhill cranes, elk, western gray squirrels, rare plants, and other species. Research needs would focus on Oregon spotted frogs and greater Sandhill cranes.

Visitor services would focus on passive activities in select areas. The refuge would be open from sunrise to sunset for all uses, except hunting; hunting access is allowed from 1-1/2 hours before legal hunting time to 1-1/2 hours after legal hunting time. Wildlife observation and photography would make use of limited open areas via the existing trail and public road system, as well as the Willard Springs Trail Observation Overlook. Environmental education and interpretation would remain the same with a limited program and limited facilities. Free-roaming waterfowl hunting and deer hunting species would be allowed in areas defined on Map 4 and according to Washington State hunting seasons. Fishing on the lower 0.25 mile of Outlet Creek according to Washington State fishing regulations, from the first Saturday in June through the end of October, with potential closures for active Sandhill crane nests, would continue.

Cultural resource protection would continue as mandated by law and policy, but no additional measures would be undertaken. The Whitcomb-Cole Hewn Log House would continue to be a focus point, but its role would be of passive interpretation. That is, it would remain open, but there would be few, if any, active programs to provide for education and interpretation.

Alternative 2: Potential Changes to Current Management

As under Alternative 1, the focus of refuge management would continue to be for wildlife rather than public use, and most current management actions would continue. The Water Management Plan would be revised within 2 years of plan completion and then modified as needed. Haying and mowing would continue, but grazing would be added as a potential management tool for reed canarygrass. Existing dikes would be evaluated and potentially modified to achieve target water levels. Additionally, disking and prolonged deep flooding would be potentially used to control reed canarygrass. In areas with known Oregon spotted frog oviposition and rosy owl-clover sites, these techniques would be performed on an experimental basis with pre- and post-monitoring. An aggressive bullfrog and bullhead fish control program would be implemented. The cover of shrubs and trees would be reduced in upland meadow habitats using mechanized removal and prescribed fire, where appropriate. A program to actively create snags in all forest types would be implemented

to benefit woodpeckers, other insectivore birds, and cavity-nesting species. Additional forest thinning in all forest-stand types would occur to create structural diversity and allow regeneration of understory species and young trees.

While the refuge is focused on wildlife protection and conservation, visitor services opportunities would be provided in key areas. The refuge would continue with the same public access hours. Wildlife observation and photography would continue to be allowed in the same open areas in Alternative 1. However, the area west of the Cold Springs Canal would be opened to public use, apart from hunting and fishing. The Willard Springs Trail would be realigned, lengthened, and given a new interpretive emphasis. Environmental education would receive a greater emphasis through the hiring of a part-time staff person, training of local teachers through a new program so that they might conduct classes, and implementing a monitoring program to track progress. The recruitment and use of volunteers would be enhanced for all visitor service activities, but with a strong emphasis on education. New interpretive exhibits would be installed at the refuge headquarters and along the Willard Springs Trail, the Observation Overlook, and the Whitcomb-Cole Hewn Log House. Deer hunting within the 100-acre deer hunting area would be discontinued. Elsewhere, waterfowl hunting and fishing would remain much the same.

Cultural resource management would still strive to fulfill law and policy, and additional measures would be implemented, such as completing a cultural resources overview, establishing new tribal partnerships, evaluating the National Register eligibility of archeological sites, and developing an inadvertent discovery plan. The Whitcomb-Cole Hewn Log House would receive an increased emphasis, primarily through the use of volunteers to provide education and interpretation.

2.4 Goals, Objectives and Strategies

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 NWRS mission.

A CCP describes management actions that help bring a refuge closer to its vision. The vision broadly reflects the refuge's purpose(s), the NWRS 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.

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

The goals for CLNWR to be implemented over the next 15 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 order of goals does not imply any priority in this CCP. Below each objective statement are the strategies that could be employed in order to accomplish the objectives.

Strategies included under Alternative 2, but not under Alternative 1, represent a change in current management direction; Alternative 1 is the no-action alternative, which assumes no change in current management programs. However, if an existing use is found to be not appropriate, or is not compatible with refuge purposes or resources (see Appendices A and B), then that use would not be allowed even under Alternative 1.

Goal 1. Protect and maintain a diverse assemblage of aquatic habitats characteristic of Glenwood Valley/Conboy Lake Region.

Objective 1.1 Wet Prairie (Wet Meadow)

Annually, protect and maintain 3,281 acres of wet meadows on CLNWR for the benefit of migrating waterfowl (e.g., mallards, northern pintails), breeding/migrating greater Sandhill cranes, raptors (e.g., northern harriers, short-eared owls), native amphibians (e.g., Oregon spotted frogs), and other wetland-dependent species. Wet prairie would be characterized by:

- Water depths ranging from saturated soils to 3 feet.
- Inundation from approximately October 1 to late June or early July.
- A short (<2 feet) cover of sedges (e.g., *Carex* species), rushes (e.g., *Juncus* species), spikerushes (e.g., *Eleocharis* species), and other native or desirable emergents.
- The presence of native forbs (e.g., camas, common monkey-flower, potentilla).
- The presence of rare plant species (e.g., rosy owl-clover, Oregon coyote thistle, long-bearded sago lily, dwarf rushes).
- A limited presence of woody species (e.g., lodgepole pine, spirea, willow species).
- A <20% cover of reed canarygrass where native wet meadow vegetation is established.
- A <10 inch vegetation height by late fall in reed canarygrass-dominated wet meadow sites.
- A <5% presence of invasive/undesirable plants (e.g., Scotch broom, Canada thistle, meadow knapweed, St. John's wort).

Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
Acres	*3,281*	
A. Mimic the natural duration when surface water is present (hydroperiod) throughout the year (i.e., flooding to commence with the fall rains and subside with the summer dry season).		X
B. Revise Water Management Plan within 2 years of CCP completion and then modify as needed.		X
C. Set boards in water control structures in all creeks and ditches by October 1 to maintain maximum (optimal) water levels for overwintering Oregon spotted frogs and other aquatic species. Initiate drawdowns by July 1 with drawdowns complete by August 15. Some water may be maintained in swales or deeper portions all year.	X	X

D. Hay reed canarygrass from August 1 to October 15 (see Haying CD).	X	X
E. Mow reed canarygrass from late summer (e.g., August 1, unless Sandhill crane colts less than 3 weeks of age are present) through fall (e.g., October 15) in important Oregon spotted frog breeding areas (such as C&H Units, Conboy Lake, and the Oxbow area) that have not been hayed.	X	X
F. Graze reed canarygrass from September 1 to November 30 (see Grazing CD).		X
G. Evaluate and modify existing dikes to achieve target water levels as outlined in the Water Management Plan.		X
H. Use disking and prolonged deep flooding. In areas with known Oregon spotted frog oviposition and rosy owl-clover sites, perform on an experimental basis with pre- and post-monitoring. See also Goal 5.		X
I. Use prescribed fire to treat up to 700 acres between September 1 and December 1.		X
J. Use appropriate IPM techniques which may include mechanical/physical, cultural, chemical, and/or biological means to eradicate or control invasive species (see Appendix H).	X	X

Rationale

The refuge was initially established for nesting and migrating waterfowl. Wet meadow habitats represent important foraging habitat for a variety of migrating waterfowl, such as mallards, tundra swans, northern pintails, and Canada geese. Under the CCP, the refuge would continue to manage wet meadows to provide habitat for waterfowl. In addition to providing suitable waterfowl habitat, the refuge also provides important habitat for populations of several species of State and Federal management concern. The species of highest concern found in wet meadows include Oregon spotted frogs, greater Sandhill cranes, rosy owl-clover, long-bearded sego lily, and Oregon coyote thistle. Under Alternative 2, strategies for wet meadow management on the refuge include a combination of water management, haying, mowing, and prescribed fire to benefit Oregon spotted frogs, greater Sandhill cranes, rare plants, waterfowl, and all wet meadow associated native species. The refuge would also pursue other management alternatives when appropriate. These actions include chemical treatment, disking, and strictly controlled grazing.

Water management is the single most important management issue on the refuge and within Glenwood Valley. The wet prairie, emergent marsh, and seasonally flooded scrub-shrub and forest habitats are important due to their biodiversity, juxtaposition within the broader geographic landscape, and remaining populations of rare wildlife and plants. In general, the goal of CLNWR water management is to manage wetlands that mimic the natural hydrology of the basin, where feasible. This includes protecting and maintaining the large contiguous wet prairie system (Camas Prairie) and the areas including and surrounding the Conboy Lake wetland system.

In 2005, a Water Management Plan was written that outlined water-flow scenarios, target water elevations, and infrastructure needed for water management. A key design component of the water management infrastructure is to pass virtually all inflows through the wetland system versus bypassing flows down drainage ditches. This system also should allow passive movement of aquatic adapted wildlife (frogs, salamanders, fish) through the dike system, between permanent waters (creeks and ditches) and seasonal wetlands. Under Alternative 2, the Water Management Plan, which details the timing and elevation of water levels by management unit, would be revised to include subsequent restoration work that has been accomplished as well as future needs.

Refuge wet prairie areas are managed as seasonal wetlands with variable water regimes that range from October (flood-up) to August (drawdown). Annual water inundation varies considerably depending on the unit location, rainfall and snowpack, inflow/outflow capabilities, and specific unit vegetation and management needs. Water management is feasible only in a few units where water is available and can be manipulated without affecting private landowners. Effective water management occurs in areas such as the C&H Units and Conboy Lake Unit where adequate infrastructure exists and there are no known impacts to private landowners. More extensive water management capabilities would be realized through modifying existing or adding water management infrastructure, such as a berms, water control structures, and spillways. The natural seasonal and cyclical pattern of water would be restored by improving the water management infrastructure and/or working with adjacent landowners.

For the purposes of this plan, October 1 is set as the initiation of the water year as this coincides approximately with the end of the haying/mowing season and commencement of fall rains and increased water flow onto the refuge. A later flood-up initiation date may be required if inflows are insufficient or specific management objectives have not yet been accomplished (e.g., haying or desiccation to prevent juvenile recruitment of bullfrogs and bullhead catfish). Regardless, boards should be installed in water control structures in all prairie and wetland units by freeze-up (usually late November). Mid-June should be the earliest start of slow drawdown to maintain waterfowl and waterbird brood habitat. However, drawdowns should be initiated by July 1 and completed by August 15 except in permanent ditches and creeks, which should be maintained at maximum elevations year-round when possible.

A key component of water management for frogs and cranes (and others) is to ensure that all meadows and wetlands are filled to maximum by early February to allow movements of frogs, salamanders, and dace into meadow units via spillways and other conveyance routes. High winter water conditions also tend to suppress reed canarygrass growth. Streams and ditches need to be at maximum fall and winter to provide overwintering habitat and to ensure that critical water is not lost during flood-up by having to fill ditches, etc., first.

Invasive reed canarygrass is widespread in many refuge wetlands, altering plant and animal community composition. As much as 2,300 acres of seasonal wetlands are heavily infested with reed canarygrass. Invasive plants limit native plant production and cause impacts to food, nesting, and cover for wildlife and reduce waterfowl food availability during the migration and wintering periods.

Reed canarygrass is an aggressive, cool-season perennial grass that invades many wetland systems (Foster and Wetzel 2005). Reed canarygrass is clonal and rapidly spreads with rhizomes, forming dense monotypic stands that prevent the establishment and survival of other herbaceous species (Barnes 1999; Galatowitsch et al. 1999; Green and Galatowitsch 2001). Few animals will eat the grass after flowering because of its rank growth, and most waterfowl are unable to utilize the

monotypic habitat for nesting, food, or cover (Maia 1994). However, waterfowl, greater Sandhill cranes, and Oregon spotted frogs do utilize reed canarygrass when it is managed as short-grass by haying, mowing, and/or grazing and then subsequently flooded during winter and spring.

Because of the aggressive nature of reed canarygrass, control strategies are limited and require long-term planning, dedicated resources, and commitment to follow-up for multiple years. Reed canarygrass-dominated wet meadows would be managed as short-grass habitats until resources are available to control the reed canarygrass and convert the habitats to sustainable native vegetation.

Haying is preferable to mowing, as mowing leaves residual vegetation and is more costly, but not all areas can be hayed due to the presence of surface water or woody vegetation. Under the CCP, up to 2,325 acres of wet meadows would be hayed or mowed from early summer through fall to provide for short grass management of reed canarygrass. Where haying is not possible, some areas would be mowed to provide short-grass areas. Mowing would occur on low-demand areas not economically suitable for haying by authorized permittees, but that still require mechanical manipulation of reed canarygrass to attain short-grass conditions. Managed livestock grazing would be utilized on a limited basis from late summer through fall to help address reed canarygrass in areas where haying or mowing cannot occur and reed canarygrass becomes unmanageable or rank. In some areas, grazing may be the only management alternative available to limit growth of woody vegetation and reduce cover of reed canarygrass. Grazing can have negative effects, including overbrowsing of palatable plant species, trampling of vegetation, soil compaction, reduced water quality, and disturbance to native species. Any grazing on the refuge would be limited to small areas and low numbers of animals. Limited grazing has been shown to have little effect on Oregon spotted frogs (Watson et al. 2003). Haying, grazing, and mowing start dates would be established to reduce the disturbance to ground nesting birds.

When resources become available, an integrated and adaptive management strategy would be established to control reed canarygrass and convert those areas to native vegetation. The control strategy would most likely include a combination of chemical and mechanical applications, prescribed fire, planting a cover crop, and native vegetation seeding and planting.

IPM methods, which may include chemical application of herbicides in the fall (Kilbride and Paveglio 1999; Reinhardt Adams and Galatowitsch 2006), would be used to control herbaceous species such as reed canary grass. The use of prescribed fire would reduce the seed bank density (Reinhardt Adams and Galatowitsch 2006), help reduce the amount of thatch, and prepare a suitable seed bed for native vegetation re-establishment. Native seed or live plant selection would be limited to vegetation native to the Glenwood Valley. In some instances, a cover crop may be planted to help reduce the recolonization of reed canarygrass by shading until dense native vegetation can be established. Shade limits reed canarygrass establishment from seed, leading to a dense, native canopy that may prevent reed canarygrass establishment and growth (Mauer and Zedler 2002; Mauer et al. 2003). However, this strategy would apply following eradication efforts only if native species can close the canopy faster than reed canarygrass re-invades. Often reed canarygrass can establish more quickly than the native species despite sowing native seeds immediately following removal of extant reed canarygrass individuals (Reinhardt Adams and Galatowitsch 2006). Therefore, seeding with natives alone is not likely to limit reed canarygrass recolonization. Reed canarygrass management would be necessary during establishment of the native species canopy and during times in which gaps in the native canopy occur. As native species recolonize, selectively removing reed canarygrass would become increasingly complex and would shift from broadcast chemical treatments to selective spot applications and hand removal.

An alternative option would be to use disking and prolonged deep flooding in order to control reed canarygrass (Kilbride and Paveglio 1999; Paveglio and Kilbride 2000; Tu 2004). Wetland units could be modified to allow for greater water management capability by impounding water within a dike, thus reducing the amount of reed canarygrass, promoting a diversity of native wetland plants and provide more suitable migratory waterfowl and greater Sandhill crane habitat. Further analysis would be required to understand topography, hydrogeology, and historical natural conditions when considering this option. This potential strategy would be carefully considered where Oregon spotted frogs are present to prevent barriers to dispersal. In areas with known Oregon spotted frog oviposition and rosy owl-clover sites, this option would be initially explored on an experimental basis with pre- and post-monitoring.

Prescribed fire is effective at removing woody vegetation and accumulated grasses but is very expensive. The timing and locations where prescribed fire can be applied on the refuge are limited. Where it is possible, prescribed fire would be used to manage for short reed canarygrass, remove thatch, and promote nutrient cycling. Prescribed fire may also be used in areas inaccessible to mechanical equipment due to woody debris and uneven terrain.

Oregon spotted frogs were historically found from southwestern British Columbia to northern California, throughout the Puget Trough and Willamette Valley and extending into the Cascades in Oregon and southern Washington (McAllister and Leonard 1997). The Oregon spotted frog is now thought to be extirpated from up to 90% of its historic range (Hayes 1997). This decline is due mainly to habitat loss, modification, and curtailment, as well as through interactions with introduced bullfrogs and predatory fish (Service 2010d). The refuge is home to the largest extant population of Oregon spotted frogs and the only population in Washington known to coexist with bullfrogs (Service 2007; McAllister and Leonard 1997). The loss of historic populations and the ongoing threats to extant populations has elevated the Oregon spotted frog to a candidate for Federal ESA protection and a State endangered species, making it the highest management priority for the refuge. Refuge management would need to adapt to needed recovery actions if the Oregon spotted frog is federally listed and protected under the ESA.

Wet meadows represent core breeding habitat for Oregon spotted frogs. Oregon spotted frogs breed in shallow water (2-12 inches) that is at least seasonally connected to a larger water body. Preferred breeding habitat consists of sparse or short native grasses, sedges, and rushes. Frogs rarely utilize densely vegetated areas of wet meadows, such as reed canarygrass-dominated wetlands, unless managed as short grass through haying or mowing, and areas shaded by woody vegetation, such as in shrubs or pines (Service 2007). Under the CCP, the refuge would manage wet meadows to promote Oregon spotted frog breeding by reducing cover of undesirable vegetation, mainly reed canarygrass and woody vegetation, and by ensuring breeding areas are inundated long enough to allow sufficient time for tadpoles to metamorphose and move from seasonal wetlands to permanent waters, which typically occurs in June or July, depending on seasonal conditions. Where possible, hydrologic connections would be maintained between wetland units and permanent water through August.

Greater Sandhill cranes were listed as endangered by the State of Washington in 1981. Greater Sandhill cranes historically nested in several areas in Washington, including the southern Puget Trough and the south-central, northeastern, and southeastern regions. Crane populations declined significantly following human settlement and the associated habitat loss and through overhunting. Breeding populations were extirpated from Washington by 1941. In 1979, nesting was confirmed on the refuge (Littlefield and Ivey 2002). The refuge is now home to approximately 60 summering birds, including about 25 nesting pairs.

Breeding territories of cranes typically include a variety of habitats: wet meadows, emergent marshes, grass uplands, and partially forested uplands. Nest sites are generally found in open areas in wet meadows or emergent marshes. Under the CCP, the Service would manage wet meadows to ensure continued crane nesting by maintaining habitat through removal of undesirable vegetation, mainly reed canarygrass and woody vegetation, and delaying any management actions which may affect breeding cranes until August 1 or after all colts have fledged. Management activities, such as pine removal in wet meadows that may affect breeding cranes, would be discontinued after March 1.

Rosy owl-clover, long-bearded sego lily, and Oregon coyote-thistle are wet meadow plants of management concern. Rosy owl-clover is restricted to two areas in Washington and is listed as endangered by the State of Washington. Long-bearded sego lily is restricted to a few populations in Klickitat and Yakima Counties; it is listed as sensitive by the State of Washington. Oregon coyote-thistle is restricted to three populations in Klickitat and Clark Counties. All three plant species rely on open wet meadow habitat with little woody vegetation or competing cover, such as reed canarygrass (Camp and Gamon 2011). Under the CCP, the refuge would manage wet meadow habitat to remove woody vegetation for these three rare plant species.

The nonnative bullfrog is fairly common on the refuge, and studies indicate that bullfrogs can prey heavily on native frog species (including Oregon spotted frogs). Brown bullhead fish are not native to the refuge and they occur in virtually all permanent and seasonal wetlands. There is no information about the impacts of bullhead on the native wildlife or ecology of the prairie and wetlands. Under the IPM program within the CCP, bullfrogs and bullheads would be removed from wetland areas using water management (drawdowns) and other reasonable methods. Drawdowns are an important management tool for reducing American bullfrog populations. Bullfrogs spend two years in the tadpole stage, so fall drawdowns limit bullfrog populations by culling tadpoles. Screening water control structure outlets is an additional option utilized to prevent bullfrog tadpoles from entering permanent water sources. Water level management requires functional water control structures. Water control structures are regularly maintained to keep them free of vegetation and ensure proper water flow and are replaced when no longer capable of functioning.

Beaver activity creates considerable habitat for Oregon spotted frogs (and other wildlife). Beaver dams provide low-flow, stable water conditions that promote invertebrate populations, provide rearing areas, and enhance vegetative diversity within the pond system. Dams and lodges contain a complex matrix of logs and branches that maintains a water flow with high levels of dissolved oxygen. This structure also limits freezing in a microhabitat relatively secure from predators and thus provides ideal frog overwintering sites; beaver ponds are also secure from most predators. However, beaver dams and beaver activity can also cause damage to water management infrastructure by compromising the integrity of dikes and water control structures. Under the CCP, beavers determined to be causing damage to water management infrastructure would be removed or relocated to alternative locations within the Yakama Nation Reservation or other suitable sites.

Objective 1.2 Emergent Marsh

Annually, protect and maintain 156 acres of emergent marsh on CLNWR for the benefit of migratory/breeding waterfowl, migrating/breeding greater Sandhill cranes, waterbirds (e.g., Virginia rails, soras, black terns), overwintering and breeding native amphibians (e.g., Oregon spotted frogs), and a diverse assemblage of wetland-dependent species. Emergent marshes would be characterized by:

• Water depths ranging from 2 to 4 feet. • Inundation from approximately October 1 to late July or early September. • A 50/50 ratio of open water and emergent cover as a mosaic. • Native emergent cover, including bulrushes (*Scirpus* species) and cattails (*Typha* species). • Open water with native/desirable submergents (e.g., pondweeds). • A limited presence of woody species (e.g., lodgepole pine, spirea, willow species). • A <5% presence of invasive/undesirable plants (e.g., purple loosestrife). • Limited bullfrog recruitment.		
Strategies For Achieving Objective	***Alt. 1***	***Alt. 2***
Acres	*156*	
A. Mimic the natural duration when surface water is present (hydroperiod) throughout the year (i.e., flooding to commence with the fall rains and subside with the summer dry season).		X
B. Revise Water Management Plan within 2 years of CCP completion and then modify as needed.		X
C. Set boards in water control structures in all creeks and ditches by October 1 to maintain maximum (optimal) water levels for overwintering Oregon spotted frogs and other aquatic species. Initiate drawdowns by July 1 with drawdowns complete by August 15. Some water may be maintained in swales or deeper portions all year.	X	X
D. Apply prescribed fire to treat a maximum of 50 acres/year.		X
E. Graze reed canarygrass from September 1 to November 30 (see Grazing CD).		X
F. Employ mechanical techniques (mowing, disking) to reduce emergent cover and maintain the desired vegetation/open water ratio.		X
G. Remove bullfrog tadpoles and bullheads using all available and appropriate means.		X
H. Use appropriate IPM techniques which may include mechanical/physical, cultural, chemical, and/or biological means to eradicate or control invasive species (see Appendix H).	X	X

Rationale

The refuge was initially established for breeding and migrating waterfowl. Emergent marsh habitats represent important nesting and brooding areas for a variety of waterbirds that nest on the refuge, such as mallards, Virginia rails, soras, and black terns. Emergent marsh is also important for

migrating waterfowl, such as mallards, tundra swans, northern pintails, and Canada geese. Under the CCP, the refuge would continue to manage emergent marsh to provide habitat for waterfowl.

Oregon spotted frogs also require emergent marsh habitat during parts of the year. As noted in Objective 1.1, Oregon spotted frog populations have declined precipitously and they are State endangered. The refuge population represents the largest extant population and the only population in Washington that coexists with large numbers of introduced bullfrogs (Service 2007; McAllister and Leonard 1997). Emergent marshes contain water through much of the summer and sometimes year-round. Oregon spotted frogs may utilize these areas for breeding in the spring and for foraging during the summer when other wetlands become dry. Frogs may also overwinter in the deeper water found in emergent marshes. For summering frogs, at least 50% open water is required for basking and to allow escape from predators (Watson et al. 2003). Although year-round water is beneficial to Oregon spotted frogs, such permanent water also provides breeding habitat for bullfrogs. The presence of bullfrogs negatively affects Oregon spotted frogs (Pearl et al. 2004). Under the CCP, the refuge would manage emergent marshes to maintain open water for Oregon spotted frogs and to curtail breeding of bullfrogs. Emergent marsh units, such as Willard Pond, C&H Bog, and Cattail Marsh, would be periodically drawn down to maintain open water to vegetation ratio and to reduce bullfrog recruitment. The units may be drawn down as much as every other year, but only one emergent marsh unit would be dewatered in any given year to maintain suitable Oregon spotted frog habitat.

Greater Sandhill cranes, another species of management concern addressed in Objective 1.1, utilize emergent marsh habitat on the refuge. Open water found in emergent marshes provides roosting sites for cranes; roosting in open water allows cranes to avoid predation. In some units, notably the Oxbow and Willard Units, cranes nest in emergent marsh. Under the CCP, the refuge would manage emergent marshes to maintain open water for crane roosting and would delay any management activities that may affect breeding cranes until after August 1, or all colts have fledged, and would cease management activities that may affect breeding cranes after March 1.

Current management of emergent marshes includes water level management, such as flooding or drawdowns, to influence vegetation and maintain some areas of open water. Drawdowns are an important management tool for reducing American bullfrog populations. Bullfrogs spend two years in the tadpole stage, so fall drawdowns limit bullfrog populations by culling tadpoles. Screening water control structure outlets is an additional option utilized to prevent bullfrog tadpoles from entering permanent water sources. Water level management requires functional water control structures. Water control structures are regularly maintained to keep them free of vegetation and ensure proper water flow and are replaced when no longer capable of functioning. For more information on water management, see the Rationale in Objective 1.1.

Under Alternative 2, management actions may include prescribed fire, mowing, disking, and grazing. Prescribed fire, mowing, and disking would be utilized to reduce emergent vegetation, create open water habitat, and reduce the cover of undesirable species, such as reed canarygrass. Prescribed fire is highly effective at reducing vegetative cover and removing accumulated vegetation. However, it is often cost prohibitive and only feasible in some areas. Mowing is less costly, but leaves behind residual vegetation and is less effective at removing shrubs and reed canarygrass. Additionally, mowing is not practical in all areas and produces only short-term benefits. Disking is a management tool for creating disturbance that increases heterogeneity in the landscape and can effectively reduce vegetative cover. In limited circumstances, livestock grazing may also be used to reduce emergent vegetation. Grazing can be effective at reducing vegetative cover and creating open water but can

have significant negative effects on native plants and animals. Limited grazing would occur in select areas where no other management alternatives are available. IPM techniques, which may include mechanical, cultural, chemical, and/or biological agents, would be used to eradicate or control invasive species. Management actions would usually occur from August 1 until precipitation prevents further use. For bullfrogs, populations may be controlled by direct removal.

Objective 1.3 Main Water Delivery System (Creeks and Ditches)

Annually, protect and maintain 19 miles of creeks and ditches on CLNWR for the benefit of Oregon spotted frogs, native fishes (e.g., speckled dace), migratory birds, and a diverse assemblage of other species (e.g., invertebrates). These creeks and ditches are characterized by:

- Permanent, moving water.
- Variable elevations and flows.
- The presence of submergents and floating vegetation (e.g., pondweeds).
- Limited/restricted stands of tall emergents (e.g., *Typha* species).

Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
Miles	*19*	
A. Set water control structure flood-up levels by October 1. Set water control structure drawdown levels by July 1 (see Conboy Lake Water Management Plan 2005).	X	X
B. Revise Water Management Plan within 2 years of CCP completion and then modify as needed.		X
C. Use mechanical techniques (dredging, vegetation removal) to maintain water flows.	X	X
D. Use appropriate IPM techniques which may include mechanical/physical, cultural, chemical, and/or biological means to eradicate or control invasive species (see Appendix H).	X	X

Rationale

A legacy of agricultural use in the Glenwood Valley has resulted in several man-made or altered ditches and creeks that function as inflows and outflows for the refuge. Chapman and Holmes Creeks provide spring-time flows to the southwest side of the refuge. Cold Springs Ditch, supplied by several springs, provides some year-round flow to the west side of the Camas Prairie lake bed. Bird Creek, supplied by irrigation water, provides the bulk of year-round water and flows to the north side of the refuge. Water drains out of the refuge through the Camas Ditch, which becomes Outlet Creek and flows east into the Klickitat River. Although these ditches are man-made, some have been in place for 100 years and now serve as critical habitat for Oregon spotted frogs, native invertebrates, and fish. They are also the water delivery system for all aquatic habitats on the refuge, which

includes critical habitat for Oregon spotted frogs, Sandhill cranes, rare plants, and other species of management concern.

As noted in Objective 1.1, Oregon spotted frogs are State endangered due to precipitous population declines as a result of habitat loss and degradation and interactions with introduced bullfrogs and predatory fish. The ditches and creeks, supplied by springs, run-off, and irrigation water, contain the bulk of year-round water on the refuge. During late summer into winter, these ditches and creeks are important habitat for the highly aquatic Oregon spotted frog, as they are the only available water, other than several emergent marshes. Under the CCP, the refuge would manage ditches and creeks so that they continue to function as summer and winter habitat for Oregon spotted frogs.

As the bulk of year-round water, the ditches and creeks serve as habitat for aquatic invertebrates and speckled dace, a native fish. Creek and ditch banks also represent the only riparian habitat on the refuge. Under the CCP, the Service would manage the creeks and ditches to maintain native assemblages of invertebrates, fish, and riparian vegetation.

Current management of creeks and ditches includes maintenance of water control structures and spillways, occasional cleaning and dredging, and vegetation control in riparian areas. Maintenance of water control structures is necessary to ensure continued flow and functioning of ditches and creeks. The timing and intensity of any cleaning and dredging activities would take into consideration the presence of Oregon spotted frogs. Water control structures also allow wetland units to be filled or drained as necessary. Spillways provide mitigation of flood water and hydrologic connections for migration of aquatic animals and require occasional maintenance.

It should be noted that in the future there may be a management need to restore (likely through filling of manmade water channels) the stream system to its historic conditions. However, at this time what those historic conditions were is unknown. Additional study would be needed to determine those conditions and if restoration is desirable (see Goal 5). Such restoration would be the content of future CCPs or a modification of this one.

Objective 1.4 Springs

Annually, protect and maintain springs (e.g., Willard Springs, Headquarters) on CLNWR for the benefit of a diverse assemblage of native species. Springs are characterized by:

- Permanent, moving water.
- Being groundwater-driven or associated with groundwater.
- Water temperatures ranging from 44 to 48°F.

Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
Springs	*4*	
A. Strategically remove unwanted vegetation and debris, when necessary, to promote natural hydrology.	X	X
B. Use appropriate IPM techniques, including mechanical /physical, cultural, chemical, and/or biological means to eradicate or control invasive species (see Appendix H).	X	X

Rationale

There are four known springs on the refuge: Willard Spring is the only named spring. This habitat can support a diverse assemblage of native species, including overwintering Oregon spotted frogs. Springs are sometimes home to rare, endemic species; however, no biological surveys have been conducted on springs within the refuge, so it is unknown what species occupy these springs. The refuge would manage springs to protect any native species present and promote and maintain natural hydrology. This would be accomplished by conducting biological surveys within springs and initiating a periodic flow and temperature monitoring regime. Unwanted vegetation that accumulates in springs may be removed to allow free flow from springs. Maintaining existing springs is consistent with the Service's 2001 policy on BIDEH (601 FW 3).

Goal 2. Protect and maintain upland meadow habitat characteristic of Glenwood Valley/Conboy Lake Region.

Objective 2.1 Upland Meadow

Annually, protect and maintain 799 acres of upland meadow habitat on CLNWR for the benefit of foraging greater Sandhill cranes, migratory landbirds (e.g., grasshopper sparrows), raptors (e.g., northern harriers, short-eared owls), and a diverse assemblage of other native species (e.g., Mardon skippers, western yellow-bellied racers). Upland meadows are characterized by:

- A full complement of native grasses (e.g., bluebunch wheatgrass, blue wildrye, and Idaho fescue).
- A 20% cover of native forbs (e.g., Oregon checkermallow, yarrow, aster species).
- A 75% cover of native bunchgrasses (e.g., blue-bunch wheatgrass, blue wildrye, Idaho fescue).
- A <5% cover of invasive species (e.g., meadow knapweed).
- A limited presence of woody species (e.g., ponderosa pine, lodgepole pine).

Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
Acres	*799*	
A. Apply prescribed fire to treat up to 100 acres annually	X	X
B. Graze nonnative grasses from September 1 to November 30 (see Grazing CD).		X
C. Use mechanical techniques (e.g., mowing, grazing, heavy equipment) to selectively remove ponderosa and lodgepole pines and control pine seedlings.	X	X
D. Use appropriate IPM techniques which may include mechanical/physical, cultural, chemical, and/or biological means to eradicate or control invasive species (see Appendix H).	X	X

Rationale

Protection of habitat for migratory birds was the initial reason for the creation of the refuge. Upland meadows provide habitat for migratory songbirds, such as grasshopper sparrows. Raptors, such as northern harriers, build nests and forage in upland meadows. Greater Sandhill cranes, a species of management concern, forage in upland meadow habitats. Under the CCP, the refuge would manage upland meadows to provide habitat for migratory birds.

Upland meadow habitat also provides habitat for other species of management concern. The Mardon skipper is a small butterfly that relies on native bunchgrasses, especially fescues, within upland meadows. Throughout much of its range, a great deal of upland meadow habitat has been lost or degraded by overgrazing, forest encroachment, invasive species, residential development, and recreational activities. As a result of this habitat loss, Mardon skippers are restricted to five geographic areas, including two in Washington (77 FR 54331). Due to population declines, the Mardon skipper has been elevated to State endangered status. Mardon skipper populations are known to exist in two areas in upland meadows on the refuge, although extensive surveys for Mardon skippers across all appropriate habitats on the refuge have not been conducted.

Mardon skippers require native bunchgrasses, particularly fescues and oatgrasses, for reproduction and other native plants, such as early blue violet, for foraging (Service 2010b). The presence of shrubs and trees negatively affects Mardon skippers by reducing meadow habitat. Fire suppression in upland meadows has allowed encroachment by shrubs and trees on the refuge, particularly lodgepole and ponderosa pines. Prescribed fire has been used in many grassland restoration sites to prevent the establishment and growth of woody vegetation, reduce the density of nonnative herbs, and maintain vigorous stands of native grasses and forbs. However, due to small population sizes, limited connectivity between Mardon skipper populations, and their limited dispersal ability, the potential for direct mortality due to fire could harm Mardon skipper populations (Service 2010b, Black 2011, Black et al. 2011). Mardon skipper populations may be vulnerable to local extirpation if a fire burns all of the occupied habitats at a population site (Black 2011). If a known Mardon skipper site is burned, these areas must then be re-colonized by butterflies flying in from unburned parts of the meadow; however, the rate and extent of re-colonization for Mardon skippers is still currently being investigated (Black 2011, Black et al. 2011). Overall, assessing whether the habitat benefits gained from using prescribed fire would balance the lethal effects fire can pose to Mardon skippers is a complex undertaking. Further, potential effects would depend upon the timing and severity of the fire and the condition of the habitat. The re-colonization rate and extent would depend upon the abundance and distribution of the protected core populations as well as the habitat response of the burned areas.

Under the CCP, the refuge would manage upland meadows for the benefit of Mardon skippers by reducing the cover of shrubs and trees. Activities that may negatively affect Mardon skippers would be avoided, including heavy grazing and extensive burning. In areas with known populations of Mardon skippers, grazing, burning, and other management activities would be subject to careful consideration.

Invasive species are a concern within upland meadows. Invasives crowd out native plants and reduce plant biodiversity. Some invasives, like cheatgrass, increase fire frequency. Under the CCP, the refuge would manage upland meadows to reduce the cover of invasive plants. Current management of upland meadows that do not contain populations of Mardon skippers include pine removal and chemical control of invasive, nonnative plants, such as meadow knapweed.

Pine removal and chemical control of invasive plants would continue to be management strategies. Pine removal is conducted by sawyers, and slash is hand piled. Mechanized removal actions would be extremely limited in areas with active Mardon skipper populations; all pine removal in known areas of Mardon skipper populations would be conducted by hand to minimize trampling and disturbance. In areas where the Mardon skipper does not occur, small pines may be removed by mowing or mastication; larger pines would be removed using chainsaws or heavy equipment. Mechanical, cultural, chemical, and biological agents may be used to eradicate or control invasive species. Prescribed fire may also be used to remove pines and shrubs. When applied, prescribed fires would be conducted in fall to mimic natural processes. Light, managed grazing may also be applied to prevent pine and shrub growth in areas where Mardon skippers do not occur. Management activities would be delayed until late summer or fall to reduce effects on nesting cranes and migratory birds.

Goal 3. Protect, maintain, and enhance forest habitats characteristic of Glenwood Valley/Conboy Lake Region.

Objective 3.1 Ponderosa Pine Forest

Over the life of the CCP, protect, maintain, and enhance 610 acres of ponderosa pine forest on CLNWR for the benefit of migratory birds (e.g., white-headed woodpeckers, chipping sparrows, dark-eyed juncos, Townsend's solitaires, dusky flycatchers) and a diverse assemblage of native forest-dependent species (e.g., Ames' milk-vetch, Pulsifer's monkey-flower). Late-succession ponderosa pine forest is characterized by:

- Being dominated by large, well-spaced ponderosa pine with lesser amounts of lodgepole pine, Douglas-fir, and grand fir.
- Some areas of small trees in even-aged groups, one to several acres in size.
- Mean canopy closures of 10-40% with 10 trees/acres at >21 inches diameter at breast height (DBH), with at least two trees being >31 inches DBH.
- An average of 1.4 snags/acres being >8 inches DBH.
- Small forest openings in dry sites with bitterbrush and milk-vetch present.
- An open understory with regenerating pines.
- An interspersion of herbaceous ground cover with native shrubs (e.g., snowberry, wild rose, bitterbrush, rabbitbrush).
- A <5% presence of invasive/undesirable plants.

In areas where ponderosa pine stands are potential western gray squirrel habitat (where it meets Oregon white oak forest), desired attributes include:

- A multi-layered and well-connected canopy with between 45% and 75% canopy cover.
- At least eight large conifers (>16 inches DBH) per acre.
- At least a 30% cover of native shrubs.
- A 50% to 80% ground cover of forest litter or moss.

Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
Acres	*610*	

A. Over the life of the CCP, conduct mechanical thinning on ponderosa pine stands as prescribed in the Silvicultural Report and Recommendations (White 2009). For about 35% of the stand, thin to a stand density index of about 100-135. On an additional 35% of the stand, thin to a stand density index of about 180. Maintain about 15% of the stand intact, with no treatment, in patches 2-5 acres in size.		X
B. Apply prescribed fire in the fall as outlined in the Silvicultural Report and Recommendations. Use "underburning," or the use of light controlled burns, to remove fuels, kill some small trees, and remove ladder fuels.		X
C. Create small openings in about 15% of the stand, in sizes from .5 to 2 acres. Small openings could be contiguous to very widely spaced areas, in order to allow for maximum growth on large ponderosa pine trees.		X
D. Determine the existing snag density and, if needed, create additional snags through girdling, cutting, or prescribed fire.		X
E. Use appropriate IPM techniques which may include mechanical/physical, cultural, chemical, and/or biological means to eradicate or control invasive species (see Appendix H).	X	X

Rationale

Protecting, maintaining, and enhancing the existing ponderosa pine forest is consistent with the Service's 2001 policy on BIDEH (601 FW 3). This habitat provides thermal cover and migration and dispersal corridors for a diverse assemblage of wildlife species, including amphibians, reptiles, migratory landbirds, and small mammals. The State threatened western gray squirrel relies on ponderosa pine forests for foraging habitat (Linders et al. 2010). A number of rare or uncommon native birds and wildflowers have been found in this habitat.

The black-backed woodpecker and white-headed woodpecker are found in ponderosa pine forests. Both are candidates for listing as State threatened or endangered and prefer open, mature stands of ponderosa pine (Wahl et al. 2005). Under Alternative 2, the refuge would manage for late-succession ponderosa pine stands exhibiting variable stand structure that would support species such as black-backed and white-headed woodpeckers. Mechanical thinning would occur to meet attributes identified above, as well as objectives defined in the CLNWR Silvicultural Report and Recommendations (White 2009).

Ames' milk-vetch is a State endangered plant found on the refuge and adjacent lands. This represents the only population in Washington. Ames' milk-vetch is found in open ponderosa pine habitat and germinates on disturbed ground with little forest litter. Historically, periodic fires maintained open ponderosa pine forests free of shrubs and forest litter (Camp and Gamon 2011).

However, fire suppression during the last century has limited available habitat for the Ames' milk-vetch. Under Alternative 2, the refuge would manage ponderosa pine stands for the benefit of Ames' milk-vetch.

Western gray squirrels utilize ponderosa pine stands that are adjacent to, or intermingled with, stands of Oregon white oak. These stands occur mainly on the southern boundary of the refuge. Ideal pine stands are a mix of ages and stand densities. Mature ponderosa pines provide nest sites and serve as a reliable food source. Areas with dense cover allow fungal production, which is an important food source, while openings enhance the variety of food sources by allowing seed-bearing shrubs to grow. Isolated trees often produce more seeds and may serve as secluded den sites and cover for migration; isolated trees should be maintained for these purposes. Migration corridors should be two or more trees wide with a complex canopy. In areas where ponderosa pine stands are potential western gray squirrel habitat, stands would be managed to provide a multi-layered and well-connected canopy between 45% and 75% canopy cover with at least eight large conifers (>16 inches DBH) per acre. These stands should also have at least 30% cover of native shrubs and 50% to 80% ground cover of forest litter or moss. Timber management or prescribed fire would be avoided around active squirrel nests between March 1 and August 31 to prevent any disturbance to nesting females and young (Linders et al. 2010).

The existing ponderosa pine forest sites are occupied by stands primarily composed of 60–100 year-old ponderosa pine. These stands are dominated by ponderosa pine, with lesser amounts of lodgepole pine, Douglas-fir, and grand fir present. Two of the stands are part of the forested landscape directly west of Conboy Lake. The other ponderosa pine stands are scattered along the edges of Conboy Lake wetlands, and are usually associated with adjacent stands of lodgepole pine and quaking aspen. In these cases, as mentioned previously, ponderosa pine occupies slightly higher, better drained sites. Common understory shrubs and herbs include snowberry (*Symphocarpus* spp.), wild rose (*Rosa* spp.), bitterbrush (*Purshia tridentata*), bracken fern (*Pteridium aquilinum*), various native bunchgrasses, and other grass species. Ecologically, these stands lie between the grand fir and ponderosa pine zones (Franklin and Dyrness 1973) and are similar to, but drier than, the grand fir/pinegrass and grand fir/elk sedge plant communities in the Gifford Pinchot National Forest to the west (Topik 1989).

Ponderosa pine stands in the refuge have followed a development history similar to others on the eastern slopes of the Cascade Range. In pre-settlement times, frequent, low-intensity ground fires probably were the predominant disturbance influencing these forests and were key in maintaining more open conditions than we see today. Fire prevention, beginning in the late 1800s and early 1900s, mostly removed the influence of fire on forest succession in ponderosa pine stands. The lack of fires has probably resulted in an increased density in these stands. Most ponderosa pine stands on CLNWR are densely stocked, and understory tree species are mostly lodgepole pine, Douglas-fir, ponderosa pine, and grand fir. Pure ponderosa pine stands often contain large numbers of small trees.

Under the CCP, most ponderosa pine stands would be managed towards a desired future condition comprised of large patches of older forest with large snags. Stands would be dominated by large, well-spaced ponderosa pine trees, with some areas of small trees in even-age groups one to several acres in size. Reducing stand density via mechanical thinning would enhance individual tree vigor, promoting development of large, old-growth pines in the future, help provide for habitat for species adapted to open pine stands, and would provide a margin of protection from future insect outbreaks and wildfires. Reducing stand density may also allow for the re-introduction of light ground fires in a future prescribed burning program. Density reduction prior to the reintroduction of fire is likely

necessary in many areas; build-up of duff and reduction of individual tree vigor in dense stands after years of fire exclusion may make it difficult to immediately reintroduce fire (Arno 2005). Mechanical thinning could include commercial thinning, hand clearing with chainsaws, or other suitable heavy equipment.

Fire suppression has allowed a hazardous buildup of fuels within ponderosa pine forests. A fire moving through this forest could become catastrophic and threaten human life or property. Under Alternative 2, the refuge would manage ponderosa pine forests to reduce the buildup of fuels and avoid stand replacement fires. Proposed hazardous fuels reduction is detailed in the MCRNWRC's Fire Management Plan.

Within recent history, the ponderosa pine forest has not been actively managed. In the future, hazardous fuels treatments, including prescribed fire and mechanical methods, would be conducted to reduce risks to humans and wildlife. These treatments also address past climate trends and projected increases to fire risk associated with future climate conditions. Mechanical thinning and prescribed fire may be used to create more open structure for Ames' milk-vetch and black-backed and white-headed woodpeckers. For the benefit of both woodpeckers and other species, such as owls, that nest and forage in ponderosa pine forests, snags would be created through fire or girdling. Additionally, other mechanical, cultural, chemical, and biological agents may be used to control or eradicate invasive species.

Objective 3.2 Lodgepole/Ponderosa Pine Forest

Over the life of the CCP, protect, maintain, and enhance 587 acres of lodgepole/ponderosa pine on CLNWR for the benefit of migratory birds (e.g., mountain chickadees, yellow-rumped warblers, Cassin's finches), nesting bald eagles, and a diverse assemblage of other native forest-dependent species (e.g., elk, deer, Douglas squirrels, western gray squirrels). Lodgepole/ponderosa pine is characterized by:

- Larger, older lodgepole and ponderosa pine.
- Small openings with small trees in even-aged groups, one to several acres in size.
- An average of 1.4 snags/acres being >8 inches DBH.
- A <5% presence of invasive/undesirable plants.

In areas where ponderosa pine stands are potential western gray squirrel habitat (where it meets Oregon white oak forest), stands would be managed with:

- A multi-layered and well-connected canopy with between 45% and 75% canopy cover.
- At least eight large conifers (>16 inches DBH) per acre.
- At least a 30% cover of native shrubs.
- A 50% to 80% ground cover of forest litter or moss.

Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
Acres	*587*	
A. Over the life of the CCP, conduct mechanical thinning on lodgepole/ponderosa pine stands as prescribed in the		X

Silvicultural Report and Recommendations (White 2009). Focus on areas where the stand is a mixture of lodgepole and ponderosa pine and replicate the density called for in ponderosa pine stands, favoring ponderosa pine.		
B. Create small openings to enhance structural diversity.		X
C. Determine the existing snag density and, if needed, create additional snags through girdling or cutting.		X
D. Apply prescribed fire in the fall as outlined in the Silvicultural Report and Recommendations where appropriate.		X
E. Use appropriate IPM techniques which may include mechanical/physical, cultural, chemical, and/or biological means to eradicate or control invasive species (see Appendix H).	X	X

Rationale

Maintaining existing lodgepole/ponderosa pine forest is consistent with the Service's 2001 policy on BIDEH (601 FW 3). This habitat provides thermal cover and migration and dispersal corridors for a diverse assemblage of wildlife species. Migratory songbirds, such as the yellow-rumped warbler, Cassin's finch, and mountain chickadee, which have experienced population declines in Washington, nest and forage in lodgepole/ponderosa pine forests. Native mammals, such as elk, deer, and Douglas squirrels may use lodgepole/ponderosa pine forests for nesting, foraging, or cover. Bald eagles, which are a State sensitive species, nest in mature lodgepole and ponderosa pines.

Western gray squirrels, a State threatened species, may use some lodgepole and ponderosa pine stands. Western gray squirrels may utilize pine stands that are adjacent to, or intermingled with, stands of Oregon white oak, which occurs mainly on the southern boundary of the refuge. These pine stands should be managed to increase stand complexity, with a variety of densities and tree ages. The largest trees are important for nest sites and food sources and should be maintained. Isolated trees and small groups of trees are also important as migration cover and secluded nest sites. In areas where pine stands are potential western gray squirrel habitat, stands would be managed to provide a multi-layered and well-connected canopy between 45% and 75% canopy cover with at least eight large conifers (>16 inch DBH) per acre, preferably ponderosa pine. These stands should also have at least 30% cover of native shrubs and 50% to 80% ground cover of forest litter or moss. Timber management or prescribed fire would be avoided around active squirrel nests between March 1 and August 31 to prevent any disturbance to nesting females and young (Linders et al. 2010). CLNWR lodgepole/ponderosa pine forests are primarily composed of 40-100-year-old lodgepole and ponderosa pines. Lodgepole pine occupies low areas and depressions on the local landscape, adjacent to wet meadows. Farther away from wet meadow edges, on slightly higher terrain, stands change to a mixture of lodgepole pine and ponderosa pine. Some areas in the middle of these stands are almost pure ponderosa pine. The most common shrub in lodgepole/ponderosa pine stands is spirea. Other common shrubs and forbs include serviceberry, snowberry, wild rose, and trailing blackberry. Lodgepole/ponderosa pine stands on CLNWR are densely stocked and are reasonably healthy. Lodgepole pine is quite intolerant of shade, thus needing room to grow well. Lodgepole

pine can, however, grow at very dense levels, with little individual tree growth. CLNWR stands are growing at moderate rates.

Unlike ponderosa pine, lodgepole pine is not maintained by frequent, low-intensity fire. The species has thin bark and is susceptible to cambium damage and killing by fire (Evers et al. 1996). Lodgepole pine grows fast and is relatively short-lived, usually not surviving more than 150 or 200 years (Arno 1977). Mature, dense stands are susceptible to attacks by the mountain pine beetle, which can kill the majority of trees in a stand. Large fires, such as the Yellowstone fires of 1988, burned in stands that had earlier outbreaks of mountain pine beetles (Lynch et al. 2006). Trees occupying low sites with high water tables, such as at CLNWR, are also subject to periodic breakage or uprooting by wind, adding fuel for later wildfires.

Although stands are not maintained by fire, lodgepole pine is well-adapted to regrowing after fire. The tree colonizes and grows quickly on open, disturbed sites. The tree exhibits fast juvenile growth and quickly becomes established. The species is very tolerant of growing season frost and does well on valley bottoms, depressions, and other sites where cold air accumulates and growing season frost can be a problem.

Under Alternative 2, the refuge would manage for late-succession lodgepole/ponderosa pine forests for a variety of species by creating structural diversity. In areas where the stand is a mixture of lodgepole and ponderosa pine, thinning to replicate the density to favor ponderosa pines would improve stand vigor. This would be accomplished by creating openings through mechanical methods, creating snags by girdling trees, prescribed fire, and mechanical thinning to reduce stand density. Reducing density in areas of pure lodgepole pine, a relatively short-lived species, would not necessarily translate into long-term stand health; even thinned stands are susceptible to insects such as the mountain pine beetle and other pathogens. In addition, there is value in retaining some areas of unthinned stand, which may provide superior habitat for species such as the black-backed woodpecker. Stand density reduction efforts would focus on areas of mixed ponderosa pine and lodgepole pine and on removing lodgepole pine. Mechanical thinning would occur to meet attributes identified above, as well as objectives defined in the CLNWR Silvicultural Report and Recommendations (White 2009). Mechanical thinning could include commercial thinning or hand clearing with chainsaws or other suitable heavy equipment. Natural processes, such as windthrow of trees, would also contribute to creation of structural diversity. Invasive species that negatively affect native species may be controlled or eradicated through a combination of mechanical, cultural, chemical, and biological methods.

A history of fire suppression has allowed a hazardous buildup of fuels within lodgepole/ponderosa pine forests. To reduce risks to human life and property, as well as wildlife, the refuge would reduce hazardous fuels through prescribed fire and mechanical thinning. These treatments would also address past climate trends and projected increases to fire risk associated with future climate conditions. Hazardous fuels reduction is detailed in the MCRNWRC's Fire Management Plan.

Objective 3.3 Mixed Conifer Forest

Over the life of the CCP, protect, maintain, and enhance 926 acres of mixed conifer forest on CLNWR for the benefit migratory birds (e.g., brown creepers, Townsend's warblers, red-breasted nuthatches, pine siskins) and a diverse assemblage of other forest-dependent species (e.g., elk, black-tailed deer). Mixed conifer forest is characterized by:

- A dense overstory canopy dominated by Douglas-fir, grand fir, and ponderosa pine.
- Being multi-layered and structurally diverse.
- Large, well-spaced Douglas-fir and ponderosa pine (>4 trees/acre at >18 inches DBH with at least two trees >24 inches DBH).
- At least two snags/acre.
- A 20% aerial coverage of scattered openings with understory shrubs (e.g., snowberry, California hazel, wild rose) and other herbaceous species (e.g., bracken fern).

In areas where ponderosa pine stands are potential western gray squirrel habitat (where it meets Oregon white oak forest), stands would be managed with:

- A multi-layered and well-connected canopy with between 45% and 75% canopy cover.
- At least eight large conifers (>16 inches DBH) per acre.
- At least a 30% cover of native shrubs.
- A 50% to 80% ground cover of forest litter or moss.

Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
Acres	*926*	
A. Over the life of the CCP, conduct mechanical thinning on mixed conifer stands as prescribed in the Silvicultural Report and Recommendations (White 2009). Over about 50% of the stand area, thin Douglas-fir and grand fir to a relative density of 25-35 and retain larger trees.		X
B. Create small openings (approximately 0.5 acres in size) to enhance structural diversity.		X
C. Determine the existing snag density and, if needed, create additional snags through girdling or cutting.		X
D. Apply prescribed fire in the fall as outlined in the Silvicultural Report and Recommendations.		X
E. Use appropriate IPM techniques which may include mechanical/physical, cultural, chemical, and/or biological means to eradicate or control invasive species (see Appendix H).	X	X

Rationale

Maintaining existing mixed conifer forest is consistent with the Service's 2001 policy on BIDEH (601 FW 3). This habitat provides thermal cover and migration and dispersal corridors for a diverse assemblage of wildlife species. Mixed conifer forests provide nesting and foraging habitat for a variety of migratory birds, including brown creepers, Townsend's warblers, red-breasted nuthatches,

and pine siskins, which have declined in Washington (Wahl et al. 2005). Other native animals, such as elk and deer, use mixed conifer forests for cover and as migration corridors.

Western gray squirrels may utilize conifer stands that are adjacent to, or intermingled with, stands of Oregon white oak, which occurs mainly on the southern boundary of the refuge. These stands should be managed to increase stand complexity, with a variety of densities and tree ages. Areas of dense canopy cover promote the growth of fungi, which are important food sources. Light gaps allow the growth of seed-bearing shrubs. The largest trees are important for nest sites and food sources and should be maintained. Isolated trees and small groups of trees are also important as migration cover and secluded nest sites. In areas where pine stands are potential western gray squirrel habitat, stands would be managed to provide a multi-layered and well-connected canopy between 45% and 75% canopy cover with at least eight large conifers (>16 inch DBH) per acre, preferably ponderosa pine and Douglas-fir. These stands should also have at least 30% cover of native shrubs and 50% to 80% ground cover of forest litter or moss. Timber management or prescribed fire would be avoided around active squirrel nests between March 1 and August 31 to prevent any disturbance to nesting females and young (Linders et al. 2010).

CLNWR mixed conifer stands are densely populated, with a few areas of light stocking (dry ridgetops populated by young ponderosa pine and Oregon white oak). These stands are stocked with Douglas-fir, ponderosa pine, and grand fir as the primary tree species. In addition, most mixed conifer stands include an understory of grand fir, or a component of grand fir in the overstory. Although many small grand fir and Douglas-fir saplings inflate the number of stems per acre, stands are fully occupied with larger trees. Mixed conifer stands appear to be about 100 years old, similar to or a bit older than other stands on the refuge. Fire is probably less frequent than in ponderosa pine stands, on the order of every 25–100 years. Semi-frequent surface fire maintained stands of ponderosa pine and Douglas-fir on the drier end of this fire group.

The northerly slopes of these stands allow development of shade-tolerant grand fir to a greater extent than ponderosa pine and lodgepole pine stands, particularly with fire exclusion during the past century. Currently, mixed conifer stands are relatively dense and include understories of Douglas-fir and grand fir. In some areas, grand fir is a stand canopy component.

Under Alternative 2, management would include retaining late-successional forest conditions, which these stands are developing, and creating edge. Small openings and thinned areas, combined with areas that remain in their current, relatively dense condition, would help to maintain parts of the stand as dense forest. Creating openings and reducing overall stand density would lessen the chance of large-scale stand loss from disturbance agents such as insects or fire. Under Alternative 2, the refuge would manage for native wildlife by creating and maintaining structural diversity dominated by Douglas-fir, grand fir, and ponderosa pine in mixed conifer forests. This would be accomplished through prescribed fire, mechanical thinning, creating small openings, and creating snags by girdling. Mechanical thinning would occur to meet attributes identified above, as well as objectives defined in the CLNWR Silvicultural Report and Recommendations (White 2009). Mechanical thinning could include commercial thinning or hand clearing with chainsaws or other suitable heavy equipment. A history of fire suppression has allowed a hazardous buildup of fuels. A fire burning in mixed conifer forests could threaten human life and property, as well as wildlife. To prevent hazardous wildfires, several management tools may be used. Stands may be commercially thinned to reduce stand density and remove ladder fuels. Grand fir, which is not fire resistant, may be selectively removed. Prescribed fire may also be used to reduce hazardous fuels. These treatments also address

past climate trends and projected increases to fire risk associated with future climate conditions. Hazardous fuels reduction is detailed in the MCRNWRC's Fire Management Plan.

Objective 3.4 Oregon White Oak Woodland

Over the life of the CCP, protect, maintain, and enhance 61 acres of Oregon white oak woodlands on CLNWR for the benefit of breeding and migrating landbirds (e.g., dusky flycatchers, American robins, white-breasted nuthatches, Lewis' woodpeckers), foraging greater Sandhill cranes, small mammals (e.g., western gray squirrels) and a diverse assemblage of oak woodland-dependent species (e.g., turkeys, deer). Oregon white oak woodlands are characterized by:

- Oak-pine woodland, with or without scattered trees, that comprise a moderate and variable (<25 to 75%) canopy cover.
- At least eight large diameter (>16 inch DBH) trees per acre, dominated by conifers, but with a diversity of mast-producing trees.
- A multi-layered canopy of ponderosa pine with an upper canopy layer >46 feet.
- Sparse understories of oak with <50% shrub cover or other ground vegetation.
- The presence of snags.
- Connectivity of the oak forests with adjacent conifer forests.
- A <5% presence of invasive/undesirable plants.

Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
Acres	*61*	
A. Create openings with mechanical techniques to allow oak recruitment.		X
B. Selectively thinning (e.g., mechanical techniques) adjacent conifers overtopping hardwood species.		X
C. Determine the existing snag density and, if needed, create additional snags through girdling.		X
D. Apply prescribed fire in the fall as outlined in the Silvicultural Report and Recommendations (White 2009).		X
E. Use appropriate IPM techniques which may include mechanical/physical, cultural, chemical, and/or biological means to eradicate or control invasive species (see Appendix H).	X	X

Rationale

Protecting and maintaining Oregon white oak woodland habitat is consistent with the Service's 2001 policy on BIDEH (601 FW 3). Oregon white oak woodland is also a priority habitat in Washington due to declining populations (Larsen and Morgan 1998). White oak woodlands provide habitat for a

variety of native species, including turkey, deer, bats, and other small mammals and migratory birds. Birds such as the white-breasted nuthatch and Lewis's woodpecker, a State candidate species, nest in white oak woodlands (Wahl et al. 2005). Greater Sandhill cranes, a State endangered species, forage in white oak woodlands. Under the CCP, the refuge would protect and promote the growth of Oregon white oak woodlands for the benefit of native species.

Oregon white oak woodlands also provide habitat for the State threatened western gray squirrel which is present on the refuge. Ideal habitat for western gray squirrels is complex, with a mix of age classes, species, and densities. Mature oaks are an important food source, and the largest oaks should be maintained by removing conifers that overtop them. Conifers within Oregon white oak woodlands are an important component of habitat. Large pines provide nesting, foraging, and denning habitat. Areas of dense pine cover allow for growth of fungus, such as truffles, which are a food source for western gray squirrels. Areas of low canopy cover and open patches ensure a broader variety of food sources, such as seed-bearing shrubs. However, a dense shrub understory may stress plants and limit seed production. Timber management or prescribed fire between March 1 and August 31 could disrupt breeding or access to mates and young and should be avoided within 400 feet of any squirrel nests (Linders et al. 2010).

Oregon white oak occurs interspersed with conifers, or in small, almost pure, groups on the refuge. The species is very drought-tolerant and occupies locations with very shallow soils where conifers have difficulty competing. The species is shade-intolerant; fire exclusion has resulted in many Oregon white oaks being overtopped by conifers, decreasing their vigor or killing the hardwoods due to lack of light.

Due to its importance as habitat, the primary strategy for managing Oregon white oak on CLNWR would be to protect, maintain, and enhance the vigor and growth of existing trees. A recommended practice for Oregon white oak is to thin adjacent conifers that are shading the hardwood in order to maintain the oaks' vigor and growth (Larson and Morgan 1998). Thinning conifers from the south side of oak trees leaves some connectivity on the north side for arboreal rodents such as the western gray squirrel. Connectivity is important since gray squirrels nest in conifers (Larson and Morgan 1998).

Periodic, low-intensity fire is one of the key ecological processes affecting the viability of oak woodland ecosystems. An anthropogenic fire regime by American Indians was probably present historically. Fire maintained open understory conditions in oak woodland and favored dominance of oak over Douglas-fir. The recent history of fire suppression on the refuge has allowed encroachment of Douglas-fir and invasive plants in oak woodlands and may have contributed to a decline in oak recruitment and in native wildflowers. To maintain this rare plant community, control of invasive plants, planting oak seedlings or saplings, and maintaining sufficient forest floor light conditions by thinning dense, even-aged oak stands may be necessary.

Structurally diverse stands would be created to benefit native species, such as western gray squirrels. To benefit cavity-nesting species, such as Lewis's woodpecker, snags may be created by girdling. Connectivity with conifer forests would be maintained to serve as movement corridors for western gray squirrels, turkey, deer, and other native species.

Objective 3.5 Quaking Aspen Stands

Over the life of the CCP, protect, maintain, and enhance 95 acres of quaking aspen stands on CLNWR for the benefit of migratory landbirds (e.g., red-naped sapsuckers, house wrens, western screech owls, tree swallows, northern flickers), raptors (e.g., sharp-shinned hawks, Cooper's hawks), and a diverse assemblage of other native species (e.g., elk, ruffed grouse, beavers). Quaking aspen is characterized by:

- Large aspen trees and snags with regeneration.
- A mean canopy cover of 40-80% (either clumped with patches and openings or relatively evenly distributed) with >1.5 trees and >1.5 snags/acre >39 feet in height and 10 inch DBH.
- A >10% cover of saplings in the understory.

Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
Acres	*95*	
A. Provide a setback from haying to promote suckering (recruitment) of aspens.		X
B. Disk up to five acres annually to cause disturbance and promote suckering.		X
C. Selectively thin pine up to 30 feet around aspen stands to promote expansion of aspen stands within conifer forests.		X
D. Remove conifers (mechanical techniques, girdling) within established aspen stands.		X
E. Determine the existing snag density and, if needed, create additional snags through girdling.	X	X
F. Selectively cut back (top) or girdle large aspens to promote suckering, where necessary.		X
G. Apply prescribed fire in the fall as outlined in the Silvicultural Report and Recommendations (White 2009).		X
H. Use appropriate IPM techniques which may include mechanical/physical, cultural, chemical, and/or biological means to eradicate or control invasive species (see Appendix H).	X	X

Rationale

Protecting and maintaining aspen stands is consistent with the Service's 2001 policy on BIDEH (601 FW 3). Aspen stands provide habitat for a diverse assemblage of native species. Migratory landbirds are found in all life stages within aspen stands. Snags provide an insect food source for birds, such as red-naped sapsuckers and downy and hairy woodpeckers, as well as habitat for cavity nesters. Cavities created by birds for nesting are used by other birds and mammals. Aspen stands are also important habitat for western screech owls, mountain bluebirds, tree swallows, and other birds (Altman 2000). Raptors, such as sharp-shinned and Cooper's hawks, forage in aspen stands. The aspen buds are an important winter food source for ruffed grouse. Elk and deer rely on aspen for foraging and calving or fawning. Porcupines, beaver, rabbits, bears, and other mammals eat aspen bark, foliage, or buds.

Aspen is found on the valley floor, adjacent to wetlands. Quaking aspen grows in clones, with many stems sharing the same genetic makeup. The species sprouts prolifically from root suckers, produced on the shallow lateral roots. Suckering occurs mainly at the edge of existing aspen stands and often occurs due to disturbance. The resulting young trees need abundant light in order to develop; thus, new suckers that survive and develop are on the edges of the clone. Suckers are susceptible to consumption by wild and domestic ungulates. Individual quaking aspen trees are not long-lived (maximum age of about 150 years in the western United States), although clones are much older. Fire suppression reduces suckering and allows conifers to become established within aspen stands. Conifer encroachment can eliminate aspen stands because aspen is shade-intolerant.

Under Alternative 2, the refuge would manage aspen stands to maintain structural diversity and promote suckering through multiple disturbance regimes. This would be accomplished by removing pines within aspen stands, as well as by selectively removing pines around aspen stands. Prescribed fire in the fall may be used to simulate natural conditions that promote disturbance. Any haying or mowing would be set back from stand edges to promote suckering. Large aspens may be topped or girdled to promote suckering and create snags. Refuge boundary fences would be maintained to prevent unauthorized grazing by cattle, which can limit aspen recruitment.

Goal 4. Protect and maintain riparian habitats characteristic of the Glenwood Valley/Conboy Lake Region.

Objective 4.1 Riparian Corridor (Alder and Willow)		
Over the life of the CCP, protect and maintain 35 acres of alder/willow-dominated riparian corridor on CLNWR for the benefit of breeding and migrating landbirds (e.g., wood ducks, willow flycatchers, yellow warblers, song sparrows, spotted towhees), accipiters (e.g., red-shouldered hawks), and a diverse assemblage of other native species (e.g., ruffed grouse, deer, elk). Desired attributes of alder/willow dominated riparian corridors include: • The presence of riparian shrubs (e.g., willow, alder, hawthorne) on up to 50% of the riparian corridor.		
Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*

Acres	*35*	
A. Create setbacks from grazing/haying activities to protect riparian areas.	X	X
B. Strategically remove riparian vegetation for infrastructure maintenance (e.g., dikes, ditches).	X	X
C. Use appropriate IPM techniques which may include mechanical/physical, cultural, chemical, and/or biological means to eradicate or control invasive species (see Appendix H).	X	X

Rationale

A legacy of agricultural use on the refuge has resulted in a series of ditches and channelized creeks. Riparian habitat associated with these ditches and creeks was probably not present in the area prior to development of agriculture. However, within the altered landscape riparian zones provide resources for a variety of wildlife species, especially neotropical migrant birds which use riparian habitat more than any other habitat for foraging and nesting (Quigley and Arbelbide 1997). Riparian areas also provide habitat for bats, other small mammals, grouse, deer, elk, and frogs. However, excessive riparian vegetation can overshadow waterways, preventing growth of aquatic vegetation that is important to Oregon spotted frogs, a species of management concern.

Under the CCP, riparian areas would be managed to provide habitat for a variety of native species. Haying, mowing, and grazing would be set back from riparian edges to allow growth of riparian vegetation. A variety of techniques, including mechanical, cultural, chemical, and biological agents may be used to eradicate or control invasive species. Riparian vegetation would be selectively removed in areas to allow for maintenance of infrastructure, such as dikes, ditches, and water control structures, as well as provide open areas to promote aquatic vegetation growth.

Goal 5. Gather scientific information (surveys, research, and assessments) to support adaptive management decisions under objectives for Goals 1-4.

Objective 5.1 Surveys

Throughout the life of the CCP, conduct high-priority inventory and monitoring (survey) activities that evaluate resource management and public-use activities to facilitate adaptive management. 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 1-4 in the CCP. These surveys have the following attributes:

- Data collection techniques would have minimal animal mortality or disturbance and minimal habitat destruction.

- The 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 implementing quarantine methods, where necessary, would minimize the potential spread or introduction of invasive species.
- Projects would adhere to scientifically defensible protocols for data collection, where available and applicable.

Prioritized List of Surveys

- Oregon spotted frog egg mass surveys.
- Mardon skipper surveys across all appropriate habitats on the refuge.
- Sandhill crane monitoring: breeding pair surveys, productivity, and colt survival.
- Monitoring water levels with staff gauges in wet meadows and emergent marshes.
- Western gray squirrel surveys.
- Rare plant surveys.
- Elk population surveys.
- Waterfowl survey during spring migration.
- Waterfowl pair and brood counts.
- Invasive species mapping and monitoring.
- Secretive marshbird surveys.
- Pollinator surveys.
- Bat surveys.
- Western toad surveys.
- Water rights monitoring.
- Aquatic invertebrate surveys.
- Refuge plant list by habitat.
- Coyote population surveys.
- Inventory of all species present in springs, including plants and invertebrates.
- Monitoring flows and temperatures in springs.
- Terrestrial invertebrate surveys.
- Deer population surveys.

Strategies For Acheiving Objective	*Alt. 1*	*Alt. 2*
A. Understand distributions of species through appropriate survey methodologies.		X
B. Conduct refuge-wide sampling in all habitats.		X
C. Stratified sampling techniques to select for key species or guilds.		X
D. Develop a geodatabase that ties individual records to specific locations (GIS/GPS).		X

Rationale

The Administration Act, as amended (16 U.S.C. 668dd ee), requires monitor the status and trends of fish, wildlife, and plants in each refuge. Surveys would be used primarily to evaluate resource response to assess progress toward achieving refuge management objectives (under Goals 1-4 in this CCP) derived from the NWRS mission, refuge purpose(s), and the maintenance of BIDEH (601 FW 3). Determining resource status and evaluating progress toward achieving objectives is essential to implementing adaptive management on Department of the Interior lands as required by policy (522 DM 1). Specifically, results of surveys would be used to refine management strategies, where necessary, over time in order to achieve resource objectives. Surveys would provide the best available scientific information to promote transparent decision-making processes for resource management over time on refuge lands.

Inventories, monitoring, research, and studies are essential to high-quality habitat and population management. Currently, CLNWR has comprehensive species lists, but population numbers of numerous species are little more than estimates, albeit ones made from years spent on the refuge. Inventorying populations of at least the target species in this CCP is a priority.

Most of the highest priority surveys concern species listed as sensitive, candidate, threatened, or endangered (State or Federal), including Mardon skipper, Oregon spotted frog, Sandhill crane, western gray squirrel, and rare plants. It is important to initiate or continue monitoring these populations to understand their distribution on the refuge to ensure appropriate management actions and to evaluate the effectiveness of management actions. Other high priority surveys, such as monitoring water levels and invasive species mapping, facilitate habitat restoration and management. Water levels directly influence the suitability of habitat for Oregon spotted frogs and Sandhill cranes. Invasive species, notably bullfrogs and various plants, can greatly diminish habitat suitability and need to be mapped. Elk population surveys would be valuable for understanding the numbers and distribution of elk on the refuge and evaluating the effects of a limited hunt. Waterfowl and secretive marshbird surveys directly relate to the reason for which the refuge was created and also relate to hunting, one of the priority public uses of the refuge. Other surveys identified in the objectives concern species or communities that may be listed as threatened or endangered or they concern food sources and predators that affect species of concern. Some surveys are valuable to understanding water availability and inputs to the refuge.

Monitoring habitat conditions provides valuable support for sound decision making when applied to refuge resource management and also contributes to the Service's ability to modify management practices (adaptive management). This is especially the case due to long-term changes in climatic conditions that may affect habitats and fish and wildlife populations. Wildlife populations, habitat conditions, and habitat management practices, including restoration efforts, must be monitored to evaluate their status and effectiveness. Population trends can be used to evaluate habitat effectiveness and guide management actions.

The importance of monitoring is amplified by climate change, which is projected to significantly affect habitats and species on the refuge. These changes could result in species declines and/or loss of populations at refuges, particularly for small and isolated populations, and for species with high sensitivity to changes in temperature, precipitation, hydrology, disturbance, and other stressors influenced by climate. The most likely beneficiaries of these changes are species that can rapidly disperse and establish, but unfortunately nonnative invasive species also share these traits.

Objective 5.2 Research

Throughout the life of the CCP, conduct high-priority research projects that provide the best science for habitat and wildlife management on and off refuges. Scientific findings gained through these projects would expand knowledge regarding life-history needs of species and species groups as well as identify or refine habitat and wildlife management actions. Research also would reduce uncertainty regarding wildlife and habitat responses to refuge management actions in order to achieve desired outcomes reflected in resource management objectives and to facilitate adaptive management. These research projects have the following attributes:

- Adhere to scientifically defensible protocols for data collection, where available and applicable, in order to develop the best science for resource management.
- Data collection techniques would have minimal animal mortality or disturbance and minimal habitat destruction.
- Collect the minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, vertebrates) to meet statistical analysis requirements for identification and/or experimentation in order to minimize long-term or cumulative impacts.
- Utilize proper cleaning of investigator equipment and clothing, as well as implementing quarantine methods where necessary, to minimize the potential spread or introduction of invasive species.
- Often result in peer-reviewed articles in scientific journals and publications and/or symposiums.

Prioritized List of Research Needs

- The fate and movement of Oregon spotted frog metamorphs.
- Oregon spotted frog overwintering habitat needs.
- Sandhill crane habitat use (nesting and foraging) in relation to water and upland management on the refuge.
- Sandhill crane colt dispersal and survival estimates from radio-telemetry and banding.
- The effects of disking and prolonged flooding in wetland areas on vegetation and target species.

Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
A. Generally use well-established procedures and protocols.	X	X
B. Establish partnerships to assist in research efforts.	X	X
C. Establish relationships with universities, etc., to assist in research efforts.	X	X

Rationale

Research projects on refuge lands would address a wide range of natural and cultural resource and public use management issues. Examples of research projects include habitat use and life-history requirements for specific species/species groups, practical methods for habitat management and restoration, extent and severity of environmental contaminants, techniques to control or eradicate

pest species, effects of climate change on environmental conditions and associated habitat/wildlife response, identification and analyses of paleontological specimens, wilderness character, modeling of wildlife populations, and assessing the response of habitat/wildlife to disturbance from public uses. Projects may be species-specific, refuge-specific, or evaluate the relative contribution of the refuge to larger landscape (e.g., ecoregion, region, flyway, national, international) issues and trends. Like monitoring, results of research projects would expand the best available scientific information and potentially reduce uncertainties, promoting transparent decision-making processes for resource management over time on refuge lands. In combination with the results of surveys, research would promote adaptive management on refuge lands. Scientific publications resulting from research on refuge lands would help increase the visibility of the NWRS as a leader in the development of the best science for resource conservation and management.

Refuges must collect site-specific information and conduct defensible research to provide information for devising, guiding, and adapting management practices. Research is valuable for protecting and understanding refuge resources, determining natural resource components and their interactions, and understanding the consequences of management actions on the parts and the whole. Research is also necessary for the overall advancement of science and scientific inquiry. Applied research on the refuge would help address management issues and questions, in theory, and would result in improved management decisions on both the refuge and on a regional basis.

Developing and maintaining partnerships is crucial in accomplishing this goal as funds and staff time are limited. The refuge has always maintained a close working relationship with several State, tribal, local agencies, and universities to advance the knowledge base of a variety of habitats and plant and wildlife species. Applied research by universities and other entities would be encouraged and would help address management issues and answer questions, allowing an opportunity to improve management decisions. Invasive species are a major threat to high-quality wildlife habitat and pose a major problem in the restoration and recovery of rare and listed species. Efforts would be made to work with partners as much as possible in a combined effort to pinpoint infestations and plan and coordinate control efforts both on and off the refuge.

Understanding fate and movement of metamorphs and overwintering requirements of Oregon spotted frogs is necessary to properly manage wetlands and make management decisions regarding habitat restoration. Likewise, a better understanding of habitat use and dispersal of Sandhill cranes would facilitate management decisions regarding habitat and habitat restoration.

Depending on future management goals and objectives, there may be a desire to return streams to their historic conditions (see Objective 1.3). Determining what those conditions were is the first step needed.

Objective 5.3 Scientific Assessments

Throughout the life of the CCP, conduct scientific assessments to provide baseline information to expand knowledge regarding the status of refuge resources to better inform resource management decisions. These scientific assessments would contribute to the development of refuge resource objectives and they would also be used to facilitate habitat restoration through selection of appropriate habitat management strategies based upon site-specific conditions.

- Utilize accepted standards, where available, for completion of assessments.

• The scale and accuracy of assessments would be appropriate for development and implementation of refuge habitat and wildlife management actions.		
Prioritized List of Scientific Assessments		
• Water resources inventory (Water Resources Branch). • NVCS habitat/vegetation map, georectified in GIS. • Species and habitat sensitivity to climate change.		
Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
A. Establish relationships with universities, etc., to assist in research efforts.	X	X
B. Develop cost-share cooperative projects with other agencies.	X	X
C. Whenever possible, conduct research on a basin-wide scale.	X	X

Rationale

In accordance with policy for implementing adaptive management on refuge lands (522 DM 1), appropriate and applicable environmental assessments are necessary to determine resource status, promote learning, and evaluate progress toward achieving objectives whenever using adaptive management. These assessments would provide fundamental information about biotic (e.g., vegetation data layer) and abiotic (e.g., soils, topography) processes and conditions to ensure that implementation of on-the-ground management actions achieve the resource management objectives identified under Goals 1-4.

In addition to surveys and research, complete assessments of resources and habitats facilitate management of the refuge, maintenance of biodiversity, and recovery of listed species. A greater understanding of water inputs to the refuge and movement of water through the refuge would contribute directly to management of Oregon spotted frogs, Sandhill cranes, and waterfowl. Thoroughly mapped habitat and vegetation would help direct management activities to improve habitat. Such assessments would also facilitate further research into relationships between species and their habitats.

Goal 6. Visitors of all ages and abilities will feel welcomed and enjoy safe, quality, wildlife-dependent recreational uses, including wildlife observation and photography, hunting, fishing, and environmental education and interpretation, compatible with CLNWR's purpose and vision.

Objective 6.1 Wildlife Observation and Photography		
Over the life of the CCP, implement the CLNWR Visitor Experience Site Plan to facilitate self-guided wildlife observation and photography opportunities on the refuge.		
Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
A. Maintain the existing open areas, the Willard Springs Trail and its Observation Overlook (raised platform), and parking areas.	X	X
B. Open the area from the Cold Springs Ditch to the western boundary of the refuge to allowed public uses, except for hunting and fishing.		X
C. Within 5 years of the completion of the CCP, design and build information and interpretive structures at the Willard Springs Trailhead and the BZ Highway parking area to welcome, orient, and educate visitors about the refuge.		X
D. Design and construct 0.25 mile of accessible trails on the Willard Springs Trail leading to the Observation Overlook, Whitcomb-Cole Hewn Log House, and Cold Springs section within the life of the CCP.		X
E. Realign and construct up to one mile of the Willard Springs Trail to enhance wildlife observation and photography opportunities within 10 years of the adoption of the CCP.		X
F. Replace the Willard Springs Trail Observation Overlook with a safer, accessible, and sized-to-accommodate structure.		X
G. Construct three vehicle pullouts, following the Visitor Facilities Enhancement Five-Year Plan, along adjacent roads to provide safe wildlife observation and photography opportunities within 15 years of the adoption of the CCP (subject to working with, and approval by, the appropriate highway departments).		X
H. Create a Service-standard wildlife list.		X

Rationale

Wildlife observation and photography are two of the six priority public uses of the NWRS and are to be facilitated when compatible. They are important and valuable activities that promote understanding and appreciation of our natural heritage. CLNWR offers breathtaking opportunities for viewing and photographing wildlife and landscapes.

Currently, the refuge is closed to public use, except for the Willard Springs Trail and a limited area around the headquarters and apart from special access provided to hunters and anglers. Opening the area around the trail from the Cold Springs Ditch to the refuge's western boundary would allow visitors to explore the refuge while having limited impact to resources. Visitor use would be concentrated in one area, while still protecting the majority of the refuge from human intrusion.

The CLNWR Visitor Experience Site Plan (VSP), February 2011, was created to enhance the visitor experience around the headquarters area of the refuge. The site plan includes universally accessible nature trail enhancements along with overlook locations and designs. It also includes design plans (specifications and details) for kiosks and signs to guide visitors engaged in wildlife observation and photography. Due to limited staffing, visitor contact with refuge personnel is limited. The site plan addresses the need to create a self-guided and user-friendly system which would limit the need for refuge staff to welcome and orient visitors. By focusing the development of visitor use facilities around the headquarters area, an area already disturbed with refuge facilities (e.g., visitor contact area, shop, and housing), the refuge would minimize disturbance to wildlife, yet allow visitors the opportunity to experience the splendor and beauty of this national wildlife refuge.

Building a new overlook platform on the Willard Springs Trail would provide a safe, universally accessible, and size-appropriate viewing area for the public walking the nature trail. The current overlook platform contains stairs for access, can accommodate only a few visitors, and is in need of repairs.

A new BZ Highway parking area kiosk would incorporate the CLNWR's interpretive message(s), as outlined in the VSP, and provide prospective visitors information about the refuge's cultural and natural heritage, refuge regulations, and the wildlife-dependent recreational opportunities available on the refuge. The current kiosk serves as a sign post for law enforcement regulations. The kiosk is rotting and needs to be replaced.

Creating vehicle pullouts along adjacent roads in and around the refuge would provide safe stopping areas for wildlife viewing and photography. These pullouts would also facilitate accommodation for our physically challenged visitors by giving them an opportunity to experience the refuge from their vehicle where it otherwise might not be feasible. In recent years, the roadways in and around the refuge have become a popular bicycle tour route called the Glenwood Loop, which starts at BZ Corners and loops through Glenwood for a 43-mile ride.

If implemented, the strategies under Alternative 2 would accomplish a balanced and measured increase in facilities for wildlife observation and photography, while continuing to meet fish and wildlife protection and management responsibilities.

Objective 6.2 Volunteers

Over the life of the CCP, continually recruit and train volunteers to assist the public in appreciating the resources of CLNWR; function as a link between the Service and the public; and assist refuge staff in doing their jobs. Volunteers would maintain up-to-date signage, information, and brochures with current public use regulations.

Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
A. Annually recruit and train one volunteer to operate the Visitor Contact Station to welcome and orient visitors from May to September.		X
B. Host a 2–3 day training session in early May.		X
C. Conduct outreach to recruit volunteers in the local community, with the refuge volunteer program and Friends of Mid-Columbia River Wildlife Refuges group, and online at Volunteer.gov.	X	X

Rationale

Welcoming and orienting refuge visitors follows the criteria that define a quality wildlife-dependent recreation program as identified in the Administration Act. By having and supporting a volunteer-run visitor contact station, CLNWR would continue to show its commitment to the newly reauthorized National Wildlife Refuge Volunteer Improvement Act of 2010 and would provide a meaningful opportunity for volunteers to support the resource management, conservation, and public education programs and activities of a national wildlife refuge as outlined in the Act. Currently, the visitor contact station is only open when staff is available, which is a limited amount of time during the work week.

This service would also provide refuge management with a better understanding of visitor needs and patterns and allow the refuge mission and management practices to be communicated to visitors.

Objective 6.3 Hunting and Fishing

Over the life of the CCP, provide safe, quality hunting opportunities on 2,343 acres of CLNWR and fishing opportunities on the lower 0.25 mile of Outlet Creek, compatible with protecting natural and cultural resources.

Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
A. Maintain fishing on the lower 0.25 mile of Outlet Creek, from the first Saturday in June through the end of October, with an extension of the closure for active Sandhill crane nests. The buffer around Sandhill crane nests will be a minimum of 660 feet, or as determined by further research.	X	X

B. Continue the existing 7 day/week free-roam waterfowl hunting program.	X	X
C. Construct a mobility-impaired blind within the next 15 years to meet the needs of a growing and aging population.		X
D. Continue the existing 100-acre deer hunting program.	X	
E. Discontinue the existing 100-acre deer hunting program.		X
F. Make hunting regulations and information readily available that emphasize safe, appropriate, and ethical hunting behavior and help reduce hunting conflicts.	X	X

Rationale

Hunting and fishing are two of the six priority public uses of the NWRS and are to be facilitated when compatible and provide a quality experience. According to draft policy on hunting on NWRs, issued in the January 16, 2001, *Federal Register* (Volume 66, Number 10), a quality hunting experience is one that:

1) Maximizes safety for hunters and other visitors;
2) Encourages the highest standards of ethical behavior in taking or attempting to take wildlife;
3) Is available to a broad spectrum of the hunting public;
4) Contributes positively to or has no adverse effects on population management of resident or migratory species;
5) Reflects positively on the individual refuge, the NWRS, and the Service;
6) Provides hunters uncrowded conditions by minimizing conflicts and competition among hunters;
7) Provides reasonable challenges and opportunities for taking targeted species under the described harvest objective established by the hunting program;
8) Minimizes the reliance on motorized vehicles and technology designed to increase the advantage of the hunter over wildlife;
9) Minimizes habitat impacts;
10) Creates minimal conflict with other priority, wildlife-dependent recreational uses or refuge operations; and
11) Incorporates a message of stewardship and conservation in hunting opportunities.

Waterfowl hunting at CLNWR is opportunistic, as waterfowl sporadically migrate through during the early fall, and goose and duck use peaks later in the season; this is reflected in the amount of hunter visits. Generally, waterfowl migration patterns and use are less consistent during the early fall due to a lack of early season irrigation water available to produce quality habitat and the geographic location of the refuge in the Pacific Flyway. Hunting use peaks during the late season when waterfowl populations peak and weather conditions permit.

The current hunting system provides 7-day-a-week, free-roam hunting on 2,343 acres. Over the years, the refuge has maintained a quality, albeit opportunistic, waterfowl hunt program at the refuge. There exists no hunter use data to help determine whether hunting demand exceeds opportunity, but

hunter feedback generally relates to the need for more early-season opportunities. Currently, no mobility-impaired waterfowl hunting opportunities are available.

While the Administration Act recognizes that wildlife-dependent recreation is an appropriate use of NWRS lands, the Act also mandates that the needs of wildlife come first on refuges. Opening additional refuge wetland areas to any public use through this planning process would effectively reduce the refuge's value to migrating waterfowl and other purpose species. Due to the limited availability of waterfowl habitat in the area, it is not feasible to significantly increase the number of acres hunted on the refuge. As such, under the CCP the free-roaming waterfowl hunting opportunities for 7 days a week would remain the same as present. A mobility-impaired blind would be added over the next 15 years to meet the needs of a growing and aging population.

Deer hunting is allowed within the refuge hunt area, but suitable deer habitat is limited to approximately 100 acres, and general observations document limited deer presence. No hunter use data exist, but general opinion is that very little use occurs. Historic deer population levels are unknown but are generally thought to be higher than current deer numbers (McCorquodale 1999). Record harvests in the mid-1960s, coupled with severe winter conditions, drastically reduced deer populations, and deer have never fully recovered in Klickitat County (Oliver 1986).

When deer hunting was established on the refuge, there was a significant cattle presence, but the elk population was much lower than today. Increasing elk populations, the presence of cattle, and severe winters, coupled with harvest, may have led to reduced deer populations. Therefore, under Alternative 2, deer hunting on the refuge would be discontinued due to low populations and inability to meet the Service's policy on quality hunting until refuge surveys document a harvestable population that can support a deer hunt program.

Currently, fishing is allowed on a 0.25-mile reach of Outlet Canal, a man-made drainage ditch. No fishing visit numbers are available, but general observations indicate limited use, almost entirely by local residents. However, rainbow and brook trout can be taken; rainbow trout is stocked annually and brook trout are remnants of former stocking within the system. As the fishing is a well-established, long-time use, and as there are no known negative impacts of any significance associated with fishing if undertaken correctly, there is no reason to discontinue a use identified in the Administration Act as being desirable on a national wildlife refuge.

However, the fishing area is in the vicinity of habitat suitable for greater Sandhill crane nesting. Sandhill cranes generally begin nesting in April to May, while the fishing season does not start until the first Saturday in June. If there are active Sandhill crane nests within the area at the start of the fishing season, the season would be delayed until the colts leave the nest. Generally, a 1/8-mile buffer around the nests would be sufficient (Gary Ivey, personal communication), although this could be extended if refuge staff believe it necessary.

Objective 6.4 Law Enforcement

Reduce illegal activities on CLNWR.

Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
A. Increase law enforcement, signs, and education to reduce		X

activity, partially through recruitment of an additional Law Enforcement Officer.		
B. Increase both law enforcement patrols and regular (scheduled) staff presence on-site by all staff or volunteer representatives.		X
C. Enhance cooperative relationships with WDFW Law Enforcement to provide regular patrols and presence on the refuge.		X

Rationale

Problems with illegal trespassing, shooting, and vandalism at the refuge are increasing. A Law Enforcement Officer from the MCRNWRC is assigned to enforce special refuge regulations, protect resources, and maintain public safety. However, this officer has multiple refuges in the MCRNRWC, which covers a large geographical area, to protect. The MCRNWRC headquarters, where the officer is stationed, is four hours from CLNWR.

Increasing presence on the refuge by hiring an additional Law Enforcement Officer and scheduling more refuge law enforcement patrols, scheduling volunteers to operate the visitor contact station, and working cooperatively with WDFW Law Enforcement Officers would help to reduce illegal activity.

Goal 7. Students, educators, and visitors will understand, appreciate, and support CLNWR's cultural and natural heritage through environmental education and interpretation.

Objective 7.1 Environmental Education

Within 15 years, develop and deliver a curriculum-based environmental education program that follows State education standards in partnership with the local school districts, utilizing the refuge as an outdoor classroom for up to 500 student visits annually.

Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
A. Hire a part-time Visitor Services Specialist.		X
B. Host educator workshops to enhance knowledge of CLNWR.		X
C. Continue and enhance partnerships with the Spring Creek National Fish Hatchery and the Columbia Gorge Ecology Institute.	X	X
D. By the end of 15 years, develop up-to-date environmental education curricula to be used with teacher-led classes. Enlist		X

local teachers to help develop curricula to ensure that educational requirements are met.		
E. Develop and implement evaluation techniques with volunteers, students, and teachers to maintain program quality.		X
F. Foster long-term support for environmental education by ensuring that the refuge has committed, qualified, and trained volunteers available to implement high-quality educational experiences for local school visits and youth group outings (e.g., scouts, summer camps).		X

Rationale

Environmental education is one of the six priority public uses of the NWRS and is to be fostered if compatible with refuge purposes and the NWRS mission. Incorporating environmental education into school curricula is an important way to influence the future well-being of the refuge. Environmental education is also key to changing attitudes and behavior which affect the refuge through off-refuge land use decisions and on-refuge conduct and use.

CLNWR is fortunate to have an environmental education partnership with the Service's Spring Creek Fish Hatchery in White River, Washington, and the Columbia Gorge Ecology Institute (CGEI) in Hood River, Oregon. With the lack of visitor services staff at the refuge, these partners fill the void for environmental education. The Information and Education Specialist at the Spring Creek Fish Hatchery has been educating 2nd–5th grade students on field trips to CLNWR for 3–4 years. The non-profit CGEI is dedicated to promoting knowledge, stewardship, and curiosity of the local environment. The CGEI provides environmental education programming to area schools surrounding the refuge.

In 2010, CGEI received a Nature of Learning Grant from the National Fish and Wildlife Foundation to link diverse natural resource and climate change-focused environmental education initiatives to CLNWR. As a result of this grant, CGEI has reached out to the Glenwood School District to partner on environmental education programming. Although in its early stage of developing, they are talking about naming the program "Natural Resources Academy" and using the refuge as an outdoor classroom.

Since environmental education is a curriculum-based and labor intensive, a part-time Visitor Services Specialist is needed to administer this program.

Objective 7.2 Environmental Interpretation

Throughout the life of the CCP, provide visitors with opportunities for self-guided and refuge-led interpretation that would enhance visitor understanding of CLNWR's natural and cultural heritage.

Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
A. Within 5 years after the completion of the CCP, develop a		X

refuge interpretive plan that would describe new and enhanced interpretive facilities and programs.		
B. Develop and install interpretive exhibits at the visitor contact station.		X
C. Design and build two interpretive panels on the Willard Springs Trail near the refuge headquarters, including the Whitcomb-Cole Hewn Log House and the observation platform.		X
D. Recruit and train volunteers to design and present five interpretive programs from May through September.		X

Rationale

Interpretation is one of the six priority public uses of the NWRS and is to be fostered if compatible with refuge purposes and the NWRS mission. Interpreting the resources and challenges of CLNWR to the general public are important ways to influence the future well-being of the refuge. Only through understanding and appreciation will people be moved to personal and collective action to ensure a healthy refuge for the future.

The interpretive plan would orient visitors, increase visitor awareness of the cultural and natural heritage, and increase visitor understanding of the management practices at CLNWR. Summer interpretive programming would be well received by the community as discussed at the public scoping meeting for this CCP and visitors to the area. It would enhance a better understanding of the refuge's vision and purposes through direct contact with volunteers who are trained and familiar with the refuge.

Goal 8. CLNWR will preserve and value its cultural resources and heritage and connect refuge staff, visitors, and the community to the area's past.

Objective 8.1 Cultural Resource Protection		
Inventory, evaluate, monitor, and protect the refuge's cultural resources throughout the life of the CCP.		
Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
A. Identify archaeological sites that coincide with existing and planned construction of roads and facilities, public use areas, habitat projects, and other undertakings in compliance with Section 106 of NHPA. Plan and implement activities to avoid or mitigate impacts to sites as necessary.	X	X
B. Complete a comprehensive cultural survey of the refuge, as		X

called for in Section 110 of NHPA, and consolidate all previous site surveys, work requests, and reports for secure access by managers.		
C. Coordinate and consult with Native American Tribe Cultural Resource Programs to identify and plan for protection of significant sites.	X	X
D. In partnership with Native American Tribes and the Regional Cultural Resources Team, establish protocols for consultation to help managers meet NHPA and Archeological Resource Protection Act (ARPA) requirements, including consultation, identification, inventory, and evaluation of projects and sites.		X
E. Evaluate the eligibility to the National Register archaeological sites and other historic properties. Priority would be given to those that may be affected by management activities, other human activities, erosion, and other natural processes.		X
F. Protect cultural resources through law enforcement patrols.	X	X
G. Develop a plan for the inadvertent discovery and repatriation of human remains with affected tribes and implement it through MOUs with tribes.	X	X

Rationale

Under all alternatives, the Section 106 process of NHPA would be followed. Since many historic properties have been lost over time, those that remain, including buildings, structures, and historic and prehistoric archeological sites, should be evaluated for listing on the National Register. If determined eligible, these sites should be monitored and efforts made to protect and stabilize them as historic properties.

There are many cultural resources on CLNWR, identified or not, that are at risk of damage or loss from a variety of sources. Vandalism of cultural resources is another threat that has negative impacts on both cultural resources and relations with the tribes. Once destroyed, these resources are irretrievable, hence the need for implementation of a strategy for protection.

Objective 8.2 Public Awareness and Education of Cultural Resources		
Increase public awareness and appreciation of CLNWR's historic, archaeological, and cultural resources throughout the life of the CCP.		
Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*

A. Partner with Native American Tribes, historical societies, and other interested groups to tell the history and interpret the cultural heritage of CLNWR. Prepare media (brochures, signs, exhibits) describing the history of Native Americans and early settlers in this area, with an emphasis on the fish and wildlife resources and their historic uses.		X
B. Partner with Native American Tribes, historical societies, and volunteers to provide up to two cultural and natural heritage interpretation programs per year for both tribal members and the public.		X
C. Where feasible and appropriate, produce exhibits (permanent, temporary, or traveling) incorporating artifacts found on the refuge, or replica artifacts.		X

Rationale

See the discussion under Objective 7.2 regarding the benefits of interpretation.

Partnering with the Yakama Nation, historical societies, and other interested groups would ensure the interpretive facilities and programs tell an accurate and compelling story about CLNWR's historic, archeological, and cultural resources.

Objective 8.3 Whitcomb-Cole Hewn Log House

Integrate the Whitcomb-Cole Hewn Log House into CLNWR's interpretation and environmental education program within 5 years of the completion of the CCP.

Strategies For Achieving Objective	*Alt. 1*	*Alt. 2*
A. Utilize volunteers to deliver interpretation and environmental education programs at the Whitcomb-Cole Hewn Log House from May through September.		X
B. Work with partners to incorporate environmental education into educational programs and special events utilizing the Whitcomb-Cole Hewn Log House.		X
C. Develop approved interpretive and educational scripts to ensure consistency and accuracy of messages conveyed to the public.		X

Rationale

See the discussion under Objective 7.2 regarding the benefits of interpretation.

The Whitcomb-Cole Hewn Log House has significant historical valley to the area and is listed on the National Register. Interpreting the cultural heritage of this structure to the general public, and incorporating these topics into school curricula, are important ways to influence the future well-being of CLNWR and the log house.

Chapter 3

Physical Environment

Chapter 3. Physical Environment

3.1 Topography

CLNWR is east of Mount Adams and is surrounded by a number of smaller volcanic buttes and basalt flows. The topography of CLNWR is mostly flat valley bottom. The western, southern, and eastern edges of the refuge are gently sloped. CLNWR is located at an elevation between about 1,820 and 1,900 feet above mean sea level on and adjacent to the relatively flat Camas Prairie. Higher and steeper terrain comprised of volcanic buttes and ridges rise to northwest and southeast of the refuge.

3.2 Geology

3.2.1 Origins and Development

The refuge is located on a series of basalt flows that were deposited during and since the Miocene epoch. More recent Quaternary basalt flows are located at the western side of the refuge, and most of the refuge is located on alluvium of volcanic origin that has been deposited on the valley floor. Geologic formations that have been mapped in the refuge are shown in Table 3.2-1. The alluvium that makes up the valley floor has a moderate to high susceptibility to liquefaction.

Table 3.2-1. CLNWR Geologic Formations.

Geologic Unit	Lithology	Geologic Age
Camas Prairie Basalt	Basalt flows	Quaternary
Younger Alluvium	Alluvium	Quaternary
Simcoe Mountains Volcanics	Basalt flows	Pleistocene-Pliocene
Grande Ronde Basalt	Basalt flows	Miocene (middle)
Frenchman Springs Member, Wanapum Basalt	Basalt flows	Miocene (middle)
Sources: Hildreth and Fierstein 1995; WDNR 2011		

3.2.2 Recent Geologic Events

The Camas Prairie has developed on alluvium deposited within the last 10,000 years. During that period the area has received volcanic ash from repeated eruptions of Mount Mazama, Mount Adams, and Mount Saint Helens (Scott et al. 1995).

3.3 Soils

Soils have been described for three forest types within the refuge (White 2009). In ponderosa pine stands soils include Guler Stony Sandy Loam, Fanal Sandy Loam, Kreft Sandy Loam, Sedigal Sandy Loam, and Kaiders Sandy Loam. These soils are mostly deep and well-drained in volcanic ash and colluvium from basalt. These soils have low water holding capacities, making them effectively too dry for Douglas-fir and grand fir to thrive, thereby allowing ponderosa pine to occupy these areas (White 2009).

Three soils are mapped in mixed lodgepole/ponderosa pine stands: Kreft, Sedigal, and Fanal Sandy Loams. These soils are mostly deep and well-drained in volcanic ash and colluvium from basalt. It is likely that these sites also contain associated soil types, such as Conboy or Grayland series, which are on old lake bottoms and are poorly drained.

Mixed conifer stands located on sideslopes and ridges include Beezee Cobbly Loam, Fanal Sandy Loam, Kaiders Stony Loam, Panak Cobbly Loam, and Underwood Loam soils. As with the other forested soils, these soils are mostly deep and well-drained in volcanic ash and colluvium from basalt. Small inclusions, usually on convex slopes, have shallower soils, some with soil moisture too limiting for growth of conifers. These areas are occupied by Oregon white oak (White 2009).

Table 3.3-1. CLNWR Soils.

Soil Series	Parent Material	Drainage & Permeability	Use & Vegetation
Beezee Cobbly Loam	Basalt colluvium mixed with loess.	Well-drained; medium to rapid runoff; moderate permeability.	Woodland, grazable woodland, wildlife habitat, and recreation. Native vegetation is ponderosa pine, Douglas-fir, and Oregon white oak with an understory of common snowberry, deerbrush, ceanothus, western hazel, creambush, oceanspray, and elk sedge.
Conboy	Alluvium of volcanic ash, diatomite, and basalt in lake basins.	Poorly drained; very slow runoff; moderately slow permeability.	Pasture and hay production.
Fanal Sandy Loam	Alluvium and colluvium of volcanic ash and basalt in lake basins.	Moderately well-drained; slow to medium runoff; moderate permeability.	Pasture and timber production. Native vegetation is mainly ponderosa pine and some Douglas-fir and Oregon white oak, with an understory of common snowberry, woods rose, Canada bluegrass, tufted hairgrass, and spirea.
Grayland	Lacustrine and alluvium with basalt and volcanic ash.	Poorly drained; ponded to very slow runoff; slow permeability.	Pasture and hay production. Native vegetation is sedge, biscuitroot, common snowberry, rose, and alder.

Soil Series	Parent Material	Drainage & Permeability	Use & Vegetation
Guler Sandy Loam	Volcanic ash and colluvium from basalt.	Well-drained; slow to medium runoff; moderately rapid permeability.	Timber production, livestock grazing, wildlife habitat, hay, and pasture. Vegetation is ponderosa pine, with an understory of antelope bitterbrush, Idaho fescue, elk sedge, hawkweed, rabbitbrush, goldenweed, snowbrush, ceanothus, mountain brome, and needlegrass.
Kaiders Stony Loam	Colluvium from basalt and minor amounts of volcanic ash and loess.	Well-drained; medium to rapid runoff; moderate permeability.	Timber production, grazable woodland and wildlife habitat. Vegetation is Douglas-fir, ponderosa pine, and Oregon white oak, with an understory of western hazel, deerbrush, ceanothus, redstem ceanothus, Oregon-grape, elk sedge, Idaho fescue, and squawcarpet.
Kreft Sandy Loam	Alluvium from volcanic ash and basalt.	Moderately well-drained; slow runoff; moderate permeability.	Timber production, livestock grazing, crop production, building sites, and wildlife habitat. Native vegetation is ponderosa pine, lodgepole pine, black cottonwood, Oregon white oak, Douglas-fir, and grand fir, with and understory of elk sedge, spirea, common snowberry, black hawthorn, and rose.
Panak Cobbly Loam	Residuum from basalt with an influence of volcanic ash; formed in colluvium.	Well-drained; medium to rapid runoff; moderate permeability.	Timber production, livestock grazing, wildlife habitat, and recreation. Native vegetation is Douglas-fir, grand fir, and ponderosa pine with an understory of common snowberry, western hazel, rose, vine maple, creambush, oceanspray, Oregon-grape, trailing blackberry, Pacific dogwood, and bitter cherry.
Underwood Loam	Residuum from basalt with an influence of volcanic ash; formed in colluvium.	Well-drained, medium to rapid runoff; moderately slow permeability.	Timber production, orchards, homesites, wildlife habitat, and livestock grazing. Native vegetation is Douglas-fir, bigleaf maple, vine maple, salal, starflower, and western bracken fern.
Soils descriptions: NRCS 2005, 2008a, 2008b, 2008c, 2008d, 2010, 2011a, 2011b, 2011c.			

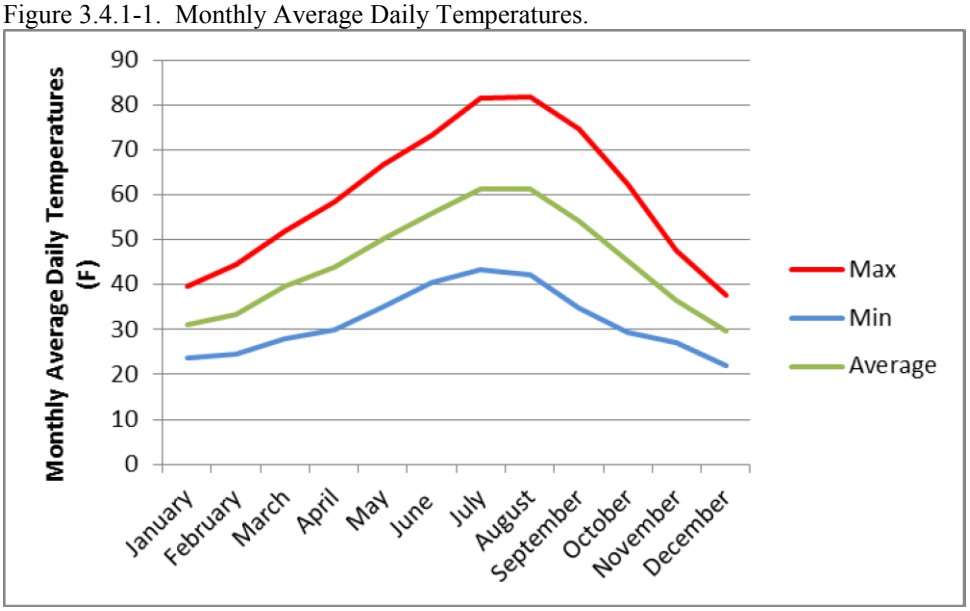
3.4 Climate

CLNWR is in the rain shadow of Mount Adams and Mount Saint Helens. The climate is temperate, with warm dry summers and most precipitation falling as snow during winter months. The nearest weather station with reported data is located at Glenwood, Washington, about 2.5 miles from CLNWR and at 1,900 feet elevation, the same elevation as portions of the refuge (WRCC 2011).

3.4.1 Temperature

The monthly average minimum daily temperatures for Glenwood, Washington, range from 21.9/F in December to 43.3/F in July, while the average maximum daily temperatures range from 37.7/F in December to 81.9/F in August. Normal daily temperature ranges are shown in Figure 3.4.1-1 (WRCC 2011).

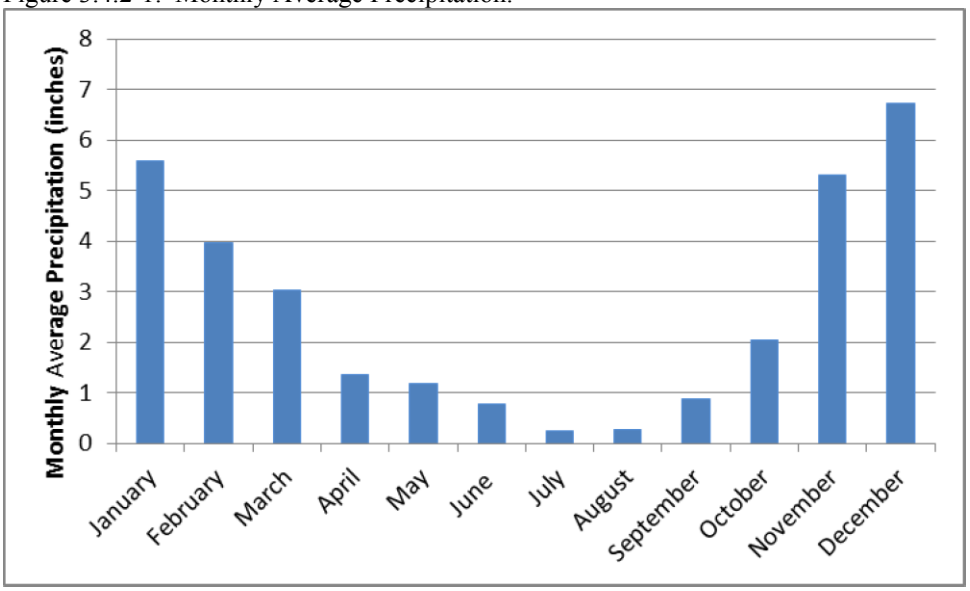
Figure 3.4.1-1. Monthly Average Daily Temperatures.



3.4.2 Precipitation

A large proportion of precipitation falls as snow during the winter months, and the mean annual precipitation is 31 inches per year. Average monthly precipitation is shown in Figure 3.4.2-1 (WRCC 2011).

Figure 3.4.2-1. Monthly Average Precipitation.



3.4.3 Wind

Wind speed data are not available at ground level for CLNWR, but are generally low. Wind speed models developed for assessing wind power potential estimate that annual average wind speeds at 250 meters above the ground range from about 15 to about 18 feet per second (AWS Truepower and NREL 2010). Assuming wind speed at CLNWR follows the logarithmic relationship between elevation and speed observed at other locations (Thuillier and Lappe 1964), the average wind speed at ground level is estimated to be less than 3 feet/second.

Prevailing winds in south-central Washington are generally from the north to northwest during summer and from the south to southwest during winter (Western Regional Climate Center 2002).

3.5 Climate Change

No research has been done to determine any changes that may have already occurred, and no modeling has been done to predict specific changes at CLNWR. Additional work, or at least opportunistic monitoring, will need to occur over the next few years to begin to assess what, if any, climate change effects are realized at CLNWR.

As stated in DOI Secretarial Order 3226 (DOI 2009) and the Service's Climate Change Strategic Plan (Service 2010c), the Service considers and analyzes climate change in its decisions, long-range plans, and other activities. Additionally, a 1999 U.S. Department of Energy (DOE) report, Carbon Sequestration Research and Development (DOE 1999), concluded that ecosystem protection is

important to carbon sequestration and may reduce or prevent loss of carbon currently stored in the terrestrial biosphere. The report defines carbon sequestration as the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere.

The terms "climate" and "climate change" are defined by the Intergovernmental Panel on Climate Change (IPCC). The term "climate" refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007a). The term "climate change" thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007a).

Scientific measurements spanning several decades demonstrate that changes in climate are occurring and that the rate of change has been faster since the 1950s. Examples include warming of the global climate system and substantial increases in precipitation in some regions of the world and decreases in other regions. (For these and other examples, see IPCC 2007a and Solomon et al. 2007.) In the Pacific Northwest, increased greenhouse gases and warmer temperatures have resulted in a number of physical and chemical impacts. These include changes in snowpack, stream flow timing and volume, flooding and landslides, sea levels, ocean temperatures and acidity, and disturbance regimes such as wildfires, insects, and disease outbreaks (USGCRP 2009). All of these changes will cause major perturbations to ecosystem conditions, possibly imperiling species that evolved in response to local conditions.

Results of scientific analyses presented by the IPCC show that most of the observed increase in global average temperature since the mid-20th century cannot be explained by natural variability in climate and is very likely (defined by the IPCC as 90% or higher probability) due to the observed increase in greenhouse gas (GHG) concentrations in the atmosphere as a result of human activities, particularly carbon dioxide emissions from use of fossil fuels (IPCC 2007a; Solomon et al. 2007). Further confirmation of the role of GHGs comes from analyses by Huber and Knutti (2011), who concluded it is extremely probable that approximately 75% of global warming since 1950 has been caused by human activities.

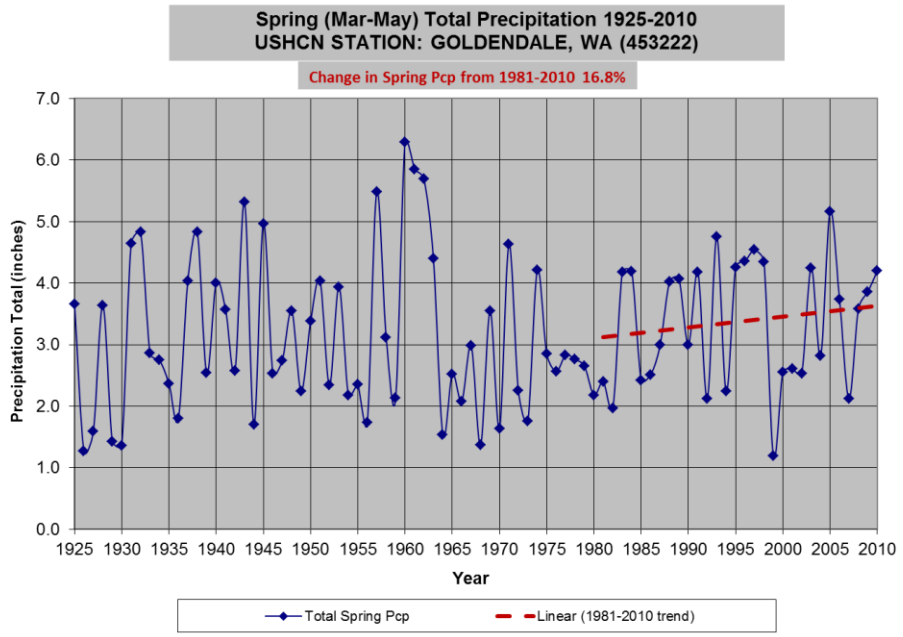
Climate Trends in the Pacific Northwest and at CLNWR

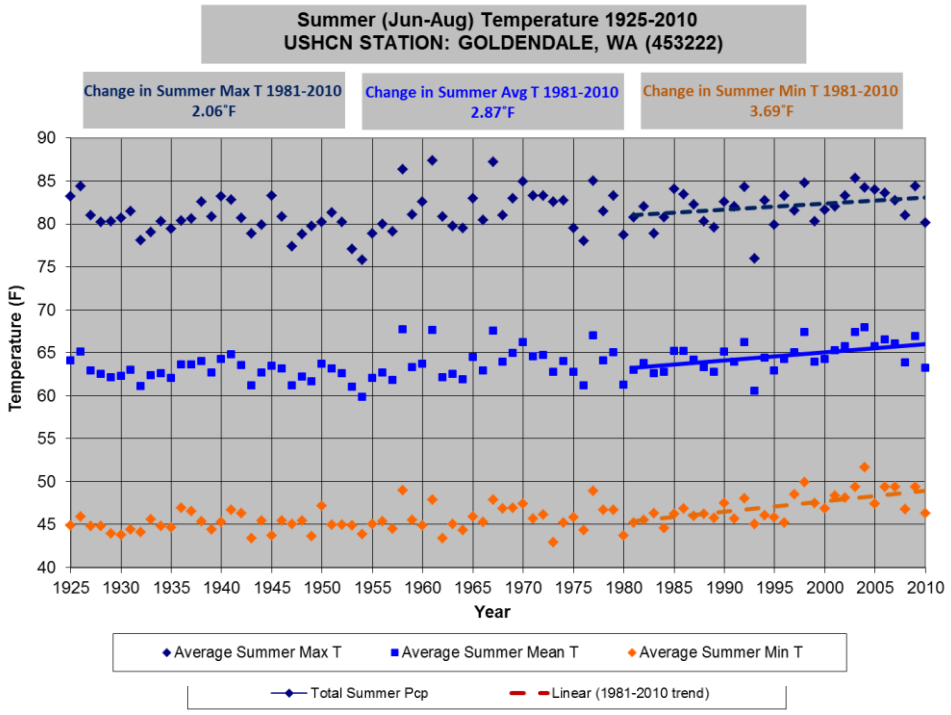
Climate trends are already having profound effects on the region's natural resources (Littell et al. 2009; Waring et al. 2022). In the Pacific Northwest, regionally averaged temperature rose 1.5/F between 1920 and 2000, slightly more than the global average; warming was largest for the winter months of January–March (Mote et al. 2005). Minimum daily temperatures have increased faster than maximum daily temperatures (Mote et al. 2005). Fu et al. (2010) showed that in Washington State from 1952 to 2002, annual mean air temperature increased 1.1/F (daily mean), 0.43/F (daily maximum), and 1.67/F (daily minimum), on average. Increases in winter temperatures have created more rain-on-snow events, high winds, and landslides for the region (Guthrie et al. 2010), but this is not manifested uniformly throughout the region and appears to be more pronounced in areas northwest of CLNWR (Salathé et al. 2010). As a result, average snow depth decreased widely across the western United States, especially at lower-elevation stations (less than 3,280 feet) (Grundstein and Mote 2010). The vast majority of lower-elevation stations (80%) and a majority (62%) of mid-elevation stations (6,560 to 9,840 feet) showed significantly negative trends (Grundstein and Mote 2010).

The closest United States Historical Climatology Network (USHCN) observation station to CLNWR is Goldendale, Washington.[1] Temperature and precipitation changes shown below from the Goldendale station conform to regional trends: +1.230F has been observed from 1981 to 2010 in average monthly temperature, with a larger increase in average monthly maximum temperature of +2.070F. Precipitation trends are slight (-0.5%) and note the large inter-annual variation, a common feature in the Pacific Northwest due to inter-annual and decadal oscillations such as the El Nino Southern Oscillation and the Pacific Decadal Oscillation. More striking are the changes in seasonal trends. The Goldendale area has experienced wetter springs (+16.8% precipitation) and hotter (+2.870F average monthly temperatures) and drier (-12.2% precipitation) summers.

The graphs below show the total change in precipitation and temperature using monthly data. The most recent 30-year period is calculated using the slope of the linear trendline. The precipitation change is calculated as a percent change from the initial value in 1981, while the temperature change is an absolute change over the 30-year period.

[1] The USHCN has been developed to assist in the detection of regional climate change. It has been widely used in analyzing United States climate and each of the stations has a complete record of monthly temperature and precipitation from 1895 to 2010.


Spring (Mar-May) Total Precipitation 1925-2010
USHCN STATION: GOLDENDALE, WA (453222)
Change in Spring Pcp from 1981-2010 16.8%
Precipitation Total (inches)
Year
Total Spring Pcp
Linear (1981-2010 trend)


Summer (Jun-Aug) Temperature 1925-2010
USHCN STATION: GOLDENDALE, WA (453222)
Change in Summer Max T 1981-2010
2.06˚F
Change in Summer Avg T 1981-2010
2.87˚F
Change in Summer Min T 1981-2010
3.69˚F
Temperature (F)
Year
Average Summer Max T
Average Summer Mean T
Average Summer Min T
Total Summer Pcp
Linear (1981-2010 trend)

Climate Projections for the Pacific Northwest Affecting CLNWR

Scientists use a variety of climate models, which include consideration of natural processes and variability, as well as various scenarios of potential levels and timing of GHG emissions, to evaluate the causes of changes already observed and to project future changes in temperature and other climate conditions (Meehl et al. 2007; Ganguly et al. 2009; Prinn et al. 2011). All combinations of models and emissions scenarios yield very similar projections of increases in the most common measure of climate change, average global surface temperature (commonly known as global warming), until about 2030. Although projections of the magnitude and rate of warming differ after about 2030, the overall trajectory of all the projections is one of increased global warming through the end of this century, even for the projections based on scenarios that assume that GHG emissions will stabilize or decline. Thus, there is strong scientific support for projections that warming will continue through the 21st Century and that the magnitude and rate of change will be influenced substantially by the extent of GHG emissions (IPCC 2007a; Meehl et al. 2007; Ganguly et al. 2009; Prinn et al. 2011).

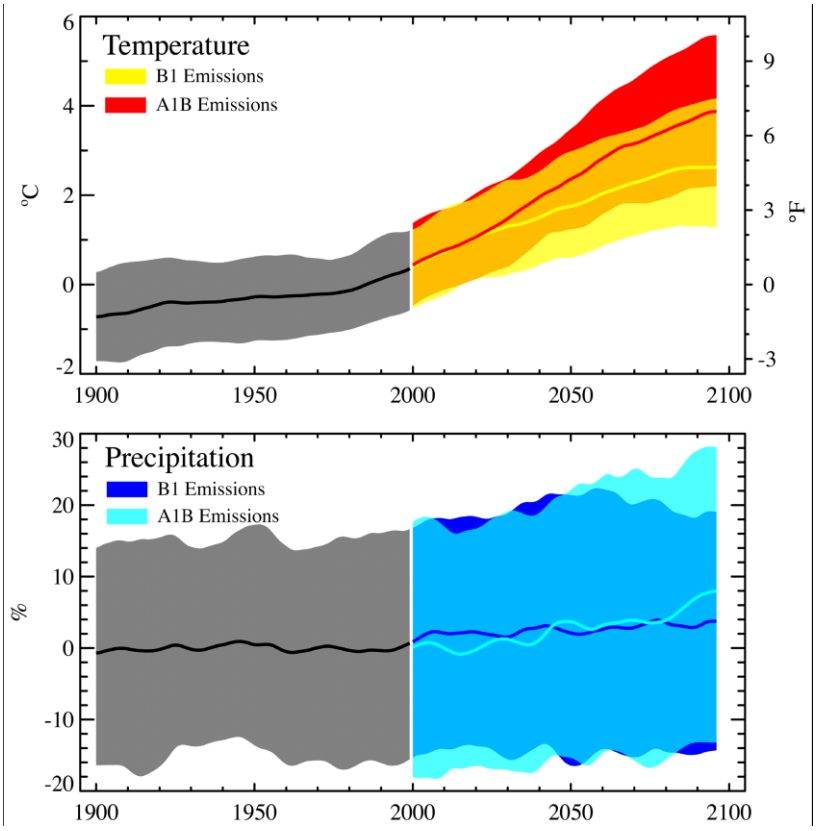
The statistical downscaling of 20 global climate models projects average annual temperature to increase 2.0/F by the 2020 decade for the Pacific Northwest, 3.2/F by the 2040 decade, and 5.3/F by the 2080 decade, relative to the 1970–1999 average temperature (Figure 1) (Mote and Salathé 2010). These projected changes are substantially greater than the 1.5/F increase in average annual temperature observed in the Pacific Northwest during the 20th Century. Seasonally, summer temperatures are projected to increase the most. Actual global emissions of greenhouse gases in the past decade have so far exceeded even the highest IPCC emissions scenario (A2), which wasn't included in Mote and Salathé (2009 and 2010, above), or Salathé et al. 2010 (below). Consequently, if these emissions trends continue, the climate projections referenced herein likely represent a conservative estimate of future climatic changes.

Two additional regional climate simulations conducted by Salathé et al. (2010) support the warming increases described above, with small variations (one shows slightly higher increases and one slightly lower). Mean air temperature is predicted to significantly increase across all seasons to the east of the Cascade mountains by both regional climate change models, with the CCSM3-WRF model consistently predicting greater increase than the ECHAM5-WRF model. The CCSM3-WRF model predicts the greatest seasonal increase of up to 5.4/F in the summer, while the ECHAM5-WRF model predicts a lower increase of only 2.7 to 4.5/F. The frequency of heat waves is predicted to increase substantially, especially in southwest Washington. Increases of >1.8/F are predicted by both models for the rest of the seasons.

Projected changes in mean annual precipitation are less clear. The projected trends from Mote and Salathé (2009 and 2010) and Salathé et al. (2010) are very small relative to the inter-annual variability in precipitation. Seasonally, precipitation is projected by Mote and Salathé (2009 and 2010) to decrease in the summer and increase in the autumn and winter by most climate models, although the average shifts are small. However, even small changes in seasonal precipitation could have impacts on streamflow flooding, summer water demand, drought stress, and forest fire frequency. Salathé et al. (2010) project wetter autumns and drier or stable summers. Regional simulations vary whether winter and spring seasons will turn wetter or drier. Salathé et al. (2010) project increased extreme precipitation events in the State of Washington, with stronger increases in the northwestern portion of the State. Increases in the intensity of future extreme winter precipitation are projected for the western United States by Dominguez et al. (2012). These researchers project an area-averaged 12.6% increase in 20-year return period and 14.4% increase in 50-year return period

daily precipitation (a return period is an estimate of how long it will be between rainfall events of a given magnitude).

Figure 3.5. Simulated temperature change (top panel) and percent precipitation change (bottom panel) in the Pacific Northwest from 20th and 21st Century global climate model simulations.



The black curve for each panel is the weighted average of all models during the 20th Century. The colored curves are the weighted average of all models in that emissions scenario ("low" or B1, and "medium" or A1B) for the 21st Century. The colored areas indicate the range (5th to 95th percentile) for each year in the 21st century. All changes are relative to 1970-1999 averages. (Credit: Mote and Salathé 2009 and 2010).

3.6 Hydrology

3.6.1 Regional Hydrology for the Klickitat River Sub-Basin

CLNWR is located within the Klickitat River Sub-Basin. The Klickitat River drains an area of about 1,350 square miles from Mount Adams and Cispus Pass to the Columbia River Gorge at Lyle, Washington (Yakama Nation 2012). Major tributaries include Swale Creek, Little Klickitat River, Outlet Creek, West Fork Klickitat River, and Diamond Fork Klickitat River. The Klickitat River is free-flowing, with no dams or other flow control.

3.6.2 Refuge-Specific Hydrology

This section describes the hydrology of CLNWR as detailed in the *Conboy Lake National Wildlife Refuge Water Management Plan* (Service 2005). Major channels that flow through the refuge are shown in Map 3.

The refuge encompasses approximately 3,182 acres of the Conboy Lake wetland. This makes up about 58% of the wetland system that was formed by the historic Camas Prairie, Conboy Lake, and Swan Lake; the remaining 42% is in private inholdings, creating a mosaic of refuge and private lands within the basin. This wetland complex, as well as lands surrounding the refuge, north to the town of Glenwood, is generally referred to as the Glenwood Valley. Water management in the Glenwood Valley has been primarily for agricultural purposes and is focused on early green-up of grasses for hay removal in July and August, as well as earlier dewatering for cattle pastures. Private land inholding activities necessitate the early drawdown of water from approximately 1,879 acres of refuge wet meadow habitat, equivalent to 59% of the refuge total.

CLNWR is crossed by a network of over a hundred miles of dikes, low-level berms, and drainage ditches from historic agricultural uses. Dozens of unaccounted and unmanaged water control structures still exist within the refuge boundaries. These agricultural relics are largely dysfunctional, serve little purpose for current refuge management, and inhibit efficient management of water resources. Berms and dikes divert or impede water flow, while even the smallest ditches accelerate the loss of both ground and surface water from the wetland system.

Water enters the refuge through precipitation and slope runoff, springs, Frasier Creek, Holmes Creek, Chapman Creek, and Bird Creek. All water ultimately flows into and exits the refuge through the Camas Ditch and Outlet Creek, then downstream (northeast) into the Klickitat River. The Camas Ditch is that segment of the main basin drain west of the BZ-Glenwood Highway. Outlet Creek is that portion of the main basin drain east of the BZ-Glenwood Highway. All creeks have been realigned, channelized, and deepened for drainage purposes. Outlet Creek and the Camas Ditch are periodically dredged by the KDID or the refuge to enhance drainage. Based on the original land survey maps (1870s), the Camas Prairie (fed by Holmes, Chapman, and Bird Creeks) did not have a direct outlet to the Klickitat River. This water outflow was historically impeded by high ground at what is now the north-south segment of the Glenwood-BZ Road (H. Cole personal communication in Service 2005); this high ground separated the Camas Prairie (to the west) from Conboy Lake. The 1870s land surveys show that Conboy Lake drained into the Klickitat River via Outlet Creek. The Camas Ditch was excavated through high ground to expedite drainage of the Camas Prairie. The Camas Ditch was continued downstream, dividing Conboy Lake, and bypassing and cutting off the oxbows of Outlet Creek that historically drained toward the Klickitat River. Because of its size and high outflow, management of the Camas Ditch/Outlet Creek and its embankments are critical to the water management within the entire valley, both for water retention and drainage purposes.

Fall and winter precipitation via rain and snow is important for initial soil saturation but is generally inadequate for filling wetlands and maintaining water levels throughout the valley. Runoff from slopes provides much of the water necessary to fill and maintain the refuge parcels known as the Camas South, Lakeside SW, Lakeside SE, Myer, Arena, and East Oxbow Units. Currently there is no efficient alternative to filling these units from the creek inflows. Water can be backed into these units from the main drain during winter months (depending on water levels) but requires diligent

observation to close off structures as water recedes. Slope runoff generally maintains the water level in these units into the late spring, but levels recede rapidly thereafter.

Springs occur primarily in the northwestern portion of the refuge, around the headquarters and on private lands along the western boundary of the Camas Prairie. Spring waters generally enter the Cold Springs Ditch, which rings the western edge of the Camas Prairie from approximately Kreps Lane north and east to Lake Road. This water is shunted into the lakebed on both refuge and private lands. Private landowners control and manage most of the spring waters.

Holmes Creek enters the valley from the southwest near Laurel. Most of the flow is diverted onto private lands through various ditch systems, ultimately flowing south into Chapman Creek or flowing eastward along Kreps Lane and then joining Chapman Creek on refuge lands. Holmes Creek is important for filling and maintaining the refuge's Laurel West Unit. This unit, west of Laurel Road, is an important breeding site for the State-listed Oregon spotted frog (endangered). Transitional zones between wet prairie and uplands in this area support the State-listed rosy owl-clover (endangered), Mardon skipper (endangered), and long-bearded sego lily (sensitive). The Service has no direct management control of Holmes Creek flow; therefore, the management of hydrology in the Laurel West Unit is dependent upon the private landowner.

Chapman Creek enters at the southwest corner of the valley. It bisects a disjointed segment of the refuge in the southwest valley but primarily flows through private lands, including a 700-acre refuge easement. A beaver dam on the creek at the refuge boundary maintains a wetland critical for Sandhill cranes and Oregon spotted frogs in the Laurel East Unit. Various ditches divert water onto private lands. The creek re-enters the refuge in the Chapman Creek South Unit (south of Kreps Lane). A water control structure within the creek checks up water to fill the refuge wetlands south of the road. Chapman and Holmes Creeks then join along the road edge and continue northeast under the Kreps Lane Bridge. The creek is then necessary to fill refuge wetlands to the west (Chapman Creek North Unit and Aspen Grove Unit). However, unless water levels are high, the creek must first be checked up within private lands to back water through the appropriate structures. There is no current agreement with the landowner to check up water for these units; therefore, their annual filling and maintenance is not dependable. These units are rarely filled to capacity, and may remain dry in some years. Chapman Creek continues northward through private land before terminating at the Camas Ditch.

Bird Creek enters the refuge from the north, off Hansen Road. It is the main source of sustained inflow for the refuge as it is fed by snowmelt from Mt. Adams. Bird Creek can be diverted at Hansen Road into the C&H Units via a screw-gate, westward along the Alternate Bird Creek Channel (which then turns into the Cold Springs Ditch), or southward in the main Bird Creek Channel. Bird Creek was completely realigned in the early 1900s and no longer follows any portion of the historic creek bed while on the refuge (per original 1870s land survey maps). Bird Creek water is used to flood the entire Camas Prairie lakebed north of Camas Ditch. It is also shunted eastward under the Glenwood-BZ Road to fill Conboy Lake and the wetlands and oxbows of the Troh and West Oxbow Units. Bird Creek enters the Camas Ditch in the northern portion of the refuge where it then drains toward the Klickitat River. Water coming down Bird Creek and onto the refuge is controlled by various local landowners and irrigation districts; the timing and duration of the refuge water supply is reliant upon these private entities. The refuge does not exercise its water rights to refine timing and duration since this generally is not critical, except in dry years.

Frasier Creek enters the refuge in the northeast corner. Currently there are no infrastructure options for utilizing this water, and virtually all flows exit the refuge via the Camas Ditch.

The refuge also receives water from the Anderson Ditch and through ditches entering the Troh area, both along Troh Lane east of the Glenwood-BZ Road. These channels are part of the Old Joe Creek system. Flows in these channels are unknown and unreliable. Water can also be brought onto the refuge just west of the Glenwood-BZ Road through the recently acquired Gamble Tract. Water also flows through the Kelley Tract in the far northern portion of the refuge. Water rights for these four sites are unknown, and the refuge does not currently exercise any requests for these waters.

The Service owns 16 water rights for irrigation of the refuge (Mayer 2009). On the refuge, Bird Creek and Frazier Creek have been adjudicated. The Service filed claims for Holmes Creek, Chapman Creek, and several other sources for irrigation, stockwater, and domestic use. The claims for Holmes Creek and Chapman Creek are for large flows (400 cfs and 200 cfs, respectively), and the place of use encompasses almost the entire approved boundary of the refuge. The validity of these claims will not be established until there is an adjudication (Mayer 2009).

3.7 Water Quality and Environmental Contaminants

3.7.1 Overview Klickitat River Basin

The Klickitat River Watershed is largely undeveloped. Land uses include wilderness, forestry, and agriculture. No stream reaches in the watershed are listed as impaired by the WDOE (2008). One reach of the Klickitat River, located upstream of the confluence of Outlet Creek, was identified as Category 2 water (water of concern) due to detection of polychlorinated biphenol (PCB) beyond the National Toxic Rule criterion in a composite tissue sample from four spring Chinook salmon collected in 1997 (WDOE 2008). However, since there are no suspected sources of PCB in the watershed, and since Chinook salmon are migratory, it is possible that the source of this pollutant was from outside the watershed.

3.7.2 CLNWR Waterways

All of the streams on CLNWR drain to Outlet Creek and then to the Klickitat River. There are no water quality concerns on any of these streams.

Chapter 4

Biological Environment

Chapter 4. Biological Environment

4.1 Overview

CLNWR includes a diversity of native habitats centered around the seasonally flooded wet prairie habitat. Approximately 50% of the refuge is wet prairie; the other habitats on the refuge include mixed conifer, upland meadow, ponderosa pine, ponderosa pine-lodgepole pine, emergent marsh, quaking aspen, Oregon white oak, and alder-willow dominated riparian.

The refuge's seasonal wetlands and meadows provide important resting, feeding, and breeding areas for migrating waterfowl and shorebirds within the Pacific Flyway. In particular, the refuge is used by thousands of Canada geese, ducks, and swans. Greater Sandhill cranes breed in the area.

The mosaic of habitats in proximity to extensive seasonal wetlands and coniferous forests results in a diverse assemblage of more than 250 species of birds, mammals, fish, reptiles, and amphibians. Overall, refuge lands are vital to healthy populations of wildlife dependent on these rare habitats. Table 4-1 lists the area of each of the habitat types mapped in the refuge.

Table 4-1. Existing Habitats at Conboy Lake National Wildlife Refuge.

Habitat Type	Acreage
Administrative/Developed	3.5
Alder and Willow (Riparian)	35.0
Emergent Marsh (Seasonal Wetland)	156.0
Lodgepole/Ponderosa Pine	587.0
Mixed Conifer	926.0
Oregon White Oak	61.0
Ponderosa Pine	610.0
Quaking Aspen	95.0
Upland Meadow	799.0
Wet Prairie (Wet Meadow, Seasonal Wetland)	3,281.0
Total	**6,553.5**

The habitats described below, and the management actions proposed, are also described in Chapter 2 under the corresponding goals and objectives. Please refer to those descriptions for additional information.

4.2 Wet Prairie (Wet Meadow)

4.2.1 Overview

Wet prairies are characterized by saturated soil and ponding of water up to 3 feet deep from October through late June to early July. Ideally, wet prairie areas have a short (<2 foot) cover of sedges (e.g., *Carex* species), rushes (e.g., *Juncus* species), spikerushes (e.g., *Eleocharis* species), and other native or desirable emergents. Native forbs include camas, common monkey-flower, and potentilla. Wet prairies are known for mounded topography, with interstitial spaces that support many plant species.

Wetland prairie habitat covers 3,281 acres, approximately half of CLNWR. This habitat is key for migratory waterfowl, shorebirds, and other waterbirds, as well as aquatic mammals and amphibians.

4.2.2 Historic and Current Distribution

Historic farming practices in the Glenwood Valley included ditch construction and draining of large areas, primarily for pasture and hay cultivation. Prior to European settlement of the area and the subsequent ditching and draining, a large portion of the valley was naturally sustained wet prairie.

4.2.3 Key Species Supported

Wet prairie habitat supports a number of species of Federal and State management concern, including rosy owl clover, long-bearded sego lily, Oregon coyote thistle, Oregon spotted frog, Sandhill crane, and elk. Of particular note, wet meadows represent core breeding habitat for Oregon spotted frogs. In addition, this habitat supports migratory waterfowl, such as mallards, tundra swans, northern pintails, and Canada geese.

4.2.4 Refuge Management Activities

Wet prairie habitat is managed through control of the local hydrology. Units of wet prairie are seasonally flooded, beginning in October and then allowed to drain starting in July. Some areas are mowed and/or hayed to control reed canarygrass and maintain short grass conditions that are more suitable for Oregon spotted frogs and Sandhill cranes.

Under the CCP, controlled grazing would also be used to reduce reed canarygrass in targeted areas during summer and fall.

4.3 Emergent Marsh

4.3.1 Overview

Emergent marsh habitat is characterized by a 50-50 mosaic of areas of open water and emergent plants. Water depths range from 2 to 4 feet from October 1 through late July to September. Common native emergent plants include bulrushes (*Scirpus* species) and cattails (*Typha* species). Open water supports submerged aquatic plants, such as pondweeds (*Potomogeton* species). There

should be a limited presence of woody vegetation (e.g., lodgepole pine, spirea, and willow (*Salix* species)).

4.3.2 Historic and Current Distribution in the Glenwood Valley

Presumably, emergent marsh habitat was present adjacent to the original stream channels. The flat topography would allow beavers to construct ponds that probably covered a larger area than is now occupied by emergent marsh habitat; currently, the refuge supports 156 acres of emergent marsh habitat in several areas adjacent to Outlet Creek, Bird Creek, Chapman Creek, and the Willard Spillway.

4.3.3 Key Species Supported

While limited in acreage, emergent marsh is important to migratory and breeding waterfowl, migrating and breeding greater Sandhill cranes, waterbirds (e.g., Virginia rails, soras, American bitterns), overwintering and breeding native amphibians (e.g., Oregon spotted frogs), and a diverse assemblage of wetland-dependent plant species.

4.3.4 Refuge Management Activities

The hydrologic regime is maintained by allowing marsh habitat to flood from October 1 through July 1, then allowing these areas to drain completely by August 1 in order to control bullfrog recruitment. Integrated pest management techniques are used to control invasive plant species, including physical removal and the use of chemical and biological agents.

In addition to hydrologic control and integrated pest management listed above, under the proposed CCP additional management activities would include prescribed burns, targeted grazing on reed canarygrass, and mowing and disking to remove vegetation and maintain the desired ratio of vegetation to open water. Reducing emergent vegetation would benefit Oregon spotted frogs and curtail breeding of American bullfrogs.

4.4 Riverine (Streams, Water Delivery Systems)

4.4.1 Overview

Numerous creeks, ditches, and spillways cross the Glenwood Valley floor and drain to Chapman Creek, Camas Ditch, Bird Creek, Holmes Creek, Frazier Creek, and Outlet Creek. Outlet Creek flows northeast from the refuge to the Klickitat River that drains south to the Columbia River.

A series of water control structures are located throughout the refuge for management of water in various units of the refuge.

4.4.2 Historic and Current Stream Network

Prior to agricultural uses in the Glenwood Valley, it is clear that drainage would have followed a more sinuous pattern that would have included a greater length of stream habitat. A natural drainage

pattern likely would have supported a different distribution of associated emergent wetland and wet prairie areas. Currently there are 19 miles of channels in the area on and around the refuge, including streams and ditches. A network of spillways, gauges, and other control structures allows management of flows to fill and drain wet prairie areas to support refuge goals.

4.4.3 Key Species Supported

The streams and ditches support Oregon spotted frogs, native fishes (e.g., speckled dace), migratory birds, and a diverse assemblage of stream invertebrates. Submergent and floating vegetation are also present.

4.4.4 Refuge Management Activities

Flow control structures are used to flood areas by October 1 and to draw down water levels by July 1. Dredging and vegetation removal are used to maintain flows. Integrated pest management techniques, including mechanical/physical, cultural, chemical, and biological agents are used to eradicate or control invasive plants. These measures would continue unchanged under the proposed CCP.

4.5 Springs

4.5.1 Overview

There are four springs on the refuge: Willard Spring and three that are unnamed.

4.5.2 Historic and Current Distribution

There are no records of the locations of springs prior to agricultural development in the Glenwood Valley. The existing springs have probably been flowing in their current locations for many years.

4.5.3 Key Species Supported

This habitat can support a diverse assemblage of native species, including overwintering Oregon spotted frogs. However, no biological surveys have been conducted on springs within the refuge, so it is unknown what species actually occupy these springs.

4.5.4 Refuge Management Activities

Unwanted vegetation and debris may be strategically removed to promote natural flow and habitat conditions at the springs. IPM techniques, including mechanical/physical, chemical, and biological agents may be used to eradicate or control invasive plants in and around the springs. These measures would continue unchanged under the proposed CCP.

4.6 Upland Meadow

4.6.1 Overview

Upland meadows are characterized by a diverse mix of grasses and forbs, including bluebunch wheatgrass, blue wildrye, Idaho fescue, Oregon checkermallow, yarrow, and asters, as well as limited numbers of woody species such as ponderosa and lodgepole pine.

4.6.2 Historic and Current Distribution

Upland meadow areas are generally located on higher ground surrounding the wet prairie areas. On the refuge much of the upland meadow habitat is transitional between wet prairies and woodlands. The greatest extent of the 799 acres of upland meadows is located along the southeast edges of the refuge. In the absence of fire or management activities, these areas would likely be succeeded by pine forest. Historically, there may have been less upland meadow and more pine woodlands that were cleared for agricultural uses, which then developed into upland meadow habitat over time.

4.6.3 Key Species Supported

Upland meadows provide habitat for migratory songbirds. Raptors, such as northern harriers, nest and forage in upland meadows. Greater Sandhill cranes, a species of management concern, forage and occasionally nest in upland meadow habitats. The Mardon skipper butterfly relies on native bunchgrasses in upland meadows; on the refuge, Mardon skippers are limited to two locations, both in upland meadows.

4.6.4 Refuge Management Activities

Refuge management actions are focused on maintaining this habitat, particularly as necessary to preserve Mardon skipper habitat and as habitat for migratory birds. Management activities include limited controlled burns that avoid existing Mardon skipper habitat, selective mechanical removal of pines and pine seedlings, and the use of IPM techniques to eradicate or control invasive plants.

Under the proposed CCP, controlled grazing would also be used to reduce reed canarygrass in targeted upland meadow areas during summer and fall.

4.7 Ponderosa Pine

4.7.1 Overview

Ponderosa pine stands on CLNWR are relatively dense compared to the range of natural variation for a ponderosa pine forest. On the refuge these stands are dominated by 80- to 100-year-old ponderosa pines, with smaller numbers of lodgepole pine, Douglas-fir, and grand fir scattered throughout. Ideally, understory and ground cover include bitterbrush, milk-vetch, snowberry, wild rose, and bracken fern, with about 5%t cover of invasive/undesirable plants. Wildfires naturally maintain the open condition of ponderosa forests by periodically removing understory vegetation from around the large fire-resistant ponderosa pines.

4.7.2 Historic and Current Distribution

As described in Chapter 2, ponderosa pine stands on CLNWR have followed a development history similar to others on the eastern slopes of the Cascade Range. In pre-european settlement times, frequent, low-intensity ground fires probably were the predominant disturbance influencing these forests and were key in maintaining more open conditions than we see today. Fire prevention, beginning in the late 1800s and early 1900s, mostly removed the influence of fire on forest succession in ponderosa pine stands. The lack of fires has probably resulted in an increased density in these stands. Most ponderosa pine stands on CLNWR are densely stocked, and understory tree species are mostly lodgepole pine, Douglas-fir, ponderosa pine, and grand fir. Pure ponderosa pine stands often contain large numbers of small trees. Currently there are 610 acres of ponderosa pine forest on the refuge.

4.7.3 Key Species Supported

Black-backed and white-headed woodpeckers are found in ponderosa pine forests, preferring open, mature stands of ponderosa pine (Wahl et al. 2005). Both are candidates for listing by the State of Washington as threatened or endangered. Ames' milk-vetch is a State-listed endangered species that is found only on the refuge and adjacent lands. The State-listed threatened western gray squirrel is also present. This habitat also provides cover for a variety of amphibian, reptile, upland migratory bird, and mammal species.

4.7.4 Refuge Management Activities

Currently, refuge management of ponderosa pine forest is limited to IPM techniques, including mechanical/physical, cultural, chemical, and biological agents to eradicate or control invasive species.

Under the CCP, likely additional management measures described in the silvicultural plan would include mechanical thinning on the entire forest, application of controlled burns to reduce fuel and some small trees, creation of canopy openings for Ames' milk-vetch, and creation of additional snags through tree girdling if necessary to achieve an appropriate density of snags that support black-backed and white-headed woodpeckers and other species.

4.8 Lodgepole/Ponderosa Pine

4.8.1 Overview

CLNWR supports 587 acres of mixed lodgepole and ponderosa pine forest in upland areas at the eastern, western, and southern portions of the refuge. This forest habitat is characterized by 40- to 80-year-old pines with small openings in even-aged groups. Ponderosa pines and lodgepole pines show some differences in moisture preference, with lodgepole pines often inhabiting lower lying areas and ponderosa pines in higher and dryer areas. The lodgepole/ponderosa habitat type represents a gradient between these other forest types. The tree density is higher in this forest than in mature ponderosa pine forest. Understory shrubs include snowberry, wild rose, bitterbrush, rabbitbrush, bracken fern, and various native grasses.

4.8.2 Historic and Current Distribution

The historic distribution of lodgepole/ponderosa pine forest has likely shifted with changes in disturbance history (from fires, timber harvest, and clearing) and climate changes. Currently, the majority of this habitat is in the northern portion of the refuge, adjacent to wet prairie and ponderosa pine forest.

4.8.3 Key Species Supported

Key species supported are migratory songbirds, including the yellow-rumped warbler, Cassin's finch, and mountain chickadee, which nest and forage in ponderosa/lodgepole pine forests. Native mammals, such as elk, deer, and Douglas squirrels may use ponderosa/lodgepole pine forests for nesting, foraging, or cover. Bald eagles, which are a State sensitive species, nest in mature ponderosa and lodgepole pines. Western gray squirrels may be present in portions of this habitat that are adjacent to oak forest. Black-backed woodpeckers also inhabit ponderosa pine forests and may be present in this habitat on the refuge.

4.8.4 Refuge Management Activities

Currently, IPM includes mechanical/physical, chemical, and biological agents used to eradicate or control invasive species.

Under the CCP, lodgepole/ponderosa pine forest could be managed using a number of practices described in The Silvicultural Report and Recommendations for Conboy Lake National Wildlife Refuge Forest Stands (White 2009). Selective clearing could be used to create openings and to encourage understory growth, enhancing the structural diversity of the forest. In areas with low snag density, tree girdling may be used to increase the number of snags. Clearing and thinning would be strategically located to prevent pine encroachment into wet prairie and upland meadows and to improve habitat within this forest type.

4.9 Mixed Conifer

4.9.1 Overview

The 926 acres of mixed conifer stands on CLNWR feature a densely populated mix of Douglas-fir, ponderosa pine, and grand fir. Oregon white oak is also present in places. These stands are located on north-, west-, or east-facing slopes on the edges of the Glenwood Valley in areas with lower moisture stress than on flat or southerly slopes. Stands feature a multi-layered complex forest structure.

4.9.2 Historic and Current Distribution

Forest clearing for settlement and agriculture has reduced the coverage of mixed conifer stands. Historically, mixed conifer stands probably experienced fire on the order of every 25 to 100 years, less frequently than for ponderosa pine forests on the refuge. Fire intensity in these sloped sites

would be more intense than on flat sites, resulting in greater changes in vegetation when fires did occur.

4.9.3 Key Species Supported

Mixed conifer forest supports a diverse community of migratory birds and forest-dependent mammal species. The silviculture plan identified Townsend's warbler, varied thrush, hermit thrush, and olive-sided flycatcher as focal species for this habitat. These birds use large, older, mixed conifer stands for breeding and generally favor mature stands of large trees. The olive-sided flycatcher also favors the edges of openings in this habitat. Where ponderosa pines and Oregon white oak forest are in close proximity, this forest type offers potential western gray squirrel habitat.

4.9.4 Refuge Management Activities

Currently, IPM, including mechanical/physical, chemical, and biological agents, is used to eradicate or control invasive species.

Under the CCP, mixed forest could be managed as described in the silviculture plan. Mixed conifer forest could be managed with mechanical thinning and prescribed fire to reduce fuel and prevent hazardous wildfires. Tree clearing could be used to create small openings to enhance structural diversity. Tree girdling could be used as necessary to create the desired density of snags.

4.10 Oregon White Oak

4.10.1 Overview

CLNWR supports 61 acres of Oregon white oak woodlands adjacent to mixed conifer stands, primarily along the BZ-Glenwood Highway. These stands typically are characterized as oak-pine woodland, with scattered trees that create from approximately 25% up to 75% canopy cover of a multi-layered canopy of oaks and pines and a sparse (<50%) understory of shrubs and other ground cover. However, some stands on the refuge are composed almost entirely of Oregon white oak.

4.10.2 Historic and Current Distribution

There is nothing known about the historic distribution of this forest type. However, given the historic fire regime and the oak's resistance to fire, it is likely that the historic conditions for the area are much as they are today.

4.10.3 Key Species Supported

Oregon white oak woodlands benefit migratory landbirds, foraging greater Sandhill cranes, and western gray squirrels which occur south of the refuge and may be present on the refuge.

4.10.4 Refuge Management Activities

Currently, IPM, including mechanical/physical, chemical, and biological agents, is used to eradicate or control invasive species.

Under the CCP, Oregon white oak woodland could be managed as described in the Silvicultural Report and Recommendations (White 2009). Selective thinning could be used to remove adjacent conifers that overtop hardwood species and to create openings allowing oak recruitment. Tree girdling could be used to create additional snags as needed to improve wildlife habitat.

4.11 Quaking Aspen

4.11.1 Overview

Quaking aspen occupies small stands on a total of 95 acres on the valley floor of the refuge adjacent to wetland areas. Quaking aspens are not long-lived, but they do regenerate from lateral shoots as clones. Young trees need abundant light, so this species occupies recently opened areas.

4.11.2 Historic and Current Distribution

The historic distribution of quaking aspen stands in the Glenwood Valley is not known, but likely was variable, with this species colonizing valley floor areas adjacent to wetlands after fire or other disturbance cleared areas of other trees. Currently quaking aspen stands are interspersed with wet prairie habitat in the valley floor.

4.11.3 Key Species Supported

Quaking aspen stands support migratory landbirds, including red-naped sapsuckers, house wrens, western screech owls, tree swallows, and northern flickers; raptors, including sharp-shinned and Cooper's hawks; and a diverse assemblage of resident species, including ruffed grouse, elk, beavers, porcupines, rabbits, and black bears.

4.11.4 Refuge Management Activities

Current management activities include girdling trees as necessary to provide an adequate density of snags and IPM to eradicate or control invasive species, including mechanical/physical, chemical, and biological methods.

Under the CCP, management could also include measures to promote expansion of quaking aspen stands including providing a setback for haying to allow aspen suckers to become established, disking up to 5 acres annually to cause disturbance and promote suckering at the edges of aspen stands, selective thinning of conifers within 30 feet of aspen stands to promote expansion into conifer forest areas, and selective topping or girdling of large aspens to promote suckering. Prescribed fire in the fall may be used to simulate a natural disturbance regime.

4.12 Alder and Willow (Riparian)

4.12.1 Overview

Alder and willow-dominated riparian habitat covers about 35 acres along the stream channels in the refuge. This riparian corridor shades stream channels, provides organic material, and provides habitat for a diverse assemblage of resident and migratory wildlife species.

4.12.2 Historic and Current Distribution

This habitat is defined by proximity to stream channels. Historically, the distribution would probably have included a greater area associated with a more meandering stream network.

4.12.3 Key Species Supported

Key bird species supported include wood ducks, willow flycatchers, yellow warblers, song sparrows, spotted towhees, red shouldered hawks, and ruffed grouse. Mammals supported include deer and elk.

4.12.4 Refuge Management Activities

Management of riparian areas includes the use of setbacks to protect this habitat from grazing and haying. Vegetation removal is conducted to maintain water control infrastructure (e.g., dikes, ditches, stream gauges, and spillways) and to promote aquatic vegetation in certain areas. IPM, including mechanical/physical, chemical, and biological agents, is used to eradicate or control invasive species. These measures would continue under the CCP.

4.13 Waterfowl

Under the authorities of the Migratory Bird Conservation Act, the established Migratory Bird Conservation Commission (MBCC) emphasized the value of CLNWR for waterfowl nesting through the restoration of former wetland habitats and stabilizing spring and summer water levels in managed impoundments. CLNWR is an important breeding area for Canada geese, with as many as 200,000 individuals recorded over the spring season (NAS 2012). Emergent marsh, other wetlands, agricultural pastures, wet prairies, and upland meadow areas all provide habitat for Canada geese. Several species of ducks also breed on the refuge. As many as 5,000 geese, 4,000 ducks, and 500 tundra swans have been present on the refuge at a time during annual migrations in the spring and fall (Service 1992).

Hunting for waterfowl is allowed in the eastern portion of the refuge in accordance with a hunting plan (Service 1992) and State hunting regulations. Generally hunts are allowed at times between mid-October and mid-January.

CLNWR also supports numerous other waterfowl. Table 4-2 lists the waterfowl species that have been seen at the refuge.

Table 4-2. Waterbird Occurrence at Conboy Lake National Wildlife Refuge.

Species	Spring	Summer	Fall	Winter
Grebes				
Pied-Billed Grebe*	o	o	o	
Red-necked Grebe		x		
Western Grebe	r		r	
Bitterns & Herons				
American Bittern*	o	u	u	
Great Blue Heron	c	c	c	u
Great Egret		x		
Green Heron		x		
Double-crested Cormorant		x		
Swans, Geese & Ducks				
Tundra Swan	u	o	o	
Trumpeter Swan	r		r	
Greater White-fronted Goose	o		o	r
Snow Goose	r		r	r
Ross' Goose	r			
Canada Goose*	a	u	u	c
Wood Duck*	c	c	c	
Green-winged Teal*	u	u	u	
Mallard*	a	a	c	c
Northern Pintail	c		u	c
Blue-winged Teal*	u	o	o	
Cinnamon Teal*	c	u	u	
Northern Shoveler*	o	o	o	o
Gadwall*	o	o	o	
American Wigeon	u		o	o
Canvasback			r	
Redhead	r			r

Species	Spring	Summer	Fall	Winter
Ring-necked Duck*	o	o	o	o
Scaup*	o	o	r	o
Common Goldeneye	o		o	o
Barrow's Goldeneye	r		r	r
Bufflehead	o		o	o
Hooded Merganser	u	u	u	o
Common Merganser	o		o	o
Cranes & Rails				
Virginia Rail*	u	u	u	
Sora*	c	c	o	
American Coot*	u	u	u	o
Greater Sandhill Crane*	u	u	u	
Shorebirds & Gulls				
Black-bellied Plover	r			
Killdeer*	c	a	c	o
Semipalmated Plover	r			
Black-necked Stilt	r			
American Avocet	x			
Long-billed Curlew	o	o	o	
Greater Yellowlegs	o	o	o	
Lesser Yellowlegs			r	
Spotted Sandpiper*	o	o	r	
Least Sandpiper	o	o	r	
Pectoral Sandpiper			r	
Dunlin	r			r
Long-billed Dowitcher	o	r	r	
Common Snipe*	a	a	c	r
Wilson's Phalarope*	c	u	r	
Bonaparte's Gull			r	

Species	Spring	Summer	Fall	Winter
Glaucous-winged Gull	r			
California Gull	r	r		
Ring-billed Gull	r	r		
Forster's Tern	r	r		
Black Tern*	o	o	o	

Codes: *: birds known to nest locally
a: abundant; very numerous
c: common; certain to be seen in proper habitat
u: uncommon; present, but not certain to be seen
o: occasional; seen only a few times during the season
r: rare; not present every year
x: accidental; outside normal species range

4.14 Endangered, Threatened and Rare Species

4.14.1 Plants

CLNWR is located in a transitional zone between higher elevations surrounding Mt. Adams and drier foothills, resulting in a diverse botanical community that includes several rare species (Engler 2007). Ten State-recognized plants have been found in the refuge. These plants and their habitat requirements are summarized in Table 4-3.

Table 4-3. Rare Plants at Conboy Lake National Wildlife Refuge.

Common Name	Scientific Name	Status	CLNWR Occurrence
Long-bearded Sego Lily	*Calochortus longebarbatus* var. *longebarbatus*	State Sensitive	Common in wet meadows and prairies.
Oregon Coyote-thistle	*Eryngium petiolatum*	State Threatened	Only known in two wet meadow complexes.
Rosy Owl-clover	*Orthocarpus bracteosus*	State Endangered	Throughout wet meadows and prairies and on adjacent lands.
Kellogg's Rush	*Juncus kelloggii*	State Threatened	Seasonal wetlands. CLNWR is the only known occurrence in Washington. No verified presence since 1989.
Dwarf Rush	*Juncus hemiendytus* var. *hemiendytus*	State Threatened	Seasonal wetlands. Only found in one location in 2005. CLNWR is the only known occurrence in Klickitat County.

Common Name	Scientific Name	Status	CLNWR Occurrence
Pulsifer's Monkey-flower	*Mimulus pulsiferae*	State Sensitive	One location in a seasonally moist area in the transition zone between an open meadow and a ponderosa pine forest area in the vicinity of a spring.
Suksdorf's Milk-vetch aka Ames' Milk-vetch	*Astragalus pulsiferae* var. *suksdorfii*	State Endangered	Ponderosa pine forest and on adjacent lands.
California Broomrape	*Orobanche californica* ssp. *grayana*	Possibly Extirpated	Moist meadows in association with asters and erigeron species. Historical collection of this species is from the Falcon Valley (includes CLNWR), but no recent sightings in Washington.
Suksdorf's Bladderwort	*Utricularia ochroleuca*	State Sensitive	Has not been verified since its initial description.
Carnival Meconella	*Meconella linearis*	Not Listed	Photographed on refuge in 1989, but not verified since. No other known occurrences in Washington.
Sources: Engler 2007; Stutte and Engler 2005.			

4.14.2 Insects

The Mardon skipper butterfly (State endangered) is found in only four locations, including a portion of Klickitat County that includes CLNWR (Potter et al. 1999). This species occupies five sites within the refuge. Threats to this species include losses of habitat associated with development, overgrazing, and natural succession, as well as herbicides and introduced plants that result in the loss of host plants. Additional potential threats include competition from introduced insects and diseases of insects or host plants (Potter et al. 1999). On CLNWR fescue and western blue violet that occur in upland meadow habitat have the potential to support Mardon skippers.

4.14.3 Amphibians

The Camas Prairie that intersects the CLNWR is one of only four locations in Washington where the Oregon spotted frog (State endangered) still occurs. This species is adapted to develop in warmer water than other Pacific Northwest species (Pearl and Hayes 2004). Oregon spotted frogs currently occupy less than about 30% of their historical range (Pearl and Hayes 2004). On the refuge, Oregon spotted frogs occur primarily in emergent marsh and wet prairie habitats, although some individuals may overwinter at springs on the refuge. As described in Chapter 2, wet meadows provide core breeding habitat for Oregon spotted frogs. Stressors to Oregon spotted frogs include changes in vegetation, cattle grazing, and bull frog predation (Pearl and Hayes 2004).

4.14.4 Birds

Eleven special status bird species occur on CLNWR (Table 4-4).

Table 4-4. Special Status Birds Conboy Lake National Wildlife Refuge.

Species	Status	Spring	Summer	Fall	Winter
Western Grebe	SC	r		r	
Bald Eagle	SS	u	o	u	u
Golden Eagle	SC	r	r	r	r
Peregrine Falcon	SS	o	o	o	o
Greater Sandhill Crane	SE	u	u	u	
Lewis Woodpecker	SC	o	o	o	o
Pileated Woodpecker	SC	o	o	o	o
White-headed Woodpecker*	SC	o	o	o	o
Loggerhead Shrike	SC	o		o	r
Purple Martin	SC			x	
Sage Thrasher	SC		x		

Codes: *: birds known to nest locally
a: abundant; very numerous
c: common; certain to be seen in proper habitat
u: uncommon; present, but not certain to be seen
o: occasional; seen only a few times during the season
r: rare; not present every year
x: accidental; outside normal species range

Status: SS: State Sensitive
SC: State Candidate
SE: State Endangered

At least one pair of bald eagles nests on the refuge annually. Juvenile bald eagles are common.

CLNWR and the surrounding area is the only known remaining nesting location for greater Sandhill cranes in Washington (Stocking et al. 2007, Stocking et al. 2008). In recent years, there have been typically more than 25 breeding pairs on the refuge. Due to the limited range and small population, greater Sandhill cranes are a State-listed endangered species. The white-headed woodpecker (State candidate for listing) nests and forages on the refuge and prefers open, mature stands of ponderosa pine (Wahl et al. 2005). Northern spotted owls have been observed in the general vicinity of the refuge (WDFW 2012), but have not been observed there in recent years. The other special status birds are outside of their normal range or are only seen occasionally.

4.14.5 Mammals

The western gray squirrel, State-listed as threatened, is known to occur outside of the refuge and may use some ponderosa and lodgepole pine stands in the refuge.

The gray wolf State-listed as endangered, is not likely to occur on the refuge; however, one reportedly was observed in the Glenwood Valley in 1992 (WDFW 2012).

4.15 Fisheries

Fish are present in the main stream channels in the refuge, including Outlet Creek, Bird Creek, Chapman Creek, Holmes Creek, and Cold Spring Ditch. These waters support two non-native game fish, rainbow trout and eastern brook trout, as well as brown bullhead, and speckled dace. Eastern brook trout were stocked into ponds located upstream of the refuge, escaped and have been reported to spawn within the refuge (Service 1983). Rainbow trout are stocked in Outlet Creek annually.

4.16 Other Wildlife and Plants

A diverse assemblage of wildlife species attests to the diversity of habitats that occur on and near the refuge.

4.16.1 Amphibians and Reptiles

Several amphibian and reptile species are found on the refuge, including long-toed salamanders, northwestern salamanders, rough-skinned newts, western toads, Pacific tree frogs, Oregon spotted frogs, bullfrogs (introduced), western fence lizards, western skinks, rubber boas, western yellow-belly racers, northwestern garter snakes, and valley (common) garter snakes.

4.16.2 Landbirds

Landbirds can be found in all habitats of the refuge. Each habitat type has value to some species, and the mosaic of habitats provides important transitional and edge habitats that can be important foraging areas for many species. A total of 198 bird species have been recorded on the CLNWR bird list (Service 2012). Of these, 140 are landbirds, including 14 diurnal raptors, 4 gallinaceous birds (pheasant, grouse, turkey, and quail), pigeons and doves, 7 owls, nighthawks, Vaux's swifts, 3 hummingbird species, belted kingfishers, 9 woodpeckers, horned larks, and 98 perching birds (passerines). A total of 80 landbird species are known to breed on CLNWR.

4.16.3 Mammals

There are 36 mammal species that have been confirmed on the refuge and another 7 that are likely to be present. Mammals that are confirmed present include badgers, beavers, Bendire's shrews, black bears, black-tailed deer, bobcats, bushy-tailed woodrats, California ground squirrels, California myotis, big brown bats, Cascade golden-mantled ground squirrels, coyotes, deer mice, Douglas' squirrels, hoary bats, little brown myotis, long-eared myotis, long-tailed weasels, minks, mountain lions, muskrats, northern flying squirrels, northern pocket gophers, Pacific jumping mice, pine

martens, porcupines, raccoons, river otters, Rocky Mountain elk, shrew-moles, silver-haired bats, small-footed myotis, snowshoe hares, striped skunks, Townsend's big-eared bats, yellow-bellied marmots, and Yuma myotis.

Other mammals that are likely to occur on the refuge include long-legged myotis, long-tailed voles, montane shrews, Townsend's chipmunks, Trowbridge shrews, vagrant shrews, yellow pine chipmunks. As with birds, the mosaic of fully functioning habitats supports a greater diversity of mammals than would generally be found in a single uniform habitat or a situation where individual habitat units are too small to provide values that vary from surrounding units. For example, bat species present will roost in the forested areas and forage in the open areas, particularly over the extensive wetland areas. The upland meadows and seasonally dry prairie areas bordered by mixed conifer and pine forest support Rocky Mountain elk and mule deer through most of the refuge.

4.17 Exotic, Invasive, and Nuisance 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 (Service Executive Order 13112). Generally, the terms "nuisance" and "invasive" can be used interchangeably. However, in certain circumstances, a native species can be considered a nuisance when it is out of balance with its habitat or when it is present in a time or location where it is annoying to humans. Canada geese feeding on a golf course is a frequent example of a nuisance. Nationwide, impacts from invasive species are considered to be the most critical issue facing wildlife refuges, especially in ecosystems with threatened and endangered species (Service 2010).

4.17.1 Exotic and Invasive Plants

The management strategy utilized at CLNWR is 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. For this reason, invasive species mapping and monitoring are a relatively high priority among survey needs.

Although native plants are also present, reed canarygrass can be found in up to 2,300 acres of seasonal wetlands. This aggressive species out-competes native plants, limiting food, nesting habitat, and cover for wildlife species. Reed canarygrass can severely limit suitability and use of seasonal wetlands by Oregon spotted frogs and other wetland-dependent species. Other invasive or undesirable plants of concern on the refuge include Scotch broom, Canada thistle, meadow knapweed, and St. John's wort.

4.17.2 Exotic Wildlife Species

American bullfrogs (McKercher and Gregoire 2012) and brown bullhead fish (USGS 2009) are present within the waters of the refuge; populations expand and contract seasonally with water levels and availability. Bullfrogs are voracious predators and can have significant adverse effects on native amphibian populations, such as the Oregon spotted frogs. 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 dewatering interrupts that life cycle.

Chapter 5

Social and Economic Environment

Chapter 5. Social and Economic Environment

This chapter addresses the existing refuge facilities, public use programs, cultural resources, economics, and social considerations.

5.1 Administrative Facilities

Administrative facilities at CLNWR are all located at the end of Wildlife Refuge Road at the western portion of the refuge. Facilities in this complex include the refuge office/shop/visitor contact building, public restrooms, employee house, bunkhouse, equipment storage building, and a portable building for storage of hazardous materials.

5.2 Recreation Overview

5.2.1 Entrances and Access Points

The main entrance (Wildlife Refuge Road) is located at the western side of the refuge off Trout Lake to Glenwood Road.

5.2.2 Roads, Trails, and Parking Areas

There are four designated parking areas in the refuge: the office complex, the southern end of Lake Road, from BZ-Glenwood Road just south of Bird Creek, and by BZ-Glenwood Road Bridge across Outlet Creek. These areas provide access to the portion of the refuge open to hunting. The southwestern units of the refuge may be viewed via county roads. The Willard Springs Trail is the one established trail on CLNWR. This 2-mile trail originates at the administrative complex and winds north through mixed conifer forest along the western edge of Conboy Lake to the southwestern side of Willard Springs.

5.2.3 Open and Closed Areas

Approximately 2,300 acres of the refuge is open to waterfowl hunting in accordance with State and refuge-specific rules. This hunting area is primarily the eastern portion of the refuge, and hunters are allowed free range within this area. Deer hunting is currently restricted to an approximately 80-acre parcel south and east of Troh Lane. Non-hunting access is limited to the administrative complex, Willard Springs Trail, county roads, four established parking areas, and the Whitcomb-Cole Hewn Log House.

Under Alternative 2, additional acres may be opened to non-consumptive public use and access.

5.2.4 Annual Recreation Visits

Annual visitation is estimated to be 6,620 visitors per year, including about 6,500 for non-consumptive uses (wildlife viewing, photography, environmental education, cross-country skiing, snowshoeing, and painting) and about 120 visits per year for hunting.

5.2.5 Accessibility of Recreation Sites and Programs to Disabled Persons

The four parking areas and roadside viewing are accessible to disabled persons.

5.3 Wildlife Observation and Photography

Non-consumptive wildlife-dependent uses are allowed from sunrise to sunset the entire year, unless temporary closures are necessary to protect wildlife. The mix of open and forested habitats with large open areas, including seasonally flooded areas that concentrate migratory waterfowl, set against the backdrop of Mt. Adams, provides a setting of natural beauty with opportunities for wildlife viewing and photography. The Willard Springs Trail that loops through mixed coniferous forest on the northern portion of the refuge provides excellent viewing opportunities. Pullouts along county roads and dirt and gravel roads within the refuge also provide opportunities for wildlife viewing. In order to minimize visitor disturbance of wildlife, access apart from hunting and fishing is limited to the Willard Springs Trail, established parking areas, and county roads. Approximately 5% of the refuge is accessible to visual-based activities. A detailed description of this use is included in Appendix B.

5.4 Interpretation

Interpretation is largely self-guided. Information about refuge resources is available on the refuge website (Service 2012). On-site interpretation includes information signs at the refuge office, Willard Springs Trail, and at Whitcomb-Cole Hewn Log House.

As funds become available, the refuge intends to implement a Visitor Services Experience Site Plan (Service 2011b) to improve interpretive facilities, landscaping, and road and trail alignment at the administrative complex.

5.5 Environmental Education

Currently, the Information and Education Specialist at the Service's Spring Creek Fish Hatchery provides field trip opportunities on the refuge for local school children. CGEI, a non-profit environmental education organization, has also started working with the Glenwood School District to create an outdoor classroom curriculum for CLNWR.

Under Alternative 2, the refuge proposes to hire a part-time Visitor Services Specialist. This position would also manage the volunteer program. The Visitor Services Specialist would facilitate partnerships; provide teacher training; create site-specific curricula, materials, and activities; and provide field trip assistance to enhance learning in an outdoor classroom. Ideally, refuge staff would work with local educators to develop curricula for outdoor learning to foster an understanding of, and appreciation for, resource management and human impacts on wildlife and habitats.

5.6 Hunting

5.6.1 Waterfowl Hunting

The Service estimates there are approximately 120 waterfowl hunting visits each year. The overall harvest success, typically measured by the number of birds harvested per hunter per day, is unknown. The most common species harvested include Canada geese, mallards, northern pintails, and American widgeons. Select portions of the refuge are open to waterfowl hunting (approximately 2,343 acres); the areas include wet meadows and wetlands. Within those areas, hunting is free-roam and open for access from 1-1/2 hours before the start of legal hunting within the State of Washington to 1-1/2 hours after the end of legal hunting hours, 7 days a week. Only shotguns and archery equipment may be used and the use must be in accordance with State of Washington regulations. Only federally approved, non-toxic shot may be used or possessed, and hunters are limited to 25 shells per day. Appendix B provides a detailed description of waterfowl hunting on the refuge.

5.6.2 Big Game Hunting

Currently big game hunting is limited to deer hunting within one 100-acre parcel southeast of Troh Lane Road. Parking is restricted to designated areas. Only shotguns, muzzleloaders, and archery equipment may be used and the use must be in accordance with State of Washington regulations.

5.7 Fishing

Fishing is allowed only on a 0.25-mile segment of Outlet Creek upstream of the bridge on Lakeside Road at the northeast end of the Refuge. Eastern brook trout is the main game fish in this stream segment, although brown bullheads are also present and may be caught as well.

5.8 Non-Wildlife-Dependent Recreation

Cross country skiing, hiking, snowshoeing and painting have been identified as current non-wildlife-dependent uses of the refuge. A description of these uses is found in Appendix B. All of these uses are limited to defined trails and county roads immediately adjacent to refuge facilities, although this could change under Alternative 2.

5.9 Illegal Uses and Law Enforcement

Law enforcement is currently provided by Service officers stationed at the MCRNWRC in Burbank, Washington. Because of the distance from the MCRNWRC office, law enforcement visits are limited to a few periodic visits throughout the year (Service 2010). Fortunately, there have been few instances of poaching and sign vandalism in the past. Otherwise, there is little attraction for criminal activity, and other illegal uses of the refuge have not been noted recently.

5.10 Cultural Resources

This section addresses Federal statutes, regulations, executive orders, and memoranda applicable to the consideration and management of historic properties in the CLNWR study area. Sections 106 and 110 of the NHPA (P.L. 88-655; 16 U.S.C § 470 et seq.) ensure that Federal agencies consider historic properties, defined as any prehistoric or historic district, site building, structure, or object eligible for inclusion on the National Register in their proposed programs, projects, and actions prior to their initiation.

CLNWR was established in 1964 and currently encompasses 6,532 acres of the Conboy/Camas lakebeds, a shallow marshy wetland area with a multitude of wildlife and plant resources used by Native Americans for thousands of years, the same abundance of resources that attracted early Euro-American settlers.

5.10.1 Native American Overview

CLNWR is located within the southwestern portion of the Southern Plateau Pre-contact Culture Area. Cultural developments on the plateau prior to contact with European cultures have been summarized by Ames et. al. (1998), Browman and Munsell (1969), Sanger (1967), and Greengo (1986), as well as others. Studies of the archaeology and prehistory of the region typically divide the pre-contact cultural sequence into multiple phases, or periods, from around 11,500 years ago to around 280 years ago. These phases are academic in nature and do not necessarily reflect tribal viewpoints. The following summarizes the pre-contact cultural chronology for the southern plateau developed by Ames and others (2008), which divides the cultural sequence into three periods.

Period 1

Period 1a (11,500 years ago to 11,000 years ago): A single site from the southern plateau, the Richey-Roberts Clovis Cache, has been dated to this period. The site contains bone objects, large bifaces, biface blades, fluted points, and unifacial implements. The assemblage is attributed to the Clovis culture, a group of highly mobile terrestrial mammal hunters (Bonnichsen and Turnmire 1991). Rare isolated fluted points associated with the Clovis culture have been found throughout the region.

Period 1b (11,000 years ago to 7,000/6,400 years ago): Archaeological assemblages from post-Clovis cultures typically include a wide variety of stone, bone, and antler technology, with occasional assemblages containing fishing gear, abraders, milling stones, and anvils. There is temporal variation in projectile point form during this period, with shouldered, stemmed, and unstemmed lancolate points prior to 9,000 years ago, laurel-leaf shaped points between 9,000 and 7,800 years ago, and side- and corner-notched points after 7,800 years ago. Based on the composition of the artifact assemblage, people from this period were highly mobile hunter gatherers with low population densities that moved annually as well as seasonally.

Period 2

This period (7,000/6,400 years ago to 3,900 year ago) is characterized by reduced investment in chipped stone tools; the paucity of edge ground cobbles and prepared cores; and the appearance of milling stones and semi-subterranean house pits. There is also evidence of increased reliance on

roots and salmon for subsistence, indicating a transition toward a less mobile lifestyle oriented to points of resource procurement. Near the end of this period, projectile point styles become highly variable over space.

Period 3

This period (3,900 years ago to 280 years ago) is characterized by the widespread use of pit houses, increased capture and storage of salmon, and intensive exploitation of camas. Perishable wood and fiber tools appear during this period as well. The concentration of winter-use pit houses around drainages and occurrence of summer-use special use camps in the uplands during this period is consistent with ethnographically documented settlement patterns, indicating a continued move towards sedentism.

CLNWR

CLNWR is located in an area known as the Camas (or Tahk) Prairie on the south side of Mt. Adams. Archaeological, ethnographic, and historical evidence indicates that cultural use of the Camas Prairie extends into the early to middle Holocene (Period 2) and occurred as recently as the historic past. Previous archaeological investigations within the Camas Prairie resulted in the discovery of lithic artifacts with diagnostic attributes, indicating human use between 7,000 and 11,000 years ago (Adams 1992).

Ethnographic research indicates the prairie was traditionally used by the Yakama and Klickitat Tribes and was an important seasonal gathering location for plants and animals (Fagan et al. 2000:1). Since the Camas Prairie is located at a relatively high altitude, the growth and development of plants is delayed relative to plants located at lower altitudes (Adams 1992). The traditional inhabitants may have taken advantage of this delay to extend the harvesting season for camas bulbs, berries, and other plants known to have existed in concentrated patches in the area. As a result, it is likely that the Conboy Lake area would have been used as a seasonal resource collection camp in support of larger villages located along the Columbia River (Speulda 2006:4). Examination of General Land Office (GLO) surveyor notes indicates that a network of Indian trails crossed through the Camas Prairie, particularly on the eastern side of the refuge (Adams 1992).

During the 1830s, the Yakama and Klickitat Tribes were decimated by smallpox epidemics (Boyd 1985), resulting in severely reduced Native American populations in the project vicinity. By the time Euro-American settlers permanently moved into the valley in the mid-1850s, fewer than 100 Native Americans were living around the Camas Prairie (Speulda 2006:4; Adams 1992:7). Following the ratification of the Yakama Treaty in 1859, the traditional inhabitants of the area were displaced to the Yakama Indian Reservation.

5.10.2 Euro-American Overview

The earliest Euro-American settlement of what is now Klickitat County began in 1852 along the north side of the Columbia River (Adams 1992:7). Hudson's Bay Company trappers reportedly inhabited the Camas Prairie vicinity during seasonal trapping excursions at least as early as the 1850s, and Captain George B. McClellan led an expedition through the area in 1853, camping at several locations on the prairie while exploring possible railroad routes through the Cascades. Klickitat County was formed in 1859, with county elections held the next year, and the first sawmill

in the region was built in 1860 as lumbering began in the nearby mountains. It was not until 1872, however, that Peter Conboy, Sr., filed the first land claim in the Camas Prairie (Adams 1992:6-7). After Conboy's death in 1875, his widow and children continued to live in the valley, assigning their family name to the small lake near their claim. After 1875, the name Conboy Lake appeared in various land surveyor notes.

Peter Conboy is also credited as being one of the first Euro-American settlers of the community of Glenwood, along with the Joseph Silva and Richard Kelly families. The city of Glenwood is approximately 3 miles north of CLNWR. Other small communities, such as Laurel and Fulda, were also established around the Camas Prairie, but these communities have not survived to the present. Accounts written by travelers, explorers, and other settlers spoke highly of the valley's beauty and abundant resources and lured even more settlers to Glenwood and the Camas Prairie area during the 1870s and 1880s (Adams 1992:8-9).

The Klickitat County's first inland post office was operated by Stephen Whitcomb in Fulda from 1877 to 1881. During this time he operated the post office out of his house (Adams 1992:8). When other community members took on the role of postmaster, they too operated out of their homes.

Early settlers established homes in various parts of the Camas Prairie. For example, in 1891 John Cole acquired land from Whitcomb and built the main structure of the house now known as the Whitcomb-Cole Hewn Log House. Although the house was moved by the Service to its current location, it is listed on the National Register and is considered historically significant as one of the last examples of early pioneer log house construction in the region (Speulda 2004). Many of the known historic sites in the Camas Prairie are the locations of these early homesteads.

Agriculture and raising livestock were the basis of the Camas Prairie's early economy. Initially, during the 19th century, ranching was more feasible than agriculture for residents of the Camas Prairie (Speulda 2006:4; Adams 1992:9). The nearby hills provided ample grass for grazing cattle and sheep, which could be more affordably transported to markets than carts of produce (Adams 1992:9). The agricultural potential of the prairie, however, was known and eventually exploited. As early as 1873, land surveyors noted the rich lakebed soils would be highly suitable for agriculture, if only the lake and marsh could be drained.

Commercial logging was first established in the area at the turn of the 20th century. The Menominee Lumber Company began log drives on the White Salmon River, and a sawmill was constructed in the community of Laurel. The town of Glenwood emerged as the primary commercial center for the Camas Prairie during this period (Adams 1992:9).

Economic growth from the increasing dairy, logging, and milling industries influenced a boom in the local economy of the Camas Prairie communities between 1910 and 1930 (Speulda 2006:4). At least half of the farmsteads identified during the 1990 survey of the refuge were established during this period (Adams 1992:39). The excavation of the Camas Ditch also began in 1910, greatly expanding the amount of arable land. The Camas Ditch stretched across the center of the valley and effectively drained Conboy Lake and the marshes to create more pasture land for livestock grazing and to help irrigate agricultural fields by diverting water to small, intersecting creeks that once fed the marsh (Speulda 2006:5).

The Camas Prairie's boom ended in the 1930s. By this time, the rich lakebed soils were depleted, and the valley experienced several years of poor agricultural production, contributing to the Great

Depression. Ranchers went bankrupt, and residents began leaving Glenwood and the neighboring communities of Fulda and Laurel. A small wave of people moved back into the valley following the end of World War II. These new residents took up ranching and dairying. A resurgence in the logging and agricultural industries occurred in the 1950s, followed again by subsequent declines in the 1960s (Speulda 2006:5). Today, the Camas Prairie has a population of approximately 600 to 700 people, is home to CLNWR, and serves as a gateway to recreation on nearby Mt. Adams.

5.10.3 Current Knowledge of Local Cultural Resources

A record search was undertaken on January 18, 2011, using the Washington Information System for Architectural and Archaeological Records Database (WISAARD) published by the Washington Department of Archaeology and Historic Preservation (DAHP) to identify previously documented archaeological and historic resources within 1 mile of the study area. No fieldwork was conducted to identify previously unknown cultural resources as part of this process. The cultural resources considered in the study area may be categorized into two major types, archaeological resources and historic resources. This draft EA assumes the study area contains additional archaeological resources and historic resources that have not been identified at this time.

The study area falls into what DAHP has identified as a very high probability area for archaeological resources in its statewide predicative model based on environmental factors.

Previously Conducted Cultural Resources Surveys

Five cultural resource surveys and investigations have been conducted within the study area (Table 5-1). An overview of the refuge was completed in 1990 (Adams 1992), during which 30 prehistoric, 35 historic-period, and 5 multi-component archaeological resources were identified. It should be noted that the study used transects and only in areas with known resources or very likely to have resources, e.g. homestead locations. All of the cultural resources identified by Adams (1992) are within the study area of this EA. The multi-component sites typically contained remains of historic farmsteads and prehistoric lithic artifact scatters. The greatest concentrations of both prehistoric and historic-period sites were found in the eastern half of the refuge. This extensive survey continues to be the primary comprehensive survey of the refuge area. More recent surveys have focused on specific, previously recorded resources or newly acquired tracts of land, but not on CLNWR as a whole.

In 1997 a pedestrian survey was conducted of the Kreps Ranch along the southeastern edge of the refuge. It was conducted at the request of the property owner, in anticipation of proposed gravel mining operations (Daughterty 1997:7). The survey did not identify any cultural resources in its 20-acre study area. The study did identify lithic debris and evidence of someone digging for artifacts just outside the gravel pit study area. However, these finds were not further examined because they were outside the study area of the time (Daughterty 1997:8).

In 2000 a pedestrian survey was conducted in association with the development and realignment of Lakeside Road through the northeast corner of the refuge. The survey identified three historic refuse scatters, one prehistoric lithic scatter, and three prehistoric isolates (Fagan 2000). A data recovery excavation was later conducted at one of the refuse scatters, Can Dump Number 2, which contained a wide range of early 20th century food and domestic debris (Fagan et al. 2000).

In 2006 the newly acquired Gamble Tract portion of CLNWR was surveyed for the development of a new refuge headquarters. This 15-acre tract on the north boundary was not part of the refuge when the 1990 cultural resources survey was conducted for the entire refuge area (Adams 1992; Speulda 2006:1). The proposed headquarters development necessitated the removal of several existing buildings on the property, which were built between 1940 and 1960 (Speulda 2006:1). No archaeological resources were identified during the pedestrian survey (Speulda 2006:5). The house, hobby shed, and barn structures were evaluated and found not eligible for listing on the National Register.

Table 5-1. Some Recent Cultural Resources Investigations within Study Area.

Authors/Year	Project	Methods	Cultural Resources
Adams 1992	Archaeological Survey and Testing, CLNWR	Pedestrian Survey and Archaeological Testing	Prehistoric and Historic Archaeological Resources
Daugherty 1997	A Cultural Resource Survey for Kreps Ranch	20 Acres, Pedestrian Survey	None
Fagan 2000	Lakeside Road Reconstruction Project	Pedestrian Survey	Prehistoric and Historic Archaeological Resources
Fagan et al. 2000	Klickitat County Road Project	Data Recovery	Historic Archaeological Site
Speulda 2006	CLNWR: Gamble Tract Development Project	15 Acres, Pedestrian Survey	None

Previously Recorded Archaeological Sites

CLNWR contains 76 previously recorded archaeological sites. Most of the recorded sites have been found on the surface during pedestrian surveys. The eligibility of most archaeological resources in the study area remains undetermined. Adams (1992) noted that many of the archaeological sites identified by the 1990 cultural resources survey had been disturbed by past logging activities.

The known prehistoric archaeological sites within the refuge are primarily classified as lithic scatters. About one-third of these sites include only flakes and fire-cracked rocks. The 1990 cultural resources survey (Adams 1992) recorded 15 prehistoric archaeological sites with formed tools, with only six sites containing a single diagnostic stemmed point (Adams 1992:37). Although temporally diagnostic artifacts were few, based on the discovery of a point similar to the Windust Phase, Adams (1992) suggested that humans have been using the Camas Prairie for as much as 10,000 years.
The known historic archaeological sites located within the refuge include concentrated refuse deposits and structural remains with surface scatters of domestic, agricultural, and architectural artifacts. Most structural remains (ranging from rock foundations to corral poles to rotting plank sheds) are associated with late 19th to mid-20th century farmsteads.

Four recorded sites are associated with burials. One site is associated with 1873 land survey notes, which mention an Indian Graveyard estimated in the vicinity of a prehistoric lithic artifact scatter. The other three sites are small historic cemeteries or unmarked burials associated with the farmsteads and Euro-American settlers.

Previously Recorded Historic Resources

One historic structure on CLNWR is listed on the National Register. Known as the Whitcomb-Cole Hewn Log House, the structure is considered historically significant as one of the last examples of early pioneer log house construction in the region from the 1870s to the 1900s.

No other historic resources on the refuge have been determined eligible for listing on the National Register or the Washington Historic Register. Structures associated with the Klosner Ranch and Gamble Tract were inventoried and evaluated in 2004 and 2006, respectively (Speulda 2004; Speulda 2006). The Klosner Ranch is adjacent to the Whitcomb Cabin and is used by the CLNWR headquarters. The house, hobby shed, and barn structures in the Gamble Tract were found not eligible for listing on the National Register based on lack of integrity and lack of historical association.

5.10.4 Section 106 Consultation

The State Historic Preservation Officer (SHPO), affected tribes and other interested parties will be provided a description of the proposed alternatives at CLNWR, per the requirements of Section 106 of the NHPA. Coordination with the SHPO and tribes with an interest in CLNWR is ongoing and will continue until the CCP process is complete. All activities initiated will undergo Section 106 compliance and clearance.

5.10.5 Native American Resources

No traditional cultural properties or Native American sacred places have been identified within CLNWR. The Native American Tribe that has an expressed interest in CLNWR is the Yakama Nation, which is a federally recognized tribe. The Yakama Nation has been sent a consultation letter regarding this proposed action. Coordination and consultation are described in Appendix K.

5.11 Paleontological Resources

No paleontological resources are known to exist on CLNWR. Due to the geologically young condition of the refuge, there is limited potential for paleontological resources to occur. If any fossils are present in the volcanic alluvium that makes up the valley floor, they would likely be of extant species.

5.12 Socioeconomic Environment

5.12.1 Overview of Regional Economic Setting

CLNWR is located in the Glenwood Valley, south of the town of Glenwood, Washington, in rural Klickitat County. This community and the surrounding area support agriculture, timber, and outdoor recreation-related businesses.

5.12.2 Regional Demographic Information

Population

Table 5-2 shows the population estimates and past trends for Washington and Klickitat County. Washington's population increased by 14% from 2000 to 2010, and Klickitat County increased by 6% (U.S. Census Bureau 2010).

Table 5-2. Local and State Population Estimates and Characteristics.

	Residents	Median Age	Persons/ Square Mile	Land Area (Square Miles)	Population Change 2000-2010
State of Washington	6,830,038	37	103	66,455	14.1%
Klickitat County	20,318	45	11	1,871	6%

Source: US Census Bureau (2010). All figures rounded to the nearest whole number.

Ethnicity, Ancestry, and Education

In 2010 Washington's population consisted of 77% white persons not of Hispanic or Latino origin (U.S. Census Bureau 2010). The Klickitat County average was higher at 88%. In 2010 the Klickitat County Hispanic or Latino population was roughly 11%, the same as for Washington State. The second most populous group in Klickitat County was American Indian, at 2.4%. All other ethnicity groups were less than 1% each (U.S. Census Bureau 2010). By comparison, the statewide population in Washington was 7.2% Asian, 3.6% black, and 1.5% American Indian.

5.12.3 Local Industries

The refuge is located in rural Klickitat County. Agriculture and timber production are the primary industries (Mesek 2011).

Chapter 6

Environmental Effects

Chapter 6. Environmental Effects

This chapter provides an analysis of the environmental consequences of implementing the alternatives described in Chapter 2. Impacts are described for the environmental resources delineated 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.

The overall cumulative impacts on the environment from implementing the various alternatives are described in Section 6.23. Cumulative impacts include: 1) impacts on refuge resources from reasonably foreseeable events; and 2) impacts resulting from interaction of management actions with actions taking place outside the refuge. A brief discussion on potential impacts of climate change to refuge resources is included. More detailed assessments of the CCP's cumulative effects for relevant impact topics are presented section by section.

6.1 Overview of Effects Analysis

The effects analysis has been developed by: 1) identifying the species groups, habitats, refuge users, aspects of the physical environment, and other resources of interest; and 2) identifying effects to these resources that could potentially result from implementing the actions described under each alternative. Effects are evaluated in terms of the change from current conditions. Alternative 1, the "no action" alternative, would continue present management actions. However, the consequences of implementing Alternative 1 may have beneficial, neutral, or negative effects. For example, the continued use of IPM techniques under Alternative 1 to control invasive species would have a minor positive impact on native habitats and species.

More details are presented on effects from recreational or economic uses in Appendix B, Compatibility Determinations.

The information used in this CCP/EA was obtained from relevant scientific literature, existing databases and inventories, consultations with other professionals, professional knowledge of resources based on field visits, and experience.

The terms below were used to describe the scope, scale, and intensity of effects on natural, cultural, social (including recreational), and economic 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, or 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.

Intermediate. 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.

Major (Significant). 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:

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.

One further assumption in the environmental assessment must be noted: Even though an action may be proposed, there may be no discernible potential impact and thus the action is not analyzed. For example, there are not expected to be any impacts associated with soils from environmental education, and thus there is no discussion of this activity on soils. The lack of a presence of a discussion should be assumed to indicate that there is no discernible relationship of an activity to the resource.

6.2 Effects Common to All Alternatives

Integrated Pest Management (IPM). Potential effects to the biological and physical environment associated with the proposed site-, time-, and target-specific use of pesticides on refuge lands would be evaluated using scientific information and analyses documented in "Chemical Profiles" (Appendix H). These chemical profiles provide quantitative assessment/screening tools and threshold values to evaluate potential effects to species groups (birds, mammals, and fish) and environmental quality (water, soil, and air). Any pesticide use must be approved through a Pesticide Use Proposal (PUP). PUPs (including appropriate Best Management Practices) would be approved where the chemical profiles provide scientific evidence that potential impacts to refuge biological resources and the physical environment are likely to be only minor, temporary, or localized in nature.

Along with the selective use of pesticides, PUPs would also describe other appropriate IPM strategies (biological, physical, mechanical, and cultural methods) to eradicate, control, or contain pest species in order to achieve resource management objectives.

The effects of non-pesticide IPM strategies to address pest species on refuge lands would be similar to those effects described elsewhere within this chapter, where they are discussed specifically as habitat management techniques to achieve resource management objectives on the refuge.

Based on scientific information and analyses documented in "Chemical Profiles," most pesticides allowed for use on refuge lands would be of relatively low risk to non-target organisms as a result of low toxicity or short-term persistence in the environment. Thus, potential impacts to refuge resources and neighboring natural resources from pesticide applications would be expected to be short-term and minor—detectable at the local scale, but of little consequence to the overall population of the targeted species. (See Appendix H for additional information on integrated pest management.)

6.3 Effects to Soil Resources

6.3.1 Effects from Habitat Actions

Under both alternatives, wet prairies would continue to be managed with an appropriate flooding regime to maintain these areas as seasonal wetlands with wetland soil characteristics. Disking would continue to be used to control reed canarygrass in wet prairie areas. Since these areas are flat and covered in standing water when flooded, there is a low risk of erosive soil loss.

Under both alternatives, prescribed fire is used as a management tool as described in Chapter 2. The effects of prescribed fires on soils can vary tremendously because of the diversity of fire behavior experienced in the diverse habitats of the refuge. Fire affects soil properties because organic matter located on or near the soil surface is rapidly combusted. This, in turn, affects several chemical, physical, and microbiological properties of the underlying soil. Although some nutrients are volatilized and lost, most nutrients are made more available (St. John and Rundel 1976).

In grass and herb dominated habitats (wet meadows and marshes, upland meadows) the short residence time of fires lead to few concerns over soil heating and the consequences discussed above (Walstad et al. 1990). In the absence of frequent fire, grass litter and thatch can accumulate and during subsequent fires can patchily heat underlying mineral soil horizons (DeBano et al. 1998). In forested systems, the effects can vary tremendously based of fuel loading, litter, and duff. Duff consumption in ponderosa pine stands can heat underlying mineral soil horizons substantially via long-duration heating (Ryan and Frandsen 1991).

Under Alternative 2, disking could also be used in emergent marsh areas to control reed canarygrass, as it is currently in wet prairies, with the same low risk of soil loss. Over-grazing has the potential to result in soil erosion and soil compaction. However, because grazing would be carefully controlled and limited, over-grazing and excessive concentrations of cattle are not expected to occur.

Also under Alternative 2, selective timber thinning has the potential to cause local soil disturbance or compaction from vehicle use and yarding logs. However, timber clearing would be relatively

dispersed. Small openings would be created, and tree clearing would not require intense activity in concentrated areas, so effects on forest soils would be negligible to minor.

Research would continue on the refuge and may include classification and analysis of soils, with potential benefits to refuge management of soil resources. Research may involve excavating small soil pits in order to collect samples or to allow descriptions of soil horizons. Soil pits would be filled once samples have been collected. Effects of research projects to soils would be negligible.

6.3.2 Effects from Public Recreational Use

Under both alternatives, public recreational use would be carefully controlled. Vehicles are only allowed on county roads, and non-hunting visitors must stay on official trails or in already disturbed areas. As a result, the effects of public recreational use on soils would be negligible.

Under Alternative 2, the construction, replacement, or realignment of public use facilities, including trails, would result in soil disturbance. However, equipment and material staging areas would be identified to minimize soil disturbance and compaction on site. Erosion control measures would be incorporated into site development plans to reduce or eliminate loss of site soils during construction. Since the collective footprint of these facilities would be relatively small, the overall anticipated adverse impacts to soil would be minor.

6.3.3 Overall Effects

Under Alternative 1, there would be no new impacts to soils. Under Alternative 2, the effects on soils would be negligible to minor due to the limited area and intensity of potential disturbance activities where the activities would occur. In addition, the local conditions (e.g., healthy forest, low gradient prairie) are not readily impacted by any of the proposed activities.

6.4 Effects to Air Quality

The only action that would have potential adverse effects on air quality would be prescribed burning used to control forest fuel and invasive plants. Controlled burns would be conducted in the fall.

6.4.1 Effects from Habitat Actions

Under both alternatives, prescribed burns would be used to treat upland meadows. Under Alternative 2, prescribed burns would also be used to treat wet prairie, emergent marsh, ponderosa pine forest, lodgepole/ponderosa pine forest, mixed conifer forest, white oak forest, and quaking aspen stands. These additional burns would cause local increases in smoke and airborne soot. However, controlled burns would be limited in size so as to be contained by existing fire personnel, and the impacts would be localized, short-lived, and under wind, temperature, and moisture conditions that are planned to have minor impacts to humans and desired habitats and species. For the most part, the major pollutants within smoke associated with prescribed burns are particulate, carbon monoxide, and volatile organics (EPA 1996). Some nitrous oxides (NOx) are emitted during wildfires, but the level to which emissions occur is largely dependent on the temperature of the fire. Burning would be controlled so as to limit the extent and intensity of smoke. Although controlled burns would have a temporary seasonal adverse effect on air quality, controlled burning would reduce the potential for

uncontrolled wildfires which would generally encompass a much larger area and have a much greater adverse effect on air quality, as well as desired habitats and species.

6.4.2 Effects from Public Recreational Use

Under both alternatives, the number of refuge visitors would be too low to have any discernible effects on air quality. Any impacts would be from vehicle exhaust. Due to the small number of visitors and limited access of vehicles to the refuge, effects on air quality would be negligible.

6.4.3 Overall Effects

Under Alternative 2, minor adverse effects on air quality would occur as the result of controlled burns. Overall, this would reduce the risk of wildfires that could result in major air quality impacts over much larger areas.

6.5 Effects to Wet Prairie and Associated Species

6.5.1 Effects From Habitat Actions

Wet prairie habitats and associated species require, at a minimum, maintenance of an appropriate hydrologic regime and control of invasive species. Management measures in wet prairie habitats consist of hydrologic control and vegetation management. Given the prevalence of invasive reed canarygrass, the measures described in Chapter 2 would result in minor to intermediate beneficial impacts to the native vegetation community and to the wildlife species that use this habitat. The impacts would vary according to the species and their populations. For example, controlling reed canarygrass would have minor to intermediate impacts to waterfowl populations; those species are mobile and can exist in a fairly broad range of suitable habitats. On the other hand, Oregon spotted frog populations could see intermediate benefits from reed canarygrass control. That species has very narrow habitat requirements, a limited distribution range, and a limited population; almost any impacts are substantial.

Under both alternatives, water rights would continue to be used to flood wet prairie parcels starting in October and then drawing these areas down again during the period July 1 through August 15. This regime provides open water habitat during the spring and fall to the benefit of waterfowl species that depend on this habitat. Again, the impacts are species-specific and are expected to range from minor to intermediate.

Haying would result in short-term disturbance but long-term intermediate benefits to resident and migratory wildlife. The timing of haying would avoid adverse effects to Sandhill cranes and Oregon spotted frogs. Haying, prescribed burns, and IPM measures would occur when the area is dry, avoiding potential impacts to Oregon spotted frogs and other species of wildlife. In addition, haying would not commence until after Sandhill crane colts have fledged, avoiding potential disturbance of nesting cranes. Haying impacts are also discussed in Appendix B.

Under Alternative 2, prescribed fire would be used to treat up to 700 acres per year. The effects of prescribed fires on soils can vary tremendously because of the diversity of fire behavior experienced in wet prairies. The majority of herbaceous vegetation species recover quickly following a fire,

though fires burn with increased intensity in communities of tussock-forming species (e.g., many *Juncus* spp.), which may delay recovery somewhat.

Under Alternative 2, grazing would also be used to control reed canarygrass in wet prairie areas. Impacts of grazing are discussed in Appendix B. Grazing is anticipated to moderately benefit wet prairie species by reducing reed canarygrass height, thereby allowing other vegetation to become established. However, certain species would benefit more than others; it is anticipated that waterfowl would see limited overall benefits, while Oregon spotted frogs would see higher benefits. Reed canarygrass, shortened by grazing, provides improved breeding conditions for Oregon spotted frogs when these areas are subsequently flooded compared to unmanaged reed canarygrass. Surveys for rare plants would continue, and grazing would be limited to areas where it would not have an adverse effect on rare plant species. Carefully controlled grazing would enhance this habitat for other plants by reducing reed canarygrass height and improving the potential for other species to grow and survive in these areas.

6.5.2 Effects from Public Recreational Use

Under both alternatives, public access to wet prairies would continue for wildlife observation, photography, and waterfowl hunting. These recreational uses can result in local vegetation trampling at the most popular access points. However, in wet prairie areas, most of this habitat is flooded during a large part of the hunting season when public use is at its greatest and is not generally affected by foot traffic.

Under Alternative 1, deer hunting would continue, whereas under Alternative 2, deer hunting would be discontinued. Due to the timing of the hunt (fall) and the very limited number of participants and the number of animals taken, the current impacts are negligible, and the impacts of discontinuing the hunt would be negligible. Appendix B has full discussions of impacts from recreational activities under the General Uses CD.

6.5.3 Overall Effects

Overall, a minor to intermediate beneficial effect from improved vegetation management would occur for wet prairie habitat and associated species under Alternative 2, and a negligible to minor negative impact from recreational activities would occur. All of the impacts would be minimized through activity-specific planning and implementation of control measures.

6.6 Effects to Emergent Marsh and Associated Species

6.6.1 Effects from Habitat Actions

Habitat management for marsh habitat and associated species includes maintaining an appropriate hydrologic regime and control of invasive species, including reed canarygrass and American bullfrogs.

Under both alternatives, a flooding regime would be implemented starting October 1 with drawdowns beginning by July 1 of the following year. Emergent marsh areas are to be drawn down

by August 1 in order to reduce bullfrog recruitment. IPM would be used to eradicate or control other invasive plant species.

Under Alternative 2, more aggressive measures to control invasive plants would be used, including prescribed burns to treat up to 50 acres annually, grazing, and mowing/disking. Because of the timing of prescribed fires, the effects to the habitat are expected to be similar as is described under wet prairie habitat. By reducing reed canarygrass, other more beneficial plant species would likely have increased survival, and a beneficial ratio of open water to vegetation would be maintained. This would benefit waterfowl species that breed, overwinter, and forage in emergent marsh areas. Management activities would not commence until after Sandhill cranes have fledged, avoiding adverse effects to this species. Traps and nets would be used to capture bullfrog tadpoles and brown bullhead catfish. Control of these species would benefit Oregon spotted frogs and other native aquatic species that are frequently preyed on by American bullfrogs.

6.6.2 Effects from Public Recreational Use

Under Alternatives 1 and 2, public recreational use of emergent marsh areas primarily includes wildlife observation, photography, and waterfowl hunting. These uses would continue under either alternative. During the waterfowl hunting season these areas would generally only be accessed by non-motorized boat or by retriever dogs as allowed under the refuge hunting rules (Service 2011). Hunting regulations, including the timing and location of hunting areas, species, bag limits, and prohibition of the use of toxic shot would continue to avoid or minimize adverse effects to emergent marsh and dependent wildlife species.

6.6.3 Overall Effects

Under Alternative 2, additional vegetation management measures would result in negligible to minor incidental temporary loss of native vegetation as the target invasive species (e.g., reed canarygrass) is controlled. Overall, the effect would be minor to intermediate beneficial to the emergent marsh community, allowing native species to colonize and survive where invasives would otherwise dominate. American bullfrogs and brown bullheads have the potential to inflict substantial predation on Oregon spotted frogs and other native aquatic species. Bullfrog and bullhead control would result in a beneficial effect on Oregon spotted frogs and other native aquatic species by reducing predation. Because it is difficult to estimate the efficacy of bullfrog and bullhead control, the benefit of this effect is considered to be intermediate. Public recreation would continue to have the same low level of effects on emergent marsh under either alternative.

Appendix B has full discussions of impacts from recreational activities under the General Uses CD.

6.7 Effects to Main Water Delivery System (Creeks and Ditches) and Associated Species

6.7.1 Effects from Habitat Actions

Under either alternative, removal of excess vegetation and sediment could be used to maintain flow and operation of control structures. These activities would be expected to cause short-term local releases of turbidity into the local area stream channels, causing a minor, temporary adverse effect to

riverine aquatic species. Due to the very limited extent and short-term nature of this effect, the intensity of the effect would be negligible to minor and then only for a short time period.

6.7.2 Effects from Public Recreational Use

Under Alternatives 1 and 2, fishing would continue to be allowed in the lower 0.25 miles of Outlet Creek. However, use is extremely low and expected to remain that way; thus impacts on stream banks and riparian vegetation from foot traffic would be negligible. The Fishing CD in Appendix B has additional discussion.

Waterfowl hunting could occur in this habitat. However, these areas are not well-suited for hunting, so use is expected to be low and thus impacts are anticipated to be negligible, both to the habitat and associated species.

6.7.3 Overall Effects

Management of main water delivery system would be identical under either alternative. Under both alternatives, minor, short-term negative effects may be associated with individual management actions (i.e. short-term increased turbidity), but since the goal of the actions are to maintain current flow and operation of control structures, the long-term effects of the proposed actions would be negligible.

6.8 Effects to Springs and Associated Species

6.8.1 Effects from Habitat Actions

Under either alternative, removal of excess vegetation and sediment could be used to promote a natural flow regime. These activities would be expected to cause short-term local releases of turbidity into the local area stream channels, causing a minor, temporary adverse effect to riverine aquatic species. Due to the very limited extent and short-term nature of this effect, the intensity of the effect would be negligible to minor and then only for a short time period.

6.8.2 Effects from Public Recreational Use

Recreational use of springs would generally be limited to wildlife viewing and photography, generally enjoyed from a distance. The anticipated effects of any recreational activity on springs would be negligible to the habitat and negligible to minor for associated wildlife; there could be some short-term disturbance of wildlife, but this would be negligible over the long term.

6.8.3 Overall Effects

Management of riverine habitat would be identical under either alternative. Minor, short-term negative effects may be associated with individual management actions (i.e., short-term increased turbidity), but long-term minor beneficial effects to the resource and associated wildlife are anticipated from promoting a more natural flow regime.

6.9 Effects to Upland Meadow and Associated Species

6.9.1 Effects from Habitat Actions

Under both alternatives, IPM techniques including controlled burns, haying non-native grass, and selective pine seedling removal would continue. By carefully controlling the location and intensity of these activities, accidental removal or other adverse effects on special status species are avoided. These activities would continue to maintain upland meadows in their current condition. Prescribed fire in open grasslands with native herbaceous community and few annual or woody invaders tend to have benign effects on the herbaceous dominants (Franklin and Dyrness 1973) which typically re-sprout vigorously following burning.

Under Alternative 2, grazing would also be used in upland meadows to reduce the quantity of reed canarygrass in order to maintain this habitat for supported wildlife species, including Mardon skipper butterflies and Sandhill cranes. As described in more detail in Appendix B, grazing would be conducted under permit according to an annual grazing plan that would include restrictions to protect sensitive natural areas. Under these restrictions, grazing is anticipated to provide a minor benefit to upland meadow habitat and species by reducing dead plant material and non-native vegetation, thereby allowing increases in native plants through reduced competition. These changes in vegetative communities are also expected to increase macroinvertebrate populations that are prey to many birds and other wildlife species.

The Grazing CD in Appendix B has additional discussion of the impacts of grazing and the stipulations to be implemented to ensure the impacts would be positive.

6.9.2 Effects from Public Recreational Use

Under both alternatives, wildlife observation and photography would continue, having negligible effects on upland meadow habitat as the use is limited to areas immediately adjacent to parking areas and other facilities.

6.9.3 Overall Effects

Alternative 1 would continue to maintain upland meadows in their current condition. Therefore, effects to upland meadows and associated wildlife species would be negligible. Under Alternative 2, overall effects are expected to have a minor beneficial effect on the vegetation community of upland meadow habitat by reducing invasive species, given that recreational activities allowed under Alternative 2 would have negligible effects to vegetation and wildlife from foot traffic.

6.10 Effects to Ponderosa Pine and Associated Species

6.10.1 Effects from Habitat Actions

Under both alternatives, IPM techniques, including physical, chemical, and biological agents, would continue to be used to eradicate or control invasive plant species. No other habitat management actions are proposed for ponderosa pine forests under Alternative 1.

Under Alternative 2, the refuge would implement recommended treatments from *Silvicultural Recommendations: Conboy Lake National Wildlife Refuge* (White 2009). Ponderosa pine forest would be managed to create structural diversity to benefit forest-dependent wildlife species. Treatments would include commercial or non-commercial thinning in targeted locations in order to reduce the density of trees and to create openings in the canopy. Mechanical thinning could include commercial thinning or hand clearing with chainsaws or other suitable heavy equipment. Natural processes, such as windthrow of trees, will also contribute to creation of structural diversity. Approximately 200 to 400 acres of the 1,500 acres of ponderosa pine forest would be treated annually to achieve the habitat goals described in Chapter 2. Ponderosa pine stands would be managed to eventually increase the proportion of mature forest, reduce tree densities in overstocked stands, and promote growth in the remaining trees. Focal species for the recommended activities would be white-headed woodpecker and chipping sparrow, but other species would also benefit from these measures, including Hammond's flycatcher, hairy woodpecker, brown creeper, white-breasted nuthatch, pygmy nuthatch, Townsend's solitaire, American robin, dark-eyed junco, dusky flycatcher, gray flycatcher, Cassin's finch, western bluebird, western tanager, and flammulated owl. Because the existing ponderosa pine forest is relatively young, with most trees less than 100 years old, the snag density is low. Snags would be created by girdling selected live trees in order to provide 1.4 snags (greater than 8-inch diameter at dbh with 50 percent greater than 25-inch dbh) per acre.

Impacts from thinning could include minor, temporary local disturbance of vegetation, soil compaction from logging vehicles, and noise from chainsaws and other logging equipment. Although no ESA-listed species have been observed on CLNWR, Washington State identifies the northern spotted owl as occurring in Township 6, Range 12 E that overlaps with the refuge. When specific locations for tree clearing are identified, the potential effects to northern spotted owl would need to be evaluated.

Alternative 2 would also introduce prescribed fires as a management tool in ponderosa pine forests. The effects of prescribed fire on the focal flora in ponderosa pine ecosystems are relative to stand condition and the characteristics of the ignited fire. Most prescribed fires tend to have benign effects on overstory pines and the native herbs (Agee 1993). Wildlife foraging behavior is affected in the area of the fire due to the immediate reduction in prey for ground- and aerial-foraging species, especially those that prey on invertebrates. This effect is expected to be short-term and of a minor intensity due to the small amount of acreage that would be burned at any given time. Due to seasonal restrictions on the use of fire, nesting species would not be affected.

6.10.2 Effects from Public Recreational Use

Currently only one area of ponderosa pine forest is within the designated deer hunting area. As noted above, use is low and during the fall when vegetation is dormant or going dormant. As such, impacts under Alternative 1 are negligible and those associated with discontinuing the hunt are also negligible. Elsewhere, ponderosa pine stands that overlap the open hunting portion of the refuge currently are only open to waterfowl hunting. Since waterfowl are generally not found in ponderosa pine forest, hunting activity in this habitat is generally limited to foot travel and occasional use along the margins adjacent to wetland areas where waterfowl congregate. As a result, impacts are negligible and primarily limited to a temporary disturbance of wildlife along travel corridors. No other public use occurs in this habitat type.

6.10.3 Overall Effects

Under Alternative 1 activities that might impact ponderosa pine forest such as waterfowl hunting, wildlife observation, photography, etc., are expected to have negligible negative impacts. The only management proposed is to use appropriate IPM techniques which may include mechanical/physical, cultural, chemical, and/or biological means to eradicate or control invasive species which when combined with the effects of the other uses would result in a minor beneficial effect to ponderosa pine forests.

Under Alternative 2, activities such as waterfowl hunting, wildlife observation, photography, etc., are expected to have negligible negative impacts. There would be moderate vegetation disturbance associated with the use of prescribed fire and tree thinning. Forest characteristics would be changed to include a larger number of small clearings and a lower density of trees, providing more open space and increased growth rates for the larger trees that remain. Noise and activity associated with tree clearing would likely have minor, temporary negative effects on forest wildlife species due to the timing (November-January), limited duration, and extent of this activity. This is more than offset by the long-term positive effects of habitat improvement, which when combined with the effects of the other uses would result is an intermediate beneficial effect.

6.11 Effects to Lodgepole/Ponderosa Pine and Associated Species

6.11.1 Effects from Habitat Actions

Under both alternatives, IPM techniques, including physical, chemical, and biological agents, would continue to be used to eradicate or control invasive plant species. No other habitat management actions are proposed for lodgepole/ponderosa pine forests under Alternative 1.

Under Alternative 2, the refuge would implement recommended treatments from *Silvicultural Recommendations: Conboy Lake National Wildlife Refuge* (White 2009). Lodgepole/ponderosa pine forest would be managed to create structural diversity to benefit forest-dependent wildlife species. Treatments would include commercial or non-commercial thinning of targeted locations in order to reduce the density of trees and to create openings in the canopy. Mechanical thinning could include commercial thinning or hand clearing with chainsaws or other suitable heavy equipment. Natural processes, such as windthrow of trees, will also contribute to creation of structural diversity. Thinning would be used to favor mature trees, reduce fuel that could otherwise lead to intense wildfires, and to improve habitat structure. Focal species would be the same as described for ponderosa pine forest, above.

Alternative 2 would also introduce prescribed fires as a management tool in ponderosa pine forests as described in the *Silvicultural Recommendations: Conboy Lake National Wildlife Refuge* (White 2009). Effects in this habitat type are expected to be similar as described under the section on ponderosa pine forests.

In areas adjacent to Oregon white oak forest, stands would be managed to favor a multi-layered canopy with a 45-75% cover to improve habitat for western gray squirrels. Snags would be created

by girdling selected live trees in order to provide at least eight snags (greater than 16-inch dbh) per acre.

Impacts from thinning and snag creation could include minor, temporary, local disturbance of vegetation, soil compaction from logging vehicles, and noise from chainsaws and other logging equipment due to the timing (November–January), limited duration, and extent of this activity.

6.11.2 Effects from Public Recreational Use

Currently the only public use of lodgepole/ponderosa pine forests is waterfowl hunting in those areas that overlap with the portion of the refuge open to hunting. Since waterfowl are generally not found in pine forests, hunting activity in this habitat is generally limited to foot travel and occasional use along the margins adjacent to wetland areas where waterfowl congregate. As a result, impacts are negligible and primarily limited to a temporary disturbance of wildlife along travel corridors.

6.11.3 Overall Effects

Under Alternative 1, the effects of IPM techniques to eradicate or control invasive species, combined with the effects of waterfowl hunting (which are negligible), would result in a minor beneficial effect to lodgepole pine/ponderosa pine forests.

Under Alternative 2, there would be short-term intermediate vegetation disturbance associated with prescribed fire and tree thinning. Forest characteristics would be changed to include a larger number of small clearings and a lower density of trees, providing more open space and increasing growth rates for the larger trees that remain. Noise and activity associated with tree clearing would likely have minor, temporary negative effects on forest wildlife species due to the timing (November–January), limited duration, and extent of this activity. This, when combined with the negligible effects of waterfowl hunting, would result in a long-term, intermediate beneficial effect to lodgepole pine/ponderosa pine forests of habitat improvement, which are anticipated to be minor to intermediate.

6.12 Effects to Mixed Conifer and Associated Species

6.12.1 Effects from Habitat Actions

Under both alternatives, IPM techniques, including physical, chemical, and biological agents, would continue to be used to eradicate or control invasive plant species. No other habitat management actions are proposed for mixed-conifer forests under Alternative 1.

Under Alternative 2, the refuge would implement recommended treatments from *Silvicultural Recommendations: Conboy Lake National Wildlife Refuge* (White 2009). Mixed coniferous forest would be managed for the benefit of migratory birds. Focal species would include Vaux's swift, varied thrush, Townsend's warbler, hermit thrush, and olive-sided flycatcher. Other benefitting species would include hairy woodpecker, golden-crowned kinglet, chestnut-backed chickadee, red-breasted nuthatch, winter wren, brown creeper, pileated woodpecker, flammulated owl, western tanager, Cassin's finch, western wood-peewee, mountain bluebird, northern flicker, American kestrel, American robin, and other forest-dependent species, including elk and black-tailed deer.

Treatments would include commercial or non-commercial thinning of targeted locations in order to reduce the density of trees and to create small openings in the canopy. Mechanical thinning could include commercial thinning or hand clearing with chainsaws or other suitable heavy equipment. Natural processes, such as windthrow of trees, will also contribute to creation of structural diversity. Thinning would be used to favor mature trees, reduce fuel that could otherwise lead to intense wildfires, and to improve habitat structure. Small openings would also be created to provide forest edge habitat favored by olive-sided flycatchers.

Alternative 2 would also introduce prescribed fires as a management tool in ponderosa pine forests as described in the silvicultural plan. Effects in this habitat type are expected to be similar as described under the section on ponderosa pine forests.

In areas adjacent to Oregon white oak forest, stands would be managed to favor a multi-layered canopy with 45 to 75% cover to improve habitat for western gray squirrels. Snags would be created by girdling selected live trees in order to provide at least 8 snags (greater than 16-inch dbh) per acre. Timber management or prescribed burns would not occur during the active squirrel nest season (March 1 through August 1).

Impacts from thinning could include minor, temporary, local disturbance of vegetation, soil compaction from logging vehicles, and noise from chainsaws and other logging equipment.

6.12.2 Effects from Public Recreational Use

Currently the only public use of mixed conifer forests is waterfowl hunting in those areas that overlap with the portion of the refuge open to hunting. Since waterfowl are generally not found in conifer forest, hunting activity in this habitat is generally limited to foot travel and occasional use along the margins adjacent to wetland areas where waterfowl congregate. As a result, impacts are negligible and primarily limited to a temporary disturbance of wildlife along travel corridors.

6.12.3 Overall Effects

Under Alternative 1, the effects of IPM techniques to eradicate or control invasive species, combined with the effects of waterfowl hunting (which are negligible), would result in a minor beneficial effect to mixed conifer forests.

Under Alternative 2, there would be short-term, intermediate vegetation disturbance associated with prescribed fire and tree thinning. Forest characteristics would be changed to include a larger number of small clearings and a lower density of trees, providing more open space and increasing growth rates for the larger trees that remain. Noise and activity associated with tree clearing would likely have minor, temporary, negative effects on forest wildlife species due to the timing (November–January), limited duration, and extent of this activity. This, when combined with the negligible effects of public uses, would result in an intermediate, long-term positive effect to mixed conifer forest habitats.

6.13 Effects to Oregon White Oak Woodland and Associated Species

6.13.1 Effects from Habitat Actions

Under both alternatives, IPM techniques, including physical, chemical, and biological agents, would continue to be used to eradicate or control invasive plant species. No other habitat management actions are proposed for white oak woodlands under Alternative 1.

Under Alternative 2, the refuge would implement recommended treatments from the *Silvicultural Recommendations: Conboy Lake National Wildlife Refuge* (White 2009). The focal species for this activity would be the western gray squirrel. The recommended practice for Oregon white oak habitat management (White 2009) is to thin adjacent conifers that are overtopping the hardwood in order to maintain oak vigor and growth. A local practice has been to thin conifers from the south side of oak trees, leaving some connectivity on the north side for arboreal rodents such as the western gray squirrel.

Alternative 2 would also introduce prescribed fires as a management tool in Oregon white oak woodlands as described in the silvicultural plan. Effects in this habitat type are expected to be similar as described under the section on ponderosa pine forests.

6.13.2 Effects from Public Recreational Use

There are no public uses of Oregon white oak woodlands. White oak stands would not be open to hunting or foot traffic under either alternative. Therefore, recreational activity would have no effect on this habitat.

6.13.3 Overall Effects

Under Alternative 1, the effects of IPM techniques to eradicate or control invasive species would result in a minor beneficial effect to mixed conifer forests.

Under Alternative 2, prescribed fire and some localized tree removal would occur to improve the health and vigor of Oregon white oaks. Short-term effects related to the use of prescribed fire and tree clearing are expected to be minor and localized. Wildlife in the vicinity may respond by temporarily fleeing the vicinity of a prescribed fire and from the noise and activity of tree cutting. Overall, there would be an intermediate beneficial effect to Oregon white oak habitat in the form of enhanced stand vigor, resulting in intermediate beneficial impacts to the species using this forest type.

6.14 Effects to Quaking Aspen and Associated Species

6.14.1 Effects from Habitat Actions

Under both alternatives, IPM techniques, which may include physical, chemical, and/or biological agents, would continue to be used to eradicate or control invasive plant species. Selective tree

girdling could also occur under both alternatives to create at least 1.5 snags per acre that are at least 10 inches dbh to improve habitat for a variety of species that inhabit tree cavities. Aspens provide cavity nesting habitat for a variety of birds, as well as food for beavers, ruffed grouse, deer, and elk. Creating additional snags would provide a minor positive benefit to cavity-nesting species.

Under Alternative 2, quaking aspen stands would be managed to maintain or increase this habitat, providing valuable complexity among coniferous stands. Selective thinning may be used to remove lodgepole pines that are overtopping aspen. Selected aspens may also be topped to thin aspen stands and promote suckering. Disking soil surrounding aspen stands would also be used, at a rate of up to 5 acres per year, to promote suckering from roots. This would result in a minor, short-term local disturbance of ground cover vegetation but would be expected to show an intermediate increase in quaking aspen recruitment.

Alternative 2 would introduce the use of prescribed fire as a management tool in quaking aspen stands. Prescribed fire in the fall would simulate natural disturbance and suckering. In low-intensity prescribed fires, aspen both survive the fires and sprout in areas where trees may be injured or killed. The herbaceous understory plants would re-sprout quickly after a fire. Wildlife impacts would be minimal due to the seasonal restrictions on the use of prescribed fire.

6.14.2 Effects from Public Recreational Use

One very small stand of aspen is located within the area open to waterfowl hunting, and no stands are accessible to non-hunting recreational use. As waterfowl hunting does not typically occur in these areas, the impacts are limited to the edges, primarily from travel back and forth to better hunting areas. Given that waterfowl hunting pressure is light to begin with, impacts are negligible, and the direct effects of all recreational uses on quaking aspen would be negligible under both alternatives.

6.14.3 Overall Effects

Under Alternative 1, the effects of IPM techniques to eradicate or control invasive species, which when combined with the effects of creating additional snags, would result in a minor beneficial effect to mixed conifer forests and associated species.

Habitat management proposed under Alternative 2 would likely have a minor to intermediate beneficial effect on recruitment and health of the quaking aspen stands, which in turn would have a minor to intermediate positive impact on species using this habitat.

6.15 Effects to Riparian (Alder and Willow) and Associated Species

6.15.1 Effects from Habitat Actions

Under both alternatives, riparian habitat would be protected and enhanced for the benefit of breeding and migrating landbirds, accipiters, and many other wildlife species. Riparian areas would be protected by maintaining buffers from grazing and haying. IPM techniques, including physical

removal and chemical and biological agents would be used to eradicate or control invasive species. Riparian vegetation would also be strategically removed as necessary to maintain dikes and ditches.

No additional habitat actions would be prescribed under Alternative 2.

6.15.2 Effects from Public Recreational Use

Under both alternatives, fishing would continue to be allowed in a 0.25-mile segment of Outlet Creek upstream of the Lakeside Road Bridge. Although angling records are not available, it is apparent that fishing is poor and angling pressure very light. As a result, the effect of anglers accessing this segment of Outlet Creek has a negligible effect on riparian habitat and species.

6.15.3 Overall Effects

The effects of refuge management and public use on riparian areas would maintain current conditions and would therefore be negligible under either alternative.

6.16 Effects to Threatened and Endangered Species

No federally listed threatened or endangered species are known to inhabit the refuge. However, one species that occurs on the refuge, the Oregon spotted frog, is a candidate for Federal listing. As described in Section 4.14 above, there are several State-listed or very rare plants, insects, birds, and mammals that have either been observed on CLNWR at some time or that are known residents.

6.16.1 Effects to Plant Species

Under both alternatives, IPM techniques would be used to control invasive plant species, benefitting native species, including all of the special status species that have been observed at the refuge (Oregon coyote thistle, rosy owl-clover, Kellogg's rush, dwarf rush, Pulsifer's monkey-flower, Suksdorf's milk-vetch, Suksdorf's bladderwort, and Ames' milk-vetch).

All rare plant species could benefit from the rare plant surveys proposed under Alternative 2 in that management actions could be implemented to protect and enhance these species. Management of habitat for the benefit of these species depends on knowledge of their presence and distribution so that grazing, mowing, prescribed burns, and other management measures enhance habitat rather than disturb sensitive species.

Under Alternative 2, Suksdorf's milk-vetch and Ames' milk-vetch have the potential to benefit from implementation of the silvicultural recommendations for ponderosa pine forest and lodgepole/ponderosa pine forest that would result in more open areas suitable for these species.

Grazing and mowing of reed canarygrass in wet prairies and other seasonal wetlands areas has the potential to benefit long-bearded sego lily, Oregon coyote thistle, rosy owl-clover, Kellogg's rush, dwarf rush, and Pulsifer's monkey-flower by reducing the potential for these species to be out-competed by invasive grasses.

6.16.2 Effects to Mardon Skipper Butterfly

Mardon skipper populations are known to exist in two areas in upland meadows on the refuge, although extensive surveys for Mardon skippers across all appropriate habitats on the refuge have not been conducted. IPM techniques would benefit this species under both alternatives by controlling invasive species that might otherwise out-compete native plants that support Mardon skippers.

Under Alternative 2, surveys including invasive species monitoring and mapping a refuge plant list by habitat could potentially enhance the ability of managers to manage habitat for the benefit of sensitive species, such as Mardon skippers. Additionally, the refuge would manage upland meadows for the benefit of Mardon skippers by reducing the cover of shrubs and trees. Reducing the establishment and growth of woody vegetation would help maintain the extent of meadow habitat. The use of IPM techniques to reduce the density of nonnative herbs would help improve the condition of the meadow habitat. These actions would benefit Mardon skippers by providing more available quality habitat.

In areas with known populations of Mardon skippers, burning, grazing, and other management activities would be subject to careful consideration. Due to small population sizes, limited connectivity between Mardon skipper populations, and their limited dispersal ability, the potential for direct mortality due to management activities such as fire could harm Mardon skipper populations. For example, Mardon skipper populations may be vulnerable to local extirpation if a fire burns all of the occupied habitats at a population site (Black 2011). If a known Mardon skipper site is burned, these areas must then be re-colonized by butterflies flying in from unburned parts of the meadow; however, the rate and extent of re-colonization for Mardon skippers is still currently being investigated (Black 2011, Black et al. 2011). Overall, assessing whether the habitat benefits gained from using prescribed fire would balance the lethal effects fire can pose to Mardon skippers is a complex undertaking. Further, potential effects would depend upon the timing and severity of the fire and the condition of the habitat. The re-colonization rate and extent would depend upon the abundance and distribution of the protected core populations as well as the habitat response of the burned areas. If management activities are conducted in areas with known populations of Mardon skippers, there would be potential short-term minor to intermediate negative impacts; however, in the long term, improved habitat conditions would lead to minor to intermediate benefits.

6.16.3 Effects to Oregon Spotted Frog

Oregon spotted frog research would continue under both alternatives to the benefit of this species.

Under Alternative 2, grazing and mowing of reed canarygrass in wet prairies and other seasonal wetland areas has the potential to benefit Oregon spotted frogs that depend on short vegetation in shallow, seasonally flooded areas for breeding success. Oregon spotted frog egg mass surveys would be one of the top priority biological surveys. Information from these surveys would be used in planning vegetation management actions.

6.16.4 Effects to Special Status Bird Species

Under Alternative 2, implementation of the silviculture plan would benefit forest-dependent bird species. Woodpecker species (Lewis, pileated, and white-headed) would benefit from the forest

prescriptions that create an increased numbers of snags. The Lewis woodpecker, though only seen a few times a year at the refuge, could also benefit from Oregon white-oak prescriptions. Sandhill crane breeding pair surveys, productivity, and colt monitoring would all contribute to successful management for this species.

6.16.5 Western Gray Squirrel

Under Alternative 2, implementation of silvicultural recommendations, including selective thinning to maintain and enhance multi-layered canopy at oak and pine forest interfaces, would benefit gray squirrel habitat. Selective harvest of pines that overtop oaks would help maintain oak stands, which would also benefit western gray squirrels. Western gray squirrel surveys would also be conducted under Alternative 2. Information from these surveys would help guide future management actions.

6.16.6 Overall Effects

Under both alternatives, there would be no effect to federally listed threatened or endangered species, as none are known to occur on the refuge.

Under Alternative 1, habitat management actions would primarily maintain current conditions, though additional snags would be created in quaking aspen stands. This would result in a negligible to minor long-term, beneficial effect to special status species.

Under Alternative 2, additional refuge-wide surveys would inform future management actions. The surveys themselves would have a negligible effect on the target species but the information gained could be used to develop specific prescriptions to benefit special status species. Additional habitat management activities would, in the long term, also provide minor to intermediate benefit to special status species. For example, forest management actions, including selective thinning, snag creation, and invasive species control, are all designed to have positive impacts to specific habitats and species, and the anticipated impacts are expected to have intermediate beneficial effects to special status species.

6.17 General Social Effects

6.17.1 Effects from New Facilities

Under Alternative 2, information and interpretive structures at the Willard Springs Trailhead and the BZ Highway parking area and an additional 0.25-mile of Willard Springs trail would be added. The Willard Springs Trail overlook would be replaced with a safer and more accessible structure. Given the limited extent of trails on the refuge, this would represent an intermediate beneficial effect to public access on the refuge.

6.17.2 Effects from Changes in Hunting Rules

Under Alternative 1, waterfowl and deer hunting would continue. Deer hunting would continue to be allowed in a 100-acre limited area. Under Alternative 2, deer hunting would be discontinued, the waterfowl hunting would continue and a mobility-impaired blind would be added to meet the needs of a growing and aging population. As waterfowl hunting pressure is fairly low, the social impacts

would be minor, although to individuals the positive impact could be high as few comparable opportunities exist nearby.

6.18 Effects to Opportunities for Quality Wildlife Observation, Photography, Interpretation, and Environmental Education

6.18.1 Effects from Habitat Actions

Under both alternatives, wildlife observation, photography, interpretation, and environmental education occur primarily within ponderosa pine areas. The only actions being proposed that could impact these activities are implementation of IPM and selective thinning of trees, per the silviculture plan. Selective thinning would be screened from, or conducted away from, the Willard Springs Trail, where these uses are allowed. IPM actions could take place near the trail; however, all such actions would be implemented at times when visitors are not present, if feasible. As such, the effects from habitat actions on these uses would be minor.

Selective thinning of timber could take place in areas near roads, and as such there would be impacts to aesthetic considerations, both visual and auditory. However, as noted, most logging would take place when visitors are not usually present. Likewise, the thinning permits would provide for screening from roads, except as necessary to improve habitat conditions (i.e., some thinning may be necessary adjacent to roads). Coupled with the plan that logging would be in small patches, the impacts to visitors would be minor.

6.18.2 Effects from Public Recreational Use

Under both alternatives, non-consumptive refuge uses such as wildlife observation and photography would be provided at designated parking and trail areas.

Under Alternative 2, actions that maintain the complexity of the habitat mosaic that makes up the refuge would increase the variety and abundance of wildlife, increasing the opportunities for quality wildlife observation, photography, interpretation, and environmental education experiences. Under Alternative 2 an additional 0.25 mile of trail would be added to the Willard Springs Trail. This trail extension would also provide an additional opportunity for wildlife observation, photography, interpretation, and environmental education experiences.

Under Alternative 2, interpretation and educational opportunities would be increased by development and implementation of plans for interpretive facilities and an environmental education program. Within 5 years of completion of the CCP, the refuge would develop a refuge interpretive plan that would include interpretive facilities and programs for visitors. The plan would include the design of interpretive exhibits for installation at the visitor contact station, the Willard Springs Trail, and the Whicomb-Cole Hewn Log House. The refuge would also recruit and train volunteers to design and present five interpretive programs from May to September. Within 15 years, the refuge would develop and deliver a curriculum-based environmental education program that follows State education standards in partnership with the local school districts, utilizing the refuge as an outdoor classroom for up to 500 student visits annually. All of these actions would result in intermediate beneficial effects to education and interpretation.

6.18.3 Overall Effects

Under Alternative 1, management actions would generally maintain current conditions and access, resulting in a negligible effect to opportunities for quality wildlife observation, photography, interpretation, and environmental education.

Under Alternative 2, there would be intermediate beneficial effects on wildlife observation, photography, interpretation, and environmental education experiences associated with trail extension and maintenance of the complexity of habitats on the refuge. These impacts are further discussed in Appendix B. Impacts from changes to the hunting program are discussed in Appendix C and Section 6.4.2.

6.19 Effects to Opportunities for Quality Hunting and Fishing Experiences

6.19.1 Effects from Habitat Actions

Under Alternative 2, more aggressive means to control reed canarygrass would be used and monitored for effectiveness. In wet prairie and emergent marsh areas, reed canarygrass removal would be done prior to flooding these areas in the fall. During the hunting season, the areas would mostly be flooded, so the effects of vegetation removal on the visual aesthetics experienced by hunters would be neutral to minor. Since these vegetation-control actions would enhance habitat in these areas, there is expected to be an intermediate benefit to a number of species, including waterfowl, which would be beneficial to providing opportunities for a quality hunting experience.

Opportunities for quality fishing experiences would be limited under either alternative, and as no changes are proposed to the opportunities themselves, there would no impacts to fishing. Under Alternative 2 bullhead removal could have a beneficial effect on trout populations, likely a negligible to minor benefit to the limited fishing opportunities.

The General Uses CD in Appendix B has additional discussions of impacts.

6.19.2 Effects from Public Recreational Use

Under both alternatives, waterfowl hunting would remain the same, so there would be no impacts from changes. Elimination of the deer hunting area under Alternative 2 would have a minor negative impact on hunting opportunities; there are few deer and even fewer deer hunters in the area currently open.

6.19.3 Overall Effects

Under Alternative 1, management actions would generally maintain current habitat conditions and access, resulting in a negligible effect to opportunities for quality hunting and fishing opportunities.

Under Alternative 2, habitat actions to benefit wildlife, including waterfowl, would generally improve the quality of hunting experiences to a minor to intermediate degree.

6.20 Effects to Cultural Resources

6.20.1 Effects Common to Both Alternatives

Minor adverse effects to cultural resources are possible under both alternatives. As of January 2012, nearly 80 cultural resources are known to exist in the study area. Due to the proximity of these known cultural resources, both alternatives involve activities that could have negative effects on known cultural resources, including NRHP-eligible historic properties. Activities under either alternative could also have negative effects on unknown cultural resources.

How an individual activity would affect cultural resources is dependent on the proximity of the proposed activity to a cultural resource, the existing integrity of the resource, and the sensitivity of the current or historic use of the resource. The assessment of potential effects based on these factors would happen on a project-specific level. Once a project is proposed, it is undertaken in compliance with the requirements of local, State, and Federal cultural resource protection laws, including Section 106 of the NHPA.

Both alternatives accommodate continued refuge management for the benefit of wildlife; however, Alternative 2 includes more intensive management strategies. Habitat enhancement or restoration can occur in any portion of the study area under both alternatives. Therefore, potential negative effects on known and unknown cultural resources would be the same under either alternative, although the likelihood of those effects would vary.

Under both alternatives the refuge would utilize adaptive management approaches for protecting cultural resources, meaning that as knowledge of cultural resources is gained, proposed activities would be reassessed. Additionally, under both alternatives visitor activity centers, visitor facilities, and both non-vehicular and vehicular travel routes would be located to minimize effects by avoiding sensitive cultural resources. The refuge would also use methods like area closures and site restriction to minimize potential effects. Visitor use would be managed using informational signs, educational materials, trails, protective devices, and law enforcement patrols.

All actions that involve ground-disturbing activities, or other actions with the potential to affect cultural resources, would undergo thorough review in compliance with the requirements of local, State and Federal cultural resource protection laws, including Section 106 of the NHPA, before being implemented. Such review may entail a literature review and records search, field investigations, and consultation with the SHPO, affected tribes, and other interested parties. If cultural resources are present, appropriate procedures would be implemented to protect them per Federal laws and Service policies and guidelines. Whenever possible, cultural resources would be avoided. Unavoidable impacts would be mitigated. Mitigation options, in addition to site avoidance by relocating or redesigning facilities, would include data recovery and using either collection techniques or in-situ site stabilization protection.

The refuge would continue to consult and coordinate with the SHPO, Yakama Nation, and other interested parties, including seeking assistance on issues related to cultural resources education and interpretation, special programs, repatriation, and the requirements of Section 106 of the NHPA. The refuge would also anticipate the need for a comprehensive cultural resource management plan under both alternatives. These activities would result in beneficial effects on cultural resources under both alternatives.

6.20.2 Effects Specific to Alternative 1

Under Alternative 1, refuge management would proceed under the current management plan and resource protection regulations. This management would likely involve ground disturbance and modifications to landforms. Because the study area would experience less intensive habitat enhancement or restoration and visitor access development than under Alternative 2, negative effects on cultural resources would be less likely.

As stated in Chapter 2, cultural resource protection will continue as mandated by law and policy, but no additional measures will be undertaken. Under current cultural resource protection policies and laws, actions with the potential to affect cultural resources would undergo a thorough review before being implemented. The Whitcomb-Cole Hewn Log House would continue to be a focal point, but its role will be of passive interpretation. The structure would remain open, but there would be few, if any, active programs to provide education and interpretation.

6.20.3 Effects Specific to Alternative 2

Alternative 2 supports a higher level of management on the refuge than Alternative 1, both in regard to wildlife habitat management and an increased focus on visitor services. Therefore, Alternative 2 is more likely to have effects on cultural resources.

The following Alternative 2 activities have the potential to disturb known and unknown cultural resources: 1) realigning and lengthening the Willard Springs Trail; and 2) creating vehicle turnouts for hunters and wildlife observation. Moreover, increasing visitor access to open spaces increases the potential for accidental disturbance or intentional vandalism of cultural resources.

To help mitigate these potential effects, the refuge would implement actions to build stronger evaluation, coordination, and protection procedures under Alternative 2. Under Alternative 2 the Service's existing cultural resources policies and protections would continue to fulfill Federal laws and policies. However, additional measures would be implemented, such as completing a comprehensive cultural resources survey of CLNWR, establishing new tribal partnerships, evaluating the NRHP eligibility of archeological sites on CLNWR, and developing an inadvertent discovery plan. The Whitcomb-Cole Hewn Log House would also receive an increased emphasis in planned activities, primarily through the use of volunteers to provide education and interpretation. In general, these actions would help strengthen long-term protection and preservation goals for all cultural resources at CLNWR.

Compared to Alternative 1, outreach and interpretation of cultural resources would be expanded under Alternative 2. 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.

6.20.4 Overall Effects

The refuge is committed to the protection of cultural resources under both alternatives. However, negative effects on cultural resources caused by activities could occur under either alternative. The scope, scale, and intensity of effects would depend on the proximity of a proposed activity to a

cultural resource, the existing integrity of the resource, and the sensitivity of the current or historic use of the resource.

Under Alternative 1, the potential for adverse effects to and level of protection for cultural resources will not change from current management practices. Under Alternative 2, outreach and interpretation of cultural resources would be expanded, and additional actions would be taken to survey CLNWR and evaluate cultural resources. In general, this would help to strengthen long-term protection and preservation of all cultural resources at the CLNWR. Outreach and interpretation of cultural resources would also be expanded under Alternative 2, 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 of archaeological and historic resources.

The level of any activity's effect would be assessed on a project-specific basis during compliance with the requirements of local, State, and Federal cultural resource protection laws, including Section 106 of the NHPA. Based on the management practices proposed under both alternatives, it is the refuge's intent to avoid or mitigate all effects on cultural resources. These measures are expected to generally reduce the effects of activities on cultural resources to a level of neutral or negligible, with some proving to be minor or intermediately beneficial.

6.21 Economic Effects

6.21.1 Effects from Habitat Actions

Habitat actions could have beneficial effects on the Klickitat County economy by providing contract opportunities for selective thinning and prescribed burning work. Issuing grazing permits for reed canarygrass control would also have a beneficial effect by potentially enabling local cattle farmers to increase production.

6.21.2 Effects from Public Recreational Use

Under Alternative 2, the refuge would seek to hire a part-time visitor services specialist. In addition, the refuge would seek increased law enforcement for the refuge. Together these increases in employment would likely amount to no more than one full-time equivalent job created. There may also be opportunities for local contractors to bid on work associated with extending the Willard Springs Trail and with constructing interpretive features. Increased educational opportunities could slightly increase the number of visitors to the refuge from outside the county. Some proportion of these visitors would spend money on local services (e.g., gasoline, food, lodging), although the amount of money would be minimal as the expected visitation increases, if any, are expected to be minimal.

6.21.3 Overall Effects

Overall, the economic effects of either alternative would be minor due to the small potential changes in jobs or other economic opportunities.

6.22 Environmental Justice

In accordance with Executive Order 12898, Federal Actions to address Environmental Justice in Minority Populations and Low-Income Populations, Federal agencies must identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. The following discussion addresses environmental justice as related to the alternatives being considered for CLNWR. The evaluations considered potential impacts arising under each of the major impact categories evaluated in this EA, including socioeconomic, cultural, physical, and biological resources.

Socioeconomic Analysis: According to recent statistics (Section 5.12), the population of Klickitat County is composed of 77% white non-Hispanic, 11% Hispanic, and 2.4% American Indian. The population in the county is largely dependent on agriculture. Under actions proposed in this CCP, the economics of the area, including jobs and income, would not change significantly, and no significant change in taxes or revenue generated by CLNWR is expected.

Considering social and economic impacts, current uses are not known to cause disproportionately high and adverse human health impacts in any population, and no such impacts would be expected to occur under either alternative. Current uses are not known to result in disproportionately high and adverse socioeconomic impacts to low-income or minority populations, and no such impacts would be expected to occur as a result of either alternative.

Cultural Resources Analysis: As noted in the Cultural Resource section, the area within the boundary of CLNWR was traditionally used by the Yakama and Klickitat Tribes and was an important seasonal gathering location for plants and animals prior to Euro-American settlement of the valley. As a result, there are known archeological artifacts present, and it is likely that more exist. Native American grave sites are also a possibility. However, there would be no significant change in protection of American Indian artifacts or remains under either alternative. In fact, proposed changes would strengthen protection and establish procedures for inadvertent discoveries.

Current uses of the refuge are not known to cause disproportionately high and adverse human health impacts in any population, and no such impacts would be expected to occur as a result of any of the actions proposed under the two alternatives. Current uses are not known to result in disproportionately high and adverse impacts to low-income or minority populations and no such impacts would be expected to occur as a result of either alternative.

Physical and Biological Analysis: Potential effects to wildlife, fish, plants, water quality, and air quality are described earlier in this chapter. In analyzing the potential effects of each alternative, and considering the area's population, the natural environment, CLNWR use, and possible health issues, such as herbicide use, current uses are not known to cause disproportionately high and adverse human health impacts in any population, and no such impacts would be expected to occur as a result of any actions proposed under the two alternatives. Current uses are also not known to result in disproportionately high and adverse impacts to low-income or minority populations, and no such impacts would be expected to occur as a result of either alternative.

In summary, socioeconomic, cultural, physical, and biological effects of either alternative do not predict any outcomes that would cause disproportionately high and adverse human health impacts in

any population, nor would they result in disproportionately high or adverse impacts to low-income or minority populations, nor would either alternative create a greater burden on low-income households. Because the alternatives would be implemented on lands under Service ownership and having no resident population, and because no material changes in land use or level of economic activity are proposed, none of the alternatives has the potential to affect environmental justice in Klickitat County.

Overall Effects

Because the alternatives would be implemented on lands under Service ownership that have no resident human population, and because no material changes in land use or level of economic activity are proposed, none of the alternatives has the potential to disproportionately adversely affect minority populations and low-income populations in Klickitat County.

6.23 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 6.2-6.20). This section addresses cumulative effects.

As defined by 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 CLNWR 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 have been presented in the previous sections of this chapter and in the CDs (Appendix B). The analysis in this section primarily focuses on effects associated with reasonably foreseeable future events and/or actions regardless of the entity undertaking that action.

6.23.1 Effects from Reasonably Foreseeable Future Refuge Activities

Compared to Alternative 1, Alternative 2 would incrementally increase the benefits of the refuge to native and migratory plant and animal species, especially those inhabiting the refuge.

6.23.2 Potential Effects from Climate Change

Various changes in climate may have direct or indirect effects on species. These effects may be positive, neutral, or negative, and they may change over time, depending on the species and other relevant considerations, such as interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007). Identifying likely effects often involves aspects of climate change vulnerability analysis and specialized research (IPCC 2007; Glick et al. 2011).

According to the Climate Impacts Group at the University of Washington, even subtle changes in Pacific Northwest precipitation and temperature have noticeable impacts on the region's mountain snowpack, river flows, flooding, the likelihood of summer droughts, forest productivity, forest fire risk, salmon abundance, and quality of coastal and near-shore habitat (Climate Impacts Group 2011). Warming is expected to affect a variety of natural processes and associated resources. However, the complexity of ecological systems and interactions means that there is a tremendous amount of uncertainty about the exact effect climate change will have, and localized effects are still a matter requiring more research (Parmesan et al. 2011). The following paragraphs attempt to identify the key potential effects of climate change on refuge-specific habitats and plants and wildlife, using the available science and projections, combined with awareness of refuge-specific conditions. By necessity this brief assessment is incomplete, and all projected effects should be treated as hypotheses and tested over time using scientific methods.

Wetlands, Moist Soil, and Riparian Habitats

Lawler et al. (2008) stated that of all aquatic systems, wetlands such as those at the refuge will likely be the most susceptible to climate change with drying, warming, and changes in water quality predicted. The causes, such as projections that the Pacific Northwest will experience a greater percentage of precipitation falling as rain rather than snow, are explained in Chapter 3, Climate Change. As stated, Pacific Northwest hydrology is particularly sensitive to changes in climate because snowmelt dominates seasonal runoff, and the region's rain/snow balance is sensitive to temperature. This is particularly the case for watersheds such as CLNWR's, which contain significant amounts of low- and mid-elevation snowpack on a yearly basis.

A neighboring watershed's hydrology, the Yakima River watershed, has been researched by Elsner et al. (2010) and Mastin (2008), and significant changes are projected. These projections can generally be assumed to be valid for CLNWR's watershed, which is in close proximity and shares similar topography, elevation, and vegetative communities at mid-to-high elevation. They are summarized below. These projected changes are likely to challenge the refuge's riparian, aquatic, wetlands, and moist soil habitats and warrant increased management attention.

Elsner et al. (2010) project weekly snow water equivalent (snowpack) decreases over the Yakima River watershed of 39% by the 2020s, 50% by the 2040s, and 70% by the 2080s. Similarly, April 1 snowpack is projected to decrease by 35 to 37% by the 2020s, 47 to 57% by the 2040s and 68 to 82% by the 2080s. The researchers also project significant changes in the timing of streamflows; peak streamflow historically occurs near week 34 (mid-May) in the Yakima River at the U.S. Geological Survey gage at Parker. The suite of projections conducted by Elsner et al. (2010) shows increased winter streamflows for the 2020s, but the timing of the peak would remain in early spring. However, by the 2040s spring peak flow would occur much earlier at week 30 (mid- to late-April), and a significant second peak flow is projected in the winter, which is characteristic of historically lower elevation transient watersheds. By the 2080s, the streamflow regime will become rain-dominant, peaking with precipitation in the winter.

Mastin (2008) also simulated annual runoff under two warming scenarios in the Yakima watershed. Total annual runoff changes are relatively small and ranged from -1.4 to -3.9% for the moderate warming scenario (+1C or +1.8F which is projected to occur in the 2020s) and from -2.5 to 8.2% for the higher warming scenario (+2C or +3.6 F which is projected to occur in the 2050s). Again, the key change is projected to be seasonal. Comparisons showed increases in runoff over the base

conditions during December to March, from 24 to 48% for a moderate warming scenario and 59 to 94% for the higher scenario. During late spring and summer months, significantly decreased runoff was simulated for both scenarios compared to base conditions. Simulated maximum decreases in runoff occurred during June and July, and the changes ranged from -22 to -51% for the plus one scenario and -44 to -76% for the plus two scenario.

Wildfires and Other Disturbances

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. Trouet et al. (2006) confirm that these increases in areas burned are tied to climate conditions, despite forest suppression management practices such as thinning. As shown in Chapter 3, virtually all climate-model projections indicate that warmer springs and summers will occur over the region in coming decades. Prolonged dry and hot periods are generally required for large fires (Gedalof et al. 2005) and future conditions may make these periods, and resultant wildfires, more likely.

Other increases in potential climate-induced disturbances include drought (Allen et al. 2010), bark beetles (Bentz et al. 2010; Raffa et al. 2008), pathogens (Woods et al. 2005; Manter et al. 2005), and a reduction in protective snow cover (Beier et al. 2008). The overall effect is projected to stress the two pine species found at the refuge—ponderosa pine and lodgepole pine—as found by Coops et al. (2011) and Waring et al. (2011). This research, based on an analysis of historic disturbance and future projections with changing climate models, shows a range retraction of these pine species and/or the increasing failure to reach old growth conditions. Hogg et al. (2002) found that aspen mortality in Canada occurred due to a combination of climate and insect stress. Similar stresses may be expected for the refuge's aspen stands in the future.

Finally, climate change is also expected to significantly increase invasive species risks for a variety of reasons. These include factors such as having a broader climate tolerance and larger geographic range and characteristics that favor rapid range shifts. Also, climate change may alter transport and introduction mechanisms, establish new invasive species, alter the impact of existing invasive species, and introduce other risk factors (Hellman et al. 2008; Rahel and Olden 2008; Willis et al. 2010).

Potential Effects to Other Biota

Climate change will continue to have a range of potential effects to wildlife and other biota (Parmesan 2006). Obviously, habitat shifts that result in changes to plant species composition 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 and shifts in precipitation patterns may also affect other ecological interactions, such as spring flowering times, emergence timing and patterns for insect and pollinator species, and many other factors (Geyer et al. 2011). These include complex cascading direct and indirect effects (Martin and Marin 2012). These researchers, for example, found that reductions in winter snowpack influenced the abundance and growth of certain tree species which in turn changed plant communities. These changes affected animal interactions, e.g., the ability of elk to forage at higher elevations. The combined effects altered entire local plant and animal populations.

CLNWR's wetland and moist soil species are perhaps the most vulnerable of these effects. 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.

6.23.3 Other Reasonably Foreseeable Activities from Others

No other activities are known or anticipated in the vicinity of CLNWR in the foreseeable future that are likely to cause significant cumulative effects on the environmental resources described in this CCP.

6.24 Conclusion

This CCP does not propose any major changes in management direction. Those changes that are proposed are generally incremental (e.g., treating only a few acres of habitat annually) or are limited in scope (e.g., closing the deer hunting area that rarely has deer or hunters). As such, and in light of stipulations and best management practices identified in Chapter 2 and Appendix B, few proposed actions have the potential to cause any significant impact to the quality of the human environment. Those that do have a disruptive potential (e.g., commercial forest thinning) will be carefully monitored, implemented gradually, and halted before any significant impacts are realized. As such, the Service finds that there are no significant impacts and that an EA and Finding of No Significant Impact are appropriate to this CCP.

Appendix A

Appropriate Uses

Appendix A. Appropriate Uses

Public uses on national wildlife refuges are considered closed until specifically opened. Opening such uses is a two-part process. First, the proposed use must be determined to be an appropriate use of the refuge. Second, if a use is found to be appropriate, then it must be found to be compatible with the purposes of the refuge (see Appendix C) in order to be allowed. Compatibility determinations do not need to be developed for uses found to be not appropriate.

Under the Service Appropriate Refuges Uses policy (601 FW 1), there are nine categories of refuge uses and activities which are found to be appropriate or otherwise exempt from the requirement for evaluation of appropriateness. These are:

1) Situations where the Service does not have adequate jurisdiction to prohibit a use.

2) The exercise of reserved rights, treaty rights by Native Americans, or other situations where legal mandates state the Service must allow certain uses.

3) Refuge management activities, not including refuge management economic activities (see 603 FW 2.6 N.).

4) Six wildlife-dependent public uses defined by the Administration Act as hunting, fishing, wildlife observation, photography, environmental education, and interpretation, often referred to as the "Big 6."

5) The take of fish and wildlife regulated by a state (e.g., through fishing, hunting, and trapping).

6) Authorized military activities that directly benefit refuge purposes.

7) Uses which have already been described in a refuge CCP or step-down management plan approved after October 9, 1997.

8) Uses which contribute to fulfilling the NWRS mission, or refuge purpose(s), goals, or objectives which are described in a refuge management plan approved after October 9, 1997.

9) State fish and wildlife agency activities which have been documented to directly contribute to achievement of refuge purpose(s), goals, and the NWRS mission, are addressed in a CCP or formal agreement, or are approved under national policy.

This appendix provides the Service's appropriateness review for uses identified by some portion of the public as being desirable on CLNWR. With few exceptions (below), the Refuge Manager must decide if a new or existing use is appropriate. In assessing whether a secondary use is appropriate, the Refuge Manager must evaluate the following ten factors (the letters correspond to the evaluation criteria in the Appropriate Uses form):

a) Does the Service have jurisdiction over the use? If the Service does not have jurisdiction over the use or the area where the use would occur, then there is no authority to consider the use.

b) Does the use comply with all applicable laws and regulations? The proposed use must be consistent with all applicable laws and regulations (e.g., Federal, State, local, and tribal). Uses prohibited by law are not appropriate.

c) Is the use consistent with applicable Executive Orders and Department and Service policies? If not, the use is not appropriate.

d) Is the use consistent with public safety? If the proposed use creates an unreasonable level of risk to visitors or staff, or if the use requires staff to take unusual safety precautions to assure the safety of the public or refuge staff, the use is not appropriate.

e) Is the use consistent with refuge goals and objectives in an approved management plan or other document? Refuge goals and objectives are designed to guide management toward achieving refuge purpose(s). Goals and objectives for CLNWR are defined in Chapter 2 of the CCP.[1] If the proposed use, either itself or in combination with other uses or activities, conflicts with a refuge goal, objective, or management strategy, the use is generally not appropriate.

f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed? If the use was already considered and rejected as not appropriate, then it should not further unless circumstances or conditions have changed significantly.

g) For uses other than wildlife-dependent recreational uses, is the use manageable with available budget and staff? If a proposed use diverts management efforts or resources away from proper, reasonable management of a refuge activity or wildlife-dependent recreational use, the use is generally not appropriate.

h) Will the use be manageable in the future within existing resources? If the use would lead to recurring requests for the same or similar activities that will be difficult to manage in the future, then the use is not appropriate.

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 those resources? If not, then the use will generally not be further considered.

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? If not, the use is generally not further considered.

If an existing use is found to be not appropriate, the Refuge Manager must eliminate or modify the use as expeditiously as practicable. If a proposed new use is not appropriate, the Refuge Manager must deny the use (601 FW 1.3).

[1] Refuges may also rely on goals and objectives found in comprehensive management plans or refuge master plans developed prior to passage of the Improvement Act, as long as these goals and objectives comply with the tenets and directives of the Administration Act.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Conboy Lake National Wildlife Refuge

Use: Cross-country Skiing

This form is not required for wildlife-dependent recreational uses, take regulated by the State of Washington, 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?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal and local)?	X	
(c) Is the use consistent with applicable Executive Orders and Departmental and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Will this be manageable with available budget and staff?	X	
(h) Is the use manageable in the future within existing resources?	X	
(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 those resources?	X	
(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 a description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate the use 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 ((e) - (j)), we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. Yes __X__ 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 the proposed use is:

Not Appropriate _____ **Appropriate** __X_

Refuge Manager: _____ Date: _____

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 of the CCP process, the Refuge Supervisor must sign concurrence.

If found to be **Appropriate**, the Refuge Supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

A Compatibility Determination is required before the use may be allowed.

Rationale: Undoubtedly, some cross-country skiing on the refuge is done in support of Big 6 activities, specifically wildlife observation and photography activities that the Service supports and encourages. Cross-country skiing allows access for these activities in the winter months. While it is likely that much of the activity takes place simply for exercise, or to be outdoors, it cannot be differentiated from that done in support of the Big 6. It likely creates a deeper appreciation for natural resources and open spaces, which in turn benefits wildlife, the Service, and the NWRS. As the impacts are inconsequential and the cost to the Service low, cross-country skiing on CLWNR is an activity that the Service allows and supports.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Conboy Lake National Wildlife Refuge

Use: Forest Thinning Through Selective Logging

This form is not required for wildlife-dependent recreational uses, take regulated by the State of Washington, 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?	X	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal and local)?	X	
(c) Is the use consistent with applicable Executive Orders and Departmental and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Will this be manageable with available budget and staff?	X	
(h) Is the use manageable in the future within existing resources?	X	
(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 those resources?	X	
(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 a description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate the use 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 ((e) - (j)), we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. Yes __X__ 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 the proposed use is:

Not Appropriate _____ **Appropriate** __X_

Refuge Manager: _____ Date: _____

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 of the CCP process, the Refuge Supervisor must sign concurrence.

If found to be **Appropriate**, the Refuge Supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

A Compatibility Determination is required before the use may be allowed.

Rationale: Forest thinning through logging is used as a management tool to achieve desired conditions and habitat goals. It puts refuge resources to a beneficial use while helping the Service enhance conditions for target species. It can be used to reduce fire threats and control the spread of arboreal diseases. It opens the forest canopy to encourage the regeneration and growth of desirable understory species.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Conboy Lake National Wildlife Refuge

Use: Grazing

This form is not required for wildlife-dependent recreational uses, take regulated by the State of Washington, 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?	X	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal and local)?	X	
(c) Is the use consistent with applicable Executive Orders and Departmental and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Will this be manageable with available budget and staff?	X	
(h) Is the use manageable in the future within existing resources?	X	
(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 those resources?	X	
(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 a description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate the use 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 ((e) - (j)), we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. Yes __X__ 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 the proposed use is:

Not Appropriate _____ **Appropriate** __X_

Refuge Manager: _____ Date: _____

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 of the CCP process, the Refuge Supervisor must sign concurrence.

If found to be **Appropriate**, the Refuge Supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

A Compatibility Determination is required before the use may be allowed.

Rationale: Grazing is used as a management tool to achieve desired conditions and habitat goals. It puts refuge resources to a beneficial use while helping the Service enhance conditions for target species. Used properly, it mimics the actions of large grazing species reduced in numbers or eliminated from the area.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Conboy Lake National Wildlife Refuge

Use: Haying

This form is not required for wildlife-dependent recreational uses, take regulated by the State of Washington, 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?	X	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal and local)?	X	
(c) Is the use consistent with applicable Executive Orders and Departmental and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Will this be manageable with available budget and staff?	X	
(h) Is the use manageable in the future within existing resources?	X	
(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 those resources?	X	
(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 a description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate the use 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 ((e) - (j)), we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. Yes __X__ 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 the proposed use is:

Not Appropriate _____ **Appropriate** __X_

Refuge Manager: _____ Date: _____

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 of the CCP process, the Refuge Supervisor must sign concurrence.

If found to be **Appropriate**, the Refuge Supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

A Compatibility Determination is required before the use may be allowed.

Rationale: Haying is used as a management tool to achieve desired conditions and habitat goals. It puts refuge resources to a beneficial use while helping the Service enhance conditions for target species.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Conboy Lake National Wildlife Refuge

Use: Hiking

This form is not required for wildlife-dependent recreational uses, take regulated by the State of Washington, 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?	X	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal and local)?	X	
(c) Is the use consistent with applicable Executive Orders and Departmental and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Will this be manageable with available budget and staff?	X	
(h) Is the use manageable in the future within existing resources?	X	
(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 those resources?	X	
(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 a description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate the use 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 ((e) - (j)), we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. Yes __X__ 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 the proposed use is:

Not Appropriate _____ **Appropriate** __X_

Refuge Manager: _____ Date: _____

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 of the CCP process, the Refuge Supervisor must sign concurrence.

If found to be **Appropriate**, the Refuge Supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

A Compatibility Determination is required before the use may be allowed.

Rationale: The majority of hiking on the refuge is done in support of Big 6 activities. Specifically for Conboy Lake these are hunting, wildlife observation, photography, interpretation, and environmental education. Some level of hiking is necessary to undertake these activities that the Service supports and encourages. While some hiking may not be directly related to the Big 6, it is likely limited in nature, cannot be differentiated from that in support of the Big 6, and the impacts are inconsequential.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Conboy Lake National Wildlife Refuge

Use: Horseback Riding

This form is not required for wildlife-dependent recreational uses, take regulated by the State of Washington, 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?	X	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal and local)?	X	
(c) Is the use consistent with applicable Executive Orders and Departmental and Service policies?	X	
(d) Is the use consistent with public safety?		X
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Will this be manageable with available budget and staff?		X
(h) Is the use manageable in the future within existing resources?		X
(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 those resources?		X
(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 a description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate the use 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 ((e) - (j)), we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. Yes __X__ 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 the proposed use is:

Not Appropriate __X___ **Appropriate** _____

Refuge Manager: _____ Date: _____

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 of the CCP process, the Refuge Supervisor must sign concurrence.

If found to be **Appropriate**, the Refuge Supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

A Compatibility Determination is required before the use may be allowed.

Rationale: Horseback riding carries with it numerous environmental impacts:

1) Horses spread noxious weeds through manure and transmittal via attachment to horse coats.

2) Horse hooves have sharp edges and are rigid which cut into soils and trample plants. Persistent riding cuts deep trails.

3) Horses and riders scare wildlife.

4) Horseback riding often interferes with other recreational activities through a variety of means, including manure, odors, degradation of trails, and physical interference of horses with other users.

While horseback riding can also facilitate Big 6 activities, due to the limited available areas for riding on CLNWR (i.e., roadways) and the environmental impacts, the risks do not offset the benefits. Also, there are numerous other nearby areas better suited to the activity with substantially greater areas available for riding. Therefore, horseback riding is not an appropriate use of CLNWR.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Conboy Lake National Wildlife Refuge

Use: Native American Plant and Materials Gathering

This form is not required for wildlife-dependent recreational uses, take regulated by the State of Washington, 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?	X	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal and local)?	X	
(c) Is the use consistent with applicable Executive Orders and Departmental and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Will this be manageable with available budget and staff?	X	
(h) Is the use manageable in the future within existing resources?	X	
(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 those resources?		X
(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 a description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate the use 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 ((e) - (j)), we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. Yes __X__ 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 the proposed use is:

Not Appropriate _____ **Appropriate** __X_

Refuge Manager: _____ Date: _____

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 of the CCP process, the Refuge Supervisor must sign concurrence.

If found to be **Appropriate**, the Refuge Supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

A Compatibility Determination is required before the use may be allowed.

Rationale: The Yakama Nation has treaties with the United States allowing them to gather plants and other materials in places where this historically occurred. The Service honors and supports all Native American treaties and is fully supportive of this activity on CLNWR, subject to conditions necessary to protect natural and cultural resources. It is the intent of the Service to actively facilitate gathering on CLNWR through whatever measures necessary (e.g., special use permits, memorandums of understanding).

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Conboy Lake National Wildlife Refuge

Use: Painting

This form is not required for wildlife-dependent recreational uses, take regulated by the State of Washington, 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?	X	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal and local)?	X	
(c) Is the use consistent with applicable Executive Orders and Departmental and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Will this be manageable with available budget and staff?	X	
(h) Is the use manageable in the future within existing resources?	X	
(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 those resources?	X	
(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 a description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate the use 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 ((e) - (j)), we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. Yes __X__ 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 the proposed use is:

Not Appropriate _____ **Appropriate** __X_

Refuge Manager: _____ Date: _____

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 of the CCP process, the Refuge Supervisor must sign concurrence.

If found to be **Appropriate**, the Refuge Supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

A Compatibility Determination is required before the use may be allowed.

Rationale: Painting of landscapes, cultural resources, and wildlife is a nonconsumptive use that has very little impact to resources and other visitors. As it can lead to a deeper appreciation of those same resources and thus support for wildlife and the NWRS, it is an activity that the Service encourages on CLNWR. Likewise, it is a beneficial use that has little, if any, cost, and no supporting facilities are needed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Conboy Lake National Wildlife Refuge

Use: Research

This form is not required for wildlife-dependent recreational uses, take regulated by the State of Washington, 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?	X	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal and local)?	X	
(c) Is the use consistent with applicable Executive Orders and Departmental and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Will this be manageable with available budget and staff?	X	
(h) Is the use manageable in the future within existing resources?	X	
(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 those resources?	X	
(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 a description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate the use 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 ((e) - (j)), we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. Yes __X__ 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 the proposed use is:

Not Appropriate _____ **Appropriate** __X_

Refuge Manager: _____ Date: _____

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 of the CCP process, the Refuge Supervisor must sign concurrence.

If found to be **Appropriate**, the Refuge Supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

A Compatibility Determination is required before the use may be allowed.

Rationale: Research contributes to a deeper understanding of refuge resources, leading to better management. If conducted in a manner that protects the refuge's natural, cultural, and recreational resources, research can only lead to positive benefits for CLNWR.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Conboy Lake National Wildlife Refuge

Use: Snowshoeing

This form is not required for wildlife-dependent recreational uses, take regulated by the State of Washington, 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?	X	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal and local)?	X	
(c) Is the use consistent with applicable Executive Orders and Departmental and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	X	
(g) Will this be manageable with available budget and staff?	X	
(h) Is the use manageable in the future within existing resources?	X	
(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 those resources?	X	
(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 a description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate the use 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 ((e) - (j)), we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. Yes __X__ 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 the proposed use is:

Not Appropriate _____ **Appropriate** __X_

Refuge Manager: _____ Date: _____

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 of the CCP process, the Refuge Supervisor must sign concurrence.

If found to be **Appropriate**, the Refuge Supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

A Compatibility Determination is required before the use may be allowed.

Rationale: Some snowshoeing on the refuge is done in support of Big 6 activities, specifically wildlife observation and photography activities that the Service supports and encourages. Snowshoeing allows access for these activities in the winter months. While it is likely that some of the activity takes place simply for exercise, or to be outdoors, it cannot be differentiated from that done in support of the Big 6. It likely creates a deeper appreciation for natural resources and open spaces, which in turn benefits wildlife, the Service, and the NWRS. As the impacts are inconsequential and the cost to the Service low, snowshoeing on CLWNR is an activity that the Service allows and supports.

Appendix B

Compatibility Determinations

Appendix B. Compatibility Determinations

B.1 Introduction

The compatibility determinations (CDs) we developed during the CCP planning process evaluate uses projected to occur on CLNWR. There is also an evaluation of funds needed for management and implementation of each use. Chapter 4 of the draft 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.

B.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, CDs will be completed for all uses proposed under a CCP that have been determined to be appropriate (see Appendix B). 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, 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 following CDs are included in this document for public review.

Table B.1 Summary of Compatible Use Determinations

Page #	Refuge Use	Compatible?	Year Due For Reevaluation
B-5	Environmental Education, Interpretation, Photography and Wildlife Observation	Yes	2027
B-15	Fishing	Yes	2027
B-21	General Uses: Hiking, Cross Country Skiing, Snowshoeing, and Painting	Yes	2022
B-33	Grazing	Yes	2022
B-43	Haying	Yes	2022
B-53	Research	Yes	2022
B-63	Timber Harvest	Yes	2022
B-73	Waterfowl Hunting	Yes	2027

B.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 NWRS 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 CD. 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, photography, 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. 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-NWRS entity. Uses generally providing an economic return (even if conducted for the purposes of habitat management) are also subject to CDs. The Service does not prepare compatibility determinations for uses when it 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 Improvement Act, were adopted by the Service in October 2000 (refuges.fws.gov/policymakers/nwrpolicies.html). The regulations require that a use must be compatible with both the mission of the NWRS and the purposes of the individual refuge. This standard helps to ensure consistency in application across the NWRS. The act also requires that CDs be in writing and that the public have an opportunity to comment on most use evaluations.

The NWRS mission emphasizes that the needs of fish, wildlife, and plants must be of primary consideration. The Administration 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 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 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 CLNWR are based on the professional judgment of refuge and planning personnel including observations of refuge uses and reviews of appropriate scientific literature.

Compatibility Determination Environmental Education, Interpretation, Photography, and Wildlife Observation

Use

Environmental Education, Interpretation, Photography, and Wildlife Observation

Refuge Name

Conboy Lake National Wildlife Refuge (CLNWR)

Establishing and Acquisition Authorities

Migratory Bird Conservation Act (16 U.S.C. § 715d)

Acquisition of lands for recreational development; funds (16 U.S.C. § 460k-1)

Refuge Recreation Act, as amended (16 U.S.C. § 460k-460k-4)

Endangered Species Act of 1973 (16 U.S.C. § 1534)

Refuge Purposes

The purposes for Conboy Lake NWR have been identified in historic legal documentation establishing and adding refuge lands. The refuge was established to preserve important habitat for migratory birds with refuge purposes specified as follows:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. § 460k-1

"... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ..." 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended).

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants ..." 16 U.S.C. § 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System (NWRS) 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.

Description of Use

Environmental education, interpretation, photography, and wildlife observation are non-consumptive wildlife-dependent recreational uses that will be allowed around the headquarters area of the refuge and, to a lesser extent, along pull-out parking areas on county roads meandering around the perimeter of the refuge. The headquarters area includes the Willard Springs Trail, Whitcomb-Cole Hewn Log House, visitor contact station, restroom facilities, and parking area. The pull-out parking areas, both existing and proposed, are located along the BZ-Glenwood Highway and Lakeside Roads. These non-consumptive, wildlife-dependent uses cover an area less than 10% of the refuge's land base, and yearly visitation for these uses is estimated to be approximately 6,500 visitors.

The Willard Springs Trail is a 3-mile loop trail traveling through the ponderosa pine forest along the edge of the Camas Prairie. The trail has spectacular views of the refuge and its wildlife. On a clear day, visitors using the observation platform are rewarded with picturesque views of Mt. Adams rising over the landscape. A refurbished and/or new observation platform will provide safe, universally accessible access. The trail has two shortcuts to allow visitors a variety of opportunities depending on the time they have. In 2010, the trailhead for the Willard Springs Trail was moved to the parking area near the refuge headquarters to centralize visitor facilities and create a more user-friendly, self-guided system. At the same time, the trail was realigned to provide new access to the Whitcomb-Cole Hewn Log House and along the Cold Springs Dike.

The Whitcomb-Cole Hewn Log House is listed on the National Register of Historic Places and is open to the public. It looms above the valley floor and catches your eye from the headquarters parking area. This historic dwelling attracts visitors to explore, photograph, paint, and ponder what life was like during the pioneer days.

All non-consumptive wildlife-dependent uses will be allowed sunrise to sunset throughout the entire year, unless temporary closures are needed to protect wildlife. However, most wildlife observation, photography, and interpretation occur during the spring, summer, and fall seasons, with the majority of environmental education occurring in the spring and fall seasons. Less use of the refuge occurs in the winter due to the cold weather and lack of wildlife activity, which coincides with the Service's need to minimize energy expenditures of wildlife through visitor contact.

Interpretation, wildlife observation, and photography would be largely self-guided and would be restricted to the headquarters area, designated trails, and developed parking areas. When staff and/or volunteers are available, they may guide interpretive walks and talks about the natural and cultural heritage of CLNWR.

Environmental education, however, will require refuge staff and/or trained individuals to guide school children and teachers around the refuge. At the present time, the Information and Education Specialist at the Spring Creek Fish Hatchery is providing field trip opportunities on the refuge for local school children. Recently, the Columbia Gorge Ecology Institute, a non-profit environmental education organization, started working with the Glenwood School District to create an outdoor classroom curriculum for CLNWR.

Because environmental education is curriculum-based and labor intensive, the refuge would like to hire a part-time Visitor Services Specialist. This position would also manage the volunteer program. The Visitor Services Specialist would facilitate partnerships; provide teacher training; create site-specific curricula, materials, and activities; and provide field trip assistance to enhance learning in an outdoor classroom.

Ideally, teachers would educate students in the refuge's outdoor classroom using multiple disciplines (science, math, writing, art, etc.) several times throughout the school year. Staff would work with students and educators to foster an understanding of the human impacts on wildlife and habitats and appreciation for resource management. After teachers attend an educator training presented by Service staff, teachers could use the refuge as an outdoor classroom on their own.

In 2011, a Visitor Services Experience Site Plan was created for CLNWR by Quatrefoil, a landscape contractor, who worked with regional office and refuge staff. Needs around the headquarters facilities addressed in the site plan include road and trail alignment, interpretive facilities, accessibility, and landscape design. This plan relates directly to the uses proposed in this compatibility determination and will ultimately, when funds become available, enhance the visitor experience in this dedicated area for interpretation, environmental education, wildlife observation, and photography on the refuge.

Availability of Resources

The following funding/annual costs would be required to administer and manage environmental education, interpretation, photography, and wildlife observation activities as described above.

Activity or Project	*One Time Expense*	*Recurring Expense*
Program Operations Visitor Services Specialist (0.5 FTE)		$30,000
Exhibits for Visitor Contact Station	$20,000	$1,000
Construction of Elevated Observation Platform on Willard Springs Trail	$20,000	
Construction of Three New Road Pull-Offs	$55,000	
Maintenance of Facilities		$20,000
Visitor Experience Site Plan	$345,000 -$510,000	
Totals	$440,000 - $605,000	$51,000

Although a portion of the programs and associated projects could be accomplished through the use of existing staff, resources, and facilities, existing refuge resources are not adequate to fully fund and safely administer the uses as envisioned in the CCP. However, because environmental education, interpretation, photography, and wildlife observation are considered priority public uses on a national wildlife refuge, the refuge will find funding to administer the program to a safe level, at a minimum.

CLNWR is part of the Mid-Columbia River National Wildlife Refuge Complex, and staff from within the complex can be available to assist with projects and development of programs, thereby helping to offset costs.

The Visitor Experience Site Plan can be completed in phases as funding becomes available.

Anticipated Impacts of the Use

Environmental education, interpretation, photography, and wildlife observation engaged in by the public can result in negative impacts to wildlife and habitat. Use of trails and associated facilities provides potential avenues for human disturbance of wildlife and habitat on the refuge. Direct impacts are those that have an immediate effect on wildlife, and indirect or cumulative impacts are those that would affect habitat, wildlife access to resources, or those that collectively or ultimately affect wildlife.

Anticipated direct impacts include disturbance to wildlife by human presence which typically results in a temporary displacement of individuals or groups. Conflicts arise when migratory birds and humans are present in the same areas (Boyle and Samson 1985). Immediate responses by wildlife to recreational activity can range from behavioral changes, including nest abandonment or departure from site (Burger 1981; Havera et al. 1992; Henson and Grant 1991; Klein 1993; Korschgen et al. 1985; Morton et al. 1989; Owens 1977; Taylor and Knight 2003; Ward and Stehn 1989); use of suboptimal habitat (Erwin 1980; Williams and Forbes 1980); changes in food habits (Knight and Cole 1995); physiological changes, such as elevated heart rates due to flight (Knight and Cole 1995); increases in energy expenditure (Belanger and Bedard 1990; Morton et al. 1989); or even death (Knight and Cole 1995). Researchers found that many waterfowl species avoid disturbance by feeding at night instead of during the day (McNeil et al. 1992). Wildlife photographers tend to have larger disturbance impacts than those viewing wildlife since they tend to approach animals more closely (Klein 1993; Morton 1995). The long-term effects are difficult to assess but may include altered behavior, vigor, productivity, or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

The magnitude of the avoidance response may depend on a number of factors, including the type (e.g., autos, bicycles, walkers), distance, movement pattern, speed, and duration of the disturbance, time of day, time of year, weather, the animal's access to food and cover, energy demands, and reproductive status (Gabrielsen and Smith 1995; Knight and Cole 1991).

Some of the impact would be mitigated as many species of wildlife habituate to human activities, and some species may even be attracted by the activity (Knight and Cole 1991). Habituation is defined as a form of learning in which individuals stop responding to stimuli that carry no reinforcing consequences for the individuals that are exposed to them (Alcock 1993). A key factor in predicting how wildlife would respond to disturbance is the predictability of the disturbance. Often, when a use is predictable, such as following a trail or boardwalk, or activity at a viewing deck, wildlife will accept a human presence (Oberbillig 2001). Gabrielsen and Smith (1995) suggest that most animals seem to have a greater defense response to humans moving unpredictably in the terrain than to humans following a distinct path. Resident waterbirds tend to be less sensitive to human disturbance than migrants, and migrant ducks are particularly sensitive when they first arrive (Klein 1993). In areas where human activity is common, birds tolerated closer approaches than in areas receiving less activity.

The location and timing of recreational activities can impact species in different ways. Stolen (2003) found that the proximity of wading birds to a roadway influenced the probability that a given bird would flush. Migratory waterfowl at J.N. Ding Darling National Wildlife Refuge remained more than 260 feet from the auto tour route, even when human visitation was low (Klein 1995). Miller et al. (1998) found that nesting success was lower near recreational trails, where human activity was common, than at greater distances from the trails. A number of species have shown greater reactions when pedestrian use occurred off-trail (Miller et al. 1998; Taylor and Knight 2003). In regard to waterfowl, Klein (1989) found migratory dabbling ducks to be the most sensitive to disturbance and migrant ducks to be more sensitive when they first arrived in the late fall than later in winter. She also found gulls and sandpipers to be apparently insensitive to human disturbance, with Burger (1981) finding the same to be true for various gull species.

Burger (1999 as cited by Oberbillig 2001) suggests that viewing distances that minimize disturbance can serve as useful guides for managers lacking good site-specific information and serve as a starting point in determining what is appropriate elsewhere. Some factors that affect viewing distances include the numbers of viewers, time of day, and noise levels. When exposing nonbreeding waterbirds to four types of human disturbances (walking, all-terrain vehicle, automobile, and boat), Rodgers and Smith (1997) concluded that a buffer zone of approximately 300 feet would minimize disturbance to most species of waterbirds. Vos et al. (1985) recommended buffer zones of approximately 800 feet on land and 500 feet in water for great blue herons. Miller et al. (1998) found that the trail zone of influence for forest and grassland birds appears to be approximately 250-325 feet. Beyond this distance, bird abundance, species composition, and nest predation were not affected by even heavily used recreational trails. Sound may elicit a much milder response from wildlife if animals are visually buffered from the disturbance (Knight and Cole 1991).

Impacts from non-consumptive uses can be controlled most effectively, mitigating the effect on refuge wildlife, by managing these uses in time and space. To minimize disturbance to wildlife and their habitats, the refuge will be open only from sunrise to sunset and visitors engaging in recreational activities must stay on designated hiking trails and roads. The existing designated trails are located at a sufficient distance from important wildlife areas that minimal disturbance is expected, while still providing the public with good opportunities to participate in recreational activities. To minimize disturbance during formal education programs, refuge staff will manage group size, timing, and locations. Enforcement to ensure visitors follow the rules, and public education that informs users of ethical and least intrusive methods will also be available.

While the impacts of visitor use can be severe, there are several reasons why the direct impacts of these uses on CLNWR are expected to be moderate and very localized. First, visitors, apart from hunters and anglers, are limited to less than 5 percent of the refuge, and those areas tend to be in already disturbed areas with ongoing human activity, e.g., the refuge headquarters area. The impacts of hunters and anglers are addressed in separate CDs, but it should be noted that these activities are limited in participants and scope and for the most part occur in seasons when impacts are minimized (or are controlled through use stipulations). Second, these uses are limited to daylight hours, which limits the duration of any impact. Third, the uses are confined to specific areas and trails, thus creating predictability for wildlife, at least within certain areas. Fourth, apart from school groups, these activities are generally quiet (see separate Hunting CD). Fifth, the number of participants is very limited at this time, thus ensuring that impacts are minor to moderate. Sixth, the stipulations below will ensure that while impacts are moderate immediately adjacent to activity areas, the impacts are confined to small areas and thus do not impact overall species or populations.

For the most part, this same rationale applies to indirect impacts. The indirect impacts of these activities depend upon a number of variables, including the season of use, duration of the activity, location, and number of users. In a general sense, these activities may result in trampling of vegetation, soil compaction, incidences of littering, potential removal of vegetation, and potential vandalism. Visitors may occasionally pull their vehicles off the county road onto vegetation, and visitors may also stray off trails, trampling vegetation. These off-road/trail activities could cause soil compaction, erosion, and alterations in vegetative structure and composition. Visitors could also act as vectors for invasive plants by moving seeds or other propagules from one area to another. Construction and maintenance of visitor use facilities will also affect vegetation and could potentially increase localized soil compaction and erosion. The maintenance of trails and parking areas will impact soils, vegetation and, in some instances, hydrology around the site. This could include an increased potential for erosion, soil compaction (Liddle 1975), reduced seed emergence (Cole and Landres 1995), alteration of vegetative structure, and composition and sediment loading (Cole and Marion 1988). However, where possible, existing administrative roads (many maintained seasonally as firebreaks) and facilities will be used. In addition, most parking lots and access trails will be relatively small in size. These factors are coupled with best management practices to minimize impacts to natural and cultural resources. In areas where new trails or access points are established, best management practices (e.g., seasonal closures during sensitive portions of life cycles, routing of trails away from sensitive areas) would negate or minimize impacts. Overall these adverse impacts on the refuge are expected to be short-term and limited to locations along the roads, trails, and associated facilities open to non-consumptive uses. These activities will be timed to minimize disturbance to wildlife and habitat.

There is a potential for conflicts between user groups. Vehicles and bicycles using the same road as pedestrians may present a safety hazard to visitors. If the number of road users increases as predicted, the potential for accidents or user group conflicts may also increase. Because of this, the refuge is proposing to build three new vehicle pull-out areas along Lakeside Road. Hunting (especially gunshot noise) has the potential to disturb refuge visitors engaged in other wildlife-dependent recreational uses. To minimize this potential conflict, the refuge has designated defined hunting areas that are separated spatially (approximately one mile) from hiking trails and visitor facilities (see Hunting CDs).

Measures to reduce potential conflicts between user groups would include providing information at the parking lots, refuge headquarters, and in the CLNWR brochure (available both at headquarters and kiosks and on the refuge website) that clearly indicates the permitted uses and rules of conduct.

Finally, it should be noted that environmental education, interpretation, photography, and wildlife observation engaged in by the public can result in positive impacts to wildlife and habitat, as these activities promote an understanding, appreciation, and ultimately a sense of stewardship toward our natural and cultural heritage.

See also the General Uses CD for a further discussion of impacts from users.

Public Review and Comment

This Compatibility Determination is being prepared concurrently with the CLNWR's CCP/EA. An open house was held and written comments were solicited from the public during the scoping period for the CCP/EA. Public review and comment will be solicited during the draft CCP/EA comment period.

Determination

_____ The use is not compatible.

__X__ The use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility

To ensure compatibility with NWRS and CLNWR goals and objectives, the following non-consumptive wildlife dependent recreational uses—environmental education, interpretation, photography, and wildlife observation—can only occur under the following stipulations:

- Activities associated with these proposed uses are restricted to the refuge headquarters, the Whitcomb-Cole Hewn Log House, the 3-mile Willard Springs Trail, and vehicle pull outs along Lakeside Road.

- Deliberate harassment of wildlife or excessive damage to vegetation is prohibited.

- Educational groups are required to have a sufficient number of adults to supervise their groups, a minimum of one adult per ten students.

- Environmental education and interpretation activities that are not led by refuge staff would require verbal approval or a Special Use Permit by the Refuge Manager to minimize conflicts with other groups, safeguard students and resources, and to allow tracking of use levels.

- CLNWR is open to public access year-round from sunrise to sunset, apart from hunting (see separate CDs).

- Camping, overnight use, fires, and littering are prohibited.

- Pets must be on a leash.

Justification

Environmental education, interpretation, photography, and wildlife observation are priority wildlife-dependent recreational uses as defined by the Administration Act and through Executive Order (Executive Order 12996, March 25, 1996). They enhance the visitor's appreciation of CLNWR, the NWRS, wildlife, their habitats, and the human environment. Access to CLNWR for these uses will help in meeting the goals of the refuge, as well as those of the NWRS.

The Service's policy is to provide expanded opportunities for these wildlife-dependent uses when compatible and consistent with sound fish and wildlife management; the Service ensures that they receive enhanced attention during planning and management. Although these activities can result in disturbance to wildlife and habitat, disturbances on the refuge are expected to be intermittent, moderate, and very localized and are not expected to diminish the value of the refuge for its stated purposes. Disturbances to wildlife and habitat will be minimized by limiting uses to the trails and associated facilities and opening these facilities to the public from sunrise to sunset only. The stipulations above also will ensure proper control of the uses and provide management flexibility should detrimental impacts develop. As noted, facilitating these uses on the refuge will increase

visitor knowledge and appreciation of fish and wildlife resources. Hopefully, this enhanced understanding will foster increased public stewardship of natural resources and support for the Service's management actions in achieving the refuge purposes and the mission of the NWRS.

It is anticipated that wildlife populations will find sufficient food resources and resting places such that their overall abundance and use of the refuge will not be measurably lessened from allowing environmental education, interpretation, photography, and wildlife observation to occur as described. The relatively limited number of individuals expected to be adversely affected by these uses will not cause wildlife populations to materially decline, the physiological condition and production of wildlife 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, these uses will not materially interfere with, or detract from, the mission of the NWRS or the purposes for which CLNWR was established.

Mandatory 10- or 15-year Re-evaluation Date

Provide month and year for allowed uses only.

__X__ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses).

_____ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses).

NEPA Compliance for Refuge Use Decision

_____ Categorical Exclusion without Environmental Action Statement.

_____ Categorical Exclusion and Environmental Action Statement.

__X__ Environmental Assessment and Finding of No Significant Impact.

_____ Environmental Impact Statement and Record of Decision.

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Signatures

Project Leader: _____
(Signature and Date)

Refuge Supervisor: _____
(Signature and Date)

Regional Chief: _____
(Signature and Date)

Compatibility Determination
Fishing

Use

Fishing

Refuge Name

Conboy Lake National Wildlife Refuge (CLNWR)

Establishing and Acquisition Authorities

Migratory Bird Conservation Act (16 U.S.C. § 715d)

Acquisition of lands for recreational development; funds (16 U.S.C. § 460k-1)

Refuge Recreation Act, as amended (16 U.S.C. § 460k-460k-4)

Endangered Species Act of 1973 (16 U.S.C. § 1534)

Refuge Purposes

The purposes for Conboy Lake NWR have been identified in historic legal documentation establishing and adding refuge lands. The refuge was established to preserve important habitat for migratory birds with refuge purposes specified as follows:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. § 460k-1

"... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ..." 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended).

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants ..." 16 U.S.C. § 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System (NWRS) 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.

Description of Use

In the National Wildlife Refuge Administration Act, the United States Congress declared hunting, fishing, wildlife observation, photography, environmental education, and interpretation as priority wildlife-dependent public uses of the NWRS. These activities have been determined to be compatible with resource protection on CLNWR through separate determinations and thus are priority public uses for the refuge.

Under all of the alternatives in the comprehensive conservation plan (CCP), fishing will continue. The Service will provide recreational fishing opportunities on a 0.25-mile stretch of lower Outlet Creek (from Lakeside Road to 0.25 mile upstream) in the northeast corner of the refuge. Outlet Creek is a man-made drainage ditch, and the fish caught include catfish and remnant populations of eastern brook trout and rainbow trout from when the State of Washington stocked tributaries outside of the refuge (Service 1983). Only bank fishing is allowed and access is by foot from a turn-out off Lakeside Road. Use is very low; the refuge estimates that approximately 20 fishing days occur each year.

There will be one change from current use. As before, anglers must comply with all Washington State regulations; however, the season dates on CLNWR are July 1 to October 31, which protects greater Sandhill cranes nesting in the area, as well as other resources.

Availability of Resources

Fishing is a nominal use on CLNWR and thus has minimal costs for signing, maintenance, and occasional patrol by law enforcement officers. The necessary funds, as described below, are available for the administration of this fishing program.

Activity or Project	***One Time Expense***	***Recurring Expense***
Administration (Management, Law Enforcement, Staff)		$1,000
Facilities Maintenance (Roads, Parking Areas, Signs, Etc.)		$200
Totals		**$1,200**

Anticipated Impacts of the Use

By its nature, fishing results in the intentional take of individual fish. Even catch-and-release fishing can harm individual fish, killing them or reducing their likelihood of long-term survival. However, the fish species available in Outlet Creek are either species of no concern on the refuge (catfish), or are remnant populations of non-native, introduced species (eastern brook trout and rainbow trout), so impacts to native, desirable refuge species will be negligible.

Fishing could cause disturbance to birds and other wildlife using the creek and surrounding area on the refuge. However, fishing, when practiced as a solitary and stationary activity as it is on CLNWR, tends to be less disturbing to wildlife than hunting or motorized boating (Tuite et al. 1983). Nonetheless, fishing activities may influence the composition of bird communities, as well as distribution, abundance, and productivity of waterbirds (Bell and Austin 1985; Bordignon 1985; Bouffard 1982; Cooke 1987; Edwards and Bell 1985; Tydeman 1977). Anglers often fish in the same areas that birds prefer, negatively impacting distribution and abundance of waterfowl and waterbirds (Cooke 1987). However, due to the extremely limited amount of fishing occurring on the refuge, impacts will be minor, at worst. To further ensure impacts are limited and to ensure that recreational fishing does not interfere with waterfowl nesting along ditch banks, the fishing area is restricted to a 0.25-mile section along Outlet Creek.

Of greatest concern, the fishing area on the refuge is in the vicinity of established greater Sandhill crane nests and within additional suitable greater Sandhill crane nesting habitat. To reduce disturbance on nesting greater Sandhill cranes, a 660-foot buffer is maintained around all nests for all activities. Should a crane nest in the area by the beginning of the fishing season on CLNWR (July 1), fishing will not be allowed to occur within this buffer until the colt(s) have fledged.

Direct habitat impacts include a certain amount of litter and general garbage left at fishing sites and could include soil compaction and trampling of vegetation. To minimize impacts to soil and vegetation, CLNWR has a parking area off Lakeside Road and a walking path located on the existing dike to the fishing area along Outlet Creek, thus limiting impacts by concentrating visitors on hardened surfaces. Disturbance and destruction of riparian vegetation, and impacts to bank stability and water quality, have not been documented at the current minimal participation levels and are expected to remain negligible with the current use levels. Littering has not been a problem, and this is expected to continue to be the case.

The public fishing area is within the public hunting area. Since the Washington State fishing season does not close until October 31, and the waterfowl hunting season normally opens in mid-October, there is a slight possibility of conflict during the time these two seasons overlap. However, there have been no known incidents of conflict reported, and since sport fishing on CLNWR is minimal, particularly at that time of the year, no significant levels of conflict are expected. Should significant conflicts become evident in the future, changes to the program will be made to minimize conflicts and ensure public safety.

Public Review and Comment

This Compatibility Determination is being prepared concurrently with the CLNWR's CCP/EA. An open house was held and written comments were solicited from the public during the scoping period for the CCP/EA. Public review and comment will be solicited during the draft CCP/EA comment period.

Determination

_____ The use is not compatible.

__X__ The use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility

To ensure compatibility with NWRS and CLNWR goals and objectives, fishing would be allowed subject to the following stipulations:

- The fishing season is from the second Saturday in June to October 31.
- If a Sandhill crane nest is found within the area by the beginning of the fishing season, a 660-foot buffer will be maintained around the nest until the colt(s) fledge.
- Anglers must obey all Washington State fishing regulations, with the season dates as listed above.
- Fishing is restricted to the 0.25-mile stretch of lower Outlet Creek from Lakeside Road to 0.25 mile upstream.
- Anglers will use existing parking areas and walking paths to access fishing areas. Access will be walk-in only, except upon special request to reasonably accommodate disability.
- Overnight use, except on public roads, and fires are prohibited.

Justification

The Administration Act clarified that the NWRS is not a multiple-use management system and is not managed for commodity production or on the basis of sustained-yield economic principles. Refuges are managed first and foremost for fish, wildlife, plants, and their habitats (House Report 105-106, Section 5), often referred to as the Wildlife First management mandate. The Administration Act states the NWRS was created to conserve fish, wildlife, and plants and their habitats and this conservation mission has been facilitated by providing Americans opportunities to participate in compatible wildlife-dependent recreation, including fishing and hunting, on System lands and to better appreciate the value of and the need for fish and wildlife conservation. It goes on to identify Executive Order 12996, which recognized six compatible wildlife-dependent recreational uses involving hunting, fishing, wildlife observation, photography, environmental education, and interpretation as priority public uses of the Refuge System. The Act also established a three-tiered hierarchy for management activities that occur on NWRS lands. The first tier involves management actions that specifically assist the refuge in fulfilling the purposes for which it was established (e.g., migratory birds and other wildlife) and the NWRS mission, including the conservation, management, and restoration of fish, wildlife, plants, and their habitats. The second and third tiers involve wildlife-dependent public uses (i.e., hunting, fishing, wildlife observation, photography, environmental education, and interpretation) and general public uses. Fishing falls into the wildlife-dependent category.

Fishing at CLNWR, as described above, will not significantly interfere with, and will have negligible impact to, any refuge resources. It also provides a wildlife-dependent recreational opportunity as defined under the Act. By limiting the area open to fishing, as well as limiting the season, a fishing program will not interfere with CLNWR achieving its purposes of providing sanctuary and a breeding ground for migratory birds and other wildlife. Other wildlife-dependent, priority public uses (i.e., wildlife observation, photography, environmental education, and interpretation) would also benefit from any increases in visitors' knowledge and appreciation of fish and wildlife, thereby

potentially leading to increased public stewardship of fish and wildlife and their habitats on the refuge. Increased public stewardship supports and complements the Service's actions in achieving the refuge's purposes and the mission of the NWRS.

Mandatory 10- or 15-year Re-evaluation Date

Provide month and year for allowed uses only.

__X__ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses).

_____ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses).

NEPA Compliance for Refuge Use Decision

_____ Categorical Exclusion without Environmental Action Statement.

_____ Categorical Exclusion and Environmental Action Statement.

__X__ Environmental Assessment and Finding of No Significant Impact.

_____ Environmental Impact Statement and Record of Decision.

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Signatures

Project Leader: _____
(Signature and Date)

Refuge Supervisor: _____
(Signature and Date)

Regional Chief: _____
(Signature and Date)

Compatibility Determination
General Uses: Hiking, Cross Country Skiing and Snowshoeing, and Painting

Use

General Uses in Support of Hunting, Fishing, Wildlife Observation, Interpretation, Environmental Education, Photography: Hiking, Cross Country Skiing and Snowshoeing, and Painting

Refuge Name

Conboy Lake National Wildlife Refuge (CLNWR)

Establishing and Acquisition Authorities

Migratory Bird Conservation Act (16 U.S.C. § 715d)

Acquisition of lands for recreational development; funds (16 U.S.C. § 460k-1)

Refuge Recreation Act, as amended (16 U.S.C. § 460k-460k-4)

Endangered Species Act of 1973 (16 U.S.C. § 1534)

Refuge Purposes

The purposes for Conboy Lake NWR have been identified in historic legal documentation establishing and adding refuge lands. The refuge was established to preserve important habitat for migratory birds with refuge purposes specified as follows:

“... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.” 16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. § 460k-1

"... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ..." 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended).

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants ..." 16 U.S.C. § 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System (NWRS) 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.

Description of Use

In the National Wildlife Refuge System Administration Act, the United States Congress declared hunting, fishing, wildlife observation, photography, environmental education, and interpretation as wildlife-dependent public uses of the NWRS. These activities have been determined to be compatible with resource protection on CLNWR through separate determinations and thus are priority public uses for the refuge.

Under all of the alternatives in the CCP, interpretive sites, interpretive trails, wildlife observation sites, and day-use areas will continue or are proposed. Some sites and trails may only be open seasonally to both protect sensitive resources and to take advantage of specific interpretive, viewing, and photographic opportunities (e.g., Sandhill cranes on their nests). Other sites and trails will be open year-round but monitored to address any negative impacts. Interpretive points, trails, observation sites, signs, kiosks, etc., will focus on CLNWR wildlife and habitats, historic features, cultural resources and traditions, restoration, management, and the other special values of the refuge. Since there are currently limited facilities to support these uses on CLNWR, the Service expects wildlife observation, environmental education, photography, and interpretation to increase over the next 15 years as facilities are developed.

Under the CCP all public uses, except hunting and fishing (see separate compatibility determinations), are limited to defined trails, refuge roads, and areas immediately adjacent to Service facilities, an area that constitutes less than 10 percent of the refuge. That includes all of the secondary activities discussed here: cross-country skiing, hiking, snowshoeing, and painting. The first three are standard uses on refuges, but painting needs clarification. CLNWR is an exceptionally scenic and historically rich refuge, with stunning views of Mt. Adams, charismatic wildlife like elk, and the historic Whitcomb-Cole Hewn Log House. The refuge has become a destination for artists to visit to paint the landscape and its wildlife and the historic log house.

Availability of Resources

These four uses, which basically support the wildlife-dependent uses, are quite inexpensive. There are some people who may undertake hiking, skiing, and snowshoeing for the activities' own sake; however, most use is directly associated with the wildlife-dependent uses. For the most part the uses are covered within the budgets and staff time for the primary wildlife uses. Any costs are additive, not separate, from those associated with wildlife-dependent uses.

Activity or Project	*One Time Expense*	*Recurring Expense*
Additional Trail and Facilities Maintenance		$1,000
Totals		**$1,000**

Anticipated Impacts of the Use

Hiking

Only the impacts of hiking on designated trails and near Service facilities are considered here. The impacts of hiking associated with hunting and fishing are discussed within CDs specific to those activities. The impacts of hiking specifically on CLNWR have not been studied; this discussion centers around impacts described elsewhere and thus may be applicable to CLNWR.

Hiking has the potential of affecting shorebird, waterfowl, marsh bird, and other migratory bird populations feeding and resting near trails or roads during certain times of the year. A primary concern in allowing any public use on CLNWR is to maintain adverse impacts within acceptable limits to habitats and wildlife.

The maintenance of trails and parking areas would impact soils, vegetation and, in some instances, hydrology around the site. This could include an increased potential for erosion, soil compaction (Liddle 1975), reduced seed emergence (Cole and Landres 1995), alteration of vegetative structure and composition, and sediment loading (Cole and Marion 1988). However, existing roads and facilities would be used to the extent possible, so additional impacts from hiking should be negligible. In addition, most parking lots and access trails would be relatively small in size. These factors are coupled with best management practices to minimize impacts to natural and cultural resources.[1] In areas where new trails or access points (i.e., facilities such as observation blinds) are established, best management practices (e.g., seasonal closures during sensitive portions of life cycles, routing of trails away from sensitive areas) would negate or minimize impacts.

Hiking can cause structural damage to plants and increase soil compaction. The degree of surface compaction is dependent on topography, soil structure, and soil moisture (Whittaker 1978). Impacts of trampling on vegetation and soils commonly noted on trails (Dale and Weaver 1974; Liddle 1975) are unlikely to occur on the road system, except for shoulder areas. While hikers are required to remain on trails and roads, some users may leave the trail to observe and photograph wildlife or for other reasons. Plants may be trampled in the process and wildlife disturbed.

Human activities on trails and at other access points can result in immediate, direct effects on wildlife through harassment, a form of disturbance that can cause physiological effects such as elevated heart rates due to flight, behavioral modifications, or death (Knight and Cole 1995a; Knight and Cole

[1] Best management practices are described in detail in Chapter 2 of the *Conboy Lake National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment*.

1995b; Smith and Hunt 1995). Numerous studies have confirmed that people on foot can cause a variety of disturbance reactions in wildlife, including flushing or displacement (Burger 1981; Erwin 1989; Fraser et al. 1985; Freddy 1986; Henson and Grant 1991; Klein 1993; Korschgen et al. 1985; Owens 1977; Taylor and Knight 2003), heart rate increases (MacArthur et al. 1982), altered behavior or foraging patterns (Burger 1981; Burger and Gochfeld 1991; Havera et al. 1992; Klein 1993; Korschgen et al. 1985; Morton et al. 1989; Ward and Stehn 1989), increases in energy expenditures (Belanger and Bedard 1990; Morton et al. 1989) and even, in some cases, diminished reproductive success (Boyle and Samson 1985).[2] 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).

The long-term effects are more difficult to assess but may include altered behavior, vigor, productivity, or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions. Many species will resort to use of suboptimal habitat (Erwin 1980; Williams and Forbes 1980); many waterfowl species will even avoid disturbance by feeding at night instead of during the day (McNeil et al. 1992). The magnitude of the avoidance response may depend on a number of factors including the type, distance, movement pattern, speed, and duration of the disturbance, as well as the time of day, time of year, weather, access to food and cover, energy demands, and reproductive status (Gabrielsen and Smith 1995; Knight and Cole 1991). Knight and Cole (1991) also suggested that sound may elicit a much milder response from wildlife if animals are visually buffered from the disturbance.

Habituation is defined as a form of learning in which individuals stop responding to stimuli that carry no reinforcing consequences for the individuals that are exposed to them (Alcock 1993). A key factor in predicting how wildlife would respond to disturbance is its predictability. Often, when a use is predictable, following a trail or boardwalk or at a viewing deck, wildlife will accept human presence (Oberbillig 2001). Gabrielsen and Smith (1995) suggest that most animals seem to have a greater defense response to humans moving unpredictably in the terrain than to humans following a distinct path. Resident waterbirds tend to be less sensitive to human disturbance than migrants, and migrant ducks are particularly sensitive when they first arrive (Klein 1993). In areas where human activity is common, birds tolerated closer approaches than in areas receiving less activity. Wildlife may also be attracted to human presence. For example, wildlife may be converted to beggars lured by handouts (Knight and Temple 1995), and scavengers are attracted to road kills (Rosen and Lowe 1994).

On the refuge, birds are especially vulnerable and can be affected by human activities when they are disturbed and flushed from feeding, resting, or nesting areas. Flushing, especially repetitive flushing, can strongly impact habitat use patterns of many bird species. Flushing from an area can cause birds to expend more energy, be deterred from using desirable habitat, affect resting or feeding patterns, increase exposure to predation, and cause abandonment of sites (Smith and Hunt 1995). Migratory birds are observed to be more sensitive than resident species to disturbance (Klein 1989).

The location and timing of recreational activities, such as hiking, impact species in different ways. Miller et al. (1998) found that nesting success was lower near recreational trails, where human activity was common, than at greater distances from the trails. A number of species have shown

[2] Based on this information, it is likely that horseback riding and bicycling would have similar impacts.

greater reactions when pedestrian use occurred off-trail (Miller et al. 1998; Taylor and Knight 2003). In regard to waterfowl, Klein (1989) found migratory dabbling ducks to be the most sensitive to disturbance and migrant ducks to be more sensitive when they first arrived, in the late fall, than later in winter. She also found gulls and sandpipers to be apparently insensitive to human disturbance, with Burger (1981) finding the same to be true for various gull species. For songbirds, Gutzwiller et al. (1994) found that singing behavior of some species was altered by low levels of human intrusion.

Nest predation for songbirds (Miller et al. 1998), raptors (Glinski 1976), colonial nesting species (Buckley and Buckley 1976), and waterfowl (Boyle and Samson 1985) tends to increase in areas more frequently visited by people. In addition, for many passerine species, primary song occurrence and consistency can be impacted by a single visitor (Gutzwiller et al. 1994). This could potentially limit the number of breeding pairs of certain passerine species, thus limiting production within riparian habitats (Reijnen and Foppen 1994).

How hiking trails and access points are planned is important. Burger (1999, as cited by Oberbillig 2001) suggests that viewing distances that minimize disturbance can serve as useful guides for managers lacking good site-specific information and serve as a starting point in determining what is appropriate elsewhere. Some factors that affect viewing distances include the numbers of viewers, the time of day, and noise level. When exposing nonbreeding waterbirds to four types of human disturbances (walking, all-terrain vehicle, automobile, and boat), Rodgers and Smith (1997) concluded that a buffer zone of approximately 300 feet would minimize disturbance to most species of waterbirds. Vos et al. (1985) recommended buffer zones of approximately 800 feet on land and 500 feet in water for great blue herons. Miller et al. (1998) found that the trail zone of influence for forest and grassland birds appears to be approximately 250-325 feet. Beyond this distance, bird abundance, species composition, and nest predation were not affected by even heavily used recreational trails.

Other design factors can be important. Movement away or at an oblique angle to the animal is less disturbing to wildlife than a direct approach (Knight and Cole 1991). Animals show greater flight response to humans moving unpredictably than to humans following a distinct path (Gabrielsen and Smith 1995). Korschgen and Dahlgren (1992) and Fox and Madsen (1997) state the importance of disturbance-free food reserves and areas as a management alternative to minimize human disturbances. These factors noted will be considered in the development of all facilities in order to minimize impacts.

The studies cited above show that public use activities, such as hiking, can and do disturb wildlife. Based on the circumstances described in the scientific literature, it is reasonable to assume similar effects could occur on CLNWR. However, based on the limitation of hikers to trails, roads, and Service facility areas (an area of less than 10 percent of the refuge) these impacts would be confined to a very small area, and the impacts would be measured in terms of individual animals, not entire habitats or populations. If unreasonable impacts are observed, the Service retains the option of seasonal or temporal closures to eliminate or mitigate those observed impacts. Due to the limited area, restrictions, number of anticipated participants, and mitigative measures at hand, impacts are anticipated to negligible to minor.

Cross Country Skiing and Snowshoeing

In principle, all of the potential impacts, and most of the discussion, that applies to hiking also applies to skiing and snowshoeing. However, there are two important differences: 1) the use is in the

winter when impacts to vegetation would be nonexistent; and 2) wildlife disturbance, when it does occur, can be of serious impact at a time when wildlife is trying to minimize energy expenditures. However, while exact numbers are not known, even casual observation shows that use is very low. Moreover, winter wildlife populations of birds and deer are low. As such, impacts to a population would be minor. Other factors that minimize impacts to both wildlife populations and individuals include: 1) with repeated use of the same trails, wildlife will move to areas with no disturbance (e.g., deer would yard elsewhere); and 2) few species are present and active, and those that are present are adapted to some level of disturbance (e.g., deer).

Unfortunately, cross country skiing does introduce a new concern to the discussion above—speed. Rapid movement is more disturbing to wildlife than slower moving hikers (Bennett and Zuelke 1999). However, this should be offset by the mere fact that there are few cross country skiers using the refuge, and the daily period of use is limited (daylight hours are limited, and the refuge is only open from dawn to dusk). As such the additive impacts of cross country skiing would still remain minor.

Painting

The only real impacts associated with painting are those potentially associated with hiking to and from locations, as described above. Use is quite low, as observed by refuge staff, and the activity is generally quiet and introduces no additional impacts. As the activity is limited to areas open to the public (i.e., trails, roads, and refuge facilities), with the mitigative measures described above and the stipulations identified below, the impacts associated with painting would be negligible.

Public Review and Comment

This Compatibility Determination is being prepared concurrently with the CLNWR's CCP/EA. An open house was held and written comments were solicited from the public during the scoping period for the CCP/EA. Public review and comment will be solicited during the draft CCP/EA comment period.

Determination

_____ The use is not compatible.

X___ The use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility

- Uses are limited to existing trails, roads, and refuge facilities, such as parking lots, observation towers, office buildings, etc.
- Seasonal closures could be implemented as necessary to protect refuge wildlife and habitats.
- Any of these activities could be reduced or closed with the finding of significant negative impacts to CLNWR facilities or natural and cultural resources.

- Monitoring will be conducted to ensure that high-quality habitat for wildlife feeding, resting, and breeding is maintained.

- A system to monitor the level of use and vegetation damage and impact along roadsides, designated parking areas, and trails may need to be established if field observations indicate possible substantial impacts from use.

- The refuge will provide signs, brochures, and digital information to promote the appropriate use of trails, roads, and waters to minimize wildlife and habitat disturbance.

- No overnight use of the refuge is allowed except travel on public roads.

Justification

Although hiking, cross country skiing, snowshoeing, and painting are not wildlife-dependent public uses of a refuge as defined by statute (16 U.S.C. 668dd et seq.), most often their implementation is fully in support of wildlife-dependent uses. Only in rare instances on CLNWR are these activities undertaken fully for their own sake—that is, where some element of wildlife observation, education, photography, etc., is not part of the experience. Those instances would be indistinguishable from a wildlife dependent activity. Thus, these activities support and/or augment other activities that the Service fully endorses.

As noted, the impacts from these activities are anticipated to be negligible to minor. As they are ongoing activities, this conclusion is supported by existing data and observations. 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 the activities. The relatively limited number of individuals expected to be adversely affected due to hiking, etc., will not cause wildlife populations to materially decline, the physiological condition and production of wildlife 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. There would be no widespread or long term impacts to habitats, plants, etc. Thus, allowing these activities to occur with stipulations will not materially detract from, or interfere with, the purposes for which CLNWR was established or the NWRS mission.

Finally, CLNWR is important to the community and is an increasingly well-known destination for wildlife watchers, photographers, and other recreational users in Washington. In addition, many local residents visit the refuge on a regular basis to observe wildlife and spend time in the outdoors, and they develop a sense of ownership of the refuge. CLNWR is a source of community pride, and many local residents feel that having a national wildlife refuge nearby contributes significantly to their quality of life.

Mandatory 10- or 15-year Re-evaluation Date

Provide month and year for allowed uses only.

_____ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses).

__X__ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses).

NEPA Compliance for Refuge Use Decision

_____ Categorical Exclusion without Environmental Action Statement.

_____ Categorical Exclusion and Environmental Action Statement.

__X__ Environmental Assessment and Finding of No Significant Impact.

_____ Environmental Impact Statement and Record of Decision.

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Signatures

Project Leader: _____
(Signature and Date)

Refuge Supervisor: _____
(Signature and Date)

Regional Chief: _____
(Signature and Date)

Compatibility Determination
Grazing

Use

Grazing

Refuge Name

Conboy Lake National Wildlife Refuge (CLNWR)

Establishing and Acquisition Authorities

Migratory Bird Conservation Act (16 U.S.C. § 715d)

Acquisition of lands for recreational development; funds (16 U.S.C. § 460k-1)

Refuge Recreation Act, as amended (16 U.S.C. § 460k-460k-4)

Endangered Species Act of 1973 (16 U.S.C. § 1534)

Refuge Purposes

The purposes for Conboy Lake NWR have been identified in historic legal documentation establishing and adding refuge lands. The refuge was established to preserve important habitat for migratory birds with refuge purposes specified as follows:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. § 460k-1

"... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ..." 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended).

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants ..." 16 U.S.C. § 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System (NWRS) 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.

Description of Use

Grazing has not been continuously used as a habitat management tool on CLNWR. Grazing was used from 1964 until 1976, when it was discontinued. The managed grazing program needs to be revived to better meet refuge purposes and goals; new biological data has been acquired, and there is need for more accessible habitat management tools. The primary objective of the grazing program is to reduce the biomass of reed canarygrass, which, left unharvested, would likely out-compete native grasses and herbaceous plant species, thus reducing overall refuge biodiversity.[3] Targeted grazing areas would include dense reed canarygrass areas not accessible to haying or mowing equipment. Secondary objectives include: 1) maintaining a low vegetation structure to enhance breeding sites for the State endangered and Federal candidate Oregon spotted frog; 2) providing late summer-through-winter foraging opportunities for elk and geese; 3) enhancing late summer invertebrate foraging opportunities for State endangered greater Sandhill cranes; 4) limiting woody species encroachment into seasonal wetlands and prairie habitats; 5) reducing fuel loads for wildfire management; and 6) providing large areas of open water habitat for migrating and wintering waterfowl. Grazing privately owned livestock would be used as a management tool to improve habitat conditions on the refuge from September 1 through November 30 in order to provide short green browse for migratory birds and suitable habitat for Sandhill cranes and Oregon spotted frogs.

Livestock grazing by privately owned livestock (cattle) could be conducted annually on CLNWR, where appropriate, for a specified period (i.e., seasonally) to manage vegetation for the benefit of native plants and wildlife habitats. The primary habitat types where grazing would be considered are wet meadows (meadow habitats with standing surface water during the growing season) and reed canarygrass areas. Areas targeted for grazing include reed canarygrass areas not accessible to haying or mowing equipment. These habitats require a management action to meet specified wildlife habitat objectives detailed in an annual habitat management plan.

Grazing would be administered with a livestock cooperator under a Special Use Permit (SUP). The SUP would state provisions for habitat objectives, expected wildlife benefits, shared staffing, facility maintenance, operating rules and laws, and reporting requirements. An annual grazing plan would identify tracts to be grazed and specify vegetation and habitat types, grazing objectives (primary target weed and/or primary native species or taxa), prescribed expected tract conditions (vegetation height), date by which expected conditions are to be met, livestock turn-in/turn-out dates, and animal unit months (AUMs). Permittees may be allowed to provide in-kind services in lieu of payment for grazing. Services completed by permittees may include ditch and dike maintenance, as well as mowing additional areas of unwanted reed canarygrass that are undesireable for grazing due to woody plant encroachment and weeds.

Under some circumstances, a cooperative land management agreement (CLMA) may be used to administer the grazing program; CLMAs are authorized under 50 CFR 29.2. These agreements would allow refuge staff and permittees to effectively work together to meet habitat objectives (e.g., ditch and dike maintenance, road repair, weed management). The CLMA serves as an annual grazing plan and states provisions for habitat objectives, expected wildlife benefits, and operating

[3] Reed canarygrass is an undesirable exotic grass that has spread to dominate the refuge's wet meadows.

rules, regulations, and reporting requirements. The CLMA prescribes expected habitat conditions (vegetation height), livestock turn-in/turn-out dates, and AUMs. The grazing plan has built-in flexibility due to the uncertainties of annual and seasonal precipitation and climate, flooding, and the consequent effect on vegetation growth. This is to ensure that expected conditions are met and that refuge vegetation is neither over-grazed nor under-grazed, both conditions resulting in degraded habitat. Because conditions change during the course of a season, regular monitoring by refuge staff would be required.

Permittees will pay a unit price per AUM that is based as closely as possible on local market rates. Market rate surveys will be completed every 3 years to establish a minimum AUM rate, and individual graze units would be awarded to the highest bidder. The previous permittee will have the right to match the high bid. Funds will be deposited into the Refuge Revenue Sharing Fund.

Availability of Resources

Based on 2010 costs, the estimated costs to administer and manage grazing activities as described above are:

Activity or Project	***One Time Expense***	***Recurring Expense***
Administration (Evaluation of Applications, Management of Permits, Oversight)		$3,000
Facilities Maintenance		$4,000
Monitoring		$1,000
Totals		**$8,000**

Refuge operational funds are currently available through the Service budget process to administer this program. Individual grazing units will be awarded to the highest bidder. Every 3 years the refuge would conduct a rate survey to determine the base rate for an AUM. This base rate provides the minimum bid used during the bidding process. The previous permittee has the right to match the high bid. Monitoring will be addressed in an annual grazing management plan.

Anticipated Impacts of the Use

Carefully controlled grazing intended to improve wildlife habitat rather than produce livestock can be an effective management tool as part of an overall vegetative management program to improve and maintain wet meadows for the benefit of migratory birds. Limited grazing can replace natural disturbance regimes that have been eliminated by human intervention and fragmentation of landscapes, helping to maintain species diversity and conserve the value of grasslands and old pastures (Hobbs and Huennekke 1992), such as those found at CLNWR. Such grasslands require some disturbance to increase forage production and accelerate nutrient cycling (Schuman et al. 1999).

Proposed grazing areas on the refuge are dominated by reed canarygrass, with some sedges (*Carex nebrascensis*, *Eleocharis* spp., *Juncus balticus*) and a minor mix of forbs. The primary benefits to plant communities associated with grazing include:

1) A reduction in the accumulation of dead plant material;

2) A reduction in non-native invasive weeds (Thomsen et al. 1993);

3) Increases in native plants, including special-status species, from reduced competition for sunlight, water, and nutrients with non-native annual grasses (Coppoletta and Moritsch 2001; Davis and Sherman 1992; Menke 1992; Muir and Moseley 1994);

4) Increases in primary production and resultant increases in plant biomass (McNaughton 1985); and

5) Increases in flowering, with consequent increases in macro-invertebrate populations, including native pollinators of native plants and prey items for refuge wildlife, such as migratory birds.

These areas where grazing might be implemented may be used by a variety of wildlife species during different parts of the year to meet specific life-cycle needs. Overall, beneficial effects to refuge habitat, wildlife, and native plants would occur as a result of a well-managed livestock grazing program. However, individual species or families respond differently to grazing in general and timing and intensity of grazing in particular. Changes to vegetation as a result of limited grazing can benefit breeding and migratory waterfowl. Grazing increases habitat heterogeneity and reduces height and density of monotypic stands of plants, such as reed canarygrass. The resulting interspersion of open areas and emergent vegetation results in a higher density of nests and higher nest success for dabbling and diving ducks (Carroll 1999; Carroll et al. 2007; Kantrud 1986). Increased habitat complexity resulting from limited grazing improves foraging habitat and abundance and increases the variety of food sources for migrating birds, including ducks and geese in spring and for broods in summer (Bos et al. 2005; Buchsbaum et al. 1986; Kantrud 1986; Vickery et al. 2005). Grazing would also provide improved shorebird foraging habitat (Colwell and Dodd 1995; Knopf and Rupert 1995).

CLNWR provides habitat for the only nesting population of greater Sandhill cranes (Grus canadensis tabida) in Washington State. Grazing had no influence on nest success in a study of 506 greater Sandhill crane nests at Malheur National Wildlife Refuge in Oregon (Ivey and Dugger 2008). However, Sandhill cranes have been observed to prefer grazed areas over ungrazed areas for foraging (Carroll 1999).

Upland and grassland nesting birds generally can benefit from limited grazing, especially when grazing is deferred during nesting and brooding (Fuhlendorf et al. 2006; Holechek et al. 1992), although there is variation in the response of upland and grassland bird species (Salo et al. 2004). However, the proposed grazing areas are generally wet meadows and would not support upland or grassland species, so impacts to these species, positive or negative, would be expected to be minimal.

Oregon spotted frogs are the main species of management concern within potentially grazed areas. Although limited grazing has been shown to have little effect on Oregon spotted frogs (Watson et al. 2003), what impacts there are from limited grazing are likely to be beneficial. Oregon spotted frogs

utilize reed canarygrass shortened by grazing to deposit their egg masses in the early spring (McAllister and Leonard 1997). Additionally, as habitat complexity is increased by grazing, invertebrate communities become more abundant and diverse (Kantrud 1986; Scrimgeour and Kendall 2003), providing more forage for Oregon spotted frogs. Grazing on CLNWR would occur when areas are dry, effectively preventing direct mortality of the highly aquatic Oregon spotted frog.

Limited grazing can also benefit other species, such as improving forage for mule deer and elk by increasing the nutritive value of grasses (Holechek et al. 1992; Vavra and Sheehy 1996). Aquatic invertebrates, insects, and special-status species could benefit from grazed herbaceous habitats (Bratton 1990; Bratton and Fryer 1990; Germano et al. 2001; Knopf and Rupert 1995; Panzer 1988).

The grazing program could also negatively affect refuge wildlife and habitat. Impacts to some nesting waterfowl and songbirds could occur, mainly through direct disturbance from cattle (Kirsch 1969; Krueper 1993; West and Messner 2006). There could be some reduced use of habitats by rodents and raptors (Johnson and Horn 2008), mainly due to changes in structure. However, since grazing would be in the fall, well outside of most potentially impacted species' use, impacts would be negligible. Since seasonal grazing would improve plant species composition and structure, short-term effects on wildlife and habitat would be more than mitigated by the long-term benefits to the refuge. Primary long-term benefits include continued annual native plant production; control of non-native invasive plant species; continued seasonal use of refuge habitat by migratory birds, deer, and elk; and improvements to overall wildlife habitat quality.

Potential impacts of grazing activities on the refuge's resources would be minimized as sufficient restrictions would be included as part of the annual habitat management plan, and grazing activities would be monitored by refuge staff. The annual habitat management plan and associated projects contribute to the enhancement, protection, conservation, and management of native wildlife populations and their habitats, thereby helping the refuge fulfill the purposes for which it was established, the mission of the NWRS, and the need to maintain ecological integrity, diversity, and environmental health.

Public Review and Comment

This Compatibility Determination is being prepared concurrently with the CLNWR's CCP/EA. An open house was held and written comments were solicited from the public during the scoping period for the CCP/EA. Public review and comment will be solicited during the draft CCP/EA comment period.

Determination

_____ The use is not compatible.

__X__ The use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility

The following stipulations will ensure that grazing is compatible with refuge resource needs.

- Grazing is not allowed in sensitive natural areas or cultural resource sites.

- Grazing is restricted to the period of September 1 through November 30.
- The permittee shall notify the Refuge Manager not less than 48 hours prior to the time of moving cattle on or off the refuge or between grazing units.
- Dead cattle shall be removed from the refuge immediately.
- The permittee will be responsible for repair or construction of unit fences. Fences must be in good condition and approved by the Refuge Manager prior to the entry of cattle. Permittees on adjoining units will be jointly responsible for fences between units. Materials for fence repairs will be furnished by the refuge.
- The criteria for evaluating the need for vegetation management, including grazing, will be determined during the annual review of the habitat management plan.
- Grazing will be conducted in accordance with the SUPs or CLMAs, which include special conditions that specify timing of grazing, location(s) of grazing, stocking densities, access locations, and personnel and equipment allowed. The specific conditions may vary annually due to differences in management objectives, habitat conditions, and weather.

Justification

The National Wildlife Refuge System Administration Act established a three-tiered hierarchy for management activities that occur on NWRS lands. The first tier involves management actions that specifically assist the refuge in fulfilling the purpose(s) for which it was established (e.g., migratory birds and other wildlife) and the NWRS mission, including the conservation, management, and restoration of fish, wildlife, plants, and their habitats. The second and third tiers involve wildlife-dependent public uses (i.e., hunting, fishing, wildlife observation, photography, environmental education, and interpretation) and general public uses. Management tools that help refuges achieve established refuge purposes become first-tier management priorities, when properly authorized through signed management plans and compatibility determinations. When management tools (such as grazing, haying, pest management, or prescribed burning) are not specifically used on a refuge to help achieve established refuge purposes, then these activities fall into the third, lowest priority tier. As described above, managing vegetation at CLNWR through grazing provides habitat in the form of water, food, cover, breeding areas, rearing areas, and sanctuary for a variety of wildlife, including migratory birds, waterfowl, and shorebirds.

There are specific Service regulations which address economic uses of refuges. At 50 CFR 29.1, it states, in part, that the Service. . . may only authorize public or private economic use of the natural resources of any national wildlife refuge, in accordance with 16 USC 715s, where we determine that the use contributes to the achievement of the national wildlife refuge purposes or the National Wildlife Refuge System mission. This regulatory standard is in addition to the compatibility requirement. Grazing is listed in the regulations as an example of a use to which this provision applies.

While grazing on the refuge provides economic benefits to permittees, grazing is dictated exclusively by habitat and wildlife management needs. All activities associated with grazing, including locations, acres, timing, and other special conditions, are directed by the Refuge Manager to the permittees through signed SUPs.

The use of permittees to complete grazing operations on refuge lands saves the refuge a significant amount of money (purchase of specialized equipment, fuel, labor, etc.) and staff time (mowing, vegetation removal, equipment maintenance, and transport, etc.). The proposed grazing program is described in the draft CCP and associated EA, which are incorporated by reference (Service 2012).

The grazing program as described is determined to be compatible and is designed to avoid or minimize anticipated impacts to the refuge's resources and visitors. Based upon impacts described in the draft CCP and EA (Service 2012), it is determined that grazing within CLNWR, as described above, would not materially interfere with or detract from the purposes for which the refuge was established or the mission of the NWRS. Grazing would directly benefit and support refuge goals, objectives, and management plans and activities. Populations of fish, wildlife, plants, and their habitats would improve through vegetation management, which would result in short-term and long-term reductions of non-native invasive plant species, increases in native plants, increases in biomass, improved foraging conditions for migratory birds and local deer and elk herds, and long-term improved nesting conditions for some species. Consequently, the grazing program would increase or maintain the biological integrity, diversity, and environmental health of the refuge. The wildlife-dependent, priority public uses (i.e., hunting, fishing, wildlife observation, photography, environmental education, and interpretation) would also benefit as a result of the increased biodiversity, wildlife, and native plant populations from improved habitat conditions associated with the grazing program.

Mandatory 10- or 15-year Re-evaluation Date

Provide month and year for allowed uses only.

_____ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses).

__X__ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses).

NEPA Compliance for Refuge Use Decision

_____ Categorical Exclusion without Environmental Action Statement.

_____ Categorical Exclusion and Environmental Action Statement.

__X__ Environmental Assessment and Finding of No Significant Impact.

_____ Environmental Impact Statement and Record of Decision.

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Signatures

Project Leader: _____
(Signature and Date)

Refuge Supervisor: _____
(Signature and Date)

Regional Chief: _____
(Signature and Date)

Compatibility Determination
Haying

Use

Haying

Refuge Name

Conboy Lake National Wildlife Refuge (CLNWR)

Establishing and Acquisition Authorities

Migratory Bird Conservation Act (16 U.S.C. § 715d)

Acquisition of lands for recreational development; funds (16 U.S.C. § 460k-1)

Refuge Recreation Act, as amended (16 U.S.C. § 460k-460k-4)

Endangered Species Act of 1973 (16 U.S.C. § 1534)

Refuge Purposes

The purposes for Conboy Lake NWR have been identified in historic legal documentation establishing and adding refuge lands. The refuge was established to preserve important habitat for migratory birds with refuge purposes specified as follows:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. § 460k-1

"... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ..." 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended).

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants ..." 16 U.S.C. § 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System (NWRS) 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.

Description of Use

Haying is the cutting, processing (typically baling), and removal of reed canarygrass, meadow grass, sedges, rushes, and associated species. Haying has been used as a habitat management tool on the refuge since its establishment. Over the past two decades, the haying program has evolved to better meet refuge purposes and goals as new biological data has been acquired. The primary objective of the haying program is to reduce the biomass of reed canarygrass (an undesirable exotic wet meadow grass that has spread to dominate the refuge's wet meadows), which, left unharvested, would likely out-compete native grasses and herbaceous plant species, thus reducing overall refuge biodiversity. Secondary objectives include: 1) maintaining a low vegetation structure to enhance breeding sites for the State endangered and Federal candidate Oregon spotted frog; 2) providing late summer-through-winter foraging opportunities for elk and geese; 3) enhancing late summer invertebrate foraging opportunities for State endangered greater Sandhill cranes; 4) limiting woody species encroachment into seasonal wetlands and prairie habitats; 5) reducing fuel loads for wildfire management; and 6) providing large areas of open water habitat for migrating and wintering waterfowl.

A late-season haying program would be conducted on up to 2,325 acres of the refuge, divided into 31 individual units, for the purpose of habitat management. The primary habitat types where haying would be used are wet meadows (meadow habitats with standing surface water during the growing season) and reed canarygrass areas. Permittees hay introduced reed canarygrass (*Phalaris arundinacea*), native grasses, pasture grasses, sedges (*Carex* spp.), and rushes (*Juncus* spp., *Eleocharis* spp.), primarily on the refuge's historic Camas Prairie and Conboy Lake wetland basins.

Haying requires the use of large equipment, including tractors; implements, such as swathers and balers; and trucks to haul gear and personnel. Equipment for haying generally remains on-refuge until the completion of a specific harvest phase or throughout the entire haying season.

Haying would be conducted by a permittee through the special use permit (SUP) process. All SUPs are allotted through a bid process. Every three years, CLNWR conducts a rate survey to determine the base rate for a ton of hay. This base rate provides the minimum bid used during the bidding process. Individual haying units are awarded to the highest bidder. The previous year's permittee has the right to match the high bid. Permittees may provide in-kind services in lieu of payment for hay. Services completed by permittees may include ditch and dike maintenance, as well as mowing additional areas of unwanted reed canarygrass made undesirable to haying due to woody plant encroachment and weeds.

Permittees pay a unit price per ton of hay cut. This price is based as closely as possible on local market rates. During 2010, 1,374 acres of the refuge were hayed. Permittees paid $7.00 per ton of hay cut on the refuge, and total revenues for haying were $3,960.00. Funds are deposited into the Refuge Revenue Sharing Fund.

Under some circumstances, a Service Cooperative Land Management Agreement (CLMA) would be used to administer the haying program. CLMAs are authorized under 50 CFR 29.2. These agreements allow refuge staff and permittees to effectively work together to meet habitat objectives (e.g., ditch and dike maintenance, road repair, weed management, habitat enhancement). The CLMA

serves as an annual haying plan and states provisions for habitat objectives, expected wildlife benefits, and operating rules, regulations, and reporting requirements. The CLMA prescribes expected habitat conditions (vegetation height) and entry and exit dates. The haying plan has built-in flexibility due to the uncertainties of annual and seasonal precipitation and climate, flooding, and the consequent effect on vegetation growth.

All haying is conducted by permittees beginning August 1 and ending October 15. The start of haying can be delayed if Sandhill crane colts less than three weeks of age are present. All hay bales and equipment are required to be removed from the refuge by October 15. Permittees typically spend 2-4 weeks haying on the refuge, although the entire process of cutting, baling, and hauling can extend longer depending on weather and other factors. In special cases, certain fields could possibly be hayed prior to August 1st, but only after a biological evaluation by a Service Biologist. Biological conditions used to evaluate haying prior to August 1st would include plant phenology, the status of nesting birds, the presence of greater Sandhill crane chicks, and the timing of Oregon spotted frog metamorphosis.

As noted, haying requires the use of heavy equipment. However, no additional roads or gates have been, or would be, constructed for this use. Administrative roads used by refuge staff would be available for use by permittees. Permittees are permitted to travel off road with vehicles through specified hay fields to conduct harvest operations. No pesticides, herbicides, or fertilizers are associated with this use.

Availability of Resources

Based on 2010 costs, the estimated costs to administer and manage haying activities as described above are:

Activity or Project	***One Time Expense***	***Recurring Expense***
Administration (Evaluation of Applications, Management of Permits, Oversight)		$2,000
Facilities Maintenance		$2,000
Monitoring		$1,000
Totals		**$5,000**

Refuge operational funds are currently available through the Service budget process to administer this program. The refuge charges a fee per ton of hay cut (see above), which recoups most of the costs to the Service, not the refuge. Monitoring will be addressed in an annual habitat management plan.

Anticipated Impacts of the Use

Haying can be an effective management tool as part of an overall vegetative management strategy to improve and maintain wet meadows for the benefit of migratory birds and other species. Primary

plant species found in areas hayed include reed canarygrass, sedges (*Carex nebrascensis*, *Eleocharis* spp., *Juncus balticus*), and a mix of forbs. These areas may be used by a variety of wildlife species during different parts of the year to meet specific life-cycle needs.

Haying would result in short-term disturbances and long-term benefits to both resident and migratory wildlife using the refuge. Short-term impacts would include disturbance and displacement by haying operations. Haying activities would also result in short-term loss of habitat for species using those areas for nesting, feeding, or resting. Long-term benefits are positive and outweigh the short-term disturbances due to establishment of desired habitat. The resulting habitat would improve conditions for most of the species adversely affected by the short-term negative impacts. Control of the timing of haying would limit anticipated impacts.

Wet meadow habitats need periodic disturbance to remove vegetation and maintain plant vigor, diversity, and structure necessary for wildlife use (Schuman et al. 1999). Haying of wet meadows can replace natural disturbance regimes that have been eliminated by habitat fragmentation and human intervention (Hobbs and Huennekke 1992). The rotation and periodic haying of areas also helps to create a mosaic and interspersion of habitats that many species find attractive for feeding, breeding, and protection (Kantrud 1986). Removal of accumulated biomass through haying would reduce unwanted overstory including dead and decadent vegetation, reduce woody plant invasion, and allow for more vigorous regrowth of desirable species. These management strategies contribute to the overall health of these vegetative communities, help limit or reduce the spread of invasive species, and reduce the speed of vegetation succession.

Haying provides short-grass habitat preferred by migratory bird species in the spring, including Canada geese, white-fronted geese, pintails, mallards, and a variety of other duck and bird species (Krapu and Reinecke 1992; Carroll 1999). During early summer, hayed areas provide foraging areas for Canada goose broods and greater Sandhill cranes (Sparling and Krapu 1994). Some duck species prefer hayed areas for nesting (Klett et al. 1988), and haying may improve nesting habitat (Burgess et al. 1965). Nesting success among ducks may be higher in hayed areas than in unmanaged areas, particularly when haying is delayed (Emery et al. 2005). Migrating birds would also benefit if haying is conducted as quickly as possible to ensure that fields can be reflooded and green-up can occur prior to the peak migration period in October.

Timing of treatments would be used to minimize the impacts to wildlife. Greater Sandhill crane management plans suggest delaying haying until August 10th to prevent mowing mortality of young Sandhill cranes (Littlefield 1995; Littlefield and Ivey 2002); the refuge can delay the start of haying even more if Sandhill crane colts less than three weeks of age are present. Haying would result in a temporary reduction of residual nesting cover for Sandhill cranes for the first spring period after haying, although haying operations are not expected to have significant impacts on Sandhill cranes (Littlefield and Paullin 1990; Ivey 2007). While there could be some short-term disturbance associated with haying activities, hayed areas can provide excellent foraging sites for nesting and migrating cranes (Sparling and Krapu 1994).

Some grassland and ground-nesting bird species benefit from haying, while others are negatively affected. However, ground-nesting and grassland birds would be minimally affected if haying is delayed until after August 1 each year (Dale et al. 1997). Hayed areas at CLNWR consist mainly of wet meadows and do not provide grassland or upland bird nesting habitat.

The main species of management concern within hayed areas, the Oregon spotted frog, is likely to benefit from haying. Oregon spotted frogs utilize reed canarygrass shortened by haying to deposit their egg masses in the early spring (McAllister and Leonard 1997). In studies of areas dominated by reed canarygrass, such as those areas hayed at CLNWR, Oregon spotted frogs oviposited only in areas where reed canarygrass had been mowed (Kapust et al.; Hayes et al.).[4] Haying on CLNWR would occur when areas are dry, effectively preventing direct mortality of the highly aquatic Oregon spotted frog.

Potential impacts of haying activities on the refuge's resources would be minimized because sufficient restrictions will be included as part of the annual habitat management plan, and haying activities will be monitored by refuge staff. Refuge staff will ensure that haying contributes to the enhancement, protection, conservation, and management of native wildlife populations and their habitats, thereby helping CLNWR fulfill the purposes for which it was established, the mission of the National Wildlife Refuge System, and the need to maintain ecological integrity, diversity, and environmental health.

Public Review and Comment

This Compatibility Determination is being prepared concurrently with the CLNWR's CCP/EA. An open house was held and written comments were solicited from the public during the scoping period for the CCP/EA. Public review and comment will be solicited during the draft CCP/EA comment period.

Determination

_____ The use is not compatible.

__X__ The use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility

The following stipulations will ensure that haying is compatible with refuge resource needs:

- The criteria for evaluating need for vegetation management, including haying, would be determined during the annual work plan review.

- Haying would be conducted from August 1 through October 15, although the start of haying would be delayed if Sandhill crane colts less than three weeks of age are present. In special cases, certain fields could possibly be hayed prior to 1 August, but only after a biological evaluation by an Service biologist. Biological conditions used to evaluate haying prior to 1 August could include plant phenology, the status of nesting birds, the presence of greater Sandhill crane chicks, and the timing of Oregon spotted frog metamorphosis.

- Haying would be conducted in accordance with the SUPs, which include special conditions that specify timing, location(s), access, personnel, and equipment allowed. The

[4] As noted in the description above, haying represents a cost-effective way to achieve results similar to mowing.

specific conditions would vary annually due to differences in objectives, habitat conditions, and weather.

- Permittees would be required to weigh and submit certified weight receipts for 10 percent of all hay taken from the field.

- Haying would be conducted during daylight hours only.

- Permittees must provide bale counts and certified weight receipts to the refuge by November 30.

- Any property damage to the refuge as a result of the permittee's activities would be added to the permittee's final billing.

- Non-use of permit privileges, in whole or in part, will be cause for the cancellation of a permittee's privileges at the discretion of the Refuge Manager, unless non-use has previously been approved. Non-use of a permit, in whole or in part, may be authorized by the Refuge Manager for resource protection, research, or fact-finding purposes. Non-use for the convenience of the permit holder will normally not be approved unless there are extenuating circumstances that would warrant such approval. Fire and flood are examples of such extenuating circumstances.

- Haying would not be allowed in sensitive natural areas or cultural resource sites.

Justification

The National Wildlife Refuge System Administration Act also established a three-tiered hierarchy for management activities that occur on NWRS lands. The first tier involves management actions that specifically assist the refuge in fulfilling the purpose(s) for which it was established (e.g., migratory birds and other wildlife) and the NWRS mission, including the conservation, management, and restoration of fish, wildlife, plants, and their habitats. The second and third tiers involve wildlife-dependent public uses (i.e., hunting, fishing, wildlife observation, photography, environmental education, and interpretation) and general public uses. Management tools that help refuges achieve established refuge purposes become first-tier management priorities, when properly authorized through signed management plans and compatibility determinations. When management tools (such as grazing, haying, pest management, or prescribed burning) are not specifically used on a refuge to help achieve established refuge purposes, then these activities fall into the third, lowest priority tier. As described above, managing vegetation at CLNWR through haying provides habitat in the form of water, food, cover, breeding areas, rearing areas, and sanctuary for a variety of wildlife, including migratory birds, waterfowl, and shorebirds.

There are specific Service regulations which address economic uses of refuges. At 50 CFR 29.1, it states, in part, that the Service. . . may only authorize public or private economic use of the natural resources of any national wildlife refuge, in accordance with 16 USC 715s, where we determine that the use contributes to the achievement of the national wildlife refuge purposes or the National Wildlife Refuge System mission. This regulatory standard is in addition to the compatibility requirement. Harvesting hay is listed in the regulations as an example of a use to which this provision applies.

While haying on the refuge provides economic benefits to permittees, haying is dictated exclusively by habitat and wildlife management needs. All activities associated with haying, including locations, acres cut, timing, and other special conditions, are directed by the Refuge Manager to the permittees through signed SUPs.

The use of permittees to complete haying operations on refuge lands saves the refuge a significant amount of money (purchase of specialized equipment, fuel, labor, etc.) and staff time (mowing, vegetation removal, equipment maintenance, and transport, etc.). The proposed haying program is described in the draft CCP and associated EA, which are incorporated by reference (Service 2012).

The haying program as described is determined to be compatible and is designed to avoid or minimize anticipated impacts to the refuge's resources and visitors. Based upon impacts described in the draft CCP and EA (Service 2012), it is determined that haying within CLNWR, as described above, will not materially interfere with or detract from the purposes for which the refuge was established or the mission of the NWRS. Haying will directly benefit and support refuge goals, objectives, and management plans and activities. Populations of fish, wildlife, plants, and their habitats will improve through vegetation management, which will result in short-term and long-term reductions of non-native invasive plant species, increases in native plants, increases in biomass, improved foraging conditions for migratory birds and local deer and elk herds, and long-term improved nesting conditions for some species. Consequently, the haying program will increase or maintain the biological integrity, diversity, and environmental health of the refuge. The wildlife-dependent, priority public uses (i.e., hunting, fishing, wildlife observation, photography, environmental education, and interpretation) would also benefit as a result of the increased biodiversity, wildlife, and native plant populations from improved habitat conditions associated with the haying program.

Mandatory 10- or 15-year Re-evaluation Date

Provide month and year for allowed uses only.

_____ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses).

__X__ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses).

NEPA Compliance for Refuge Use Decision

_____ Categorical Exclusion without Environmental Action Statement.

_____ Categorical Exclusion and Environmental Action Statement.

__X__ Environmental Assessment and Finding of No Significant Impact.

_____ Environmental Impact Statement and Record of Decision.

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Signatures

Project Leader: _____
(Signature and Date)

Refuge Supervisor: _____
(Signature and Date)

Regional Chief: _____
(Signature and Date)

Compatibility Determination
Research

Use

Research and Management Studies

Refuge Name

Conboy Lake National Wildlife Refuge (CLNWR)

Establishing and Acquisition Authorities

Migratory Bird Conservation Act (16 U.S.C. § 715d)

Acquisition of lands for recreational development; funds (16 U.S.C. § 460k-1)

Refuge Recreation Act, as amended (16 U.S.C. § 460k-460k-4)

Endangered Species Act of 1973 (16 U.S.C. § 1534)

Refuge Purposes

The purposes for Conboy Lake NWR have been identified in historic legal documentation establishing and adding refuge lands. The refuge was established to preserve important habitat for migratory birds with refuge purposes specified as follows:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. § 460k-1

"... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ..." 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended).

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants ..." 16 U.S.C. § 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System (NWRS) 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.

Description of Use

The refuge receives periodic requests from non-Service entities (e.g., universities, state or territorial agencies, other Federal agencies, non-governmental organizations) to conduct research, scientific collecting, and surveys on CLNWR. 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 climate change on environmental conditions and associated habitat/wildlife response; identification and analyses of paleontological specimens; wilderness character; modeling of wildlife populations, bioprospecting, and assessing response of habitat/wildlife to disturbance from public uses. Projects may be species-specific, refuge-specific, or evaluate the relative contribution of the refuge lands to larger landscapes (e.g., ecoregion, region, flyway, national, international), issues, and trends.

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 habitats, as well as their natural diversity. Projects that contribute to refuge-specific needs for resource and/or wilderness management goals and objectives, where applicable, would be given a higher priority over other requests.

Research applicants are required to submit a proposal that outlines:

1) The objectives of the study;

2) A justification for the study;

3) A detailed methodology and schedule;

4) The potential impacts on wildlife or its habitat, including disturbance (short- and long-term), injury, or mortality (including a description of measures the researcher will take to reduce disturbance or impacts);

5) The research personnel required;

6) Costs to the Service, if any; and

7) A timeline for submitting progress reports and final products (i.e., reports, theses, dissertations, publications).

Research proposals are reviewed by Service staff. If the proposal is approved, an SUP is issued by the Project Leader. Evaluation criteria and specific provisions for approval of studies include, but are not limited to, the following list. Future research proposals will also be subject to these criteria and provisions. This would also apply to any properties acquired in the future within the approved boundary of the CLNWR.

- Research that contributes to specific CLNWR management issues is given a higher priority over other research requests.
- Research that conflicts with other ongoing research, monitoring, or management programs will not be allowed.
- Research projects that can be accomplished off CLNWR are less likely to be approved.
- Research which causes undue disturbance or is intrusive is not likely to be allowed.
- The level and type of disturbance will be carefully evaluated when considering a request. Strategies to minimize disturbance through study design, including location, timing, scope, number of permittees, study methods, number of study sites, etc., will be encouraged.
- If staffing or logistics make it impossible for the refuge to monitor the researcher, the permit is likely to be denied.
- If the activity is in a sensitive area, the research request may be denied, depending on the specific circumstances.
- The length of the project will be considered and agreed upon before approval.
- Projects will be reviewed annually.

SUPs would be issued for monitoring and investigations which contribute to the enhancement, protection, preservation, management of native plant and wildlife populations and their habitats, public use, and other important resources, especially as they relate to CLNWR lands and management activities. Other proposals (e.g., social science research) would be subject to even stricter considerations of the potential impacts to wildlife and its habitats, geological resources, cultural resources, aesthetics, and visitor use and enjoyment.

Availability of Resources

CLNWR staff responsibilities for projects by non-Service entities will primarily be limited to the review of proposals, preparation of SUP(s) and other compliance documents (e.g., Section 7 of the Endangered Species Act, Section 106 of the National Historic Preservation Act), and monitoring project implementation to ensure that impacts and conflicts remain within acceptable levels (compatibility) over time. Additional administrative support, logistical, and operational support may also be provided, depending on each specific request. Estimated costs for one-time (e.g., preparing a SUP) and annually reoccurring tasks by CLNWR staff and other Service employees will be determined for each project. Sufficient funding in the general operating budget of CLNWR must be available to cover expenses for these projects. The terms and conditions for funding and staff support necessary to administer each project on CLNWR will be clearly stated in the SUP(s).

The following funding would be required to administer and manage research activities as described above. CLNWR has the funding to administratively support and monitor research that is currently taking place on the refuge. 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(s), sponsoring agency, or organization. No special equipment, facilities, or improvements are anticipated.

Activity or Project	***One Time Expense***	***Recurring Expense***
Administration (Evaluation of Applications, Management of Permits, Oversight)		$2,000
Monitoring		$2,000
Totals		**$4,000**

Itemized costs are current estimates calculated using 2 percent of the base cost for a GS-11 Refuge Biologist and a 2 percent cost of a GS-12 Refuge Manager.

Anticipated Impacts of the Use

Use of CLNWR 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.

If project methods impact or conflict with refuge-specific resources, priority wildlife-dependent public uses, other high-priority research, wilderness and 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 in order for the project to be compatible. The investigator(s) must identify methods/strategies in advance that are required to minimize or eliminate the potential impact(s) and conflict(s). If unacceptable impacts cannot be avoided, then the project will not be compatible. Projects that represent public or private economic use of the natural resources of any national wildlife refuge (e.g., bioprospecting), in accordance with 16 U.S.C. 715s, must contribute to the achievement of the national wildlife refuge purposes or the NWRS mission to be compatible (50 CFR. 29.1).

Impacts would be project- and site-specific, where they will vary depending upon nature and scope of the field work. Data collection techniques will generally have minimal animal mortality or disturbance, habitat destruction, no introduction of contaminants, and no introduction of non-indigenous species. In contrast, projects involving the collection of biotic samples (plants or animals), or requiring intensive ground-based data or sample collection, will have short-term impacts. To reduce impacts, the minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, vertebrates) will be collected for identification and/or experimentation and statistical analysis. Where possible, researchers will coordinate and share collections to reduce sampling needed for multiple projects. For example, if one investigator collects fish for a diet study

and another research examines otoliths, then it may be possible to accomplish sampling for both projects with one collection effort.

Investigator(s) obtaining required State, territorial and/or Federal collecting permits will also ensure minimal impacts to fish, wildlife, plants, and their habitats. If, after incorporating the above strategies, projects will result in long-term or cumulative effects, they will not be found compatible. A Section 7 consultation under the Endangered Species Act (16 U.S.C. 1531-1544, 87 Stat. 884, as amended, Public Law 93-205) will be required for activities that may affect a federally listed species and/or critical habitat. Only projects which have no effect, or will result in not likely to adversely affect determinations, will be considered compatible.

The spread of invasive plants and/or pathogens is possible from ground disturbance and/or transportation of project equipment and personnel, but it will be minimized or eliminated by requiring proper cleaning of investigator equipment and clothing, as well as implementation of quarantine methods where necessary. If, after all practical measures are taken and unacceptable spread of invasive species is anticipated to occur, then the project will be found not compatible without a restoration or mitigation plan.

There also could be localized and temporary effects from vegetation trampling, collecting of soil and plant samples, or trapping and handling of wildlife. Impacts may also occur from infrastructure necessary to support a project (e.g., permanent transects or plot markers, exclosure devices, monitoring equipment, solar panels to power unattended monitoring equipment). Some level of disturbance is expected with these projects, especially if investigator(s) enter areas closed to the public and collect samples or handle wildlife. However, wildlife disturbance (including altered behavior) will usually be localized and temporary in nature. Where long-term or cumulative unacceptable effects cannot be avoidable, the project will be found not compatible. Project proposals will be reviewed by refuge staff and others, as needed, to assess the potential impacts (short-term, long-term, and cumulative) relative to the benefits of the investigation to refuge management issues and understanding of natural systems.

At least six months before initiation of field work (unless an exception is made by prior approval of the Project Leader), project investigator(s) must submit a detailed proposal using a standard format (www.fws.gov/mcriver/research/). Project proposals will be reviewed by refuge staff and others, as needed, to assess the potential impacts (short-term, long-term, and cumulative) relative to the benefits of the investigation to refuge management issues and understanding of natural systems. This assessment will form the primary basis for allowing or denying a specific project. Projects which result in unacceptable refuge impacts will be found not compatible. If allowed and found compatible after approval, all projects will also be assessed during implementation to ensure impacts and conflicts remain within acceptable levels.

If the proposal is approved, then the Project Leader will issue an SUP(s) with required stipulations (terms and conditions) for the project to avoid and/or minimize potential impacts to refuge resources as well as conflicts with other public-use activities and refuge field management operations. After approval, projects are monitored during implementation to ensure impacts and conflicts remain within acceptable levels based upon documented stipulations.

The combination of stipulations identified above and conditions included in any SUP(s) will ensure that proposed projects contribute to the enhancement, protection, conservation, and management of native wildlife populations and their habitats on CLNWR. 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 refuge.

Projects which are not covered by the CCP (objectives under Goal 5 [Gathering Scientific Information]) will require additional National Environmental Policy Act documentation.

Public Review and Comment

This Compatibility Determination is being prepared concurrently with the CLNWR's CCP/EA. An open house was held and written comments were solicited from the public during the scoping period for the CCP/EA. Public review and comment will be solicited during the draft CCP/EA comment period.

Determination

_____ The use is not compatible.

__X__ The use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility

If proposed research methods are evaluated and determined to have potential adverse impacts on wildlife or habitat, then the Project Leader will determine the utility and need of such research to conservation and management of wildlife and habitat. If the need is demonstrated by the research permittee, and accepted by the refuge, then measures to minimize potential impacts (e.g., reduce the numbers of researchers entering an area, restrict research in specified areas) will be developed and included as part of the study design and included on the SUP (each project will require a SUP). Other stipulations and provisions include:

- Projects will adhere to scientifically defensible protocols for data collection, where available and applicable.

- Investigators must possess and comply with appropriate conditions of State, territorial, and/or Federal permits for their projects.

- SUPs will contain specific terms and conditions that the researcher(s) must follow relative to activity, location, duration, seasonality, etc., to ensure continued compatibility. All refuge rules and regulations (50 CFR) must be followed, unless otherwise exempted in writing by Service management.

- Annual or other short-term SUPs are preferred; however, some permits will be a longer period, if needed, to allow completion of the project. All SUPs will have a definite termination date in accordance with 5 RM 17.11. Renewals will be subject to Project Leader review and approval based on timely submission of and content in progress reports, compliance with SUP stipulations, and required permits.

- Continuation of existing projects will require approval by the Project Leader.

- 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) (see www.fws.gov/mcriver/research/).

- Final reports are due one year after completion of the project unless negotiated otherwise with the Project Leader.

- Service staff will be given the opportunity to review draft manuscript(s) from the project before being submitted to a scientific journal(s) for consideration of publication.

- Service staff will be provided with copies (reprints) of all publications resulting from a refuge project.

- The NWRS, specific refuge, and names of Service staff 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.

- Service staff will be provided with copies of raw data (preferably electronic database format) at the conclusion of the project.

- Sampling equipment, as well as investigator(s)' clothing and vehicles (e.g., ATV, boats), will be thoroughly cleaned (free of dirt and plant material) before being allowed for use on refuge lands to prevent the introduction and/or spread of disease or pests. Where necessary, quarantine methods will be implemented (see www.fws.gov/mcriver/research/).

- Upon completion of the project (or annually if the project is multi-year), 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(s). Failure to remove research paraphernalia will result in the principal investigator not being permitted to conduct future scientific studies on refuge lands within the Mid-Columbia River refuges.

- 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 affected by the proposed research.

- All samples collected on refuge lands are the property of the Service even while in the possession of the investigator(s). 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 understand will be necessary (see www.fws.gov/mcriver/research/).

- Investigator(s) and support staff will follow all CLNWR-specific regulations that specify access and travel on the refuge.

- When and where needed, some areas may be temporarily/seasonally closed to researchers; research can be permitted to resume when impacts to wildlife and habitat are no longer a concern.

- Research activities will be modified to avoid harm to sensitive wildlife and habitat when unforeseen impacts arise, such as wildfire altering landscape conditions or large declines in a population.

- If unacceptable impacts to natural resources or conflicts arise, or are documented by Service staff, then the Project Leader can suspend, modify conditions of, or terminate an on-going project already permitted by SUP(s) on CLNWR.

- At any time, Service staff may accompany investigator(s) in the field.

- The criteria for evaluating a research proposal, outlined in the Description of Use section above, will be used when determining whether a proposed study will be approved on CLNWR.

Service staff will monitor researcher activities for compliance with conditions outlined on the SUP. The Project Leader may determine that previously approved research and SUP be terminated:

1) If the researcher is out of compliance with permit conditions;

2) To ensure wildlife and habitat protection; and/or

3) To protect visitor and public safety.

Justification

Natural resource inventories, monitoring, and research are not only provisions of the National Wildlife Refuge Administration Act, they are necessary tools to maintain biological integrity, diversity, and environmental health, which are also key provisions of the Act. Inventories, monitoring, and research are intended to improve habitat, wildlife populations, biological integrity, diversity, and environmental health, and to monitor public use impacts. Monitoring and research will directly benefit and support CLNWR goals, objectives, and management plans and activities, as well as contribute to recovery of endangered/threatened species.

Research, scientific collecting, and surveys on refuge lands are inherently valuable to the Service because they expand scientific information available for resource management decisions. In addition, only projects which directly or indirectly contribute to the enhancement, protection, use, preservation, and management of refuge wildlife populations and their habitats generally will be authorized on refuge lands. In many cases, if it were not for Service staff providing access to refuge lands and waters, along with some support, the project would never occur and less scientific information would be available to the Service to aid in managing and conserving the refuge resources.

Monitoring and research investigations are also an important component of adaptive management. Standardized monitoring would be used to ensure data compatibility for comparisons from across the landscape.

Wildlife-dependent public uses (wildlife viewing, photography, environmental education, interpretation, fishing, and hunting) would also benefit as a result of increased biodiversity, wildlife, and native plant populations. Refuge staff would ensure research projects contribute to the

enhancement, protection, preservation, and management of wildlife populations and their habitats, thereby helping CLNWR fulfill the purposes for which it was established, the mission of the NWRS, and the need to maintain ecological integrity.

By allowing the use to occur under the stipulations described above, it is anticipated that wildlife species which could be disturbed during the use will find sufficient food resources and resting places so that their abundance and use will not be measurably lessened on CLNWR. Additionally, it is anticipated that monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, and their habitats. As a result, these projects will not materially interfere with, or detract from, fulfilling CLNWR's purposes, contributing to the mission of the NWRS, and maintaining the biological integrity, diversity, and environmental health of the refuge.

Mandatory 10- or 15-year Re-evaluation Date

Provide month and year for allowed uses only.

_____ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses).

__X__ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses).

NEPA Compliance for Refuge Use Decision

_____ Categorical Exclusion without Environmental Action Statement.

_____ Categorical Exclusion and Environmental Action Statement.

__X__ Environmental Assessment and Finding of No Significant Impact.

_____ Environmental Impact Statement and Record of Decision.

Signatures

Project Leader: _____
(Signature and Date)

Refuge Supervisor: _____
(Signature and Date)

Regional Chief: _____
(Signature and Date)

Compatibility Determination
Timber Harvest

Use

Timber Harvest

Refuge Name

Conboy Lake National Wildlife Refuge (CLNWR)

Establishing and Acquisition Authorities

Migratory Bird Conservation Act (16 U.S.C. § 715d)

Acquisition of lands for recreational development; funds (16 U.S.C. § 460k-1)

Refuge Recreation Act, as amended (16 U.S.C. § 460k-460k-4)

Endangered Species Act of 1973 (16 U.S.C. § 1534)

Refuge Purposes

The purposes for Conboy Lake NWR have been identified in historic legal documentation establishing and adding refuge lands. The refuge was established to preserve important habitat for migratory birds with refuge purposes specified as follows:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. § 460k-1

"... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ..." 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended).

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants ..." 16 U.S.C. § 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System (NWRS) 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.

Description of Use

This compatibility determination examines commercial timber harvest as proposed in the CLNWR CCP. The management goals and objectives defined in the CCP reference individual stand prescriptions detailed in *Silvicultural Recommendations: Conboy Lake National Wildlife Refuge* (White 2009). Commercial timber harvest has not been used as a habitat management tool on the refuge in the past. A managed commercial timber harvest program is needed to better meet refuge purposes and goals as new biological data are acquired, and there is a need for more accessible habitat management tools. The primary objective of the commercial timber harvest program is to develop habitats that address the needs of focal species, provide a diversity of habitats, and meet other management objectives. Treatments are prescribed to maintain tree vigor and the resilience of forest stands and to assist ecological processes associated with the more open forest conditions that historically existed. However, prescriptions are also aimed at maintaining some older forest conditions that are relatively rare in the managed forest landscape surrounding the refuge, thus addressing the needs of focal species. For example, dead and down trees, pockets of dense forest, and tree species diversity help to maintain habitat diversity and conditions important to many species.

Commercial timber harvest prescriptions are detailed in *Silvicultural Recommendations: Conboy Lake National Wildlife Refuge*. There, specific forest management prescriptions are identified to achieve habitat goals in specific stands of ponderosa pine forest, ponderosa pine/lodgepole pine forest, mixed conifer forest, oak woodlands, and aspen stands. Approximately 1,500 acres of forested habitat is available to conduct forest management. Approximately 200-400 acres of forest will be treated annually as prescribed in the silvicultural recommendations.

Commercial contractors will be used for some forest management activities, including precommercial and commercial thinning and selective harvesting. Forest management activities not completed by commercial contractors will be completed by refuge staff and volunteers. The purposes of each treatment are to aid progression of forest structure and composition to more natural conditions and may include any one or more of the following objectives:

- Increasing the proportion of mature forest.
- Maintaining mature forest components.
- Preparing select stands for low-intensity prescribed fire.
- Reducing tree densities in overstocked stands, favoring mature and over-mature trees and promoting diameter and height growth in the remaining stand.
- Creating small openings within stands.
- Removing small pines encroaching within wet and dry meadows.
- Creating and/or retaining snags.

Commercial timber harvest with the use of heavy equipment will in most cases occur during summer and fall months when soil moisture conditions are dry and stands are accessible. Other periods may be considered based upon the equipment being used and the moisture level in soils. Forest units will be cruised and marked by contractors or refuge staff prior to bid proposals going out to potential permittees. Awards will be determined through competitive bidding. The successful bidder will be issued an SUP with conditions attached.

This use is not defined as a wildlife-dependent recreational use under the National Wildlife Refuge System Administration Act. This is a refuge management economic activity, and its utilization will help the refuge achieve the purposes for which it was created and the mission of the NWRS. The proposed commercial timber harvest program is further described in the draft CCP/EA.

Availability of Resources

The following funds will be required to run a program as designed under the CCP. For the one-time expenses, all available sources will be investigated.

Activity or Project	***One Time Expense***	***Recurring Expense (Each Sale)***
Administration (Management of Permits/Contracts, Oversight)		$4,000
Cruising and Marking Timber Sales		$20,000
Monitoring		$5,000
Re-enforcement/Rehabilitation of Haul Road		$50,000
Rehabilitation of Skid Trails, Etc.		$30,000
Totals		**$109,000**

Revenues received by the refuge are submitted to the United States Treasury. Each sale site includes an estimate of rehabilitation work needed, and prospective purchasers need to submit a bid to pay for this work. The permittee either pays directly or reimburses the Service for costs of rehabilitation and monitoring on each sale site. The refuge does not anticipate the need for recurring road maintenance or reseeding after the contract closes. It is anticipated that each sale will cost the Service only the price of administration and the marking of timber sales ($24,000). Refuge operational funds are currently available through the Service budget process to administer this program, and it is possible that some portion of the timber sale marking will be recovered through money coming back to the NWRS from the timber sales.

Anticipated Impacts of the Use

All forest types will be subject to forest management treatments over the 15-year span of the CCP. The long-term intent of the treatments is to rehabilitate the forest structure and composition to

conditions more closely resembling those present just prior to settlement by American pioneers and homesteaders. The forest treatments undertaken will have the objective of increasing stand vigor, increasing the proportion of mature forest, maintaining or enhancing the presence of mature forest components, and preparing the stands for the reintroduction of low-intensity ground fires. This would be accomplished by removing excess trees, mostly from age classes of less than 70 years old. Cut-tree selection in these age classes would be based upon those trees exhibiting poor form, vigor, or that face a significant risk of disease or insect mortality. Trees aged 100 years or older would largely be left standing to continue to develop. In some instances older trees could be marked for removal where reduced competition and better spacing would enhance the longevity and vigor of neighboring desirable trees. Since a primary component of mature forests is the presence of defects—including broken tops, flattened tops, mistletoe brooms, heart rot, large coarse branches, and decay, all of which are important to wildlife—trees with these kinds of defects would mostly be left standing.

The effect of these treatments would be to reduce the overall tree density, generally favoring the larger, older trees with characteristics favorable to wildlife. Such treatments are considered to be particularly effective at promoting the diameter and height growth of the remaining stand, thus speeding the development of mature and old growth characteristics, such as large boles, large limbs, and robust canopies (Oliver and Larson 1990). Thinning and the use of prescribed fire is also intended to promote conditions that would be favorable to reintroduction of a more natural fire disturbance regime over the long term, thus lessening the likelihood of a catastrophic or lethal fire that could wipe out huge areas.

The potential negative impacts of commercial tree harvest include short-term ground disturbance from the use of heavy equipment and disturbance to wildlife from tree harvest activities. It is expected that each year for the next 15 years, between 25 and 50 acres of the refuge will be subject to potentially ground-disturbing activities. Ground disturbance will likely occur when skidding trees to a landing. Impact will also occur at the landing site during log processing and loading. Ground disturbance may increase the risk of invasion by exotic plants (Hobbs and Huennekke 1992). Rehabilitation of these sites by planting native plants or seeds will reduce the risk of invasion, as well as mitigate the site disturbance.

Impacts to wetlands can be expected if heavy equipment is allowed to work within the wetland basin or near the wetland edge. This disturbance can increase erosion and sediment transport to the wetland. Increased sedimentation can impact aquatic plant and animal communities. To alleviate these potential impacts, timber management activities would take place in the fall, when most wetlands are dry, or in the winter, when the ground is frozen, to avoid erosion and sediment transport.

Some disturbance of wildlife is expected to occur during tree harvest activity, which creates noise in addition to the presence of machinery and people. Some upland birds (songbirds, grouse, owls, and hawks), black-tailed deer, Rocky mountain elk, and coyotes are expected to avoid areas of high activity. However, these species will readily move back into these sites after the disturbance is removed, and most of these species will benefit in the long-term from an increase in forage, seeds, and the resultant rodents. This level of activity is expected to occur on less than 5 percent of the refuge at any given time.

Timber management activities may affect State threatened western gray squirrels (*Sciurus griseus*) by removal of nest trees, reducing food sources, and fragmenting the tree canopy (Linders et al.

2010). However, any activities conducted in western gray squirrel habitat would be intended to improve habitat (e.g., creating snags), and care would be taken not to remove nest trees. Tree removal may improve habitat conditions for other small mammals, such as mice and voles (Suzuki and Hayes 2003).

If tree harvest occurs during the summer months, foliage-roosting bats, such as silver-haired bats (*Lasionycteris noctivagans*) and hoary bats (*Lasiurus cinereus*), may be dislodged from roost trees, or killed if roost trees are felled (Hayes 2003, Hayes and Loeb 2007). Timber management activities may also affect the abundance, distribution, and quality of roosting sites for these species (Hayes 2003). Several other species of bat, including big brown bats (*Eptesicus fuscus*), little brown bats (*Myotis lucifugus*), California myotis (*Myotis californicus*), and small-footed myotis (*Myotis ciliolabrum*), rely on coniferous forests for foraging or occasional roosting (Carter and Menzel 2007; Kunz and Lumsden 2006; Lacki et al. 2007). Snags and trees with rot, splits, or cracks provide roosting habitat and should be retained for bats (Carter and Menzel 2007; Hayes 2003; Hayes and Loeb 2007; Kunz and Lumsden 2006); the SUPs issued would include this as an important measure.

Tree harvest activities occurring during the nesting season can directly impact both ground- and foliage-nesting birds. Delaying timber management until the fall or winter greatly reduces these impacts (Altman 2000). Cavity nesting birds may be impacted if snags or dead top trees are removed (Mannan et al. 1980; Zarnowitz and Manuwal 1985). No snags will to be cut if they measure 8" dbh or larger.

Greater Sandhill cranes are a species of concern on the refuge and are sensitive to disturbances (Littlefield and Ivey 2002). To avoid nest abandonment, any major tree harvest would occur outside of the nesting season, and minor tree removal would be restricted to areas farther than 0.25 mile from active nests.

While some short-term negative effects on wildlife and habitats are possible as a result of tree removal, timber management activities will be limited in scale, scope, and season in such a way that those negative effects will be limited. Mandatory rehabilitation will reverse the impacts, and the long-term benefits to species and stand vigor outweigh the potential drawbacks of tree removal.

Public Review and Comment

This Compatibility Determination is being prepared concurrently with the CLNWR's CCP/EA. An open house was held and written comments were solicited from the public during the scoping period for the CCP/EA. Public review and comment will be solicited during the draft CCP/EA comment period.

Determination

_____ The use is not compatible.

__X__ The use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility

The stipulations needed to ensure a successful timber harvest fall under several different areas. Specifically:

Equipment

Unless approved in writing in advance by the Refuge Manager, only high-flotation, rubber-tired equipment will be permitted.

Only rubber-tired forwarders may be used.

Metal-tracked vehicles may be used at the landings and along existing roads with the prior approval of the Refuge Manager.

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 CLNWR.

Ground Disturbance Areas, Roads, and Landings

Harvesting and heavy equipment use will be limited to periods of time when soils are either frozen or the soil moisture is just enough to cushion the ground but not be either soggy nor powder dry. The Refuge Manager will make the determination whether or not the ground conditions are right for operation.

Trees will be skidded by lifting the butt-end off the ground to minimize ground disturbance.

New road construction will not be allowed.

Existing road access will be improved, as specified in the SUP, if necessary for the specific harvest and equipment will be hauled to the harvest and landing sites so that road surface degradation can be avoided.

Landings will be of the minimum size required and will not encompass more than 5 acres of the sale.

The Service will comply with current policies and procedures related to cultural resource protection and perform mitigation required through a cultural resources review.

Sensitive Resource Protection

Limited tree harvest activities will be allowed during the peak of the spring/summer breeding season to avoid impacts to roosting bats and ground- and foliage-nesting birds. The determination will be made by the Refuge Manager as to location and quantity of harvest allowed during this period.

No snags or dead top trees capable of housing cavity-using wildlife will be removed (i.e., snags and dead top trees >8 inches dbh shall be retained).

Heavy equipment will not be allowed within 25 yards of a wetland.

Any trees cut within 25 yards of wetlands must be manually felled away from the wetland and cabled outside the buffer area before skidding.

Heavy equipment will not be used on large exposed rock outcrops.

Known cultural resource areas will not be disturbed. Contracts will be designed to avoid known cultural resource areas. If new cultural resource sites are discovered during contract activities, contract modification will be undertaken to avoid further ground disturbance in the area.

Excessive disturbance of wildlife and disturbance to sensitive areas and cultural resources will result in SUP suspension.

Rehabilitation

All soil surfaces disturbed by harvest operations shall be restored to their natural surface contours and topsoil replaced if needed.

Rehabilitation of disturbed areas by re-seeding with native species will be required of all timber operators.

Administrative Stipulations

The Service will provide the permittee with maps of wetland and other sensitive areas (cultural or historical).

Monitoring provided by the permittee will be completed on all treatment areas to assure stipulations are adhered to, expected benefits are realized, and negative impacts fall within the range anticipated.

Justification

The National Wildlife Refuge System Administration Act established a three-tiered hierarchy for management activities that occur on NWRS lands. The first tier involves management actions that specifically assist the refuge in fulfilling the purpose(s) for which it was established (e.g., migratory birds and other wildlife) and the NWRS mission, including the conservation, management, and restoration of fish, wildlife, plants, and their habitats. The second and third tiers involve wildlife-dependent public uses (i.e., hunting, fishing, wildlife observation, photography, environmental education, and interpretation) and general public uses. Management tools that help refuges achieve established refuge purposes become first-tier management priorities, when properly authorized through signed management plans and compatibility determinations. When management tools (such as grazing, haying, pest management, or prescribed burning) are not specifically used on a refuge to help achieve established refuge purposes, then these activities fall into the third, lowest priority tier. As described above, managing forested habitats at CLNWR through commercial timber harvest will provide habitat in the form of food, cover, breeding areas, rearing areas, and sanctuary for a variety of wildlife, including migratory birds, elk, and deer.

There are specific Service regulations which address economic uses of refuges. At 50 CFR 29.1, it states, in part, that the Service. . . may only authorize public or private economic use of the natural resources of any national wildlife refuge, in accordance with 16 USC 715s, where we determine that the use contributes to the achievement of the national wildlife refuge purposes or the NWRS mission.

This regulatory standard is in addition to the compatibility requirement. Commercial timber harvest is listed in the regulations as an example of a use to which this provision applies. Forest management policy for the Refuge System is described in 6 RM 3 and includes commercial contracts.

The commercial timber harvest program as described is determined to be compatible. Based on the impacts described in the CCP/EA (Service 2012), it is determined that commercial timber harvest within CLNWR will not materially interfere with, or detract from, the purposes for which the refuge was established or the mission of the NWRS. The use of commercial tree harvesting instead contributes to the NWRS mission and the purposes of CLNWR by helping to rehabilitate and manage the refuge's forested habitats for the historical conditions of widely spaced, large-diameter trees and by reducing the encroachment of pine trees into meadow and riparian areas. It also supports the National Fire Plan in reducing hazardous fuel loads on Federal lands. As detailed in the Silvicultural Plan, the refuge's forests are densely stocked due to past logging and fire suppression. Current conditions are ripe in some stands for catastrophic loss to insects, disease, and/or fire. While fire was the primary natural disturbance that maintained healthy historic forest conditions on the refuge, a combination of commercial tree harvesting and prescribed fire is needed to address today's current forest conditions, social values, air quality, human safety concerns, and resource protection needs.

Commercial timber harvest will directly benefit and support refuge goals, objectives, management plans, and activities. Populations of fish, wildlife, plants, and their habitats will improve through forest management, which will result in short-term and long-term reductions of non-native invasive plant species; increases in native plant populations; increases in biomass; improved conditions for migratory birds and local deer and elk herds; and long-term improved nesting conditions for some migratory bird species. Consequently, the commercial timber harvest program would increase or maintain the biological integrity, diversity, and environmental health of the refuge.

The wildlife-dependent, priority public uses (i.e., hunting, fishing, wildlife observation, photography, environmental education, and interpretation) will also benefit as a result of the increased biodiversity, wildlife, and native plant populations realized from improved habitat conditions associated with the commercial timber harvest program.

Mandatory 10- or 15-year Re-evaluation Date

Provide month and year for allowed uses only.

_____ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses).

__X__ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses).

NEPA Compliance for Refuge Use Decision

_____ Categorical Exclusion without Environmental Action Statement.

_____ Categorical Exclusion and Environmental Action Statement.

__X__ Environmental Assessment and Finding of No Significant Impact.

_____ Environmental Impact Statement and Record of Decision.

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Signatures

Project Leader: _____
(Signature and Date)

Refuge Supervisor: _____
(Signature and Date)

Regional Chief: _____
(Signature and Date)

Compatibility Determination
Waterfowl Hunting

Use

Waterfowl Hunting: Waterfowl, Coots, Snipe

Refuge Name

Conboy Lake National Wildlife Refuge (CLNWR)

Establishing and Acquisition Authorities

Migratory Bird Conservation Act (16 U.S.C. § 715d)

Acquisition of lands for recreational development; funds (16 U.S.C. § 460k-1)

Refuge Recreation Act, as amended (16 U.S.C. § 460k-460k-4)

Endangered Species Act of 1973 (16 U.S.C. § 1534)

Refuge Purposes

The purposes for Conboy Lake NWR have been identified in historic legal documentation establishing and adding refuge lands. The refuge was established to preserve important habitat for migratory birds with refuge purposes specified as follows:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. § 460k-1

"... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ..." 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended).

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants ..." 16 U.S.C. § 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System (NWRS) 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.

Description of Use

This compatibility determination does not propose changes to the current waterfowl hunting program on CLNWR. Only select portions of the refuge are open to waterfowl hunting (approximately 2,343 acres), and the areas include wet meadows and wetlands. Within those areas hunting is free-roam and open for access from 1-1/2 hours before the start of legal hunting within the State of Washington to 1-1/2 hours after the end of legal hunting hours, 7 days a week. Only shotguns, muzzleloaders, and archery equipment may be used, as appropriate to the species being hunted and in accordance with State of Washington regulations. Only federally approved non-toxic shot may be used or possessed, and hunters are limited to 25 shells per day.

Hunters may only enter the hunting area from one of four designated parking areas. The hunting areas themselves are walk-in only, except bicycles may be used on designated motorized routes of travel. Waterfowl hunters may use non-motorized boats in some areas to set decoys and retrieve downed birds; boats are not allowed in the Camas Drain/Outlet Creek, Bird Creek Canal, or Cold Springs Canal. Portable or temporary blinds constructed of non-living natural materials are permitted.

The refuge hosts a youth waterfowl hunt, which typically occurs two weeks prior to the general hunt opening weekend. Youth hunters must be accompanied by an adult non-hunter.

The refuge estimates that there are approximately 120 waterfowl hunting visits each year. The overall harvest success, typically measured by the number of birds harvested per hunter per day, is unknown. The most common species harvested include Canada geese, mallards, northern pintails, and American widgeons.

The refuge does not have a law enforcement officer on site. This function is administered from MCRNWRC, which is located four hours from CLNWR. As a result, there is a limited amount of time enforcing and ensuring compliance with State and refuge-specific regulations on the refuge. Field checks by refuge law enforcement officers are planned, conducted, and coordinated with Service staff and other agencies to maintain compliance with regulations. Dogs, which are normally required to be kept on leash, are allowed when engaged in authorized hunting activities and under the immediate control of a licensed hunter. The refuge's hunting regulations are available on a tear-sheet with a map, available at the CLNWR Headquarters, hunter access points, and on-line. In addition to covering refuge-specific regulations, the tear-sheet and web site inform the public of hunting opportunities.

The species that will be hunted include waterfowl (ducks, geese), coots, and snipe.

Availability of Resources

The following table shows the estimated funds needed to administer the program. Existing refuge resources are adequate to properly and safely administer the use as described.

Activity or Project	***One Time Expense***	***Recurring Expense***
Administration and Support Costs (Management, Law Enforcement, Staff)		$5,000
Maintenance of Facilities (Roads, Parking Areas, Signs, Etc.)		$3,000
Updating & Printing of Hunting Regulations		$1,000
Totals		**$9,000**

Anticipated Impacts of the Use

Hunting can impact wildlife in a variety of ways. Direct effects of hunting include mortality, wounding, and disturbance (De Long 2002). Human disturbance associated with hunting includes loud noises and rapid movements, such as those produced by shotguns. This disturbance, especially when repeated over a period of time, compels waterfowl to change food habits (e.g., foraging time), feed only at night, lose weight, or desert feeding areas (Madsen 1995; Wolder 1993).

In addition to changes in feeding behavior, there may also be changes in population structure and distribution patterns of wildlife (Bartelt 1987; Cole and Knight 1990; Madsen 1985; Owens 1977; Raveling 1979; Thomas 1983; White-Robinson 1982). For example, there appears to be an inverse relationship between the numbers of birds using an area and hunting intensity (DeLong 2002); in Connecticut, lesser scaup were observed to forage less in areas that were heavily hunted (Cronan 1957). In California, the numbers of northern pintails on the Sacramento National Wildlife Refuge's non-hunted areas increased after the first week of hunting and remained high until the season was over in early January (Heitmeyer and Raveling 1988). Following the close of the hunting season, the ducks generally increased their use of the hunted area; however, use was lower than before the hunting season began.

These impacts can be reduced by the presence of adjacent sanctuary areas where hunting does not occur and where birds can feed and rest relatively undisturbed. Sanctuaries or non-hunt areas have been identified as the most common solution to disturbance problems caused from hunting (Havera et. al 1992). Prolonged and extensive disturbances may cause large numbers of waterfowl to leave disturbed areas and migrate to sanctuary areas (Madsen 1995; Paulus 1984). In Denmark, hunting disturbance effects were experimentally tested by establishing two sanctuaries (Madsen 1995). Over a 5-year period, these sanctuaries became two of the most important staging areas for coastal waterfowl; the numbers of dabbling ducks and geese increased 4- to 20-fold within the sanctuary (Madsen 1995). In another study, mallards redistributed locally following a disturbance, which lead to a recommendation that refuge areas should be established proximate to areas that are hunted, and if possible, disturbance should be managed as a comprehensive whole rather than property by property (Dooley 2010). Thus, sanctuary and non-hunt areas are very important to minimize disturbance to waterfowl populations to ensure their continued use of CLNWR. The refuge provides 4,080 acres of sanctuary habitat where hunting and other disturbances do not occur.

Intermittent hunting can be a means of minimizing disturbance, especially if rest periods in between hunting events are weeks rather than days (Fox and Madsen 1997). Although CLNWR does not subscribe to intermittent hunting, and offers hunting 7 days a week, the refuge receives approximately 120 hunting visits per year, thus minimizing wildlife impacts through a lack of hunting pressure. The lack of hunting pressure is likely due to the remoteness of the refuge from major metropolitan areas, an inconsistent waterfowl presence in the fall, and an early freeze-up, which typically occurs by late November. Most hunting is opportunistic and occurs late in the season during January if the ice melts and when large numbers of waterfowl use the refuge during the initiation of spring migration.

The Pacific Flyway Council, of which the Service is the convening agency, sets annual waterfowl hunting parameters, determining if there is a harvestable population in any given year. To assure that populations are sustainable, the Washington Fish and Wildlife Commission, in consultation with the Washington Department of Fish and Wildlife (WDFW), annually reviews the population censuses to establish season lengths and harvest levels. In light of harvestable populations and due to low hunting pressure, the limited number of individuals expected to be removed from wildlife populations due to hunting will not cause populations to materially decline; the physiological condition and production of hunted 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.

In addition, harvest data are reported by hunters to WDFW, and season and bag limits are adjusted accordingly to ensure that overall populations of game species remain healthy into the future, thus ensuring that impacts are minor. Impacts to species numbers and composition will be monitored, and, if necessary, additional measures will be developed in coordination with WDFW to protect refuge resources.

The refuge hunting program indirectly impacts species other than those targeted by hunters. The presence of hunters and dogs, sounds of gunfire, and the sight of hunters traveling to, from, and within hunting areas can disturb other wildlife species such as elk, deer, passerine birds, and other waterbirds that use refuge wetlands. This disturbance, especially when repeated over a period of time, may result in some wildlife species altering food habits or moving to other areas. However, waterfowl hunting occurs at a time of year when few birds are present, so impacts are minor, at worst. Although deer and elk can be affected, few are present in the waterfowl hunting areas during this time period, and those that are present do not have to travel far to reach a sanctuary area; impacts are deemed to be minor.

Foot travel associated with waterfowl hunting could potentially result in trampling of vegetation and other impacts (see the General Uses CD for a full discussion). However, since waterfowl hunting on the refuge involves small numbers of hunters and takes place during the time of the year when most understory plants are dormant, this activity has little direct impact on any native plant species.

The presence of retrieving dogs can disturb wildlife through motion and sound. On CLNWR the use of retrieving dogs is permitted and encouraged in all areas open to waterfowl hunting. These dogs are required to be under control at all times. Any hunter who allows his/her dog to disturb wildlife is not well-received by other hunters who do not want waterfowl disturbed in areas they are hunting. Law enforcement officers will enforce regulations requiring owners to maintain control over their dogs while on the refuge. Between regulatory compliance, the timing of the hunt, and the very limited number of hunters, the use of dogs is expected to result in negligible impacts, especially when considered as additive to the presence of the hunter to begin with.

To further mitigate impacts, proper zoning, regulations, and refuge seasons are designated to minimize any negative impacts to wildlife populations using the refuge. Harvesting waterfowl will not result in a decrease in biological diversity on the refuge, nor substantially impact refuge resources.

Although conflicts between user groups can arise, this is currently not a significant issue at the present levels of use. Should significant conflicts become evident in the future, changes to the program will be made to minimize conflicts and ensure public safety. To minimize potential conflict, the refuge will implement the following:

- Physically separate non-hunting and hunting acres to spatially divide the activities.
- Maintaining boundary and hunting area signs to clearly define the designated hunting areas.
- Allowing vehicle traffic only on designated roads and parking areas.
- Signing parking areas to allow only pedestrian hunter access to hunting areas.
- Managing the hunting program in strict accordance with all applicable Federal laws (50 CFR Subchapter C) and to the extent practicable, consistent with applicable State laws.
- Performing field checks by Service and WDFW law enforcement officers to maintain compliance with regulations.
- Providing information about the refuge hunting program through signs, kiosks, brochures, and the refuge's website.

The public fishing area is within the public hunting area. Since the State fishing season does not close until October 31, and the State waterfowl hunting season normally opens in mid-October, there is a possibility of conflict during the time these two seasons overlap. However, since sport fishing at the refuge is minimal, particularly at that time of the year, conflicts have not occurred, and none are expected.

The public parking/access area adjacent to the Glenwood-BZ Corners Road presents a potential for conflict/confrontation between hunters and non-consumptive wildlife users. Although the hunting area is not open to the general public, the hunting area can be seen from the parking area, and both groups can use the lot at the same time. However, since general public use of this area is minimal during the hunting season (late fall early winter), conflicts have not occurred, and few, if any, are expected.

Public Review and Comment

This Compatibility Determination is being prepared concurrently with the CLNWR's CCP/EA. An open house was held and written comments were solicited from the public during the scoping period for the CCP/EA. Public review and comment will be solicited during the draft CCP/EA comment period.

Determination

_____ The use is not compatible.

__X__ The use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility

To ensure compatibility with NWRS and CLNWR goals and objectives, waterfowl hunting can only occur under the following stipulations:

- Hunters must obey all State and Federal hunting regulations.
- Hunting will be permitted from within designated hunting areas only.
- Hunters will use existing open roads and parking areas to access hunting areas. Access will be walk-in only, except upon special request to reasonably accommodate disability.
- Access will be allowed from 1-1/2 hours before legal shooting time until 1-1/2 hours after legal shooting time. No overnight use of the refuge will be allowed.
- Service permission is needed to retrieve animals from closed areas of the refuge.
- Camping, overnight use, fires, and construction of pit blinds are prohibited.

Justification

The Administration Act clarified that the NWRS is not a multiple-use management system and is not managed for commodity production or on the basis of sustained-yield economic principles. Refuges are managed first and foremost for fish, wildlife, plants, and their habitats (House Report 105-106, Section 5), often referred to as the Wildlife First management mandate. The Act states. . . the (Refuge) System was created to conserve fish, wildlife, and plants and their habitats and this conservation mission has been facilitated by providing Americans opportunities to participate in compatible wildlife-dependent recreation, including fishing and hunting, on System lands and to better appreciate the value of and the need for fish and wildlife conservation. It goes on to identify Executive Order 12996, which recognized compatible wildlife-dependent recreational uses involving hunting, fishing, wildlife observation, photography, environmental education, and interpretation as priority public uses of the Refuge System. The Act also established a three-tiered hierarchy for management activities that occur on NWRS lands. The first tier involves management actions that specifically assist the refuge in fulfilling the purposes for which it was established (e.g., migratory birds and other wildlife) and the NWRS mission, including the conservation, management, and restoration of fish, wildlife, plants, and their habitats. The second and third tiers involve wildlife-dependent public uses (i.e., hunting, fishing, wildlife observation, photography, environmental education, and interpretation) and general public uses. Waterfowl hunting falls into this category.

The hunting program will provide high-quality, safe, and cost-effective hunting opportunities and will be carried out consistent with Washington State regulations. The guiding principles of the NWRS's hunting programs (Service Manual 605 FW 2) are to:

- Manage wildlife populations consistent with NWRS-specific management plans and, to the extent practicable, State fish and wildlife conservation plans;
- Promote visitor understanding of and increase visitor appreciation for America's natural resources;
- Provide opportunities for quality recreational and educational experiences consistent with criteria describing quality found in 605 FW 1.6;
- Encourage participation in this tradition deeply rooted in America's natural heritage and conservation history; and
- Minimize conflicts with visitors participating in other compatible wildlife-dependent recreational activities.

CLNWR's hunting program will comply with the CFR Title 50, 32.1 and be managed in accordance with Service Manual 605 FW2. Hunting will be permitted in accordance with State regulations and seasons to ensure that it will not interfere with the conservation of fish and wildlife and their habitats. The waterfowl hunting season coincides with the State-specified season, typically the second weekend in October to the third weekend in January. Therefore, the hunting of migratory birds on the refuge is in compliance with State regulations and seasons; the NWRS Administration Act of 1966, as amended (16 U.S.C. 668dd-ee); and the Refuge Recreation Act of 1962 (16 U.S.C. 460k).

Managed hunting programs help promote an understanding and appreciation of the refuge's natural resources and their management. Additionally, managed hunts on the refuge contribute to the mission of the NWRS by providing a traditional wildlife-dependent recreational activity with no definable adverse impacts to the biological integrity or habitat sustainability of refuge resources.

By limiting the hunting area and providing sanctuary from human disturbance in other areas of the refuge, the waterfowl hunting program will not interfere with the refuge achieving its purposes of providing an inviolate sanctuary and a breeding ground for migratory birds. 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 hunting to occur on the refuge. Thus, allowing hunting to occur with stipulations will not materially detract or interfere with the purposes for which the refuge was established or the NWRS mission.

Hunting is one of the six wildlife-dependent recreational uses of the NWRS as stated in the Administration Act. This program as described was determined to be compatible because hunter use levels on CLNWR are relatively low, and sufficient restrictions ensure that high-quality feeding and resting habitat are available in relatively undisturbed areas to accommodate the needs of the waterfowl and other wildlife.

Mandatory 10- or 15-year Re-evaluation Date

Provide month and year for allowed uses only.

__X__ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses).

_____ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses).

NEPA Compliance for Refuge Use Decision

_____ Categorical Exclusion without Environmental Action Statement.

_____ Categorical Exclusion and Environmental Action Statement.

__X__ Environmental Assessment and Finding of No Significant Impact.

_____ Environmental Impact Statement and Record of Decision.

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Signatures

Project Leader: _____
(Signature and Date)

Refuge Supervisor: _____
(Signature and Date)

Regional Chief: _____
(Signature and Date)

Appendix C

Implementation Plan

Appendix C. Implementation Plan

C.1 Introduction

Implementation of the CCP will require increased funding, which will be sought from a variety of sources. This plan will depend upon additional congressional allocations, partnerships, and grants. There are no guarantees that additional federal funds will be made available to implement any of these projects. Other sources of funds will need to be obtained, both public and private. Activities and projects identified will be implemented as funds become available.

The CCP proposes several projects to be implemented over the next 15 years. Most of these projects are included in the Refuge Operational Needs System (RONS), such as new staff, or Service Asset Maintenance and Management System (SAMMS), such as deferred maintenance projects, which are used to request funding from Congress. Currently, a large backlog of maintenance needs exists for CLNWR. In 2012, the deferred maintenance backlog for CLNWR was $4,601,407. An attempt at reducing this backlog needs to be addressed and is included in the analysis of funding needs. Prioritized staffing needs identified in RONS will be necessary to implement the CCP to meet refuge goals and objectives and legal mandates.

Annual revenue sharing payments, associated with CLNWR in Klickitat County, will continue as deemed appropriate by Congress. The total payment made in 2012 was $44,373. Monitoring activities will be conducted on a percentage of all new and existing projects and activities to document wildlife populations and changes across time and habitat conditions and to responses to management practices.

C.2 Costs to Implement the CCP

The following sections detail both one-time and recurring costs for various projects in the plan. One-time costs reflect the initial costs associated with a project, whether it is purchase of equipment, contracting services, construction, a research project, etc. Recurring costs reflect the future operational and maintenance costs associated with the project. The following tables primarily document projects with a physically visible, trackable, on-the-ground component, such as structures, habitat restoration, research, monitoring, and surveys. The scope and costs for administrative activities, such as memorandums of understanding, reporting, and establishment of partnerships, are difficult to estimate in advance and thus are not accounted for in the tables below.

A. One-time Costs

One-time costs are project costs that have a start-up cost associated with them, such as purchasing a new vehicle for wildlife and habitat monitoring, or designing and installing an interpretive sign. Some are full project costs for those projects that can be completed in 3 years or less. One-time costs can include the cost of temporary or term salary associated with a short-term project. Salary for existing and new positions, and operational costs, are reflected in operational (or recurring) costs.

Funds for one-time costs will be sought through increases in refuge base funding, special project funds, and grants. Projects listed below in Table C-1 show one-time costs, such as those associated with building and facility needs including offices, public use facilities, road improvements, and new

signs. One-time costs are also associated with projects, such as habitat restoration, invasive plant and animal control, and research. New research projects, because of their short-term nature, are considered one-time projects and include costs of contracting services or hiring a temporary worker for the short-term project. Some project costs are taken from 2010 RONS or SAMMS proposals; others are not yet in any project database, and their costs have been estimated, particularly if the scope of the project is unknown at this time due to lack of baseline data.

C-1: Estimated one-time costs associated with implementation of the CCP.

Project Identifier	Project Description	Cost
Deferred Maintenance		
2010131638	Replace 24 miles of boundary fence	$836,000
10064594	Replace 8 water control structures	$307,000
2009945520	Repair 4 miles of levees and dikes	$1,521,000
2009945533	Rehabilitate 12,000 feet of Cold Springs Ditch and several feeder ditches	$735,000
2008867072	Repair Chapman Creek Canal at Laurel	$400,000
91100949	Replace 500 feet of above-ground powerlines at HQ	$35,000
TBD	Remove Kelley residence	$40,500
2007739719	Remove Kelley property storage sheds	$9,000
2008844420	Remove 2,850 square foot Kelley property barn	$32,000
2008866972	Remove Kelley property garage	$9,000
TBD	Remove Gambel residence	$40,500
TBD	Remove Gambel property storage sheds	$9,000
TBD	Replace Gambel property barn	$31,000
TBD	Remove Gambel property garage	$9,000
Visitor Facility Enhancements		
TBD	Exhibits for visitor contact station	$36,000
TBD	Construct new elevated observation platform on Willard Springs Trail	$57,000
	Construction of 3 new road pull-offs	$105,000
92100950	Replace directional signs	$22,300
TBD	Implementation of Visitor Experience Site Plan	$345,000 - 510,000
Refuge Operational Needs (Projects)		
TBD	Implement Silviculture Plan	$8,000
TBD	Rehabilitate 3,000 acres of Conboy Lake wet meadow habitat	$1,539,000

Acquisition		
TBD	Purchase additional lands for habitat connectivity and wildlife protection	$843,000
Research		
TBD	Assess wildlife and plant community response to management activities	$50,000

B. Annual Operational (Recurring) Costs

Operational 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 3 years.

The CCP will require increased funding for new or expanded public uses and facilities, habitat restoration and conservation activities, and new monitoring needs. This includes salary and operational expenditures, such as travel, training, supplies, utilities, and maintenance costs. Project costs include permanent and seasonal staff needed year after year to accomplish each project.

Table C-2: Reoccurring costs associated with implementation.

Annual Operating Costs	**Cost**
Implement and monitor silviculture program	$30,000
Survey and scientific assessment	$100,000
Inventory and monitoring activities	$90,000
Research	$50,000
Habitat management and restoration	$150,000
Regulatory and enforcement actions	$90,000
Public use opportunities and education	$64,000
Facilities maintenance	$100,000

C. Maintenance Costs

The maintenance need over the next 15 years is defined as funds needed to repair or replace buildings, equipment, and facilities. Maintenance includes preventative 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 costs include the maintenance backlog needs that have come due but are as yet unfunded, as well as the increased maintenance need associated with new facilities.

The facilities associated with CLNWR that require maintenance include trails, interpretive panels, regulatory signs, roads, water delivery systems, and buildings. Major equipment includes vehicles, tractors, other heavy equipment, and ATVs. Approximately 10-15% of operational (non-project) maintenance funding for MCRNWRC is expended on CLNWR; the other approximately 85-90% is

used to maintain the majority of facilities, including buildings and equipment, which are located on the other seven MCRNWRC refuges, which are not included in this Implementation Plan.

D. Staffing

Current and proposed staffing is shown in Table C-3. Two permanent full-time and two temporary positions serve CLNWR; all other current positions serve the other refuges within MCRNWRC. Because there is no separate budget for individual refuges, we have chosen to present the entire MCRNWRC staff in Table C-3. This does not include fire staff that serve the entire refuge complex. The have separate funding and have seasonally variable staff numbers.

Approximately 10% of current MCRNWRC staff time is expended on CLNWR covered under this CCP; the other approximately 90% of staff time is expended on the other refuges.

Table C-3: Current positions within MCRNWRC supporting CLNWR and proposed staff positions for CLNWR.

Staff-Refuge Operations	FTE	Staff Position	Complex Cost	Percent Time	CLNWR Cost	RONS Number
Project Leader	1	GS-0485-14	$140,692	10	$14,069	NA
Deputy Project Leader	1	GS-0485-13	$115,657	5	$5,783	NA
Deputy Project Leader	1	GS-0485-13	$119,060	15	$17,859	NA
Wildlife Biologist	1	GS-0486-13	$119,002	1	$1,190	NA
Supervisory Wildlife Biologist	1	GS-0486-12	$95,263	15	$14,289	NA
Planner	1	GS-0401-12	$108,705	10	$10,871	NA
Visitor Services Manager	1	GS-0025-12	$94,468	15	$14,170	NA
GIS Specialist	1	GS-0401-12	$102,538	5	$5,127	NA
Administrative Officer	1	GS-0341-11	$79,129	15	$11,869	NA
Park Ranger (Visitor Services)	1	GS-0025-11	$93,078	5	$4,654	NA
Supervisory Park Ranger (Law Enforcement)	1	GL-0025-11	$80,334		$0	NA
Park Ranger (Law Enforcement)	1	GL-0025-09	$62,690	10	$6,269	NA
Park Ranger (Law Enforcement)	1	GL-0025-09	$63,797	5	$3,190	NA
Park Ranger (Law Enforcement)	1	GL-0025-09	$67,579	5	$3,379	NA
Budget Technician	1	GS-0561-07	$51,980	15	$7,797	NA
Office Automation Clerk	1	GS-0303-05	$50,770	10	$5,077	NA
Refuge Manager	1	GS-0485-12	$94,402	1	$944	NA
Refuge Manager	1	GS-0485-12	$89,342	20	$17,868	NA
Wildlife Biologist	1	GS-0486-09	$76,927	0	$0	NA
Wildlife Biologist - Complex	1	GS-0486-09	$61,585	10	$6,159	NA
Engineering Equipment Operator	1	WG-5716-08	$65,799	5	$3,290	NA
Engineering Equipment	1	WG-5716-08	$61,120	5	$3,056	NA

Operator						
Engineering Equipment Operator	1	WG-5716-08	$65,799	5	$3,290	NA
Engineering Equipment Operator	1	WG-5716-10	$75,185	5	$3,759	NA
Engineering Equipment Operator	1	WG-5716-10	$75,185	5	$3,759	NA
Engineering Equipment Operator	1	WG-5716-08	$65,799	5	$3,290	NA
Maintenance Worker	1	WG-4749-08	$65,799	95	$62,509	NA
Wildlife Refuge Specialist	1	GS-0485-09	$67,067	0	$0	NA
Wildlife Refuge Specialist	1	GS-0485-09	$67,067	0	$0	NA
Wildlife Refuge Specialist	1	GS-0485-5/7/9	$61,585	90	$55,427	NA
Inventory &Monitoring Zone Biologist	1	GS-0486-12	$94,402	10	$9,440	NA
Visitor Services Specialist*	1	GS-0485-09	$71,011	50	$35,506	NA
Park Ranger*	1	GS-0025-05	$40,710	100	$40,710	FY08-6379
Park Ranger (Law Enforcement)*	1	GL-0025-09	$62,690	100	$62,690	TBD
Maintenance Worker*	1	WG-4749-06	$48,131	100	$48,131	FY08-1913
Biological Science Technician*	1	GS-0404-5/6	$45,380	100	$45,380	FY08-1912
Office Automation Clerk*	1	GS-0303-05	$40,710	100	$40,710	TBD
TOTALS	**37**		**$2,840,437**		**$571,511**	

* Additional staffing needs for CLNWR.

Table C-3 shows an increase by 10 full-time-equivalent (FTE) positions over current levels. Proposed additions include two in Visitor Services (Park Ranger), one Law Enforcement (Park Ranger), one Engineering Equipment Operator, two Maintenance Workers, one Wildlife Biologist, one Biological Technician, one Wildlife Refuge Specialist, and one Office Automation Clerk.

The two Visitor Services (Park Ranger) positions will be responsible for the environmental education and interpretation programs, as well as other wildlife-dependent recreational activities taking place on CLNWR. The environmental education program for CLNWR is currently volunteer-run by a few extremely ambitious and dedicated individuals. This program, if supported by a full-time staff member, could provide year-round environmental education to an underserved population. The interpretive and outreach program would be expanded to include bilingual signage and programs, as well as focused expansion of recreational opportunities to more appropriately incorporate the social demographic of the surrounding communities.

The Law Enforcement Officer (Park Ranger) position is needed to help prevent an increase in illegal actions currently taking place on CLNWR. Over the last decade there has been an increase in drug trafficking, drug production, vandalism, gang activity, and violent crimes within the surrounding communities and on CLNWR. This position will provide active law enforcement for both natural resource and general law enforcement issues currently on the refuge.

With a backlog of over 20 million dollars in deferred maintenance, the two additional Maintenance Workers and the Engineering Equipment Operator will help decrease the maintenance backlog, providing habitat management support (i.e., spraying of invasive species) and restoration activities (i.e., Camas Prairie Restoration). These positions will help prevent additional facilities and assets from falling into disrepair and thus further increasing the maintenance backlog.

The two Biologist positions will fill out the biological staff to conduct inventory and monitoring, research, and surveys to fully assess the biological capacity of CLNWR. These positions will support the outlined needs in Goal 4 to further the management of CLNWR, both as a refuge and in a larger scope as part of the Great Northern Landscape Conservation Cooperative.

The Wildlife Refuge Specialist and Office Automation Clerk will provide administrative support for all aspects relating to the management of CLNWR. The Wildlife Refuge Specialist will work on additional habitat and restoration needs, as well as complete the step-down plans enumerated in the next section.

E. Budget Summary

Table C-4 summarizes the data from tables C-1 and C-2.

Table C-4, Budget Summary for one-time projects and annual funding needs for CLNWR as identified in the CCP.

Activity Description	**One Time Costs**	**Recurring**
Surveys and scientific assessments	$50,000	$100,000
Inventory and monitoring activities	$60,000	$90,000
Research	$200,000	$50,000
Habitat management and restoration	$1,555,000	$180,000
Regulatory and enforcement actions	$50,000	$90,000
Public use opportunities and education	$730,300	$64,000
Facilities maintenance	$4,014,000	$100,000
Total Costs	$6,659,300	$644,000

C.3 Step-down Plans

Step-down plans are prepared when they are required by Service policy or when they are needed to provide additional details to implement the CCP. The following table identifies step-down plans, their status, and relationship to this CCP.

Step-down Plan	**Status**
Inventory and Monitoring Plan (IMP)	Within 5 year of CCP approval
Visitor Services Plan	Within 6 years of CCP approval
Fire Management Plan	Current as Complex Plan
Cultural Resources Management Plan	Within 6 years of CCP approval
Safety Plan	Current - Updated annually
Habitat Management Plan	Within 5 years of CCP approval
Hunting Plan	Within 5 years of CCP approval
Landscape Design Standards/Aesthetics Plan	Within 10 years of CCP approval
Law Enforcement and Emergency Response Plan	Within 7 years of CCP approval
Land Protection Plan	Within 5 years of CCP approval

Appendix D

Wilderness and Wild and Scenic Rivers

Appendix D. Wilderness and Wild and Scenic Rivers

D.1 Wilderness Assessment

Policy for Wilderness Reviews

Service policy (Part 602 FW 3.4 C. (1)(c)) requires that wilderness reviews be completed as part of the CCP process. This review includes the re-evaluation of refuge lands existing during the initial 10-year review period of the Wilderness Act of 1964 (16 U.S.C. 1131-1136), as amended, as well as new lands and waters added to the NWRS since 1974. A preliminary inventory of the wilderness resources is to be conducted during pre-acquisition planning for new or expanded refuges (341 FW 2.4 B., Land Acquisition Planning). NWRS policy on Wilderness Stewardship (610 FW 1-5) includes guidance for conducting wilderness reviews (610 FW 4. Wilderness Review and Evaluation).

Service Criteria for Evaluating Lands for the National Wilderness Preservation System

The Wilderness Act provides the following description of wilderness:

> *A wilderness, 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 Act as 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 . . .*

The following criteria for identifying areas as wilderness are outlined in Section 2(c) of the Wilderness Act and are further expanded upon in NWRS policy (610 FW 4). The first three criteria are evaluated during the inventory phase; the fourth criterion is evaluated during the study phase.

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 5,000 acres of land, or is of a 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 historic value.

Criterion 3 is further defined in Section 3(c) of the Wilderness Act as: 1) a roadless area of 5,000 contiguous acres or more; or 2) a roadless island. Roadless is defined as the absence of improved roads suitable and maintained for public travel by means of 4-wheeled, motorized vehicles that are intended for highway use.

As noted in Chapter 2, the CCP team also included criteria used in the Hanford Reach National Monument review, which in turn were taken in part from the BLM's Utah wilderness assessment. Chief among the reasons these additional criteria were employed is that Service policy does not account for the ability to control use by others on the land, which will be discussed below.

The Wilderness Review Process

A wilderness review is the process of determining whether the Service should recommend NWRS lands and waters to Congress for wilderness designation. The wilderness review process consists of three phases: wilderness inventory, wilderness study, and wilderness recommendation.

Wilderness Inventory

The inventory is a broad look at a refuge to identify lands and waters that meet the minimum criteria for wilderness—size, naturalness, and outstanding opportunities for solitude or primitive and unconfined types of recreation. All areas meeting the criteria are preliminarily classified as Wilderness Study Areas (WSAs). If WSAs are identified, the review proceeds to the study phase.

Wilderness Study

During the study phase, WSAs are further analyzed:

- For all values of ecological, recreational, cultural, economic, and/or symbolic value.
- For all resources, including wildlife, vegetation, water, minerals, and soils.
- For existing and proposed public uses.
- For existing and proposed refuge management activities within the area.
- To assess the refuge's ability to manage and maintain the wilderness character in perpetuity, given the current and proposed management activities. Factors for evaluation may include, but are not limited to, staffing and funding capabilities, increasing development, urbanization, public uses, and safety.

If areas are found that qualify as WSAs, the Service compares the benefits and impacts of managing the area as wilderness (All-Wilderness Alternative) as opposed to managing the area under an alternate set of goals, objectives, and strategies that do not involve wilderness designation (No-Wilderness Alternative). The Service may also develop Partial-Wilderness Alternatives that evaluate the benefits and impacts of managing portions of a WSA as wilderness.

In the alternatives, we evaluate:

1) The benefits and impacts to wilderness values and other resources.
2) How each alternative will achieve the purposes of the Wilderness Act and the National Wilderness Preservation System (NWPS).
3) How each alternative will affect achievement of refuge purpose(s) and the refuge's contribution toward achieving the NWRS mission.
4) How each alternative will affect maintaining and, where appropriate, restoring biological integrity, diversity, and environmental health at various landscape scales.
5) Other legal and policy mandates.
6) Whether a WSA can be effectively managed as wilderness by considering the effects of existing private rights, land status and service jurisdiction, refuge management activities and refuge uses and the need for, or possibility of, eliminating Section 4(c) prohibited uses.

Wilderness Recommendation

If the wilderness study demonstrates that a WSA meets the requirements for inclusion in the NWPS, a wilderness study report will be written that presents the results of the wilderness review, accompanied by a legislative environmental impact statement (LEIS). The wilderness study report and LEIS that support wilderness designation are then transmitted through the Secretary of the Interior to the President of the United States and ultimately to the United States Congress for action. Refuge lands recommended for wilderness consideration by the wilderness study report will retain their WSA status and be managed as "...wilderness according to the management direction in the final CCP until Congress makes a decision on the area or we amend the CCP to modify or remove the wilderness recommendation" (610 FW 4.22B). When a WSA is revised or eliminated, or when there is a revision in "wilderness stewardship direction, we include appropriate interagency and tribal coordination, public involvement, and documentation of compliance with NEPA" (610 FW 3.13).

Lands Considered Under This Wilderness Review

All Service-owned lands and waters (in fee title) within the CLNWR acquired boundary were considered during this wilderness review.

Wilderness Inventory

The first step of the wilderness assessment is to divide the refuge or other management entity into preliminary wilderness evaluation units. The boundaries of these artificial units can follow the refuge boundary, but not cross permanent roadways, private or other non-Federal lands, or non-Service-owned waterways. These roads, non-Federal lands, or waterways can form the boundary for an individual evaluation unit. Other obvious incompatible wilderness uses or structures (such as refuge headquarters, residential areas, rights-of-way, non-jurisdictional waters) may also be eliminated from any evaluation units at this time. Once boundaries have been established for each individual evaluation unit, the criteria in 2.1–2.3 are applied to determine each unit's suitability as potential wilderness and need for further evaluation under the wilderness study.

Unit Size

Roadless areas meet the size criteria if any one of the following standards apply:

1) An area with over 5,000 contiguous acres solely in Service ownership.
2) A roadless island of any size. A roadless island is defined as an area surrounded by permanent waters or an area that is markedly distinguished from the surrounding lands by topographical or ecological features.
3) An area of less than 5,000 contiguous Federal acres that is of sufficient size as to make practicable its preservation and use in an unimpaired condition and of a size suitable for wilderness management.
4) An area of less than 5,000 contiguous Federal acres that is contiguous with a designated wilderness, recommended wilderness, or area under wilderness review by another Federal wilderness managing agency, such as USFS, NPS, or BLM.

On CLNWR, there are no areas of 5,000 acres or more that meet these criteria. In fact, there are no areas greater than 1,000 acres that meet these criteria. The largest area without significant,

disqualifying man-made intrusions is less than 700 acres; this area is not of sufficient size to be effectively managed as wilderness. All other roadless areas are far smaller.

Naturalness and Wildness

The area must meet the criteria of generally appearing to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable. This criterion must be evaluated in the context of current natural conditions and societal values and expectations without compromising the original intent of the Wilderness Act. It is well recognized that there are few areas remaining on the planet that could be truly classified as primeval or pristine, with even fewer, if any, existing in the conterminous United States. Few areas exist that do not exhibit some impact from anthropogenic influences, be it noise, light, or air pollution; water quality or hydrological manipulations; past and current land management practices; road or trails; suppression of wildfires; invasions by non-native species of plants and animals; or public uses. While allowing for the near-complete pervasiveness of modern society on the landscape, the spirit of the Wilderness Act is to protect lands that still retain the wilderness qualities of being natural, untrammeled, and undeveloped. These three qualities are cornerstones of wilderness character. For areas proposed or designated as wilderness, wilderness character must be monitored to determine baseline conditions and thereafter be periodically monitored to assess the condition of these wilderness qualities. Proposed and designated wilderness areas by law and policy are required to maintain wilderness character through management and/or restoration in perpetuity.

Defining the first two qualities (natural and untrammeled) requires a knowledge and understanding of the ecological systems which are being evaluated as potential wilderness. Ecological systems are comprised of three primary attributes: composition, structure, and function. Composition is the components that make up an ecosystem, such as the habitat types, native species of plants and animals, and abiotic (physical and chemical) features. These contribute to the diversity of the area. Structure is the spatial arrangement of the components that contribute to the complexity of the area. Composition and structure are evaluated to determine the naturalness of the area. Function is the processes that result from the interaction of the various components, both temporally and spatially, and the disturbance processes that shape the landscape. These processes include, but are not limited to, predator-prey relationships, insect and disease outbreaks, nutrient and water cycles, decomposition, fire, windstorms, flooding, and both general and cyclic weather patterns. Ecological functions are evaluated to determine the wildness or untrammeled quality of the area.

The third quality assessment is whether an area is undeveloped. Undeveloped refers to the absence of permanent structures such as roads, buildings, dams, fences, and other man-made alterations to the landscape. Exceptions can be made for historic structures or structures required for safety or health considerations, provided they are made of natural materials and relatively unobtrusive on the landscape.

General guidelines used for evaluating areas for wilderness potential during this wilderness inventory process include:

1) The area should provide a variety of habitat types and associated abiotic features, as well as a nearly complete complement of native plants and wildlife indicative of those habitat types. Non-native and invasive species should comprise a negligible portion of the landscape.

2) The area should be spatially complex (vertically and/or horizontally) and exhibit all levels of vegetation structure typical of the habitat type, have an interspersion of these habitats, and provide avenues for plant and wildlife dispersal.
3) The area should retain the basic natural functions that define and shape the associated habitats including, but not limited to, flooding regimes, fire cycles, unaltered hydrology and flowage regimes, and basic predator-prey relationships, including herbivory patterns.
4) Due to their size, islands may not meet the habitat guidelines in 1 and 2 above. Islands should, however, exhibit the natural cover type with which it evolved and continue to be shaped and modified by natural processes. Islands should be further analyzed during the study portion of the review if they provide habitat for a significant portion of a population, or key life cycle requirements for any resources of concern, or listed species.
5) Potential wilderness areas should be relatively free of permanent structures or man-made alterations. Areas may be elevated to the study phase if existing structures or alterations can be removed or remediated within a reasonable timeframe and prior to wilderness recommendation to the Secretary of the Interior.

This section is somewhat redundant with the section on unit size in that many of the same standards that limit roadless area size are also defined here (infrastructure, man-made intrusions, etc.). As noted above, infrastructure—roads, power lines, irrigation canals, farm fields, etc.—limits the size of areas on CLNWR that might meet wilderness criteria. Here, taking into account the extreme unnaturalness of the landscape, the few large areas of CLNWR that do not have man-made objects lie within artificial ecosystems. The areas are altered by past farming and timber activities to such an extent that one cannot reasonably argue that they are natural in character or are wild, as defined above.

Outstanding Solitude or Primitive or Unconfined Recreation

A designated wilderness area must provide outstanding opportunities for solitude, or a primitive and unconfined type of recreation. Possession of only one of these outstanding opportunities is sufficient for an area to qualify as wilderness, and it is not necessary for one of these outstanding opportunities to be available on every acre. Furthermore, an area does not have to be open to public use and access to qualify under these criteria.

Opportunities for solitude refers to the ability of a visitor to be alone and secluded from other visitors in the area. Primitive and unconfined recreation means non-motorized, dispersed, outdoor recreation activities that are compatible and do not require developed facilities or mechanical transport. Primitive recreation activities may provide opportunities to experience challenge and risk, self-reliance, and adventure.

Of the large areas on CLNWR, these areas could provide for solitude, although given the developed nature of the area in general, there are little, if any, opportunities for challenge, risk, self-reliance, and adventure in the manner generally thought of as wilderness.

Inventory Summary and Conclusion

As defined above, no areas on CLNWR meet the minimum criteria for wilderness, other than the opportunity for solitude. In addition, not considered above is the impact wilderness designation would make on meeting wildlife and habitat goals, i.e., meeting the purposes for which CLNWR was established. In order to successfully manage the refuge to meet its purposes, the Service has

determined that mechanized timber harvest, haying, and grazing are needed. While grazing could be accomplished within the context of wilderness, mechanized timber harvesting and commercially viable haying cannot. Therefore, even if an area were deemed to be of such natural value despite its limited size and therefore eligible for designation, it would not be suitable for designation.

D.2 Wild & Scenic Rivers Assessment

By the 1960s, there was sufficient concern over the seemingly inexorable loss of free-flowing rivers that Congress decided to intervene. The result was passage of legislation to preserve forever in a free-flowing condition some of the nation's most precious rivers. This legislation—the Wild and Scenic Rivers Act (WSRA)—was signed into law (Public Law 90-542, as amended) on October 2, 1968, establishing the National Wild and Scenic Rivers System (National System). Section 1(b) of the Act expresses Congressional policy for America's rivers:

> *It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. The Congress declares that the established national policy of dam and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital conservation purposes.*

The heart of the WSRA is protection of free-flowing character. Free-flowing is defined in the Act as "...existing or flowing in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway. The existence, however, of low dams, diversion works, and other minor structures at the time any river is proposed for inclusion in the national wild and scenic rivers system shall not automatically bar its consideration for such inclusion ..." To protect free-flowing character, the Federal Energy Regulatory Commission (which licenses non-Federal hydroelectric projects) is not allowed to license construction for dams, water conduits, reservoirs, powerhouses, and transmission lines, or other project works on, or directly affecting, wild and scenic rivers. Other Federal agencies may not assist by loan, grant, license, or otherwise any water resource project which would have a direct and adverse effect on the values for which a river was designated.

Rivers in the National System are classified as wild, scenic, or recreational. This terminology has caused frequent confusion: wild rivers are not necessarily fast-moving whitewater rivers, scenic rivers may not be noted for scenic values, and recreational rivers may not receive heavy public use. The labels actually refer to the degree of development along the river. The definitions of wild, scenic, and recreational from the law are:

- *Wild river areas — Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.*

- *Scenic river areas — Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.*
- *Recreational river areas — Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.*

Rivers in the National System are often referred to as wild and scenic rivers without regard to actual classification. This is acceptable when speaking of the National System in general, but the specific legal classification is an important distinction as it has a direct effect on how the river is administered and whether certain activities on federally owned land within the boundaries are permissible. Regardless of classification, each designated river is administered with the goal of nondegradation and enhancement of the values which caused it to be designated.

The WSRA requires that, to be eligible for inclusion in the National System, a river or river segment must be free-flowing (as defined by the Departments of Agriculture and the Interior) and, with its immediate environment, must possess one or more outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values (i.e., it must have at least one resource important to the region or nation).

Free-Flowing Condition

Free-flowing, as defined in Section 16(b) of the WSRA, is applied to any river or section of a river, and means:

> *. . . existing or flowing in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway. The existence, however, of low dams, diversion works, and other minor structures . . . shall not automatically bar its consideration for inclusion: Provided, that this shall not be construed to authorize, intend, or encourage future construction of such structures within components of the National Wild and Scenic Rivers System.*

Outstandingly Remarkable Values

The second criterion that a river must meet to be eligible for inclusion in the National System is that it must possess one or more outstandingly remarkable resources important to the region or nation. The term "outstandingly remarkable" is not precisely defined in the WSRA. As directed by 1982 interagency guidelines, the determination of whether or not a river area contains outstandingly remarkable resources is based on the professional judgment of the study team. However, USFS and BLM in the Pacific Northwest developed standards for certain categories of values; these standards have become widely accepted by both agencies and have been used extensively by NPS. Under the USFS/BLM criteria, the river is judged on eight different classes of resources: scenic, recreational, geological, fish, wildlife, prehistoric, historic, and a catch-all category, other, as described below.

Recreation Resources

> Recreational opportunities are, or have the potential to be, unique enough to attract visitors from outside the region of comparison. Visitors are willing to travel long distances to use the river

resources for recreational purposes. River-related opportunities could include, but are not limited to, sightseeing, wildlife observation, camping, photography, hiking, fishing, hunting, and boating/rafting.

Interpretive opportunities may be exceptional and attract, or have the potential to attract, visitors from outside the region of comparison.

The river may provide, or have the potential to provide, settings for national or regional usage or competitive events.

Fish

Fish values may be judged on the relative merits of either fish populations or habitat or Native American cultural use, or a combination of these river-related conditions. Consideration shall be given for potential as well as existing values.

The river is internationally, nationally, or regionally an important producer of resident and/or anadromous fish species. Of particular significance is the presence of wild stocks and/or Federal- or State-listed threatened, endangered, and sensitive species. Diversity of species is an important consideration and could, in itself, lead to a determination of outstandingly remarkable.

Wildlife

Wildlife values shall be judged on the relative merits of either wildlife populations or habitat or Native American cultural use or a combination of these conditions.

Populations. The river or area within the river corridor contains nationally or regionally important populations of indigenous wildlife species. Of particular significance are species considered to be unique, or populations of Federal- or State-listed or candidate threatened, endangered and sensitive species. Diversity of species is an important consideration and could in itself lead to a determination of outstandingly remarkable.

Habitat. The river or area within the river corridor provides exceptionally high quality habitat for wildlife of national or regional significance, or may provide unique habitat or a critical link in habitat conditions for Federal- or State-listed or candidate threatened, endangered, and sensitive species. Contiguous habitat conditions are such that the biological needs of the species are met. Diversity of habitats is an important consideration and could, in itself, lead to a determination of outstandingly remarkable.

Scenic/Aesthetic Resources

The landscape elements of landform, vegetation, water, color, and related factors result in notable or exemplary visual features and/or attractions. When analyzing scenic values, additional factors such as seasonal variations in vegetation, scale of cultural modifications, and the length of time of negative intrusions are viewed may be considered. Scenery and visual attractions may be highly diverse over the majority of the river or river segment.

Geological Resources

> The river or the area within the river corridor contains an example(s) of a geologic feature, process, or phenomena that is rare, unusual, or unique to the region of comparison. The feature(s) may be in an unusually active stage of development, represent a textbook example, and/or represent a unique or rare combination of geologic features (erosional, volcanic, glacial and other geologic structures).

Prehistoric Resources

> The river or area within the river corridor contains a site(s) where there is evidence of occupation or use by Native Americans. Sites must have rare or unusual characteristics or exceptional human interest value(s). Sites may have national or regional importance for interpreting prehistory; may be rare and represent an area where a culture or cultural period was first identified and described; may have been used concurrently by two or more cultural groups; or may have been used by cultural groups for rare or sacred purposes.

Historic Resources

> The river or area within the river corridor contains a site(s) or feature(s) associated with a significant event, an important person, or a cultural activity of the past that was rare, unusual, or one-of-a-kind in the region. An historic site(s) and/or feature(s) in most cases is 50 years or older.

Other Values

While most river values of regional or national significance can be described under one of the other categories, sometimes there is a resource or traditional use of the river that is unique and does not fit any of the standard categories. An example can be found on the Klamath River in Oregon. There, BLM and NPS found that the river had been used continuously by three different Native American tribes for religious and spiritual purposes for at least the last 7,000 years. The agencies determined this to be a unique, nationally significant value, and Native American Traditional Use was determined to be an outstandingly remarkable resource. The criterion is:

> While no specific national evaluation guidelines have been developed for the other similar values category, assessments of additional river-related values consistent with the foregoing guidance will be completed, including, but not limited to, hydrologic, paleontologic, ecologic, and botanic resources.

Inventory Summary and Conclusion

As defined above, no areas on CLNWR meet the definition of free-flowing as the waterways are extensively channelized, and further analysis was not done. Had any waterways on CLNWR met the standard of free-flowing, it is likely that the presence of Oregon spotted frogs would have met the standard for an outstandingly remarkable value. However, both conditions must be met, and no streams qualify for wild and scenic river eligibility.

Appendix E

Management Priorities

Appendix E. Management Priorities
(Conservation Targets)

BIDEH

The following habitats are found on the refuge and are considered priorities under the concept of Biological Integrity, Diversity, and Environmental Health (BIDEH):

- Ponderosa Pine Forest
- Mixed Conifer Forest
- Lodgepole Forest
- Riparian Forest and Shrublands
- Freshwater Marshes
- Oregon White Oak Woodlands
- Quaking Aspen Stands
- Riparian
- Emergent Wetland/Wet Meadow
- Permanent Wetlands/Creeks and Canals

Habitats (Plant Communities) Represent Existing BIDEH	Population/Habitat Attributes (Age Class, Structure, Serial Stage, Species Composition)	Natural Processes Responsible For Conditions	Limiting Factors
Ponderosa Pine	Stands comprised of large patches of older forest with large snags. Common understory shrubs and herbs include snowberry (*Symphocarpus spp.*), wild rose (*rosa spp.*), bitterbrush (*Purshia tridentata*), bracken fern (*Pteridium aquilinum*), various native bunchgrasses, and other grass species. Typically associated with adjacent stands of lodgepole pine and aspen. Stands dominated by large, well-spaced ponderosa pine trees, with some areas of small trees in even-age groups one to several acres in size. Understory trees and secondary forest canopies generally absent. Small, scattered areas consist of more dense forest, with greater development of	Frequent, low-intensity ground fires, possibly every 5 to 45 years. Insects, including pine butterfly (*Noephasia menapia*), western pine beetle, and mountain pine beetle. Windfall.	Logging. Fire exclusion. Development. Stand replacement fires. Agriculture.

Habitats (Plant Communities) Represent Existing BIDEH	Population/Habitat Attributes (Age Class, Structure, Serial Stage, Species Composition)	Natural Processes Responsible For Conditions	Limiting Factors
	understory trees, including grand fir and Douglas-fir, and snags. The forest structure is not uniform. It is a mosaic of different ages and sizes, although generally very open in nature. Over time, many of the large trees would be very old, on the order of 300 years. *Potential Conservation* - White-headed woodpecker - Chipping sparrow - *Astragalus pulsiferae* - Flammulated owl - Lewis' woodpecker - *Mimulus pulsiferae*		
Lodgepole/ Ponderosa Pine	Stands are even-aged, but a variety of age and size classes would be represented across the landscape. Understories have varying fuel levels, including large down logs. Snags are numerous. Stands would be healthy, with endemic levels of mountain pine beetle and other insect use. *Potential Conservation* - Black-backed woodpecker	Windthrow. Insects, such as mountain pine beetle. Disease. Stand replacement fires.	Logging. Flooding. Agriculture. Draining. Development.
Mixed Conifer Stands	Stands are late-successional mixed conifer forests comprised of Douglas-fir, ponderosa pine, and grand fir as the primary tree species with Oregon white oak present in minor amounts. Forests dominated by large, well-spaced Douglas-fir and ponderosa pine trees. Scattered areas consist of a more dense forest with a greater development of understory trees, including	Infrequent fire. Disease. Insects.	Logging. Agriculture. Development.

Habitats (Plant Communities) Represent Existing BIDEH	Population/Habitat Attributes (Age Class, Structure, Serial Stage, Species Composition)	Natural Processes Responsible For Conditions	Limiting Factors
	grand fir, Douglas-fir, and snags. *Potential Conservation* - Black-backed woodpecker - Townsend's warbler - Varied thrush - Hermit thrush - Olive-sided flycatcher		
Oregon White Oak	Interspersed with conifers or in small, pure groups. *Potential Conservation* - Western gray squirrel	Shallow, droughty soils. Periodic fire.	Fire exclusion. Development.
Quaking Aspen	Aspen are found on the valley floor, adjacent to wetlands. Aspen grows in clones, with many stems that originate from the same genotype. The species sprouts prolifically from the root suckers produced on the shallow lateral roots.	Seasonal high soil moisture/flooding. Fire. Insects. Disease.	Draining. Development. Grazing.
Emergent Wetland	Seasonal; semi-permanent; permanent. Sedges, rushes, spike rushes, cattails, and forbs. *Potential Conservation* - Waterfowl - Canada goose - Sandhill crane - Oregon spotted frog - Shorebirds - Oregon coyote-thistle - Rosy owl-clover - Kellog's rush - Dwarf rush - Long-bearded sego lily	Periodic flooding; seasonal fluctuations/drying. Periodic fire. Intermittent grazing. Beaver dams.	Agriculture. Grazing. Invasive species, especially reed canarygrass. Draining. Dikes. Development. Fire exclusion. Woody plant encroachment.

Upland (Mesic) Meadow	Transition zone between wet meadow and forested habitats. A mix of grasses and forbs.	Periodic fire. Well-drained soils.	Agriculture. Grazing. Invasive species, especially cheatgrass, meadow knapweed. Draining. Dikes. Development. Fire exclusion. Woody plant encroachment.
Riparian	Occurring along irrigation and drainage ditches. Dominated by aspens, alders, and willows.	Space and moisture availability along creeks and streams.	Agriculture. Grazing. Draining. Dikes. Development.

Refuge Purpose Species & Habitats

Species, Species Group, or Habitat	Supporting Habitat Type(s)	Life History Requirement(s)	Documentation
Waterfowl nesting	Emergent marsh, permanent and seasonal wetlands, agricultural pastures, wet meadow, grasslands	Nesting cover, feeding areas, brood rearing habitats, hiding cover	MBCC
Migrating ducks and geese	Emergent marsh, permanent and seasonal wetlands, agricultural pastures, wet meadow, grasslands	Resting areas, loafing areas, hiding cover, security, feeding areas, staging, flocking	MBCC
Mallard	Emergent marsh, permanent and seasonal wetlands, agricultural pastures, wet meadow, grasslands	Nesting cover, feeding areas, brood rearing habitats, hiding cover, resting areas, loafing areas, security, staging, flocking, breeding	MBCC
Northern pintail	Emergent marsh, permanent and seasonal wetlands, agricultural pastures, wet meadow, grasslands	Nesting cover, feeding areas, brood rearing habitats, hiding cover, resting areas, loafing areas, security, staging, flocking, breeding	MBCC
Cinnamon teal	Emergent marsh, permanent and seasonal wetlands, agricultural	Nesting cover, feeding areas, brood rearing habitats, hiding	MBCC

Species, Species Group, or Habitat	Supporting Habitat Type(s)	Life History Requirement(s)	Documentation
	pastures, wet meadow, grasslands	cover, resting areas, loafing areas, security, staging, flocking, breeding	
Wood ducks	Emergent marsh, permanent and seasonal wetlands, agricultural pastures, wet meadow, grasslands, including forested zones	Nesting cover, feeding areas, brood rearing habitats, hiding cover, resting areas, loafing areas, security, staging, flocking, breeding	MBCC
Canada geese	Emergent marsh, permanent and seasonal wetlands, agricultural pastures, wet meadow, grasslands	Nesting cover, feeding areas, brood rearing habitats, hiding cover, resting areas, loafing areas, security, staging, flocking, breeding	MBCC
Greater Sandhill crane	Emergent marsh, permanent and seasonal wetlands, agricultural pastures, wet meadow, grasslands	Nesting cover, feeding areas, available prey base, colt rearing habitats, hiding cover, resting areas, loafing areas, security, staging, flocking, breeding	MBCC
Resident wildlife	Emergent marsh, permanent and seasonal wetlands, agricultural pastures, wet meadow, grasslands and associated upland habitat and forested areas	Cover, feeding areas, rearing habitats, hiding cover, resting areas, loafing areas, security, breeding	MBCC

Species Priorities

The key below applies to the tables that appear in the remainder of this appendix.

Refuge Purpose Species
X = Covered under refuge purposes

BIDEH (Biological Integrity, Diversity, and Environmental Health)
X = Species or habitats covered under BIDEH

Federal T&E Species
FE = Federal Endangered
FT = Federal Threatened
FC = Federal Candidate
FCo = Federal Species of Concern

State T&E Species
SE = State Endangered
ST = State Threatened
SC = State Candidate
SS = State Sensitive
SM = State Monitored

BCC (Birds of Conservation Concern) (U.S. Fish and Wildlife Service 2008)
X = Listed as Species of Concern Under Bird Conservation Region 5, Service Region 1, and Nationally.

Partners in Flight (PIF) Tier (Rosenberg, K.V. 2004. Partners in Flight Continental Priorities and Objectives Defined at the State and Bird Conservation Region Levels, Washington. Cornell Lab of Ornithology.)

Tier I = High Continental Importance: Species on the continental Watch List, which are typically of conservation concern throughout their range.

Tier II = High Regional Priority: Species that are of moderate continental priority (not on continental Watch List), but are important enough to consider for conservation within a region because of various combinations.

Tier IIA = High Regional Concern: Species that are experiencing declines in the core of their range and that require conservation action to reverse or stabilize trends.

Tier IIB = High Regional Responsibility: Species for which this region shares in the responsibility for long-term conservation, even if they are not currently declining or threatened. These are species of moderate overall priority with a disproportionately high percentage of their total population in the region.

Tier IIC = High Regional Threats: Species of moderate overall priority that are uncommon in a region and whose remaining populations are threatened, usually because of extreme threats to sensitive habitats.

Birds of Management Concern (**BMC)** (U.S. Fish and Wildlife Service, Division of Migratory Birds)

GBBDC = Game Birds Below Desired Condition

Washington State Wildlife Action Plan

X = Identified by plan as Species of Greatest Conservation Needs

Shorebird Plan (Drut, M.S., and Buchanan, J.B. 2000. Northern Pacific Coast Regional Shorebird Management Plan.)

1 = No Risk
2 = Low Concern
3 = Moderate Concern
4 = High Concern
5 = Highly Imperiled

Waterbird Plan

1 = Lowest Concern
2 = Low Concern
3 = Moderate Concern
4 = High Concern
5 = Highest Concern

Waterfowl Plan (North American Waterfowl Management Plan, 2004 Strategic Guidance. Breeding population trends in North America.)

N = No Trend
I = Increasing
D = Decreasing
NE = No Estimate

The Nature Conservancy (TNC)-ECMPWC (The Nature Conservancy and Washington Department of Fish and Wildlife. 2007.)

X = Conservation Target Species

Washington Natural Heritage Program, State Rank (WA NHP S Rank)

S1 = Critically Imperiled
S2 = Imperiled
S3 = Rare or Uncommon
S4 = Apparently Secure
S5 = Demonstrably Secure in State

Plant Priority Species

Common Name	BIDEH	FED T&E	STATE T&E	State Plan	TNC	WA NHP S Rank
Plants	x					
Ames' Milk-vetch	x	FCo	SE			S1
Long-bearded Sego Lily	x	FCo	SS			S2, S3
Oregon Coyote-thistle	x		ST			S1
Rosy Owl-clover	x		SE			S1
Dwarf Rush	x		ST			S1

Insect Priority Species

Common Name	BIDEH	FED T&E	STATE T&E	State Plan	TNC	WA NHP S Rank
Insects	x					
Mardon Skipper	x		SE	x	x	S1

Amphibian Priority Species

Common Name	BIDEH	FED T&E	STATE T&E	State Plan	TNC	WA NHP S Rank
Amphibians	x					
Oregon Spotted Frog	x	FC	SE		x	S1

Mammal Priority Species

Common Name	BIDEH	FED T&E	STATE T&E	State Plan	TNC	WA NHP S Rank
Mammals	x					
Townsend's Big-eared Bat		FCo	SC	x	x	S2, S3
Pallid Townsend's Big-eared Bat		FCo	SC	x	x	S2, S3
Long-eared Myotis		FCo	SM			S4
Western Gray Squirrel		FCo	ST	x	x	S2

Bird Priority Species

Common Name	Refuge Purpose	BIDEH	FED T&E	STATE T&E	BCC #5	BCC R1 Status	BCC National	PIF	BMC R1 Status	State Plan	Shorebird Plan	Waterbird Plan	Waterfowl Plan	TNC	WA NHP S Rank
Waterfowl	x	x													
Ducks/Geese (Migrating/Wintering)	x	x												x	
Dabbling Ducks (Nesting)	x	x													
Diving Ducks (Nesting)	x	x													
Canada Geese (Resting/Wintering Habitat)	x												NE		S5
Pacific White-fronted Goose	x	x							GBBDC				I		S3, S4
Tundra Swan	x												N	x	
Wood Duck	x								GBBDC				I		S3
Green-winged Teal	x												I		S3, S4
Mallard	x												N		S5
Northern Pintail	x								GBBDC	x			D		S3, S4
Cinnamon Teal	x												N		S5
American Wigeon	x								GBBDC				N		S4, S5
Ring-necked Duck	x								GBBDC	x			I		S3, S4
Lesser Scaup	x								GBBDC	x			D		S3, S4
Bufflehead	x												I	x	S4
Common Goldeneye	x												N		S5
Hooded Merganser	x												I		S3, S4
Common Merganser	x												I		S3, S4
Raptors		x													
Bald Eagle (Nesting/Roosting)			FCo	SS	x	x	x			x				x	S4
Northern Harrier							x								S3
Cooper's Hawk								IIA							S4
Northern Goshawk			FCo	SC	x					x				x	S2, S3
Golden Eagle				SC						x				x	S3

Common Name	Refuge Purpose	BIDEH	FED T&E	STATE T&E	BCC #5	BCC R1 Status	BCC National	PIF	BMC R1 Status	State Plan	Shorebird Plan	Waterbird Plan	Waterfowl Plan	TNC	WA NHP S Rank
Peregrine Falcon			FCo	SS	x	x	x	IIC		x				x	S2, S3
Game Birds															
Ruffed grouse								IIA							S5
California quail								IIA							
Marshbirds/ Waterbirds	x	x													
Pied-billed Grebe	x											4			S4, S5
Great Blue Heron	x			SM						x				x	S4, S5
American Bittern	x											4			S3, S4
Virginia Rail	x											3			S3, S4
Sora	x											4			S4
American Coot	x											2			S4
Sandhill Crane (Nesting/Brood Habitat)	x	x		SE						x				x	S1, S3
Shorebirds	x	x												x	
Killdeer	x										4			x	S4, S5
Greater Yellowlegs	x										4				S4, S5
Lesser Yellowlegs	x				x		x				2				S4
Spotted Sandpiper	x										3				S3, S4
Wilson's Phalarope	x						x				3				S3
Wilson's Snipe	x										4				S4, S5
Owls															
Flammulated Owl				SC		x	x			x				x	S3
Western Screech Owl								IIA							S4
Songbirds		x													
Vaux's Swift				SC				IIB		x				x	S3, S4
Rufous Hummingbird					x	x	x	I	X					x	S4
White-headed Woodpecker				SC		x	x			x				x	S2, S3
Pileated Woodpecker				SC						x				x	S4
Olive-sided Flycatcher			FCo		x	x	x	I						x	S3

Common Name	Refuge Purpose	BIDEH	FED T&E	STATE T&E	BCC #5	BCC R1 Status	BCC National	PIF	BMC R1 Status	State Plan	Shorebird Plan	Waterbird Plan	Waterfowl Plan	TNC	WA NHP S Rank
Willow Flycatcher				SC	x	x		I						x	S4
Dusky Flycatcher								IIA							S4, S5
Pacific-slope Flycatcher								IIA							S4, S5
Cassin's Vireo								IIA							S4
Steller's Jay								IIA							S5
Pygmy Nuthatch										x					S3, S4
Brown Creeper														x	S4, S5
Marsh Wren								IIC							S4, S5
Golden-crowned Kinglet								IIA							S4, S5
Western Bluebird				SM						x					S3
Black-throated Gray Warbler								IIA							S5
Townsend's Warbler								IIA							S4, S5
MacGillivray's Warbler								IIA							S4, S5
Yellow Warbler								X1							S4
Black-headed Grosbeak								IIB							S5
Bullock's Oriole								IIA							S4
Lazuli Bunting								IIA							S5
Spotted Towhee								IIA							S5
Cassin's Finch						x									S4
Purple Finch					x			IIA							S4

Focal Species

Focal Species	Habitat Type	Habitat Structure	Life History Requirement	Other Benefitting Species
White-headed woodpecker	Ponderosa pine	Large patches of old forest with large snags. Minimum patch size in 350-700 acres. Mean canopy closure 10-40% with 10 trees/acres > 21 inches DBH with at least 2 trees being >31 inches DBH and with 1.4 snags/acre > 8 in DBH. (PIF 2000)	Year-round	Lewis' woodpecker, white-breasted nuthatch, pygmy nuthatch, Hammond's flycatcher, hairy woodpecker, brown creeper
Chipping sparrow	Ponderosa pine	Open understory with regenerating pines: interspersion of herbaceous ground cover with shrub and regenerating pine patches. Canopy cover 10-30%, 20-60% cover in the shrub layer, and >20% of the shrub layer in regenerating conifer saplings, especially pines. (PIF 2000)	Breeding	Dark-eyed junco, Townsend's solitaire, dusky flycatcher
Ames milk-vetch	Ponderosa pine	Flat terrain, open ponderosa pine forests with bitterbrush. (WDNR, Natural Heritage Program)	All	Chipping sparrow, dark-eyed junco, Townsend's solitaire, dusky flycatcher
Pulsifer's monkey-flower	Ponderosa pine	Seasonally moist openings in ponderosa pine. (WDNR, Natural Heritage Program)	All	Chipping sparrow, dark-eyed junco, Townsend's solitaire, dusky flycatcher
Black-backed woodpecker	Lodgepole /ponderosa pine	Old growth lodgepole pine: large tracts of lodgepole pine forest dominated by and managed for late successional conditions. (PIF 2000)	Year-round	Mountain chickadee, yellow-rumped warbler, Cassin's finch
Brown creeper	Mixed conifer	Large trees: >75 acres blocks of late successional habitat with > 4 trees/acre > 18 inches DBH with at least 2 trees >24 inches DBH. (PIF 2000)	Breeding	Townsend's warbler, red-breasted nuthatch, pine siskin
Hermit thrush	Mixed conifer	Multi-layered dense canopy /vertical cover: patches of forest with multi-layered structure and a dense understory shrub layer. (PIF 2000)	Breeding	Varied thrush, chestnut-backed chickadee, Townsend's warbler, winter wren
Olive-sided flycatcher	Mixed conifer	Edges and openings created by wildfire: retain patches of live and dead trees/snags to provide potential nest trees (live) within the context of potential foraging and singing perches. (PIF 2000)	Breeding, foraging	Western tanager, Cassin's finch, Western wood-pewee, mountain bluebird
Nashville warbler	Oregon white oak woodland	Early succesional dense understory: oak-pine woodland	Breeding	Dusky flycatcher, American robin,

Focal Species	Habitat Type	Habitat Structure	Life History Requirement	Other Benefitting Species
		with > 40% native shrub cover interspersed with grassy openings and with or without scattered trees that comprise < 30% canopy cover. (PIF 2000)		White-breasted nuthatch
Western gray squirrel	Oregon white oak woodland	Mixed oak-pine woodlands. Stands used most often in Klickitat County study by western gray squirrels were dominated by a multi-layered canopy of ponderosa pine that had an upper canopy layer taller than 14 m (46 ft) and a sparse understory of oak with little or no shrub cover or other ground vegetation. Pine was the most frequently used tree for nesting, foraging, and cover. Squirrels on the Klickitat study area selected for moderate conifer (25-75% canopy cover) at the home range scale and for moderate and dense (>75% canopy cover) conifer (>75% conifer) cover-types at the 80% core area scale. Using radio telemetry fixes, there was selection only for moderate conifer cover types. These cover types were favored over sparse conifer (<25% canopy cover), pure oak (>75% oak) and mixed oak-conifer cover-types at all levels of canopy cover. (Linders 2000, referenced in Washington State recovery plan)	Year-round	
Red-naped sapsucker	Quaking aspen	Large aspen trees and snags with regeneration: mean canopy cover 40-80%, either clumped with patches and openings or relatively evenly distributed, with >1.5 trees and > 1.5 snags/acre > 39 feet in height and 10 inched DBH, with >10% cover of saplings in understory. (PIF 2000)	Year-round	House wren, western screech owl, tree swallow, northern flicker, ruffed grouse
Willow flycatcher	Riparian	Dense patches of native shrubs > 10 m5 interspersed with openings of herbaceous vegetation. Patch size 5-20 acres with shrub layer across 40-80%; shrub layer height > 3ft; tree cover < 30%. (PIF 2000)	Breeding	Yellow warbler, song sparrow, spotted towhee
Oregon spotted frog	Emergent wetlands	Water depths range from approximately 2–12 inches in depth, emergent vegetation can be present, though generally not dense. (Washington State recovery plan)	Breeding	Sandhill crane, cinnamon teal, Canada geese shorebirds

Focal Species	Habitat Type	Habitat Structure	Life History Requirement	Other Benefitting Species
Oregon spotted frog	Springs	Permanent moving water that is groundwater driven	Breeding, overwintering	Invertebrates, wetland plants
Sandhill crane	Emergent wetlands	Generally shallow water, averaging 8–20 inches in depth in parts of the western US, however, dry sites are used also. Vegetation at nesting sites consists of a variety of herbaceous emergents and occasional woody shrubs. (Washington State recovery plan)	Nesting	Oregon spotted frog, cinnamon teal, Canada geese, shorebirds
Sandhill crane	Wet meadow habitat	Maintain a mosaic of wetland, wet meadow, and upland meadow habitats and tracts of suitable habitat > 300 acres. (Washington State recovery plan)	Foraging, brood rearing	Wilson's snipe, Lincoln sparrow, song sparrow, common yellowthroat
Sandhill crane	Upland meadow	Maintain a mosaic of wetland, wet meadow, and upland meadow habitats and tracts of suitable habitat > 300 acres. (Washington State recovery plan)	Foraging, brood rearing	Grasshopper sparrow, Mardon skipper, western yellow-bellied racer
Dwarf rush	Emergent wetlands	Temporary and seasonally flooded shallow marshes that dry out. (WDNR, Natural Heritage Program)	All	Sandhill crane, Wilson's snipe, Lincoln sparrow, song sparrow, common yellowthroat
Long-bearded sego lily	Emergent wetland/ Wet meadow	Grass and forb dominated wet meadow with little to no shrub or tree cover. (WDNR, Natural Heritage Program)	All	Sandhill crane, Wilson's snipe, Lincoln sparrow, song sparrow, common yellowthroat
Rosy owl-clover	Emergent wetland/ Wet meadow	Grass and forb dominated wet meadow with little to no shrub or tree cover. (WDNR, Natural Heritage Program)	All	Sandhill crane, Wilson's snipe, Lincoln sparrow, song sparrow, common yellowthroat
Oregon coyote-thistle	Emergent wetland/ Wet meadow	Grass and forb dominated wet meadow with little- to-no shrub or tree cover. (WDNR, Natural Heritage Program)	All	Sandhill crane, Wilson's snipe, Lincoln sparrow, song sparrow, common yellowthroat
Ring-necked duck	Permanent wetlands, creeks and canals	Water depths 3-10 feet, mixed open water and submergent vegetation, water present in summer months, winter depths variable with precipitation	Nesting, brood rearing	Overwintering Oregon spotted frogs

Appendix F

Statement of Compliance

Appendix F. Statement of Compliance

STATEMENT OF COMPLIANCE

For Implementation of the

Conboy Lake National Wildlife Refuge Comprehensive Conservation Plan

Klickitat County, Washington

The following executive orders and legislative acts have been reviewed as they apply to implementation of the Comprehensive Conservation Plan (CCP) for Conboy Lake National Wildlife Refuge (CLNWR), located in Washington State.

National Environmental Policy Act (1969), as Amended (42 U.S.C. § 4321 et seq.)

The planning process has been conducted in accordance with National Environmental Policy Act (NEPA) Implementing Procedures, Department of the Interior (DOI) and U.S. Fish and Wildlife Service (Service) procedures, and has been performed in coordination with the affected public. The requirements of NEPA and its implementing regulations in 40 CFR 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.

An environmental assessment (EA) was prepared for the project that integrated the draft CCP management objectives and alternatives into the EA and NEPA process. The draft CCP/EA was released for a 30-day public comment period. The affected public was notified of the availability of these documents through a *Federal Register* notice, news releases to local newspapers, the CLNWR's planning website, and a planning update. Copies of the draft CCP/EA and/or planning updates were distributed to an extensive mailing list. The CCP was revised based on public comments received on the draft documents.

National Historic Preservation Act (1966), as Amended (16 U.S.C. § 470 et seq.)

The management of archaeological and cultural resources of CLNWR will comply with the regulations of Sections 106 and 110 of the National Historic Preservation Act (NHPA). CLNWR contains a number of prehistoric sites. At least 36 prehistoric sites and 43 historic sites are recorded within the acquisition boundary of CLNWR. One historic site is listed on the National Register of Historic Places (National Register): the Whitcomb-Cole Hewn Log House. No known historic properties are likely to be affected by the proposed action, based on the criteria of an effect or adverse effect as an undertaking defined in 36 CFR 800.9 and Service Manual 614 FW2. 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. The Service will comply with the NHPA for management actions that have the potential to affect any historic properties which may be present.

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 the Project Leader and the Refuge Manager.

Executive Order 13175. Consultation and Coordination with Indian Tribal Governments

As required under Secretary of the Interior Order 3206, American Indian Tribal Rights, Federal-Tribal Responsibilities, and the Endangered Species Act, the Service consulted and coordinated with the Yakama Indian Nation regarding the proposed action. Specifically, the Service coordinated with the Yakama Indian Nation throughout the Service's planning process. The tribe had the opportunity to review and provide input on the CCP alternatives.

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 Native American tribes in the United States. The CCP was evaluated and no adverse human health or environmental effects were identified for minority or low-income populations, Native American tribes, or anyone else.

Wilderness Preservation Act of 1964 (16 U.S.C. § 1131 et seq.)

The Service has evaluated the suitability of CLNWR for wilderness designation and concluded that the refuge does not meet the basic criteria for inclusion into the National Wilderness Preservation System (see Chapter 3, Wilderness and Wild and Scenic Rivers Review, and Appendix D).

Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271-1287)

The Service has evaluated the eligibility of streams on CLNWR for wild and scenic river designation and concluded no streams meet the basic criteria for inclusion into the National Wild and Scenic Rivers System (see Chapter 3, Wilderness and Wild and Scenic Rivers Review, and Appendix D).

National Wildlife Refuge System Administration Act of 1966, as Amended (16 U.S.C. § 668dd-668ee)

The National Wildlife Refuge System Administration Act (Public Law 105-57, Administration Act) requires the Service to develop and implement a CCP for each refuge. The CCP identifies and describes refuge purposes; refuge vision and goals; fish, wildlife, and plant populations and related habitats; archaeological and cultural values of the refuge; issues that may affect populations and habitats of fish, wildlife, and plants; actions necessary to restore and improve biological diversity on the refuge; and opportunities for wildlife-dependent recreation, as required by the Administration Act. During the CCP process, the Project Leader and Refuge Manager evaluated all existing and proposed refuge uses. Priority wildlife-dependent uses (hunting, fishing, wildlife observation, photography, environmental education, and interpretation) are automatically considered appropriate under Service policy and thus exempt from appropriate uses review. Uses that were found not appropriate include horseback riding (Appendix A).

Compatibility determinations (CDs) have been prepared for haying; grazing; timber harvesting; research; hunting (elk and waterfowl); fishing; wildlife observation, photography, interpretation, and environmental education; and the associated activities of hiking, cross country skiing, snowshoeing, and painting. All of these were found to be compatible with refuge purposes and the National Wildlife Refuge System mission, with stipulations specified where appropriate (Appendix B).

Executive Order 13186. Responsibilities of Federal Agencies to Protect Migratory Birds

This order directs departments and 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 Service's list of Birds of Conservation Concern (BCC). 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 planning. The effects of all alternatives to refuge habitats used by migratory birds were assessed within the draft CCP and EA.

Endangered Species Act (1973), as Amended (16 U.S.C. § 1531 et seq.)

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. Section 7 of the Endangered Species Act (ESA) requires consultation before initiating projects which affect or may affect endangered species. One Federal candidate species for listing currently occurs on CLNWR, the Oregon spotted frog. CLNWR also provides habitat for two State endangered species, Ames' milkvetch and the Mardon skipper. When the CCP is adopted and implementation begins, consultation on specific projects will be conducted prior to undertaking any management actions to avoid any adverse impacts to these species and their habitats. In most instances, CCP implementation would result in positive effects to these species; the CCP has goals and objectives directly related to improving populations where feasible.

Executive Order 11990. Protection of Wetlands

The CCP is consistent with Executive Order 11990 because CCP implementation would protect and enhance existing wetlands and associated riparian areas.

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 as CCP implementation would protect floodplains from adverse impacts as a result of modification or destruction. In fact, the CCP calls for restoration of floodplains to the extent possible.

Integrated Pest Management, 517 DM 1 and 7 RM 14

In accordance with 517 DM 1 and 569 FW 1, an integrated pest management (IPM) approach has been adopted to eradicate, control, or contain pest and invasive species on the refuge. In accordance with 517 DM 1, only pesticides registered with the U.S. Environmental Protection Agency (EPA), in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act, and as provided in

regulations, orders, or permits issued by the EPA may be applied on lands and waters under refuge jurisdiction.

Project Leader, Mid-Columbia National Wildlife Refuge Complex	Date

Appendix G

Glossary and Abbreviations

Appendix G. Glossary and Abbreviations

AAQS: Ambient Air Quality Standards.

ABA: Architectural Barriers Act

ACOE: (United States) Army Corps of Engineers.

ADA: Americans with Disabilities Act.

Adaptive Management: An approach to managing a refuge's resources that builds upon learning—based on best available science, common sense, experience, experimenting, new scientific discoveries and monitoring—by adjusting management practices based on what was learned. Where possible, Conboy Lake National Wildlife Refuge management projects will be designed to produce knowledge along with meeting other resource objectives.

Administration Act: National Wildlife Refuge System Administration Act of 1966.

Aesthetic: Of or relating to the sense of beauty. (Source: *Webster's Dictionary II*.)

Affected Environment: In an environmental impact statement, a description of the existing environment covering information that directly relates to the scope of the proposed action and alternatives that are analyzed.

Alternative: A set of objectives and strategies or means of achieving refuge purposes and goals, helping fulfill the National Wildlife Refuge System mission and resolving issues.

Anadromous Fish: Fish that normally migrate to salt water as juveniles and return to freshwater as adults to spawn.

APHIS-PPQ: (United States Department of Agriculture) Animal Plant Health Inspection Service, Plant Protection, and Quarantine.

Archeological Resource: Material remains of past human life or activities, including, but not limited to, pottery, basketry, bottles, weapons, tools, structures, and graves, or any portion of the foregoing items, as well as the physical site or context in which it is found. (Source: *Considering Cultural Resources.*)

ARPA: Archaeological Resources Protection Act of 1979. Protects cultural resources and outlines permitting procedures as well as violations and fines. (Source: *Considering Cultural Resources*)

BAF: Bioaccumulation Factors.

Basalt: A dark grey to black, fine grained igneous rock composed primarily of calcium feldspar and pyroxene, with or without olivine.

BCR: Bird Conservation Region.

BIDEH: Biological Diversity, Integrity, and Environmental Health.

Biological Diversity (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. It also defines the interrelationships within and among various levels of ecological organization. Conservation, protection, and restoration of biological species and genetic diversity are needed to sustain the health of existing biological systems. Federal resource management agencies must examine the implications of management actions and development decisions on regional and local biodiversity.

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.

BLM: (United States) Bureau of Land Management.

BMP: Best Management Practice(s). As a means of accomplishing an action, the practices that are based on the best available science and generally accepted standards for the field, as well as being the most effective and practicable (including technological, economic, and institutional considerations).

BPA: (United States) Bonneville Power Administration.

Bti: *Bacillus thuringiensis isrealensis*.

Candidate Species (Federal): A species for which there is sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list it as endangered or threatened but issuance of the proposed rule is precluded (i.e., by other listing activity or lack of funding).

Candidate Species (State): Wildlife species that are under review by the Washington Department of Wildlife for possible listing as endangered, threatened, or sensitive.

CCP: 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 BIDEH of each refuge and the System; helps achieve the goals of the National Wilderness Preservation System, if appropriate; and meets other mandates. (Service *Habitat Management Planning Policy, 602 FW 1.4*)

CD: Compatibility Determination.

Census Bureau: (United States) Census Bureau.

CEQ: (United States) Council on Environmental Quality.

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act.

CFR: Code of Federal Regulations.

cfs: Cubic Feet Per Second.

CGEI: Columbia Gorge Ecology Institute.

CLNWR: Conboy Lake National Wildlife Refuge.

Compatibility Determination: A written determination, usually signed 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.

Compatible Use: A proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purpose(s) of the national wildlife refuge.

Connectivity (Habitat Connectivity): The arrangement of habitats that allows organisms and ecological processes to move across the landscape.

Conservation and Management: To sustain and, where appropriate, restore and enhance healthy populations of fish, wildlife, and plants utilizing methods and procedures associated with modern scientific resource programs.

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.

Council: Northwest Power and Conservation Council.

Criterion 1 (State Listed and Candidate Species): State-listed species are those native fish and wildlife species legally designated as endangered, threatened, or sensitive. State candidate species are those fish and wildlife species that will be reviewed by the Department for possible listing as endangered, threatened, or sensitive. Federal candidate species are evaluated individually to determine their status in Washington and whether inclusion as a priority species is justified.

Criterion 2 (Vulnerable Aggregations): Vulnerable aggregations include those species or groups of animals susceptible to significant population declines, within a specific area or statewide, by virtue of their inclination to group together. Examples include heron rookeries, seabird concentrations, marine mammal haul-outs, shellfish beds, and fish spawning and rearing areas.

Criterion 3 (Species Considered to be of Recreational, Commercial, and/or Tribal Importance by Washington State): Native and non-native fish and wildlife species of recreational or commercial importance and recognized species used for tribal ceremonial and subsistence purposes that are vulnerable to habitat loss or degradation.

Cultural Landscape: The distinctive setting or land-use pattern associated with a historic site or areas such as a homestead, mining district, or town. There is evidence of human manipulation of the land through purposeful design, cultivation, or extraction.

Cultural Resources: The physical remains, objects, historic records, plants, animals, and traditional lifeways that connect us to our Nation's past. (Source: *Considering Cultural Resources*.)

CWA: Clean Water Act (Federal Water Pollution Control Act).

DAHP: (Washington) Department of Archaeology and Historic Preservation.

dbh: Diameter At Breast Height.

DOE: (United States) Department of Energy.

DOI: (United States) Department of the Interior.

EA: Environmental Assessment. A concise public document that analyzes the environmental impacts (consequences) of a proposed Federal action and provides sufficient evidence to determine the level of significance of the impacts. (Source: *The NEPA Book.*)

Ecosystem: A biological community together with its associated non-living environment, functioning as a unit. A system made up of a community of animals, plants, and bacteria and its interrelated physical and chemical environment.

EE: Environmental Education. A teaching process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action.

EEC: Estimated Environmental Concentration.

EIS: Environmental Impact Statement. A detailed written statement required by section 102(2)(c) of the National Environmental Policy Act, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, and any irreversible and irretrievable commitment of resources. (Source: *40 CFR 1508.11/LPO.*)

Endangered Species (Federal): A species that is likely to become extinct throughout all or a significant portion of its range. These species are listed by the U.S. Fish and Wildlife Service.

Endangered Species (State Plants): A species that is likely to become extinct throughout all or a significant portion of its range within the State of Washington.

Endangered Species (State Wildlife): Wildlife species native to the State of Washington that are seriously threatened with extinction throughout all or a significant portion of their ranges within the State.

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.

Environmental Justice: The fair treatment of people of all races, cultures, and income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Executive Order 12898 requires Federal agencies to identify and address any potentially disproportionate high and adverse human health and environmental effects of agency policies, programs, and activities on minority and low-income populations.

Environmentally Preferable Alternative: The environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA, Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources. Section 1505.2(b) requires that, in cases where an EIS has been prepared, the Record of Decision must identify all alternatives that were considered, specifying the alternative or alternatives which were considered to be environmentally preferable. (Source: *Council on Environmental Quality, 40 Questions*.)

EO: Executive Order.

EPA: (United States) Environmental Protection Agency.

ESA: Endangered Species Act.

et al: Et Alia. A Latin phrase which means "*and others*."

Ethnography: The descriptive and analytic study of the culture of particular groups or communities. Such studies are often done through interviews with community members and often through living in and observing a community (a practice referred to as participant observation). (Source: *NPS National Register Bulletin: Guidelines for Evaluating and Documenting Traditional Cultural Properties*.)

F: Fahrenheit.

Fauna: The animals of a specified region or time.

FIFRA: Federal Insecticide, Fungicide, and Rodenticide Act.

Fishery: A place to catch fish.

Floodplain: A plain along a river subject to periodic flooding (Source: *Webster's II Dictionary*). Floodplains are composed of sediment deposited by floods.

Flora: The plants of a specified region or time.

FONSI: Finding Of No Significant Impact.

Forage: Vegetation of all forms available and of a type used for animal consumption.

FR: Federal Register.

FWS: (United States) Fish and Wildlife Service.

Geological Resources: Natural features related to the form of the earth or its solid surface.

GHG: Greenhouse Gas.

GIS: Geographic Information System.

GLO: General Land Office.

GMA: (Washington State) Growth Management Act.

GMU: (Washington State) Game Management Unit.

Goal: A descriptive, open-ended, often broad statement of desired future conditions that conveys a purpose but does not define measurable units.

GPS: Global Positioning System.

GUS: Groundwater Ubiquity Score.

GWMA: Groundwater Management Area.

Habitat: A specific set of physical conditions in a geographic area that surrounds an organism, a single species, a group of species, or a large community and are required by an organism for survival and reproduction. The place where an organism typically lives. In wildlife management, the major components of habitat are food, water, cover, and living space.

Habitat Diversity: Refers to the number, interspersion, and relative abundance of indigenous plant and animal species and communities. It also refers to the horizontal and vertical structure of a plant community.

HACCP: Hazard Analysis and Critical Control Point.

Historic Conditions: Composition, structure, and functioning of ecosystems resulting from natural processes that are believed, based on sound professional judgment, to be present prior to substantial human changes to the landscape.

Historic Preservation: Includes identification, evaluation, documentation, excavation, curation, acquisition, protection, rehabilitation, restoration, stabilization, maintenance, and any combination of the foregoing activities relative to cultural resources. (Source: *Considering Cultural Resources.)*

Historic Records: Any historical, ethnographic, architectural documents, drawings, and images that provide a record of the past. (Source: *Considering Cultural Resources.*)

Hydrology: The science dealing with the properties, distribution, and circulation of water.

IBA: Important Bird Area.

Impact: Synonymous with effects and includes ecological, aesthetic, historic, cultural, economic, social, or health whether direct, indirect, or cumulative. Impacts may also include those resulting from actions which may have both beneficial and detrimental (adverse) effects. Impacts may be considered as direct, indirect, or cumulative.

Impact Severity Rating: Thresholds used in this Comprehensive Conservation Plan for analyzing the scope, scale, and intensity of effects on natural, cultural, and recreational resources. The four levels of impacts include:

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 that there would not be any measurable or perceptible consequence to a population, plant community, cultural resource, recreation opportunity, or visitor experience.

Minor: Effects would be detectable but localized, small, and of little consequence to a population, plant community, cultural resource, recreation opportunity, or visitor experience. Mitigation, if needed to offset adverse effects, would be easily implemented and successful.

Intermediate: Effects would be readily detectable and localized, with consequences to a cultural resource, population, plant community level, or specific recreation opportunity or visitor experience. Mitigation measures would be needed to offset adverse effects, would be extensive in nature, moderately complicated to implement, and probably would be successful.

Major: Effects would be obvious and would result in substantial consequences to cultural resources, populations, plant communities within the local area and region, or recreation opportunities and visitor experiences within the refuge. Extensive mitigating measures would be needed to offset adverse effects, would be large-scale in nature, very complicated to implement, and the probability of success would not be guaranteed. In some instances, major effects would include the irretrievable loss of the resource. ("Major" is also called "significant.")

Time and duration of impacts have been defined as:

Short-term: An effect that generally would last less than a single year or season.

Long-term: A change in a resource or its condition that would last longer than a single year or season.

Improvement Act: National Wildlife Refuge System Improvement Act.

Indicator Species: A species of plant or animal that is assumed to be sensitive to habitat changes and represents the needs of a larger group of species.

Interpretation: A communication process that forges emotional and intellectual connections between the interests of the audience and the inherent meanings in the resource.

Invasive Species: Plant or animal species that tend to spread rapidly and harmfully. For example, cheatgrass invasions of native shrub-steppe displace native species and alter natural fire regimes. Many invasive species are also noxious weeds.

IPCC: Intergovernmental Panel on Climate Change.

IPM: Integrated Pest Management. Used to treat targeted invasive plant species on Conboy Lake National Wildlife Refuge. Manual, mechanical, biological, cultural (e.g., prescribed fire, competitive plantings), and chemical treatment methods used to achieve prioritized weed control objectives.

Invasive species managers draw upon the full range of appropriate control technologies to develop integrated treatment plans for target species at selected priority sites. Treatment methodologies are based upon the best information available from literature and professional experience, tailored to the characteristics of the particular species and site.

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.

KDID: Klickitat Drainage District #1.

LC: Lethal Concentration.

LCC: Great Northern Landscape Conservation Cooperative.

LD: Lethal Dose.

LEIS: Legislative Environmental Impact Statement.

LOC: Level of Concern.

LOEC: Lowest Observed Effect Concentration.

LOEL: Lowest Observed Effect Level

Long-term Impact: A change in a resource or its condition that would last longer than a single year or season.

Major Impact: Also known as "significant impact." Effects would be obvious and would result in substantial consequences to cultural resources, populations, plant communities within the local area and region, or recreation opportunities and visitor experiences within Conboy Lake National Wildlife Refuge. Extensive mitigating measures would be needed to offset adverse effects, would be large-scale in nature, very complicated to implement, and the probability of success would not be guaranteed. In some instances, major effects would include the irretrievable loss of the resource.

Management Unit: An administrative unit for refuge management purposes.

MBCC: Migratory Bird Conservation Commission.

MCRNWRC: Mid-Columbia River National Wildlife Refuge Complex.

Migratory Birds: Those species of birds that migrate from place to place, either within the United States or between countries, to complete different stages of their life cycles. These species are listed under §10.13 of 50 CFR Chapter 1 - United States Fish and Wildlife Service, Department of the Interior.

Minor Impact: Effects would be detectable but localized, small, and of little consequence to a population, plant community, cultural resource, recreation opportunity, or visitor experience. Mitigation, if needed to offset adverse effects, would be easily implemented and successful.

Mitigation: Avoiding, minimizing, rectifying, reducing, eliminating, or compensating for impacts.

MOA: Memorandum of Agreement.

Moderate Impact: Effects would be readily detectable and localized, with consequences to a cultural resource, population, plant community level, or specific recreation opportunity or visitor experience. Mitigation measures would be needed to offset adverse effects, would be extensive in nature, moderately complicated to implement, and probably would be successful.

Monitoring: Tracking changes of selected parameters over time.

MOU: Memorandum of Understanding.

MSDS: Material Safety Data Sheet.

NAGPRA: Native American Graves Protection and Repatriation Act of 1991. Specifies actions to be taken by Federal agencies with regard to Native American human remains, funerary objects, objects of cultural patrimony, and sacred objects. (Source: *Considering Cultural Resources*)

National Register: National Register of Historic Places. Established through the National Historic Preservation Act of 1966, the register is administered by the National Park Service. It is the nation's master inventory of known historic properties, including buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archaeological or cultural significance at the national, state, and local levels. (Source: *Considering Cultural Resources*)

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.

NCRS: (United States) Natural Resource Conservation Service.

Negligible Impact: 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 that there would not be any measurable or perceptible consequence to a population, plant community, cultural resource, recreation opportunity, or visitor experience.

NEPA: National Environmental Policy Act.

NHPA: National Historic Preservation Act. It outlines historic preservation responsibilities of Federal agencies. (Source: *Considering Cultural Resources.*)

NIOSH: National Institute for Occupational Safety and Health.

NOAA: (United States) National Oceanic and Atmospheric Administration.

NOAA-Fisheries: (United States) National Oceanic and Atmospheric Administration Fisheries. This agency was formerly known as the National Marine Fisheries Service.

NOAEC: No Observed Adverse Effect Concentration.

NOAEL: No Observed Adverse Effect Level.

NOEC: No Observed Effect Concentration.

Non-native Invasive Species: Invasive species are plants and animals that are introduced into new areas in which they are not among the native flora and fauna, and because they no longer face the natural enemies or competition from their place of origin, spread or reproduce prolifically. Non-native invasive species can cause significant changes to ecosystems, upset the ecological balance, create economic disruptions, and harm plants and wildlife. Within this document the words non-native invasive species, invasives, noxious weeds, and weeds are used synonymously to represent those non-native species that persist and increase the risk of habitat fragmentation and degradation.

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. (Source: *Federal Noxious Weed Act*.)

NPCC: Northwest Power and Conservation Council.

NPS: National Park Service.

NRHP: National Register of Historic Places.

NVCS: National Vegetation Classification System.

NWRS: National Wildlife Refuge System.

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.

ODFW: Oregon Department of Fish and Wildlife.

Ordinary High Water Mark: The line that water impresses on land by covering it for sufficient periods to cause physical characteristics that distinguish the area below the line from the area above it. Characteristics of the area below the line include, but are not limited to, deprivation of the soil and substantially all terrestrial vegetation.

OSHA: Occupational Safety and Health Administration.

Overlay Wildlife Refuge: A wildlife refuge on land which is owned by one or more Federal agencies but managed by the U.S. Fish and Wildlife Service.

Paleontological Resources: The preserved (fossilized) remains of plants and animals that existed in various geological periods, usually prior to human existence.

PCB: Polychlorinated Biphenol. It is considered a contaminant in the context of this document.

Permit: A short-term, revocable authorization to use public lands for specific purposes.

PIF: Partners in Flight.

Planning Area: The area upon which the planning efforts will focus. A planning area may include lands outside existing planning unit boundaries currently studied for inclusion in the National Wildlife Refuge System and/or partnership planning efforts. It also may include watersheds or ecosystems outside of our jurisdiction that affect the planning unit. At a minimum, the planning area includes all lands within the authorized boundary of the refuge.

Post-contact: A time period referring to occupation of the area by Euro-Americans, usually assumed to be about 1800 in this region.

PPE: Personal Protective Equipment.

ppb: Parts Per Billion.

ppm: Parts Per Million.

Pre-contact: A time period referring to the occupation of the land solely by Native Americans and prior to the occupation by Euro-Americans. Generally equates to approximately pre-1800 in this region.

Preferred Alternative: The alternative determined 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.

Prescribed Fire: A fire ignited according to management actions to meet specific objectives. An intentionally or naturally ignited fire that burns under specified conditions that allow the fire to be confined to a predetermined area and produce the fire behavior and fire characteristics required to attain planned fire treatment and resource management objectives.

Prey Species: An animal taken by a predator as food.

Priority 1 Species (State Plants): Those taxa that are in danger of becoming extinct throughout their ranges. Populations are at critically low levels or their habitats are degraded or depleted to a significant degree. These taxa are the highest priorities for preservation.

Priority 2 Species (State Plants): Those taxa that will become endangered in Washington if factors contributing to their population decline or habitat degradation or loss continue. These taxa are high priorities for preservation efforts.

Priority 3 Species (State Plants): Those taxa that are vulnerable or declining and could become endangered or threatened in Washington without active management or removal of threats. These taxa should be important in the analysis of potential preserve sites.

Proposed Species For Listing (Federal): A species for which a proposed rule to list as endangered or threatened has been published in the *Federal Register*.

PUP: Pesticide Use Proposal.

Purposes of a National Wildlife Refuge: 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 national wildlife refuge or refuge subunit.

Raptors: Birds of prey, such as an eagle, falcon, hawk, or owl.

Review 1 Species: A plant species in need of additional field work before a status can be assigned.

Review 2 Species: A plant species with unresolved taxonomic questions.

Riparian: Of or on the bank of a natural course of water. (Source: *Webster's II Dictionary*.) For example, riparian vegetation includes any and all plant-life growing on the bank of a stream or the edge of, but not within, a pond or lake.

RM: Refuge Manual.

RQ: Risk Quotient.

Sacred Site: As defined by Executive Order 13007, a specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion, providing that the tribe or authoritative representative of an Indian religion has informed the agency of the existence of such a site. (Source: *Considering Cultural Resources*)

SCBID: South Columbia Basin Irrigation District.

Sensitive Species (State Plants): A species that is likely to become endangered or threatened in a significant portion of its range within the State of Washington.

Sensitive Species (State Wildlife): Wildlife species native to the State of Washington that are vulnerable or declining and are likely to become endangered or threatened throughout significant portions of their ranges within the State without cooperative management or the removal of threats.

SEPA: (Washington) State Environmental Policy Act.

Service: U.S. Fish and Wildlife Service.

Short-term Impact: An effect that generally would last less than a single year or season.

SHPO: (Washington) State Historic Preservation Officer.

Shrub-steppe: Arid land dominated by shrubs and grasses where soil and moisture limit the growth of trees. Washington State Department of Fish and Wildlife considers shrub-steppe a priority habitat.

Significant: See Major.

Site: When referring to cultural resources, it is the location of an event, occupation, activity, building, or structure or natural feature with cultural significance.

Special Status Species: Wildlife and plant species either federally listed or proposed for listing as endangered or threatened; state-listed; or determined priority species.

Spot Treatment: The application of chemicals directly onto a target plant to control non-native invasive species, using a backpack spraying unit, hand-held wand, wick, or other application device.

SPRC: (Washington) State Parks and Recreation Commission.

SSP: Science Support Program.

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 Comprehensive Conservation Plan goals and objectives and is usually subsequent, subservient, and complimentary to the Comprehensive Conservation Plan.

Strategy: A specific action, tool, technique, or combination of actions, tools, and techniques used to meet unit objectives.

SUP: Special Use Permit.

TE&S Species: Threatened, Endangered, and Sensitive Species.

Threatened Species (Federal): A species that is likely to become endangered in the foreseeable future.

Threatened Species (State Plants): A species that is likely to become endangered in the foreseeable future.

Threatened Species (State Wildlife): Wildlife species native to the State of Washington that are likely to become endangered in the foreseeable future throughout significant portions of their ranges within Washington without cooperative management or the removal of threats.

TNC: The Nature Conservancy.

Traditional/Religious Values: Places that possess values important to Native American tribal groups or other ethnic groups for traditional cultural or religious reasons. Traditional cultural values may not necessarily be associated with easily definable sites or objects, such as is the case with sacred peaks or viewsheds. (Source: *Considering Cultural Resources.*)

T-REX: Terrestrial Residue Exposure.

Trust Responsibility: The fiduciary obligations that attach to the United States as trustee of the assets and resources that the United States holds in trust for Native American governments and their members, the treaty and statutory obligations of the United States toward Native American governments and their members, and other legal obligations that attach to the United States by virtue of the special relationship between the Federal government and Native American governments. The

identification and quantification of trust assets is recognized as an ongoing and evolving process. (Source: The Native American Policy of the United States Fish and Wildlife Service.)

TSCA: Toxic Substances Control Act.

USC: United States Code.

USDA: United States Department of Agriculture.

USFS: United States Forest Service.

USGCRP: United Stated Global Change Research Program.

USGS: United States Geological Survey.

USHCN: United States Historical Climatology Network.

Vegetation Type: A classification of the plant community based on the dominant plant species in the community.

Vision Statement: A concise statement of what the planning unit should be, or what we hope to do, based primarily upon the National Wildlife Refuge System mission and specific refuge purposes and other mandates.

VSP: Visitor Services Plan.

Watch List Species: A species more abundant and/or less threatened in Washington than previously assumed.

Watershed: All land and water within the confines of a drainage divide.

WDFW: Washington Department of Fish and Wildlife.

WDNR: Washington Department of Natural Resources.

WDOE: Washington Department of Ecology.

WDPR: Washington Department of Parks and Recreation.

WISAARD: Washington (State) Information System for Architectural and Archaeological Records Database.

WSA: Wilderness Study Area.

Wetlands: 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.

Wild and Scenic River: A portion of a river that has been designated by Congress as part of the National Wild and Scenic Rivers System, established by the Wild and Scenic Rivers Act of 1968, the

purpose of which is to protect rivers and their immediate environments that have outstanding scenic, recreation, geologic, fish and wildlife, historic, cultural, and other similar values and are preserved in free-flowing conditions.

Wilderness Units: Areas that have been designated by Congress as units of the National Wilderness Preservation System.

Wildfire: An unplanned, unwanted wildland fire.

Wildland: An area in which development is essentially non-existent, except for roads, railroads, powerlines, and similar transportation facilities.

Wildlife-dependent Recreation: A use of a national wildlife refuge involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation. The National Wildlife Refuge System Administration Act, as amended, specifies that these are the six priority general public uses of the National Wildlife Refuge System.

WNHP: Washington Natural Heritage Program.

Yakama Nation: Confederated Tribes and Bands of the Yakama Nation.

Appendix H

Integrated Pest Management Program

Appendix H. IPM Program

Integrated Pest Management (IPM) Program

1.0 Background

IPM is an interdisciplinary approach utilizing methods to prevent, eliminate, contain and/or control pest species in concert with other management activities on refuge lands and waters to achieve wildlife and habitat management goals and objectives. IPM is also a scientifically based, adaptive management process where available scientific information and best professional judgment of the refuge staff, as well as other resource experts, would be used to identify and implement appropriate management strategies that can be modified and/or changed over time to ensure effective, site-specific management of pest species to achieve desired outcomes. In accordance with 43 CFR 46.145, adaptive management would be particularly relevant where long-term impacts may be uncertain and future monitoring would be needed to make adjustments in subsequent implementation decisions. After a tolerable pest population (threshold) is determined considering achievement of refuge resource objectives and the ecology of pest species, one or more methods, or combinations thereof, would be selected that are feasible, efficacious, and most protective of non-target resources, including native species (fish, wildlife, and plants), and Service personnel, Service authorized agents, volunteers and the public. Staff time and available funding would be considered when determining feasibility/practicality of various treatments.

IPM techniques to address pests are presented as strategies in Chapter 2 in an adaptive management context to achieve refuge resource objectives. In order to satisfy requirements for IPM planning as identified in the Director's Memo (dated September 9, 2004) entitled *Integrated Pest Management Plans and Pesticide Use Proposals: Updates, Guidance, and an Online Database* the following elements of an IPM program have been incorporated into this CCP:

- Habitat and/or wildlife objectives that identify pest species and appropriate thresholds to indicate the need for and successful implementation of IPM techniques.
- Monitoring before and/or after treatment to assess progress toward achieving objectives including pest thresholds.

Where pesticides would be necessary to address pests, this appendix provides a structured procedure to evaluate potential effects of proposed uses involving ground-based applications to CLNWR's biological resources and environmental quality in accordance with effects analyses presented in Chapter 4 of this CCP/EA. Only pesticide uses that likely would cause minor, temporary, or localized effects to refuge biological resources and environmental quality with appropriate Best Management Practices (BMPs), where necessary, would be allowed for use on CLNWR.

This Appendix does not describe the more detailed process to evaluate potential effects associated with aerial applications of pesticides. However, the basic framework to assess potential effects to refuge biological resources and environmental quality from aerial application of pesticides would be similar to the process described in this appendix for ground-based treatments of other pesticides.

2.0 Pest Management Laws and Policies

In accordance with Service policy 569 FW 1 (Integrated Pest Management), plant, invertebrate, and vertebrate pests on units of the NWRS can be controlled to assure balanced wildlife and fish populations in support of refuge-specific wildlife and habitat management objectives. Pest control on Federal (refuge) lands and waters also is authorized under the following legal mandates:

- National Wildlife Refuge System Administration Act of 1966, as amended (16 U.S.C. 668dd-668ee).
- Plant Protection Act of 2000 (7 U.S.C. 7701 *et seq*.).
- Noxious Weed Control and Eradication Act of 2004 (7 U.S.C. 7781-7786, Subtitle E).
- Federal Insecticide, Fungicide, and Rodenticide Act of 1996 (7 U.S.C. 136-136y).
- National Invasive Species Act of 1996 (16 U.S.C. 4701).
- Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (16 U.S.C. 4701).
- Food Quality Protection Act of 1996 (7 U.S.C. 136).
- Executive Order 13148, Section 601(a).
- Executive Order 13112.
- Animal Damage Control Act of 1931 (7 U.S.C. 426-426c, 46 Stat. 1468).

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" from DOI policy 517 DM 1 (Integrated Pest Management Policy). 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 CCP, the terms pest and invasive species are used interchangeably because both can prevent/impede achievement of refuge wildlife and habitat objectives and/or degrade environmental quality.

In general, control of pests (vertebrate or invertebrate) on the refuge would conserve and protect the nation's fish, wildlife, and plant resources as well as maintain environmental quality. From 569 FW 1, animal or plant species, which are considered pests, may be managed if the following criteria are met:

- Threat to human health and well-being or private property, the acceptable level of damage by the pest has been exceeded, or State or local government has designated the pest as noxious;
- Detrimental to resource objectives as specified in a refuge resource management plan (e.g., comprehensive conservation plan, habitat management plan), if available; and
- Control would not conflict with attainment of resource objectives or the purposes for which the refuge was established.

The specific justifications for pest management activities on the refuge are the following:

- Protect human health and well-being.
- Prevent substantial damage to important to refuge resources.
- Protect newly introduced or re-establish native species.
- Control non-native (exotic) species in order to support existence for populations of native species.

- Prevent damage to private property.
- Provide the public with quality, compatible wildlife-dependent recreational opportunities.

In accordance with Service policy 620 FW 1 (Habitat Management Plans), there are additional management directives regarding invasive species found on the refuge:

- "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 ..."

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 without a pest control proposal. We recognize beavers are native species and most of their activities or refuge lands represent a natural process beneficial for maintaining wetland habitats. Exotic nutria, whose denning and burrowing activities in wetland dikes cause 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., along auto tour routes) driving on structurally compromised levees and dikes can be threaten by sudden and unexpected cave-ins.

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]).

3.0 Strategies

To fully embrace IPM as identified in 569 FW 1, the following strategies, where applicable, would be carefully considered on the refuge for each pest species.

3.1 Prevention

This would be the most effective and least expensive long-term management option for pests. It encompasses methods to prevent new introductions or the spread of the established pests to un-infested areas. It requires identifying potential routes of invasion to reduce the likelihood of

infestation. Hazard Analysis and Critical Control Points (HACCP) planning can be used to determine if current management activities on a refuge may introduce and/or spread invasive species in order to identify appropriate BMPs for prevention. (See www.haccp-nrm.org for more information about HACCP planning.)

Prevention may include source reduction, using pathogen-free or weed-free seeds or fill; exclusion methods (e.g., barriers); and/or sanitation methods (e.g., wash stations) to prevent re-introductions by various mechanisms, including vehicles, personnel, livestock, and horses. Because invasive species are frequently the first to establish newly disturbed sites, prevention would require a reporting mechanism for early detection of new pest occurrences with quick response to eliminate any new satellite pest populations. Prevention would require consideration of the scale and scope of land management activities that may promote pest establishment within un-infested areas or promote reproduction and spread of existing populations. Along with preventing initial introduction, prevention would involve halting the spread of existing infestations to new sites (Mullin et al. 2000). The primary reason of prevention would be to keep pest-free lands or waters from becoming infested. Executive Order 11312 emphasizes the priority for prevention with respect to managing pests.

The following would be methods to prevent the introduction and/or spread of pests on refuge lands:[1]

- Before beginning ground-disturbing activities (e.g., disking, scraping), inventory and prioritize pest infestations in project operating areas and along access routes. CLNWR staff would identify pest species on-site or within reasonably expected potential invasion vicinity. Where possible, the staff would begin project activities in un-infested areas before working in pest-infested areas.
- The refuge staff would locate and use pest-free project staging areas. They would avoid or minimize travel through pest-infested areas, or restrict travel to those periods when spread of seed or propagules of invasive plants would be least likely.
- CLNWR staff would determine the need for, and when appropriate, identify sanitation sites where equipment can be cleaned of pests. Where possible, the refuge staff would clean equipment before entering lands at on-refuge approved cleaning site(s). This practice does not pertain to vehicles traveling frequently in and out of the project area that will remain on roadways. Seeds and plant parts of pest plants would need to be collected, where practical. Staff would remove mud, dirt, and plant parts from project equipment before moving it into a project area.
- CLNWR staff would clean all equipment before leaving the project site if operating in areas infested with pests. Staff would determine the need for, and when appropriate, identify sanitation sites where equipment can be cleaned.
- CLNWR staff, authorized agents, and volunteers would, where possible, inspect, remove, and properly dispose of seed and parts of invasive plants found on their clothing and equipment. Proper disposal means bagging the seeds and plant parts and then properly discarding of them (e.g., incinerating).
- CLNWR staff would evaluate options, including closure, to restrict the traffic on sites with on-going restoration of desired vegetation. Staff would revegetate disturbed soil (except travel ways on surfaced projects) to optimize plant establishment for each specific site. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and

[1] These prevention methods to minimize/eliminate the introduction and/or spread of pests were taken verbatim or slightly modified from Appendix E of a U.S. Forest Service Manual (2005).

weed-free mulching, as necessary. Staff would use native material, where appropriate and feasible. Staff would use certified weed-free or weed-seed-free hay or straw where certified materials are reasonably available.

- CLNWR staff would provide information, training, and appropriate pest identification materials to refuge staff, permit holders, and recreational visitors. Staff would educate them about pest identification, biology, impacts, and effective prevention measures.
- CLNWR staff would require grazing permittees to utilize preventative measures for their livestock while on refuge lands.
- CLNWR staff would inspect borrow material for invasive plants prior to use and transport onto and/or within refuge lands.
- CLNWR staff would consider invasive plants in planning for road maintenance activities.
- CLNWR staff would restrict off-road travel to designated routes.

The following would be methods to prevent the introduction and/or spread of pests into refuge waters:

- CLNWR would inspect boats (including air boats), trailers, and other boating equipment. Where possible, staff would remove any visible plants, animals, or mud before leaving any waters or boat launching facilities. Where possible, staff would drain water from motors, live wells, bilges, and transom wells while on land before leaving the site. If possible, staff would wash and dry boats, downriggers, anchors, nets, floors of boats, propellers, axles, trailers, and other boating equipment to kill pests not visible at the boat launch.
- Where feasible, CLNWR would maintain a l00-foot buffer of aquatic pest-free clearance around boat launches and docks or quarantine areas when cleaning around culverts, canals, or irrigation sites. Where possible, staff would inspect and clean equipment before moving to new sites or one project area to another.

3.2 Mechanical/Physical Methods

These methods would remove and destroy, disrupt the growth of, or interfere with the reproduction of pest species. For plants 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.

For animal species, Service employees or their authorized agents could use mechanical/physical methods (including trapping) to control pests as a refuge management activity. Based upon 50 CFR 31.2, trapping can be used on a refuge to reduce surplus wildlife populations for a balanced conservation program in accordance with Federal or State laws and regulations. In some cases, non-lethally trapped animals would be relocated to off-refuge sites with prior approval from the state.

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 resprout and continue to grow and develop. Mechanical controls are typically not capable of destroying a perennial plants root system. Although some mechanical tools (e.g., disking, plowing) may damage root systems, they may stimulate regrowth producing a denser plant population that may aid in the spread depending upon the target species (e.g., Canada thistle). In addition, steep terrain and soil conditions would be major factors that can limit the use of many mechanical control methods.

Some mechanical control methods (e.g., mowing), which would be 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.

3.3 Cultural Methods

These methods would involve manipulating habitat to increase pest mortality by reducing its suitability to the pest. Cultural methods would include water-level manipulation, mulching, using winter cover crops, changing planting dates to minimize pest impact, prescribed burning (facilitate revegetation, increase herbicide efficacy, and remove litter to assist in emergence of desirable species), flaming with propane torches, trap crops, crop rotations that would include non-susceptible crops, moisture management, addition of beneficial insect habitat, reducing clutter, proper trash disposal, planting or seeding desirable species to shade or out-compete invasive plants, applying fertilizer to enhance desirable vegetation, prescriptive grazing, and other habitat alterations.

3.4 Biological Control Agents

Classical biological control would involve the deliberate introduction and management of natural enemies (parasites, predators, or pathogens) to reduce pest populations. Many of the most ecologically or economically damaging pest species in the United States originated in foreign countries. These newly introduced pests, which are free from natural enemies found in their country or region of origin, may have a competitive advantage over cultivated and native species. This competitive advantage often allows introduced species to flourish, and they may cause widespread economic damage to crops or out compete and displace native vegetation. 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. Benefits would include reducing pesticide usage, host specificity for target pests, long-term self-perpetuating control, low cost/acre, capacity for searching and locating hosts, synchronizing biological control agents to hosts' life cycles, and the unlikelihood that hosts will develop resistance to agents. Disadvantages would include limited availability of agents from their native lands, the dependence of control on target species density, slow rate at which control occurs, biotype matching, the difficulty and expense of conflicts over control of the target pest, and host specificity when host populations are low.

A reduction in target species populations from biological controls is typically a slow process, and efficacy can be highly variable. It may not work well in a particular area although it does work well in other areas. Biological control agents would require specific environmental conditions to survive over time. Some of these conditions are understood; whereas, others are only partially understood or not at all.

Biological control agents would not eradicate a target pest. 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. After the pest population decreases, the population of the biological control agent would decrease correspondingly. This is a natural cycle. Some pest populations (e.g., invasive plants) would tend to persist for several years after a biological control

agent becomes established due to seed reserves in the soil, inefficiencies in the agents' search behavior, and the natural lag in population buildup of the agent.

The full range of pest groups potentially found on refuge lands and waters would include diseases, invertebrates (insects, mollusks), vertebrates, and invasive plants (most common group). Often it is assumed that biological control would address many, if not most, of these pest problems. There are several well-documented success stories of biological control of invasive weed species in the Pacific Northwest, including Mediterranean sage, St. John's wort (Klamath weed), and tansy ragwort. Emerging success stories include Dalmatian toadflax, diffuse knapweed, leafy spurge, purple loosestrife, and yellow star thistle. However, historically, each new introduction of a biological control agent in the United States has only about a 30 percent success rate (Coombs et al 2004). (Refer to Coombs et. al (2004) for the status of biological control agents for invasive plants in the Pacific Northwest.)

Introduced species without desirable close relatives in the United States would generally be selected as biological controls. Natural enemies that are restricted to one or a few closely related plants in their country of origin are targeted as biological controls (Center et al. 1997, Hasan and Ayres 1990).

CLNWR staff would ensure introduced agents are approved by the applicable authorities. Except for a small number of formulated biological control products registered by the EPA under FIFRA, most biological control agents are regulated by the USDA's 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.
Federal permits (USDA-APHIS-PPQ Form 526) are required to import biocontrol agents from another state. Form 526 may be obtained by writing:

USDA-APHIS-PPQ
Biological Assessment and Taxonomic Support
4700 River Road
Unit 113
Riverdale, Maryland 20737
www.aphis.usda.gov/ppq/permits/bioligical/weedbio.html

The Service strongly supports the development, and legal and responsible use, of appropriate, safe, and effective biological control agents for nuisance and non-indigenous or pest species.

State and county agriculture departments may also be sources for biological control agents, or they may have information about where biological control agents may be obtained. Commercial sources should have an Application and Permit to Move Live Plant Pests and Noxious Weeds (USDA-PPQ Form 226) to release specific biological control agents in a state and/or county. Furthermore, certification regarding the biological control agent's identity (genus, specific epithet, sub-species, and variety) and purity (e.g., parasite free, pathogen free, and biotic and abiotic contaminants) should be specified in purchase orders.

Biological control agents are subject to 7 RM 8 (Exotic Species Introduction and Management). In addition, CLNWR staff would follow the International Code of Best Practice for Classical Biological Control of Weeds (sric.ucdavis.edu/exotic /exotic.htm) as ratified by delegates to the X International Symposium on Biological Control of Weeds, Bozeman, Montana, July 9, 1999. This code identifies

release-only approved biological control agents, use of the most effective agents, documenting of releases, and monitoring for impacts to the target pest, nontarget species, and the environment.

Biological control agents formulated as pesticide products and registered by the EPA (e.g., *Bti*) are also subject to PUP review and approval (see below).

A record of all releases would be maintained with date(s), location(s) and environmental conditions of the release site(s); the identity, quantity, and condition of the biological control agents released; and other relevant data and comments, such as weather conditions. Systematic monitoring to determine the establishment and effectiveness of the release is also recommended.

NEPA documents regarding biological and other environmental effects of biological control agents prepared by another Federal agency, where the scope is relevant to evaluation of releases on refuge lands, would be reviewed. Possible source agencies for such NEPA documents include the Bureau of Land Management (BLM), U.S. Forest Service (USFS), National Park Service (NPS), USDA-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) from the review. Incorporating by reference (43 CFR 46.135) is a technique used to avoid redundancies in analysis. It also can reduce the bulk of a Service NEPA document, which must identify only the documents that are incorporated by reference. In addition, relevant portions must be summarized in the Service's 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.

3.5 Pesticides

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, the capability to utilize BMPs to reduce/eliminate potential effects to non-target species and sensitive habitats, and the potential to contaminate surface and groundwater. All pesticide usage (pesticide, target species, application rate and method of application) would comply with the applicable Federal (FIFRA) and State regulations pertaining to pesticide use, safety, storage, disposal, and reporting. Before pesticides can be used to eradicate, control, or contain pests on refuge lands and waters, PUPs would be prepared and approved in accordance with 569 FW 1. PUP records would provide a detailed, time-, site-, and target-specific description of the proposed use of pesticides on the refuge. All PUPs would be created, approved or disapproved, and stored in the Pesticide Use Proposal System (PUPS), which is a centralized database accessible only on the Service's intranet (systems.fws.gov/pups). Only Service employees would be authorized to access PUP records for a refuge in this database.

Application equipment would be selected to provide site-specific delivery to target pests while minimizing/eliminating direct or indirect (e.g., drift) exposure to non-target areas and degradation of surface and groundwater quality. Where possible, target-specific equipment (e.g., backpack sprayer, wiper) would be used to treat target pests. Other target-specific equipment to apply pesticides would include soaked wicks or paint brushes for wiping vegetation and lances, hatchets, or syringes for direct injection into stems. Granular pesticides may be applied using seeders or other specialized dispensers. In contrast, aerial spraying (e.g., fixed wing or helicopter) would be used only where access is difficult (remoteness) and/or the size/distribution of infestations precludes practical use of ground-based methods.

Because repeated use of one pesticide may allow resistant organisms to survive and reproduce, multiple pesticides with variable modes of action would be considered for treatments on CLNWR lands and waters. This is especially important if multiple applications within years and/or over a growing season likely would be necessary for habitat maintenance and restoration activities to achieve resource objectives. Integrated chemical and non-chemical controls also are highly effective, where practical, because pesticide resistant organisms can be removed from the site.

Cost may not be the primary factor in selecting a pesticide for use on a refuge. If the least expensive pesticide would potentially harm natural resources or people, then a different product would be selected, if available. The most efficacious pesticide available with the least potential to degrade environment quality (soils, surface water, and groundwater), as well as the least potential effect to native species and communities of fish, wildlife, plants, and their habitats, would be acceptable for use on refuge lands in the context of an IPM approach.

3.6 Habitat Restoration/Maintenance

Restoration and/or proper maintenance of refuge habitats associated with achieving wildlife and habitat objectives would be essential for long-term prevention, eradication, or control (at or below threshold levels) of pests. 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 three components of succession that could be manipulated through habitat maintenance and restoration are site availability, species availability, and species performance (Cox and Anderson 2004). Although a single method (e.g., herbicide treatment) may eliminate or suppress pest species in the short term, the resulting gaps and bare soil create niches that are conducive to further invasion by the species and/or other invasive plants. On degraded 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. The selection of appropriate species for revegetation would be dependent on a number of factors, including resource objectives and site-specific, abiotic factors (e.g., soil texture, precipitation/temperature regimes, and shade conditions). Seed availability and cost, ease of establishment, seed production, and competitive ability also would be important considerations.

4.0 Priorities for Treatments

For many refuges, the magnitude (number, distribution, and sizes of infestations) for pest problems is too extensive and beyond the available capital resources to effectively address during any single field season. To manage pests in the refuge, it would be essential to prioritize treatment of infestations. Highest priority treatments would be focused on early detection and rapid response to eliminate infestations of new pests, if possible. This would be especially important for aggressive pests potentially impacting species, species groups, communities, and/or habitats associated refuge purpose(s), NWRS resources of concern (Federally listed species, migratory birds, selected marine mammals, and interjurisdictional fish), and native species for maintaining/restoring biological integrity, diversity, and environmental health.

The next priority would be treating established pests that appear in one or more previously un-infested areas. Moody and Mack (1988) demonstrated through modeling that small, new outbreaks of invasive plants eventually would infest an area larger than the established, source population.

They also found that control efforts focusing on the large, main infestation rather than the new, small satellites reduced the chances of overall success. The lowest priority would be treating large infestations (sometimes monotypic stands) of well-established pests. In this case, initial efforts would focus upon containment of the perimeter followed by work to control/eradicate the established infested area. If containment and/or control of a large infestation is not effective, then efforts would focus upon halting pest reproduction or managing source populations. Maxwell et al. (2009) found treating fewer populations that are sources represents an effective long-term strategy to reduce the total number of invasive populations and decreasing meta population growth rates.

Although State-listed noxious weeds would always be of high priority for management, other pest species known to cause substantial ecological impact would also be considered. For example, cheatgrass may not be listed by a state as noxious, but it can greatly alter fire regimes in shrub-steppe habitats resulting in large monotypic stands that displace native bunch grasses, forbs, and shrubs. Pest control would likely require a multi-year commitment from CLNWR staff. Essential to the long-term success of pest management would be pre- and post-treatment monitoring, assessment of the successes and failures of treatments, and development of new approaches when proposed methods do not achieve desired outcomes.

5.0 Best Management Practices (BMPs)

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 DOI Pesticide Use Policy (517 DM 1) and the Service Pest Management Policy and Responsibilities (30 AM 12), 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.

The following are BMPs pertaining to mixing/handling and applying pesticides for all ground-based treatments of pesticides, which would be considered and utilized, where feasible, based upon target- and site-specific factors and time-specific environmental conditions. Although not listed below, the most important BMP to eliminate/reduce potential impacts to non-target resources would be an IPM approach to prevent, control, eradicate, and contain pests.

5.1 Pesticide Handling and Mixing

- 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.
- CLNWR 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.
- CLNWR 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 CLNWR spill respond plan.

5.2 Applying Pesticides

- Pesticide treatments would only be conducted by or under the supervision of Service personnel and non-Service applicators with the appropriate State or BLM certification to safely and effectively conduct these activities on refuge lands and waters.
- CLNWR staff would comply with all Federal, State, and local pesticide use laws and regulations as well as DOI, Service, and NWRS pesticide-related policies. For example, the 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, material safety data sheets (MSDSs), and PUPs for each pesticide, determining the target pest, appropriate mix rate(s), necessary personal protective equipment (PPE), and other requirements listed on the pesticide label.
- A one-foot no-spray buffer from the water's edge would be used, where applicable and where 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^{N}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 six hours, except for pesticides that are rapidly rain fast (e.g., glyphosate in one 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 overspray 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 setup and application techniques, buffer zones may be identified to protect sensitive areas downwind of applications. CLNWR staff would apply adjacent only 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.
- CLNWR staff would consider timing of application so native plants are protected (e.g., senescence) while effectively treating invasive plants.
- 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.
- Rinsate from cleaning spray equipment after application would be recaptured and reused or applied to an appropriate pest plant infestation.

6.0 Safety

Safety is the highest priority in pest management.

6.1 Personal Protective Equipment

All applicators would wear the specific PPE identified on the pesticide label. The appropriate PPE will be worn at all times during handling, mixing, and applying. PPE can include 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, EPA 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.

6.2 Notification

The restricted entry interval 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. CLNWR staff would also

notify appropriate private property owners of an intended application, including any private individuals have requested notification. Efforts would be made to contact nearby individuals who are beekeepers or who have expressed chemical sensitivities.

6.3 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 monitored if one 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 is applying pesticide handles, mixes, or applies pesticides, with a Health Hazard rating of three or higher, for eight 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 (see Section 7.7 below), experience an acute exposure (sudden, short-term), or use pesticides with a health hazard ranking of one or two. 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 CLNWR staff would be provided by the nearest certified occupational health and safety physician as determined by Federal Occupational Health.

6.4 Certification and Supervision of Pesticide Applicators

Appropriate CLNWR 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 and 569 FW 1.10B, certification is required to apply restricted use pesticides based upon EPA 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.

6.5 Record Keeping

Labels and Material Safety Data Sheets

Pesticide labels and MSDSs would be maintained at the CLNWR shop and laminated copies in the mixing area. These documents also would 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 would 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 to pesticide labels and MSDSs.

Pesticide use proposals (PUPs)

A PUP would be prepared for each proposed pesticide use associated with annual pest management on refuge lands and waters. A PUP would 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.

In accordance with Service guidelines (Director's memo [December 12, 2007]), staff may receive up to five-year approvals for Washington Office and field reviewed proposed pesticide uses based upon meeting identified criteria including an approved IPM Plan, where necessary (see www.fws.gov/contaminants/Issues/IPM.cfm). For a refuge, an IPM Plan (requirements described herein) can be completed independently or in association with a CCP if IPM strategies and potential environmental effects are adequately addressed within appropriate NEPA documentation.

PUPs would be created, approved or disapproved, and stored as records in PUPS, which is centralized database on the Service's intranet (systems.fws.gov/pups). Only Service employees can access PUP records.

Pesticide Usage

In accordance with 569 FW 1, the Refuge Manager would be required to maintain records of all pesticides annually applied on lands or waters under refuge jurisdiction. This would encompass pesticides applied by other Federal agencies, State and county governments, non-government applicators, including cooperators and their pest management service providers with Service permission. For clarification, pesticide means all insecticides, insect and plant growth regulators, dessicants, herbicides, fungicides, rodenticides, acaricides, nematicides, fumigants, avicides, and piscicides.

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 (pounds or gallons).
- Total amount of active ingredient(s) used (pounds).
- Target pest(s).
- Efficacy (percent 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, percent 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) 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.

7.0 Evaluating Pesticide Use Proposals

CLNWR personnel must have an approved PUP to use pesticides for habitat management, as well as croplands/facilities maintenance. In general, proposed pesticide uses 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 a minimal potential to degrade environmental quality.

Evaluation of PUPs is not done at the refuge level. Once the refuge submits PUPs to the Service Regional Office, they are evaluated and approved either at the regional or national level. Service staff at the regional or national level conduct a thorough review of the proposed use, including an assessment of affects to target and non-target species as well as an assessment of ecological risks associated with the proposed use. Potential effects to listed and non-listed species would be evaluated with quantitative ecological risk assessments and other screening measures. Potential effects to environmental quality would be based upon pesticide characteristics of environmental fate (water solubility, soil mobility, soil persistence, and volatilization) and other quantitative screening tools. Ecological risk assessments, as well as characteristics of environmental fate and the potential to degrade environmental quality for pesticides, would be documented in Chemical Profiles (see Section 7.5 below). These profiles would include threshold values for quantitative measures of ecological risk assessments and screening tools for environmental fate that represent minimal potential effects to species and environmental quality. In general, only pesticide uses with appropriate BMPs (see Section 4.0 above) for habitat management and cropland/facilities maintenance on CLNWR that would potentially have minor, temporary, or localized effects on refuge biological and environmental quality (threshold values not exceeded) would be approved.

7.1 Overview of Ecological Risk Assessment

An ecological risk assessment process would be used to evaluate potential adverse effects to biological resources as a result of a pesticide(s) proposed for use on refuge lands. It 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. Protocols for ecological risk assessment of pesticide uses on the refuge were developed through research and established by the EPA (2004). Assumptions for these risk assessments are presented in Section 6 above.

The toxicological data used in ecological risk assessments are typically results of standardized laboratory studies provided by pesticide registrants to the EPA to meet regulatory requirements under the 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 7.5 below.

Table 1. Ecotoxicity tests used to evaluate potential effects to birds, fish, and mammals to establish toxicity endpoints for risk quotient calculations.

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.

7.2 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 using EPA's Ecological Risk Assessment Process (2004). This deterministic approach, which is based upon a two-phase process involving estimation of environmental concentrations and then characterization of risk, would be used for ecological risk assessments. 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. This integration is achieved through risk quotients (RQs) calculated by dividing the EEC by acute and chronic toxicity values selected from standardized toxicological endpoints or published effect (Table 1).

$$RQ = EEC/Toxicological\ Endpoint$$

The level of risk associated with direct effects of pesticide use would be characterized by comparing calculated RQs to the appropriate Level of Concern (LOC) established by the EPA (1998 [Table 2]). The LOC represents a quantitative threshold value for screening potential adverse effects to fish and wildlife resources associated with pesticide use. The following are four exposure-species group

scenarios that 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.

Acute risk would 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 would 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.

Listed species are those federally designated as threatened, endangered, or proposed in accordance with the ESA (16 U.S.C. 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 affect" individuals (listed species) and it would not pose an unacceptable risk for adverse effects to populations (non-listed species) for each taxonomic group (Table 2). In contrast, an 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 2. Presumption of unacceptable risk for birds, fish, and mammals (EPA 1998).

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	1
	Fish	1	1
	Mammals	1	1

Environmental Exposure

Following release into the environment through application, pesticides would experience several different routes of environmental fate. Pesticides which would be 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 which would be injected into the

soil may also be subject to the latter two fates. The aforementioned possibilities are by no means complete, but it does indicate 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).

Terrestrial exposure. The estimated environmental concentration (ECC) for exposure to terrestrial wildlife would be quantified using an EPA screening-level approach (EPA 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 (EPA 2005*a*, EPA 2004, Pfleeger et al. 1996) through the EPA's Terrestrial Residue Exposure model (T-REX) version 1.2.3 (EPA 2005*b*). 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 from the pesticide label maximum pesticide application rate (pounds active ingredient [acid equivalent]/acre) and the pesticide half-life (days) in soil. Although there are other food item categories (tall grasses; broadleaf plants and small insects; fruits, pods, seeds, and large insects), short grass was selected because it would yield maximum EECs (240 ppm per lb ai/acre) for worst-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 3) 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 3. Average body weight of selected terrestrial wildlife species frequently used in research to establish toxicological endpoints (Dunning 1984).

Species	**Body Weight (kg)**		**Species**	**Body Weight (kg)**
Mammal (15 grams)	0.015		Bobwhite quail	0.178
House sparrow	0.0277		Rat	0.2
Mammal (35 grams)	0.035		Rock dove (aka pigeon)	0.542

Starling	0.0823		Mammal (1000 grams)	1
Red-winged blackbird	0.0526		Mallard	1.082
Common grackle	0.114		Ring-necked pheasant	1.135
Japanese quail	0.178			

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 LD_{50} value multiplied by the surrogate's body weight (Table 3). 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 percent 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 percent of the applied granules remain available to wildlife. It would be assumed that only 1 percent 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 percent 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 (LD_{50}/ft^2) for comparison to EPA Level of Concerns (EPA 1998). The T-REX version 1.2.3 (EPA 2005*b*) 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.

$$mg\ a.i./ft.^2 = [(lbs.\ product/1000\ row\ ft.)(\%\ a.i.)(453{,}580\ mg/lb.)(1\text{-}\%\ incorporated)] / (1{,}000\ ft.)(band\ width\ (ft.))$$

$$EEC = [(mg\ a.i./ft.^2)(\%\ of\ pesticide\ biologically\ available)]$$

- 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 be used to calculate an RQ based on the EEC calculated by one of the above equations. The EEC would be divided by the surrogate LD_{50} toxicological endpoint multiplied by the body weight (Table 3) of the surrogate.

$$RQ = EEC / [LD_{50}\ (mg/kg) * body\ weight\ (kg)]$$

As with other risk assessments, an 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.

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 4) 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 4.2 above) 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 percent 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 4. Estimated Environmental Concentrations (ppb) of pesticides in aquatic habitats (1 foot depth) immediately after direct application (Urban and Cook 1986).

Lbs/acre	**EEC (ppb)**		**Lbs/acre**	**EEC (ppb)**
0.1	36.7		2	735.7
0.2	73.5		2.25	827.6
0.25	91.9		2.5	919.4
0.3	110.2		3	1103.5
0.4	147		4	1471.4
0.5	183.7		5	1839
0.75	275.6		6	2207
1	367.5		7	2575
1.25	459.7		8	2943
1.5	551.6		9	3311
1.75	643.5		10	3678

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 EPA 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 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.

Use of Information on Effects of Biological Control Agents, Pesticides, Degradates and Adjuvants

NEPA documents regarding biological and other environmental effects of biological control agents, pesticides, degradate,s 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 BLM, USFS, NPS, DOA-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 would identify only 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 USFS (www.fs.fed.us/r6/invasiveplant-eis/Risk-Assessments/Herbicides-Analyzed-InvPlant-EIS.htm) and BLM (www.blm.gov/wo/st/en/prog/more/veg_eis.html). These risk assessments and associated documentation are also 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* (USFS 2005) and *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic EIS* (BLM 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 USFS 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 BLM would be incorporated by reference:

- Bromacil
- Chlorsulfuron
- Diflufenzopyr
- Diquat
- Diuron
- Fluridone
- Imazapic
- Overdrive (diflufenzopyr and dicamba)
- Sulfometuron methyl
- Tebuthiuron
- Pesticide degradates and adjuvants

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 EPA'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 (EPA 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, sheepshead 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 an LOC may influence the suitability of a pesticide use. The greater the number of days the EEC exceeds the LOC 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 (EPA 2004).

Exposure through incidental ingestion of pesticide contaminated soil is not considered in the EPA risk assessment protocols. Research suggests <15 percent 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 of 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 EPA risk assessment protocols. Such exposure may occur through three potential sources: 1) spray material in droplet form at time of application; 2) vapor phase with the pesticide volatilizing from treated surfaces; and 3) airborne particulates (soil, vegetative matter, and pesticide dusts). The EPA (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 two to five microns. The spray droplet spectra covering the majority of pesticide application scenarios indicate that less than 1 percent 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 EPA 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: 1) direct application of spray to terrestrial wildlife in the treated area or within the drift footprint; 2) incidental contact with contaminated vegetation; or 3) contact with contaminated water or soil. Interception of spray and incidental contact with treated substrates may pose a 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 EPA 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 EPA 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 EPA is actively developing protocols to quantify drinking water exposures from puddles and dew. If and when protocols are formally established by the EPA 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 EPA relies on Fletcher (1994) for setting the assumed pesticide residues in wildlife dietary items. The EPA (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 EPA represent a 95th percentile estimate. However, research conducted by Pfleeger et al. (1996) indicates EPA residue assumptions for short grass was not exceeded. Baehr and Habig (2000) compared EPA residue assumptions with distributions of measured pesticide residues for the EPA'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 effects 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 occur 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 EPA 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 effects 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.

The EPA 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, EPA 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.

7.3 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 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 in 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 requires only 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 EPA (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 “inert” or “other ingredients,” these constituents within a pesticide product have the potential to affect species or environmental quality. The EPA categorizes regulated inert ingredients into the following four lists (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 the 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 USFS (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:

- TOMES (a proprietary toxicological database including EPA's IRIS, the Hazardous Substance Data Bank, the Registry of Toxic Effects of Chemical Substances [RTECS]).
- EPA'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 EPA-approved label specifies whether a product can be mixed with one or more pesticides. Without product-specific toxicological data, it would not be 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 pesticides. 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 EPA 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.

7.4 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 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):

- Attach (sorb) to soil, vegetation, or other surfaces and remain at or near the treated area.
- Attach to soil and move off-site through erosion from run-off or wind.
- Dissolve in water that can be subjected to run-off or leaching.

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 persistence, sorption coefficient (K_{oc}), groundwater ubiquity score (GUS), and solubility.

Persistence, which is expressed as half-life (t_2), represents the length of time required for 50 percent of the deposited pesticide to degrade (completely or partially). Persistence in the soil can be categorized as 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.

Another measure of pesticide persistence is dissipation time (DT_{50}). It represents the time required for 50 percent 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 the most important degradation mechanism will be selected for quantitative analysis for both terrestrial and aquatic environments.

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).

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 (ig/g) that can range from near zero to the thousands. Pesticides with higher K_{oc} values are strongly sorbed to soil and, therefore, would be less subject to movement.

Water solubility describes the amount of pesticide that will dissolve in a known quantity of water. The water solubility of a pesticide is expressed as milligrams of pesticide dissolved in a liter of water (mg/l or ppm). Pesticide with solubility <0.1 ppm are virtually insoluble in water, 100-1000 ppm are moderately soluble, and >10,000 ppm highly soluble (USGS 2000). As pesticide solubility increases, there would be greater potential for off-site movement.

The Groundwater Ubiquity 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.

$$GUS = log_{10}(t_2) \times [4 - log_{10}(K_{oc})]$$

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 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). 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, t_2, and K_{oc} values are available for selected pesticides from the OSU Extension Pesticide Properties Database at 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).

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 pore size would lower the likelihood and rate that water 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 a 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 affects 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.

Along with soil properties, the potential for a pesticide to affect water quality through run-off and leaching would consider site-specific environmental and abiotic conditions including rainfall, water table conditions, and topography (Huddleston 1996).

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 (3 to 2 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.

7.5 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 pesticide database.

7.6 Preparing a Chemical Profile

The following instructions would be used by Service personnel to complete chemical profiles for pesticides. Specifically, profiles would be prepared for pesticide active ingredients (e.g., glyphosate, imazapic) that would be contained in one or more trade name products that are registered and labeled with the EPA. All information fields under each category (e.g., Toxicological Endpoints, Environmental Fate) would 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 would be used to complete chemical profiles. Each entry of scientific information would be shown with applicable references.

Completed chemical profiles would provide a structured decision-making process utilizing quantitative assessment/screening tools with threshold values (where appropriate) that would be used to evaluate potential biological and other environmental effects to refuge resources. 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 5.0 above), 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.

Throughout this section, 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.

Date: Service personnel would record the date when the chemical profile is completed or updated. Chemical profiles (e.g., currently approved pesticide use patterns) would be periodically reviewed

and updated, as necessary. The most recent review date would be recorded on a profile to document when it was last updated.

Trade Name(s): Service personnel would 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 would record a trade name for each pesticide product with the same active ingredient.

Common chemical name(s): Service personnel would 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: Service personnel would record the type of pesticide for an active ingredient as herbicide, dessicant, fungicide, fumigant, growth regulator, insecticide, pisicide, or rodenticide.

EPA Registration Number(s): This number 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. Service personnel would record the EPA Registration Number for each trade name product with an active ingredient based upon PUPs.

Pesticide Class: Service personnel would 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 would 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), 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 would 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, Incorporated.

Toxicological Endpoints

Toxicological endpoint data would be collected for acute and chronic tests with mammals, birds and fish. Data would be recorded for species available in the scientific literature. If no data are found for a particular taxonomic group, then ANo data available is references would be recorded as the data

entry. Throughout the chemical profile, references (including toxicological endpoint data) would be cited using parentheses (#) following the recorded data.

Mammalian LD_{50}: For test species in the scientific literature, Service personnel would record available data for oral lethal dose (LD_{50}) in mg/kg-bw (body weight) or ppm-bw. The most common test species in scientific literature are the rat and mouse. The lowest LD_{50} value found for a rat would be used as a toxicological endpoint for dose-based RQ calculations to assess acute risk to mammals (see Table 1 in Section 7.1).

Mammalian LC_{50}: For test species in the scientific literature, Service personnel would record available data for dietary lethal concentration (LC_{50}) as reported (e.g., mg/kg-diet or ppm-diet). The most common test species in scientific literature are the rat and mouse. The lowest LC_{50} value found for a rat would be used as a toxicological endpoint for diet-based RQ calculations to assess acute risk (see Table 1 in Section 7.1).

Mammalian Reproduction: For test species listed in the scientific literature, Service personnel would 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). The 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 would be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table 1 in Section 7.1).

Avian LD_{50}: For test species available in the scientific literature, Service personnel would record values for oral lethal dose (LD_{50}) in mg/kg-bw or ppm-bw. The most common test species available in scientific literature are the bobwhite quail and mallard. The lowest LD_{50} value found for an avian species would be used as a toxicological endpoint for dose-based RQ calculations to assess acute risk (see Table 1 in Section 7.1).

Avian LC_{50}: For test species available in the scientific literature, Service personnel would record values for dietary lethal concentration (LC_{50}) as reported (e.g., mg/kg-diet or ppm-diet). The most common test species available in scientific literature are the bobwhite quail and mallard. The lowest LC_{50} value found for an avian species would be used as a toxicological endpoint for dietary-based RQ calculations to assess acute risk (see Table 1 in Section 7.1).

Avian Reproduction: For test species available in the scientific literature, Service personnel would 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 would be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table 1 in Section 7.1).

Fish LC_{50}: For test freshwater or marine species listed in the scientific literature, Service personnel would record a LC_{50} in ppm or mg/L. The 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 would be used as a toxicological endpoint for RQ calculations to assess acute risk (see Table 1 in Section 7.1).

Fish Early Life Stage (ELS)/Life Cycle: For test freshwater or marine species available in the scientific literature, Service personnel would record test results (e.g., LOEC, NOAEL, NOAEC, LOAEC) in ppm for test procedure(s) (e.g., early life cycle, life cycle). The 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) would be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table 1 in Section 7.1).

Other: For test invertebrate as well as non-vascular and vascular plant species available in the scientific literature, Service personnel would record $LC_{50,}$ $LD_{50,}$ LOEC, LOEL, NOAEC, NOAEL, or EC_{50} (environmental concentration) values in ppm or mg/L. The 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 EPA 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 would be recorded.

Environmental Fate

Water Solubility: Service personnel would 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 would 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 would be greater potential to degrade water quality through run-off and leaching.

Sw would be used to evaluate potential for bioaccumulation in aquatic species [see **Octanol-Water Partition Coefficient (K_{ow})** below].
Soil Mobility: Service personnel would record available values for soil adsorption coefficient (K_{oc} [ìg/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 would be used in evaluating the potential to degrade groundwater by leaching (see **Potential to Move to Groundwater** below).

Soil Persistence: Service personnel would record values for soil half-life (t_2), 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_2 value, soil persistence would 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).

Threshold for Approving PUPs

- *If soil t_2 #100 days, then a PUP would be approved without additional BMPs to protect water quality.*
- *If soil t_2 >100 days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would 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_2 values would 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_2 describes the rate for degradation only. As for t_2, units of dissipation time are usually expressed in days. Field dissipation time would be the preferred data for use to estimate pesticide concentrations in the environment because it is based upon field studies compared to soil t_2, which is derived in a laboratory. However, soil t_2 is the most common persistence data available in the published literature. If field dissipation data is not available, soil half-life data would be used in a chemical profile. The average or representative half-life value of most important degradation mechanism would be selected for quantitative analysis for both terrestrial and aquatic environments.

Based upon the DT_{50} value, environmental persistence in the soil also would be categorized as non-persistent <30 days, moderately persistent = 30 to 100 days and persistent >100 days.
Threshold for Approving PUPs

- *If soil DT_{50} #100 days, then a PUP would be approved without additional BMPs to protect water quality.*
- *If soil DT_{50} >100 days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would 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 DT_{50} values (preferred over soil t_2) would be used in evaluating the potential to degrade groundwater by leaching (see **Potential to Move to Groundwater** below), if available.

Aquatic Persistence: Service personnel would record values for aquatic t_2, which represents the length of time required for 50% of the deposited pesticide to degrade (completely or partially) in water. Based upon the t_2 value, aquatic persistence would be categorized as non-persistent <30 days, moderately persistent = 30 to 100 days and persistent >100 days (Kerle et. al. 1996).

Threshold for Approving PUPs

- If aquatic t_2 #100 days, then a PUP would be approved without additional BMPs to protect water quality.
- If aquatic t_2 >100 days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would 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 (DT_{50}) represents the time required for 50% of the deposited pesticide to degrade or move (dissipate); whereas, aquatic t_2 describes the rate for degradation only. As for t_2, units of dissipation time are usually expressed in days. Based upon the DT_{50} value, environmental persistence in aquatic habitats also would be categorized as non-persistent <30 days, moderately persistent = 30 to 100 days and persistent >100 days.

Threshold for Approving PUPs

- *If aquatic DT_{50} #100 days, then a PUP would be approved without additional BMPs to protect water quality.*
- *If aquatic DT_{50} >100 days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would 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) = $\log_{10}$(soil t_2) x [4 B $\log_{10}(K_{oc})$]. If a DT_{50} value is available, it would be used rather than a t_2 value to calculate a GUS score. Based upon the GUS value, the potential to move toward groundwater would be recorded as 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 would be approved without additional BMPs to protect water quality.*
- *If GUS >4.0, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would 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 would be recorded by Service personnel in exponential form ($I \times 10^{-7}$), where I represents a vapor pressure index. In general, pesticides with I<10 would have 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 pesticide database.

Threshold for Approving PUPs

- *If I #1000, then a PUP would be approved without additional BMPs to minimize drift and protect air quality.*

- *If I >1000, then a PUP would only be approved with additional BMPs specifically to minimize drift and protect air quality. One or more BMPs such as the following would 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^{N}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 (K_{ow}): The octanol-water partition coefficient (K_{ow}) 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, K_{ow} would be used to assess potential for a pesticide to bioaccumulate in tissues of aquatic species (e.g., fish). If K_{ow} >1000 or S_w<1 mg/L AND soil t_2>30 days, then there would be high potential for a pesticide to bioaccumulate in aquatic species such as fish (USGS 2000).

Threshold for Approving PUPs

- *If there is not a high potential for a pesticide to bioaccumulate in aquatic species, then the PUP would be approved.*

- *If there is a high potential to bioaccumulate in aquatic species (K_{ow}>1000 or S_w<1 mg/L AND soil t_2>30 days), then the PUP would not approved, except under unusual circumstances where approval would only be granted by the Washington Office.*

Bioaccumulation/Bioconcentration: The physiological process where pesticide concentrations in tissue would increase in biota because they are taken and stored at a faster rate than they are metabolized or excreted. The potential for bioaccumulation would be evaluated through bioaccumulation factors (BAFs) or bioconcentration factors (BCFs). Based upon BAF or BCF values, the potential to bioaccumulate would be recorded as low B 0 to 300, moderate B 300 to 1000, or high >1000 (Calabrese and Baldwin 1993).
Threshold for Approving PUPs

- *If BAF or BCF#1000, then a PUP would be approved without additional BMPs.*

- *If BAF or BCF>1000, then a PUP would not approved, except under unusual circumstances where approval would only be granted by the Washington Office.*

Worst-Case Ecological Risk Assessment

Max Application Rates (acid equivalent): Service personnel would record the highest application rate of an active ingredient (ae basis) for habitat management and cropland/facilities maintenance treatments in this data field of a chemical profile. These rates can be found in Table CP.1 under the column heading AMax Product Rate B Single Application (lbs/acre B AI on acid equiv basis). This table would 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 ANS for Anot specified on label in this table.

Estimated Environmental Concentrations: An estimated environmental concentration (ECC) represents potential exposure to fish and wildlife (birds and mammals) from using a pesticide. EECs would be derived by Service personnel using an EPA screening-level approach (US Environmental Protection Agency 2004). For each max application rate [see description under **Max Application Rates (acid equivalent)**], Service personnel would record two EEC values in a chemical profile; these would represent the worst-case terrestrial and aquatic exposures for habitat management and croplands/facilities maintenance treatments. For terrestrial and aquatic EEC calculations, see the 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: Service personnel would 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 would represent the worst-case assessment for ecological risk. See Section 7.2 for a discussion regarding the calculations of RQs.

For aquatic assessments associated with habitat management treatments, RQ calculations would be based upon selected acute and chronic toxicological endpoints for fish, and the EEC would 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 would be done by Service personnel based upon selected acute and chronic toxicological endpoints for fish and an EEC would be derived from the aquatic assessment in AgDRIFT[7] model version 2.01 under Tier I ground-based application with the 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 7.2.1.2 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 would be done by Service personnel based upon dietary exposure, where the short grass food item category would represent the worst-case scenario. For terrestrial spray applications associated with habitat management and cropland/facilities maintenance treatments, exposure (EECs and RQs) would be determined using the Kanaga nomogram method through the EPA's T-REX model version 1.2.3. T-REX input variables would include maximum 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 7.2.1.1.2 for the procedure that would be used to calculate RQs.

All calculated RQs in both tables would be compared with LOCs established by the EPA (see Table 2 in Section 7.2). If a calculated RQ exceeds an established LOC value (in brackets inside the table), then there would be a potential for an acute or chronic effect (unacceptable risk) to federally listed species and nonlisted species. See Section 7.2 for detailed descriptions of acute and chronic RQ calculations and comparison to LOCs to assess risk.

Threshold for approving PUPs

- *If RQs#LOCs, then a PUP would be approved without additional BMPs.*
- *If RQs>LOCs, then a PUP would 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 would 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 would 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 BMPs: Service personnel would 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 would be based upon scientific information documented in previous data fields of a Chemical Profile. Where necessary and feasible, these specific practices would be included in PUPs as a basis for approval.

If there are no specific BMPs that are appropriate, then Service personnel would 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 4.0 above for a complete list of BMPs associated with mixing and applying pesticides appropriate for all PUPs with ground-based treatments that would be additive to any necessary, chemical-specific BMPs.

References: Service personnel would 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.
  (www.cdpr.ca.gov/docs/label/labelque.htm#regprods)

- ECOTOX database. Office of Pesticide Programs, Environmental Protection Agency, Washington, DC.
  (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.
  (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.
  (www.fao.org/WAICENT/FAOINFO/AGRICULT/AGP/AGPP/Pesticid/)

- Human health and ecological risk assessments. Pesticide Management and Coordination, Forest Health Protection, U.S. Department of Agriculture, U.S. Forest Service.
  (www.fs.fed.us/foresthealth/pesticide/risk.htm)

- Pesticide Chemical Fact Sheets. Clemson University Pesticide Information Center.
  (entweb.clemson.edu/pesticid/Document/Labels/factsheet.htm)

- Pesticide Fact Sheets. Published by Information Ventures for Bureau of Land Management, Department of the Interior; Bonneville Power Administration, U.S. Department of Energy; and U.S. Forest Service, U.S. Department of Agriculture.
  (infoventures.com/e-hlth/pesticide/pest-fact.html)

- Pesticide Fact Sheets. National Pesticide Information Center.
  (npic.orst.edu/npicfact.htm)

- Pesticide Fate Database. Environmental Protection Agency, Washington, DC.
  (cfpub.epa.gov/pfate/).

- Pesticide product labels and material safety data sheets. Crop Data Management Systems.
  (www.cdms.net/pfa/LUpdateMsg.asp) or multiple websites maintained by agrichemical companies.

- Registered Pesticide Products (Oregon database). Oregon Department of Agriculture.
  (www.oda.state.or.us/dbs/pest_products/search.lasso)

- Regulatory notes. Pest Management Regulatory Agency, Health Canada, Ontario, Canada.
  (www.hc-sc.gc.ca/pmra-arla/)

- Reptile and Amphibian Toxicology Literature. Canadian Wildlife Service, Environment Canada, Ontario, Canada.
  (www.cws-scf.ec.gc.ca/nwrc-cnrf/ratl/)

- Specific Chemical Fact Sheet B New Active Ingredients, Biopesticide Fact Sheet and Registration Fact Sheet. Environmental Protection Agency, Washington, DC.
  (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.
  (tnsweeds.ucdavis.edu/handbook.html)

- Wildlife Contaminants Online. U.S. Geological Survey, Department of Interior, Washington, DC.
  (www.pwrc.usgs.gov/contaminants-online/)

- One-liner database. 2000. Environmental Protection Agency, Office of Pesticide Programs, Washington, DC.

8.0 Use Tables/Forms

Chemical Profile

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_2):	
Soil Dissipation (DT_{50}):	
Aquatic Persistence (t_2):	

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 B ae basis)	**Habitat Management:** **Croplands/Facilities Maintenance:**
EECs	**Terrestrial (Habitat Management):** **Terrestrial (Croplands/Facilities Maintenance):** **Aquatic (Habitat Management):** **Aquatic (Croplands/Facilities Maintenance):**

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]**

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]	**Treat-ment 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/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 B habitat management or CF B cropland/facilities maintenance. If a pesticide is labeled for both types of treatments (uses), then record separate data for H and CF applications.

Appendix I

Laws, Orders, Policies, and Agreements

Appendix I. Laws, Orders, Policies, and Agreements

I.1 Federal Laws and Treaties

Relevant laws of the United States that might apply to the implementation of the land-use alternatives on CLNWR are discussed in the sections that follow.

United States Treaties with American Indian Tribes

In May and June of 1855, at Wai-i-lat-pu (near present-day Walla Walla, Washington), leaders of various Columbia Plateau American Indian tribes and bands negotiated treaties with representatives of the United States. The negotiations resulted in three treaties, one with the 14 tribes and bands of what would become the Yakama Nation, one with the 3 tribes that would become the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), and 1 with the Nez Perce Tribe. The treaties were ratified by the United States Senate in 1859. The negotiated treaties are:

- Treaty with the Walla Walla, Cayuse, etc. (June 9, 1855; 12 Stat. 945)
- Treaty with the Yakama (June 9, 1855; 12 Stat. 951)
- Treaty with the Nez Perce (June 11, 1855; 12 Stat. 957)

The terms of all three treaties are essentially the same. Each of the three tribal organizations agreed to cede large blocks of land to the United States. The tribes retained certain lands for their exclusive use (the three reservations) and also retained the rights to continue traditional activities outside the reservations. These reserved rights include the right to fish (and erect fish-curing facilities) at usual and accustomed places. These rights also include rights to hunt, gather foods and medicines, and pasture livestock on open and unclaimed lands.

The act of treaty-making between the United States and an Indian tribe has many legal consequences for both entities. The United States recognizes the existence of the tribe as sovereign and initiates a government-to-government relationship with the tribe. At the same time, the tribe loses some aspects of its sovereignty, such as the right to negotiate (independently of the United States) with other foreign powers. In return, the United States and the tribe enter into a trust relationship, whereby the United States assumes the responsibility to preserve the rights and resources of the tribe from incursions by private entities, states, or the Federal government itself. One aspect of this trust duty is the need to consult with the tribes concerning decisions made by the Federal government that could affect tribal rights or resources. In addition to these general legal consequences of treaty-making, the individual treaty itself defines particular new roles and responsibilities of the two governments, within the terms of the new legal relationship created by the treaty.

Every Federal agency that makes decisions potentially affecting the rights or resources of federally recognized American Indian tribes shares in the trust responsibility duties of the Federal government. This trust responsibility includes the duty to consult with those tribes concerning the potential impacts of agency decisions. As a result, the Service regularly consults with the CTUIR, the Yakama Nation, and the Nez Perce Tribe concerning decisions being made by the Service on its lands that might affect tribal rights or resources.

CLNWR is within the exterior boundaries of the Yakama Indian Reservation, so consultation is primarily limited to the Yakama Nation. Consultation is of utmost importance with regard to Service actions and decisions.

International Treaties of the United States

Migratory Bird Treaty Act of 1918

The Migratory Bird Treaty Act of 1918, as amended, is intended to protect birds that have common migration patterns between the United States and Canada, Mexico, Japan, and Russia. The law regulates the harvest of migratory birds by specifying factors such as the mode of harvest, hunting seasons, and bag limits. This act stipulates that, except as permitted by regulations, it is unlawful at any time, by any means, or in any manner to kill any migratory bird. The Service is the lead agency in implementation and enforcement of this act; other agencies consult with the Service regarding impacts to migratory birds and to evaluate ways to avoid or minimize impacts in accordance with the Service migration policy.

Federal Natural Resource Management, Cultural Resource Laws, Water Management, and Pollution Control

American Indian Religious Freedom Act of 1978

The American Indian Religious Freedom Act of 1978 reaffirms American Indians' religious freedom under the First Amendment and sets United States policy to protect and preserve the inherent and constitutional right of American Indian tribes to believe, express, and exercise traditional religions. This act also requires that Federal agencies avoid interfering with access to sacred locations and traditional resources that are integral to the practice of religion.

Archeological and Historic Preservation Act of 1974

The Archaeological and Historic Preservation Act of 1974, as amended, protects sites that have historic and prehistoric importance.

Archaeological Resources Protection Act of 1979

The Archaeological Resources Protection Act of 1979, as amended, requires a permit for any excavation or removal of archaeological resources from Federal or Indian lands. Excavations must be undertaken for the purpose of furthering archaeological knowledge in the public interest, and resources removed are to remain the property of the United States. Consent must be obtained from the Indian tribe or the Federal agency having authority over the land on which a resource is located before issuance of a permit; the permit must contain terms and conditions requested by the tribe or Federal agency.

Bald and Golden Eagle Protection Act of 1972

The Bald and Golden Eagle Protection Act of 1972, as amended, makes it unlawful to take, pursue, molest, or disturb bald and golden eagles, their nests, or their eggs anywhere in the United States. A permit must be obtained from DOI to relocate a nest that interferes with resource development or recovery operations.

Clean Air Act of 1970

The Clean Air Act of 1970, as amended, is intended to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population. Section 118 of the act requires each Federal agency with jurisdiction over properties or facilities engaged in any activity that might result in the discharge of air pollutants to comply with all Federal, state, interstate, and local requirements with regard to the control and abatement of air pollution.

Clean Water Act of 1977

The Clean Water Act (CWA) of 1977, as amended, was enacted to restore and maintain the chemical, physical, and biological integrity of the Nation's water. The CWA prohibits discharge of toxic pollutants in toxic amounts to navigable waters of the United States. Section 313 of the CWA requires all branches of the Federal government with jurisdiction over properties or facilities engaged in any activity that might result in a discharge or runoff of pollutants to surface waters to comply with Federal, state, interstate, and local requirements. Section 404 of the CWA authorizes the Army Corps of Engineers (ACOE) to regulate, through permits, the discharge of dredged or fill material into waters of the United States, including wetlands. Section 10 of the Rivers and Harbors Act of 1899 authorizes the ACOE to regulate, through permits, structures and work in navigable waters of the United States.

Endangered Species Act of 1973

The Endangered Species Act of 1973, as amended, is intended to prevent the further decline of endangered and threatened species and to restore those species and their habitats. This act is jointly administered by the Departments of Commerce and the Interior. Section 7 of this act requires agencies to consult with the Service or NOAA-Fisheries. This consultation determines whether endangered and threatened species or critical habitats are known to be in the vicinity of a proposed action and whether an action will adversely affect listed species or designated critical habitats.

Federal Insecticide, Fungicide, and Rodenticide Act of 1972

The Federal Insecticide, Fungicide, and Rodenticide Act of 1972, as amended, governs the storage, use, and disposal of pesticides through product labeling, registration, and user certification.

Federal Water Pollution Control Act Amendments of 1972

The Federal Water Pollution Control Act Amendments of 1972 are the predecessors to the Federal statute to the Clean Water Act of 1977.

Fish and Wildlife Conservation Act of 1980

The Fish and Wildlife Conservation Act of 1980, as amended, encourages all Federal entities (in cooperation with the public) to protect and conserve the nation's fish and wildlife.

Fish and Wildlife Coordination Act of 1934

The Fish and Wildlife Coordination Act of 1934, as amended, promotes more effectual planning and cooperation between Federal, state, public, and private agencies for the conservation and rehabilitation of the nation's fish and wildlife and authorizes DOI to provide assistance.

Historic Sites, Buildings, and Antiquities Act of 1965

The Historic Sites, Buildings, and Antiquities Act of 1965 sets national policy to preserve historic sites, buildings, and antiquities for the inspiration and benefit of United States' citizens.

National Environmental Policy Act of 1969

The National Environmental Policy Act (NEPA), as amended, establishes a national policy that encourages awareness of the environmental consequences of human activities and promotes consideration of those environmental consequences during the planning and implementing stages of a project. Under NEPA, Federal agencies are required to prepare detailed statements to address the environmental effects of proposed major Federal actions that might significantly affect the quality of the human environment.

National Historic Preservation Act of 1966

The National Historic Preservation Act of 1966, as amended, provides for nomination for placement of sites with significant national historic value on the National Register of Historic Places (NPS 1988). Permits and certifications are not required under this act; however, consultation with the Advisory Council on Historic Preservation is required if a Federal undertaking might impact a historic property resource. This consultation generally results in a memorandum of agreement that includes stipulations to minimize adverse impacts to the historic resource. Coordination with the State Historic Preservation Office is undertaken to ensure that potentially significant sites are properly identified and appropriate mitigation measures are implemented.

National Wildlife Refuge System Administration Act of 1966 (Amended by the National Wildlife Refuge System Improvement Act of 1997)

The National Wildlife Refuge System Administration Act of 1966, as amended, provides guidelines and directives for the administration and management of all lands within the system, including 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. The Secretary of the Interior is authorized to permit by regulations the use of any area within the system provided such uses are compatible with the major purposes for which such areas were established.

Native American Graves Protection and Repatriation Act of 1990

The Native American Graves Protection and Repatriation Act (NAGPRA) of 1990. This act established statutory provisions for the treatment of inadvertent discoveries of American Indians' remains and cultural objects. Specifically, when discoveries are made during ground-disturbing activities, the following must take place: 1) activity in the area of the discovery must cease immediately; 2) reasonable efforts must be made to protect the items discovered; 3) notice of

discovery must be given to the Service Director and the appropriate tribes; and 4) a period of 30 days must be set aside following notification for negotiations regarding the appropriate disposition of these items. NAGPRA also directs the Secretary of the Interior to guide Federal agencies in the repatriation of Federal archaeological collections and collections affiliated culturally to American Indian tribes, which are currently held by museums receiving Federal funding.

Occupational Safety and Health Act of 1970

The Occupational Safety and Health Act of 1970, as amended, establishes standards to enhance safe and healthy working conditions in places of employment throughout the United States. The act is administered and enforced by the Occupational Safety and Health Administration (OSHA), an agency of the United States Department of Labor. Although OSHA and the EPA both have a mandate to limit exposures to toxic substances, the jurisdiction of OSHA is limited to safety and health conditions in the workplace. In general, each employer is required to furnish a place of employment free of recognized hazards likely to cause death or serious physical harm to all employees. OSHA regulations establish specific standards telling employers what must be done to achieve a safe and healthy working environment. Employees have a duty to comply with these standards and with all rules, regulations, and orders issued by OSHA.

Wild and Scenic Rivers Act of 1968

The Wild and Scenic Rivers Act of 1968, as amended, protects selected national rivers possessing outstanding scenic, recreational, geological, fish and wildlife, historical, cultural, or other similar values. These rivers are to be preserved in a free-flowing condition to protect water quality and for other vital national conservation purposes. This act also instituted a National Wild and Scenic Rivers System, designated the initial rivers within the system, and developed standards for the addition of new rivers in the future. In accordance with this act, the Secretary of the Interior has directed that all DOI agencies conduct assessments of their rivers for eligibility into the National Wild and Scenic Rivers System as part of land planning processes.

Wilderness Act of 1964

The Wilderness Act of 1964, as amended, was intended to "assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition ..." Per DOI and Service policy, DOI lands are to be assessed for their potential as additions to the National Wilderness Preservation System as part of normal land planning processes.

I.2 State Laws

State and local statutes also apply to activities on CLNWR when Federal law delegates enforcement or implementation authority to state or local agencies. In general, state laws do not apply to the Federal government based on the National Supremacy Clause that reads, "This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding." (Article 6, U.S. Constitution).

I.2.1 Growth Management Act of 1989

Most planning by local governments falls under the State of Washington Growth Management Act (GMA), which established a statewide planning framework and created roles and responsibilities for planning at the local, regional, and State levels. The GMA requires that all counties:

1) Designate and protect wetlands, frequently flooded areas, and other critical areas.
2) Designate farm lands, forest lands, and other natural resource areas.
3) Determine that new residential subdivisions have appropriate provisions for public services and facilities.

The GMA requires the largest and fastest growing counties (counties with more than 50,000 people or with a population growth of more than 20% in the past 10 years) and cities within those counties to develop new comprehensive plans. Counties not required to plan may elect to do so. Not having met the threshold requirements, Klickitat County chose not to participate and write a new plan under the GMA requirements. However, the county already had a comprehensive plan in place, written before the passage of the GMA, and updates to the plan are written to meet GMA standards.

Shoreline Management Act of 1971

The Shoreline Management Act of 1971 uses authority passed to the state by the Federal Rivers and Harbors Act of 1899. Section 10 of the Rivers and Harbors Act prohibits the unauthorized obstruction or alteration of any navigable waters of the United States. Examples of activities requiring an ACOE permit include constructing a structure in or over any waters of the United States, excavation or deposit of material in such waters, and various types of work performed in such waters, including fill and stream channelization. The state is considered the owner of all navigable waterways within its boundaries.

The state has passed regulatory responsibility for the Shoreline Management Act to the affected county. Counties in Washington State regulate the shoreline (i.e., from the high-water mark to the low-water mark) through each county's Shoreline Management Master Plan and a shoreline permit system consistent with WDOE guidelines.

State Environmental Policy Act of 1971

The Washington State legislature enacted the State Environmental Policy Act of 1971 (SEPA). The statute was amended in 1983, and new implementing regulations (SEPA rules) were adopted and codified by the WDOE in 1984 as Washington Administrative Code 197-11. The purpose and policy sections of the statute are extremely broad, including recognition by the legislature that "each person has a fundamental and inalienable right to a healthful environment ..." SEPA contains a substantive mandate that policies, regulations, and laws of the State of Washington shall be interpreted and administered in accordance with the policies set forth.

SEPA applies to all branches of State government, including State agencies, municipal and public corporations, and counties. It requires each agency to develop procedures implementing and supplementing SEPA requirements and rules. Although SEPA does not apply directly to Federal actions, the term "government action" with respect to State agencies is defined to include the issuance of licenses, permits, and approvals. Thus, as in NEPA, proposals (Federal, State, or private) are evaluated and may be conditioned or denied through the permit process, based on environmental

considerations. SEPA does not create an independent permit requirement, but overlays all existing agency permitting activities.

I.3 Executive Orders

This section identifies Presidential Executive Orders that clarify issues of national policy and provide guidelines relevant to CLNWR land-use planning.

Executive Order 11593, Protection and Enhancement of the Cultural Environment

Executive Order 11593 requires Federal agencies to direct their policies, plans, and programs in a way that preserves, restores, and maintains federally owned sites, structures, and objects of historical or archaeological significance.

Executive Order 11988, Floodplain Management

Executive Order 11988 directs Federal agencies to establish procedures to ensure that the potential effects of flood hazards and floodplain management are considered for actions undertaken in a floodplain. This order further directs that floodplain impacts are to be avoided to the extent practicable.

Executive Order 11990, Protection of Wetlands

Governmental agencies are directed by Executive Order 11990 to avoid, to the extent practicable, any short- and long-term adverse impacts on wetlands wherever there is a practicable alternative.

Executive Order 12372, Intergovernmental Review of Federal Programs

Executive Order 12372 applies to state review of NEPA documents and to the coordination of state and Federal NEPA processes. The goal of this Executive Order is to foster an intergovernmental partnership and a strengthened coordination and consultation process.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order 12898 directs all Federal agencies, to the greatest extent practicable and permitted by law, to achieve environmental justice by identifying and addressing disproportionately high and adverse human health or environmental effects of agency programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions. This order directs each Federal agency, to the extent permitted by existing law, to develop strategies to identify and address environmental justice concerns. The order further directs each Federal agency, to the extent permitted by existing law, to collect, maintain, analyze, and make available information on the race, national origin, income level, and other readily accessible and appropriate information for areas surrounding facilities or sites expected to have a substantial environmental, human health, or economic effect on the surrounding populations. This action is required when these facilities or sites become the subject of a substantial Federal environmental administrative or judicial action.

Executive Order 13007, Indian Sacred Sites

Executive Order 13007 directs Federal agencies to take measures to protect and preserve American Indian tribes' religious practices. Federal agencies shall, to the extent practicable and permitted by law, and when consistent with essential agency functions, accommodate access to and ceremonial uses of sacred sites by American Indian tribes' religious practitioners. Further, the Executive Order states that Federal agencies will comply with presidential direction to maintain government-to-government relations with tribal governments.

Executive Order 13112, Invasive Species

Issued on February 11, 1999, Executive Order 13112 is intended to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. The Executive Order established an Invasive Species Council which created a National Invasive Species Management Plan detailing and recommending performance-oriented goals, objectives, and specific measures of success for Federal agencies concerned about invasive species.

Executive Order 13175, Consultation and Coordination with Indian Tribal Governments

Executive Order 13175 further ensures that Federal government agencies recognize the unique legal relationship the United States has with Indian tribal governments as set forth in the Constitution of the United States, treaties, statutes, other Executive Orders, and court decisions. It once again recognizes the rights of Indian tribes to self-government and to exercise inherent sovereign powers over their members and territory. It directs Federal agencies to work with Indian tribes on a government-to-government basis to address issues concerning Indian tribal self-government, tribal trust resources, and Indian tribal treaty and other rights.

I.4 Presidential and Executive Branch Policies

President Clinton issued a memorandum to the heads of executive departments and agencies regarding government-to-government relations with tribal governments on April 29, 1994; this order is still in effect. This memorandum directed executive departments and agencies to implement activities that affect tribal rights in a knowledgeable, sensitive manner respectful of tribal sovereignty. The memorandum outlined principles for executive departments and agencies to follow in their interactions with tribal governments and clarified the responsibility of the Federal government to operate within a government-to-government relationship with federally recognized American Indian tribes.

The United States Department of Justice reaffirmed a long-standing policy regarding the relationship between the Federal government and American Indian tribes (61 FR 29424). The policy states that the United States recognizes the sovereign status of Indian tribes as domestic dependent nations from its earliest days. The Constitution recognizes Indian sovereignty by classifying Indian treaties among the supreme Law of the Land, and establishes Indian affairs as a unique area of Federal concern.

The Service's American Indian policy commits the Service to working with tribal governments on a government-to-government basis, recognizes the Federal trust relationship with tribes and tribal members' treaty rights, and commits the Service to consultation with tribes regarding agency activities that could potentially affect the tribes.

Appendix J

Distribution List

Appendix J. Distribution List

The Service developed this list based on known interest or a direct socio-economic interest in the results of the planning process.

Tribal

Rex Buck, Spiritual Leader, Wanapum
Harry Smiskin, Chair, Confederated Tribes and Bands of the Yakama Indian Nation

Office of the Governor

The Honorable Jay Inslee

United States Senators

The Honorable Maria Cantwell
The Honorable Patty Murray

United States Representatives

The Honorable Suzan DelBene
The Honorable Doc Hastings
The Honorable Denny Heck
The Honorable Jamie Herrera Beutler
The Honorable Derek Kilmer
The Honorable Rick Larsen
The Honorable Jim McDermott
The Honorable Cathy McMorris Rodgers
The Honorable Adam Smith
The Honorable David Reichert

Washington State Elected Officials

Washington State Senate

The Honorable Curtis King

Washington State House of Representatives

The Honorable Norm Johnson
The Honorable Charles Ross

County Commissioners

Klickitat County Commissioners

Rex Johnson
David Sauter
Jim Sizemore

Skamania County Commissioners

Bob Anderson
Chris Brong
Doug McKenzie

Yakima County Commissioners

Kevin Bouchey
Rand Elliott
Mike Leita

Mayors

Arthur Babitz (Hood River)
Clinton Baze (Goldendale)
David Poucher (White Salmon)

Federal Agencies/Organizations

Bonneville Power Administration
Bureau of Indian Affairs
Bureau of Land Management
Bureau of Reclamation
Columbia River Inter-Tribal Fish Commission
Federal Energy Regulatory Commission
Federal Highway Administration
National Oceanic Atmospheric Administration
National Park Service
Natural Resources Conservation Service
United States Army Corps of Engineers
United States Department of Energy
United States Environmental Protection Agency
United States Forest Service
United States Geological Survey
United States Department of Transportation

State Agencies/Organizations

Washington Department of Agriculture
Washington Department of Ecology
Washington Department of Fish and Wildlife
Washington Department of Natural Resources
Washington Department of Transportation
Washington Fish and Wildlife Commission
Washington Interagency Committee for Outdoor Recreation
Washington State Historic Preservation Officer

Local Agencies/Organizations

Klickitat County Planning Department
Skamania County Planning Department
Yakima County Planning Department

Interest Groups

American Bird Conservancy
American Birding Association
American Fisheries Society
American Sportfishing Association
Animal Protection Institute
Association of Fish and Wildlife Agencies
Congressional Sportsman's Association
Defenders of Wildlife
Ducks Unlimited
Ecological Society of America
Friends of the Mid-Columbia Refuges Fund For Animals
Humane Society of the United States
Izaak Walton League of America
National Audubon Society
National Fish and Wildlife Foundation
Native Plant Society
Natural Resources Defense Council
Northwest Ecosystem Alliance
Northwest Environmental Defense Center
Predator Defense Institute
Rocky Mountain Elk Foundation
Safari Club International
Sierra Club
Society for Conservation Biology
The Conservation Fund
The Fund for Animals
The Nature Conservancy
The Wilderness Society
The Wildlife Society
Trout Unlimited
Washington League of Voters
Washington Waterfowl Association
Washington Kayak Club
Wildlife Management Institute

Media

Associated Press, Yakima
The Enterprise, White Salmon (Newspaper)
KATU, Portland (Television)
KGW, Portland (Television)
KOIN, Portland (Television)
KPTV, Portland (Television)
The Oregonian, Portland (Newspaper)
Yakima Herald-Republic, Yakima (Newspaper)

Reading Rooms/Libraries

Gonzaga University, Foley Center
Hood River Library
Library of Congress
White Salmon Community Library

Individuals

Eugene Burril
Laurie Cross
Jean Erickson
Duane Gahimer
Robert & Carol Guinn
Bryan Keithly
Darrel Spies
Larry Gohl
Cheri Anderson
David McClure
Jay McLaughlin
David Anderson
Marc Hayes

Appendix K

Public Involvement

Appendix K. Public Involvement

K.1 Service Policy

As outlined by Service policy, NEPA, and CEQ regulations for implementation (40 CFR 1500-1508), developing both a CCP and an EA is a collaborative process. This chapter summarizes the Service's efforts to involve the public, other agencies, and local, State, and tribal governments in preparing the CCP/EA. Consultation beyond the planning stage and for step-down plans will continue to address concerns, issues, and opportunities of mutual interest.

K.2 Agency Consultation and Coordination

In the course of developing the CCP and completing the NEPA analysis, the refuge contacted a number of Federal, State, and local agencies to gather information and solicit input on the issues of concern. Rather than holding CCP-specific meetings, coordination and consultation was conducted by the Refuge Manager as he met with other agencies on all refuge matters of interest to those agencies. This proved to be more efficient and saved considerable time over holding a series of CCP meetings, although one public meeting was held June 14, 2011 (see K.4.1). It also allowed for other matters to be addressed and established working relationships between the Refuge Manager and other agencies and staff. As a result of these consultations, the goals and objectives outlined in Chapter 2 were significantly enhanced to meet other agencies' goals, particularly those of the State of Washington.

K.3 Native American Government Consultation

In accordance with Service and NEPA policy, the refuge attempted to consult with the Yakama Nation during the scoping phase and throughout development of the draft CCP. With release of the draft CCP, the refuge will offer to meet with Yakama Nation Tribal Government to fully present the CCP and to arrange for appropriate input into the final CCP.

Prior to public scoping the refuge sent a letter on March 14, 2011, to the Yakama Nation requesting a meeting and consultation with the Tribal Council. The letter was signed by the Refuge Manager. Through a return letter (dated April 28, 2011) from the Yakama Nation's Chair for Fish and Wildlife, the Yakama Nation requested that the Service letter should be resubmitted by someone in a policy-level position. The letter was resent on May 3, 2011, signed by the Region 1 Refuge Supervisor. As the result of a subsequent communication between the Region 1 Refuge Supervisor and the Yakama Nation's Deputy Director of Natural Resources, an email was sent by the Region 1 Refuge Supervisor to the Deputy Director of Natural Resources requesting time on the Tribal Council agenda. The Service was given an hour on the June 8, 2011, agenda. However, since no one in the Service Regional Office was available to attend the meeting, the offered slot was rescinded. To date, a consultation meeting with the Tribal Council has not been arranged, although several additional attempts have been made (e.g., August 8, 2011, email from the Region 1 Refuge Supervisor to the Yakama Nation's Deputy Director of Natural Resources).

A September 20, 2011, meeting was arranged between the Service (Region 1 Refuge Supervisor, MCRNWRC Project Leader, Refuge Manager, and others) and three members of the Yakama

Nation's Department of Natural Resources and Wildlife Program. Points of contact were identified and approval was received by the Yakama Nation to continue technical meetings.

Technical meetings with Yakama Nation staff were held on November 2, 2011, and November 9, 2011.

K.4 Formal Scoping

Prior to developing a CCP and EA, the scope of the document, that is, what will be covered and in what detail, must be determined. Scoping is open to the public and tribal, State, and local governments, as well as to affected Federal agencies. This open process gives rise to important opportunities for better and more efficient NEPA analyses and simultaneously places responsibilities on public and agency participants alike to state their concerns early.

The scoping period has specific objectives: 1) to identify the affected public and agency concerns; 2) to identify those concerns early in the NEPA process; 3) to facilitate an efficient EA preparation process; 4) to define the issues and alternatives that will be examined in detail in the CCP/EA, while simultaneously devoting less attention and time to issues which cause no concern; and 5) to save time in the overall process by helping to ensure that drafts adequately address relevant issues, reducing the possibility that new comments will cause the CCP to be rewritten or supplemented.

As undertaken by the Service, scoping is a process, not an event or a meeting. It has continued throughout the planning and development of this CCP; public comments have been welcomed at any time throughout CCP development.

K.4.1 Notice of Intent and Public Scoping

Public scoping for issues to be addressed in the CCP, management actions to be undertaken, and opportunities to benefit wildlife and people officially began on July 13, 2011, with a notice published in the *Federal Register*. The formal comment period closed on August 12, 2011. Prior to the formal scoping period, an open house was held.

Conboy Lake Open House

The refuge held a public open house on June 14, 2011, in Glenwood, Washington, to solicit ideas from the public on CCP issues and content. While the refuge had no mailing list prior to the open house for CLNWR, the meeting notice reached the desired audience through a number of avenues.

1) A press release was sent to all media outlets in the area on June 1, 2011. The distribution list for the press release also included tribal governments, congressional staff, and agency offices.
2) The Refuge Manager made telephone calls to the Yakama Nation, WDFW staff, State house and senate members, congressional staff, local conservation organizations, and numerous other personal contacts in the area.

The refuge's open house meeting began with a 25-minute presentation by the Refuge Manager on the refuge, the planning process, and the issues the refuge had already identified. Following the presentation, the audience provided input *en masse* rather than break into stations. Comments, ideas, and suggestions for management activities are presented below.

Open House-Generated Ideas, Issues, and Management Actions

- There is a need for more access points.
- The Willard Springs Trail is a great resource; there is a need for more self-guided and other (multi-use) trails.
- Install a walk-in gate at the BZ access parking lot.
- Don't build a visitor center; a visitor contact station is all that's needed.
- There is a need to look at prioritization of infrastructure expenditures.
- Before the Service acquires any houses in the area, there is a need to consider the housing needs of the area.
- School field trips, adult education classes, and environmental education programs are needed. Consider a Bird-N-Breakfast event(s) (Malheur National Wildlife Refuge might be a model).
- The Youth Conservation Corp program is wonderful for local kids.
- Clarify and ensure boating access and use, especially for hunting.
- Implement an elk permit draw, limited to primitive weapons.
- Consider whether the elk hunt should be an ABA-accessible-only hunt. If so, the Service should consider allowing ATV access. There was a follow-up concern over ATV abuse if that were allowed.
- Determine if there would be conflicts between elk hunters and hikers.
- What happened to all the ducks and geese? Is it possible to increase the food supply on the refuge in order to increase hunting opportunities?
- Maintain current waterfowl hunting opportunities. Don't implement any drawings or blind assignments.
- Get water on the refuge sooner to benefit waterfowl hunters.
- Agreements on water management need to be worked out.
- A greater law enforcement presence is needed, with a special emphasis during waterfowl and big game seasons.
- Concerns were voiced over the proposed county road realignment route on Native American artifacts. Be sure to address cultural resource issues for all projects.
- Ensure sufficient outreach to former farmers. (There were no returning special use permit requests.) Why don't they want to hay?
- Should farming permits be for longer periods?
- Consider farming a larger area through co-op farming.
- Explore targeting grazing opportunities.
- Grazing is a concern for special status plants.
- Continue meadow enhancement.
- Hand pile slash.
- Leave a tree buffer along the roads to screen wildlife and control poaching.
- Actively manage upland forest stands for late seral conditions.
- Control bullfrogs.
- There is a need for a snake survey.
- More baseline biological information is needed, for example, on species numbers.
- It is important to monitor the impacts of management actions on species of concern. The Service needs to look for partners and co-management opportunities.
- The Washington State wildlife inventory is a good source of information, and the Service needs to utilize it and be part of its evolution.

Scoping Comment Letters

The Defenders of Wildlife submitted a comment letter focused primarily around climate change. In their letter, they stated that the CCP must consider and analyze the impacts of climate change on refuge resources, the ecosystem of north-central Oregon, and public use of the refuge. The letter went on to suggest that the CCP planning team develop a plan to inventory and monitor changes to wildlife and habitats from climate change; address the cumulative impacts of climate change with other environmental threats (e.g., invasive species, over-harvesting, pollution); outline strategies for improving habitat connectivity in the face of climate change; and incorporate climate change into environmental education programs. The Defenders of Wildlife also recommended that the CCP include an assessment of water resources quality, quantity, timing, rights, and threats.

A letter from the EPA focused primarily on water resources. Specifically:

1) Water bodies not meeting quality standards should be identified and a plan of action developed. All water bodies that might be impacted by CCP actions must be identified.
2) Drinking water sources must be protected.
3) Roads and other infrastructure that might increase sedimentation should be identified, the impacts outlined, and corrective measures undertaken.
4) The CCP should identify and map all wetland and floodplain resources. If any dredging or filling is a result of the CCP, mitigation and restorative measures must be included. This section went on to identify specific components to include in the CCP if wetlands are impacted.
5) Impacts to wildlife and habitats must be identified and analyzed and fragmentation or loss of connectivity should be identified and addressed.
6) The CCP should include a plan to control noxious weeds and assess how it will benefit rare plants.
7) If air quality may be impacted, the sources and impacts must be addressed.
8) Cumulative impacts must be identified and assessed.
9) Impacts to endangered species must be identified and actions taken to improve populations.
10) Climate change must be addressed, including identifying any significant sources of greenhouse gasses resulting from management actions.
11) There needs to be coordination with Native American tribes.
12) The CCP must include an environmental justice analysis and must provide for public input and involvement.
13) Monitoring of wildlife, habitats, and environmental conditions must be a central component of the CCP.

The WDNR submitted procedures for forest thinning and slash management. The comments did not suggest that thinning should or should not be undertaken.

Two letters from private citizens can be summarized as:

- Fences must be maintained on the refuge to control access by cattle.
- Hunting should be discontinued.
- Actions that improve Sandhill crane nesting should be a high priority.

A letter from the WDFW had the following points:

- WDFW would like to see a continuation and expansion of waterfowl hunting recreation at this refuge, especially as new acquisitions are added.
- WDFW supports consideration of a limited permit elk hunt on the refuge to address damage issues and provide additional recreation.
- Conboy is the most important site in Washington for breeding Sandhill cranes and Oregon spotted frogs. Water management is the key to many life stages for these species and should receive detailed consideration in the draft CCP.

K.4.2 Other Public Notices

The planning team sent an initial news release to all local media contacts in television, newspaper, radio, and other mass media outlets (e.g., organization newsletters). A week prior to the public scoping meeting (see below), the planning team sent a public service announcement to the mass media contacts with specific information on the meeting location and meeting format.

The refuge mailed Planning Update #1, which announced the open house.

K.5 Other Sources of Information

The refuge also conducted internal resource reviews on visitor services and wildlife and habitat. The refuge assembled teams of resource experts from local, State, and Federal agencies to assist with the resource reviews.

K.6 Planning Updates

As noted above, the refuge distributed a planning update (summarized below) to individuals, agencies, and organizations on a mailing list to initiate the scoping process. A second update is being released to announce the availability of this draft CCP.

- Planning Update 1: May 2011, provided an overview of the CCP process, announced the start of the planning process, and presented draft issues that might be addressed in the CCP.
- Planning Update 2: September/October 2013, presented draft goals and alternatives that were being analyzed in the draft CCP/EA.

CLNWR's web site at www.fws.gov/conboylake/management.html posts all planning-related documents.

Appendix L

CCP Preparation

Appendix L. CCP Preparation

L.1 CCP Preparation

Many people assisted in the writing of this CCP. While the Service hopes that the following lists are complete, there were so many people providing assistance, it is possible that some people's names were inadvertently omitted. If so, please know that your contributions are valued and that the omission was in error.

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Appendix M

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Appendix M. References Cited

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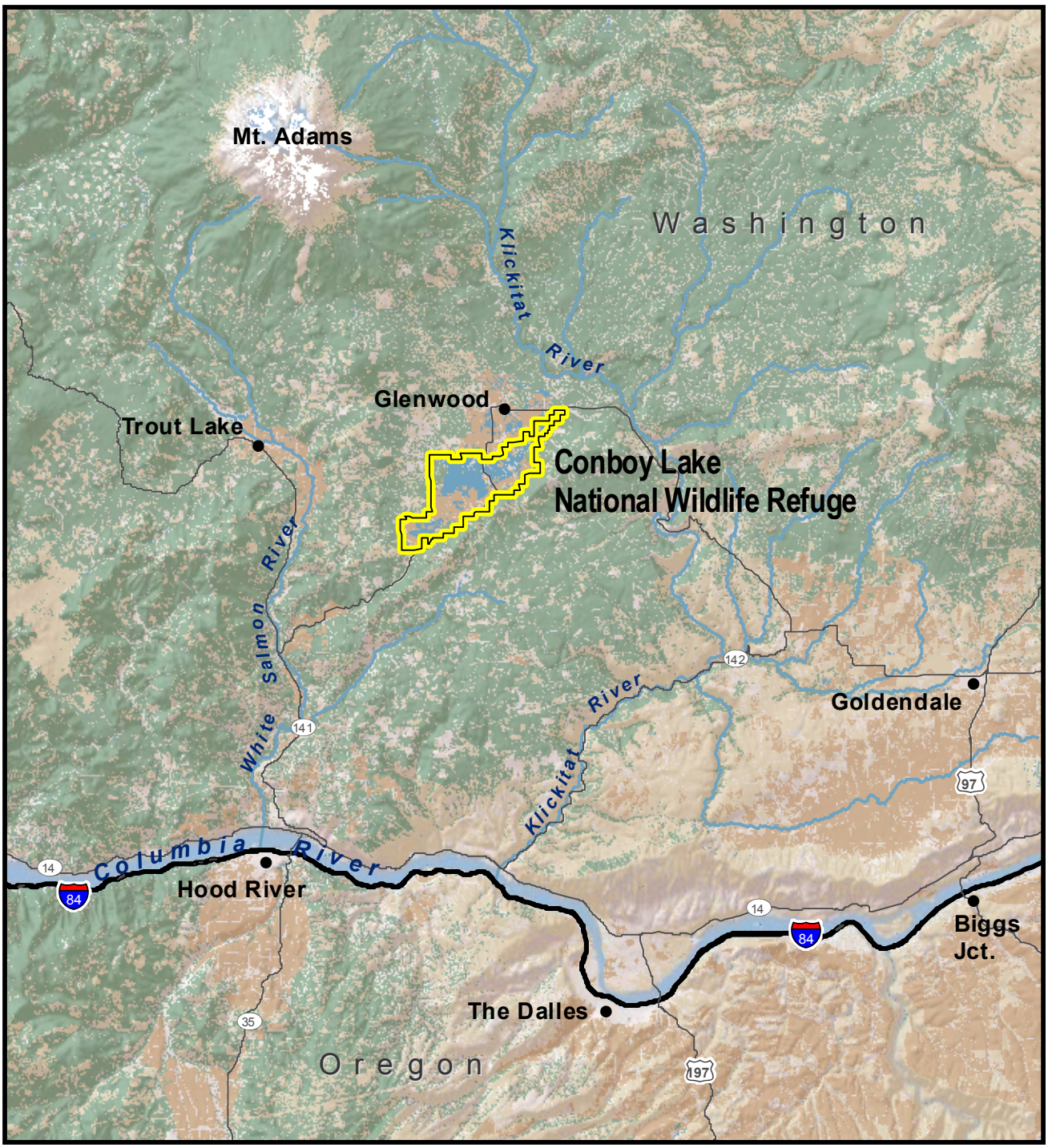
Appendix N

Maps

Map 1 ***Location of Refuge and Regional Land Cover***



Regional Land Cover

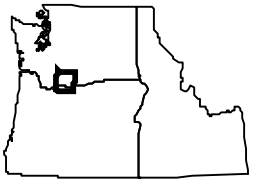
- Agriculture
- Wetlands
- Forest
- Perennial Snow/Ice
- Shrub/Scrub

Approved Aquisition Boundary

N

0 5 10 Miles

0 5 10 Kilometers



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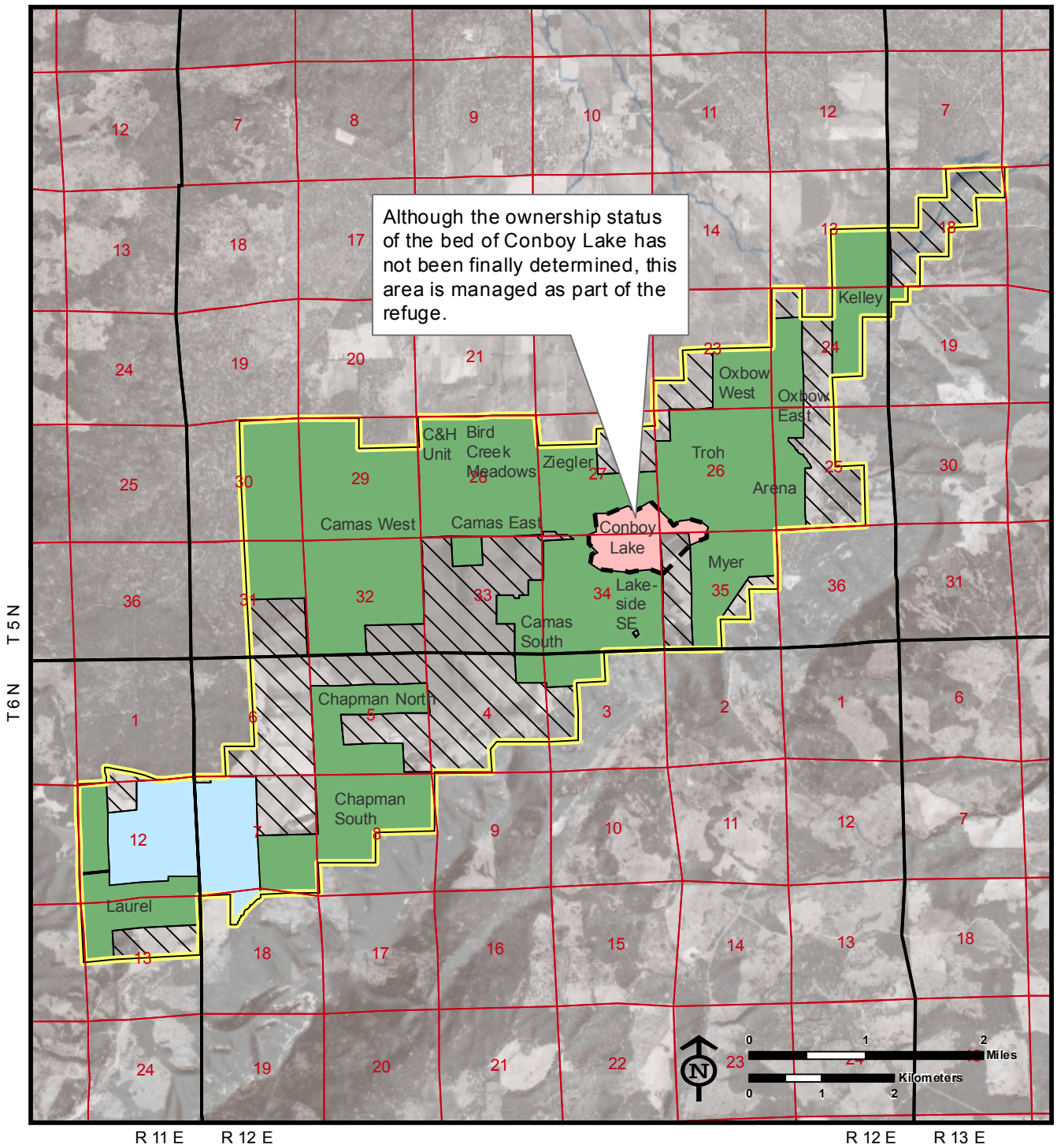
Map Date: 7/1/2013 File: 12-154-1.mxd

Data Source: USGS NHD, ESRI World_Shaded_Relief, USGS National Land Cover Dataset 2001

Map 2 ***Land Status and Management Unit Names***

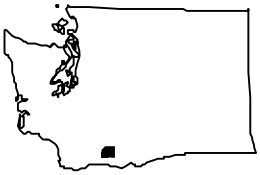


Land Status

- Easement
- Fee
- Inholding
- Uncertain
- Approved Aquisition Boundary
- Meander Line

Public Land Survey System
Willamette Meridian

- Townships
- Sections



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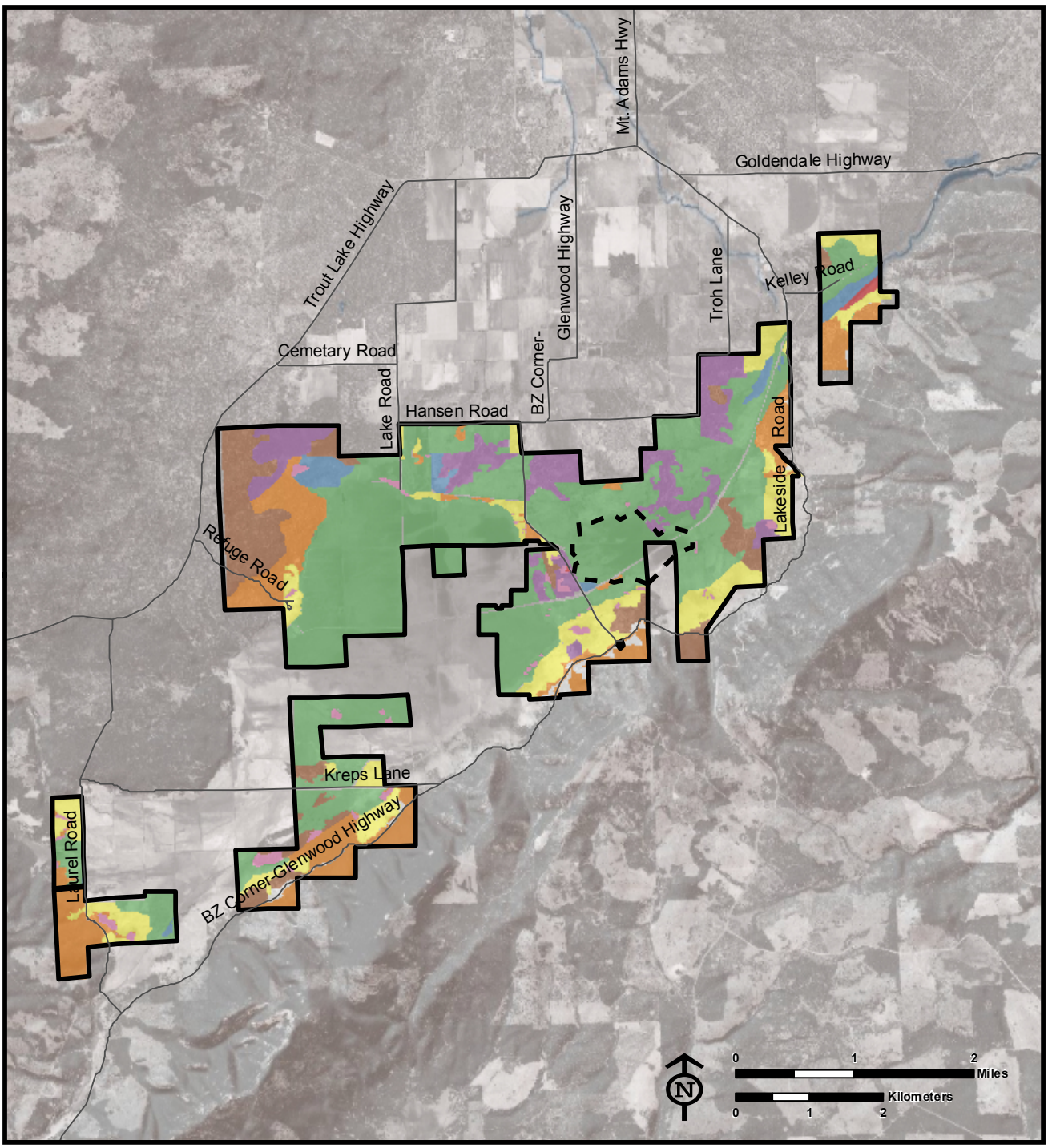
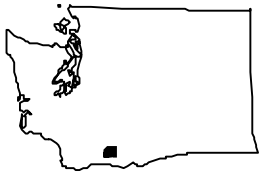
Data Source: USDA National Agriculture Imagery Program 2011, ESRI World_Shaded_Relief

Map 3 — *Habitat Types*



- Fee Title Refuge Boundary
- Roads
- Meander Line
- Alder and Willow
- Emergent Marsh
- Lodgepole/Ponderosa Pine
- Mixed Conifer
- Oregon White Oak
- Ponderosa Pine
- Quaking Aspen
- Upland Meadow
- Wet Prairie (Wet Meadow)



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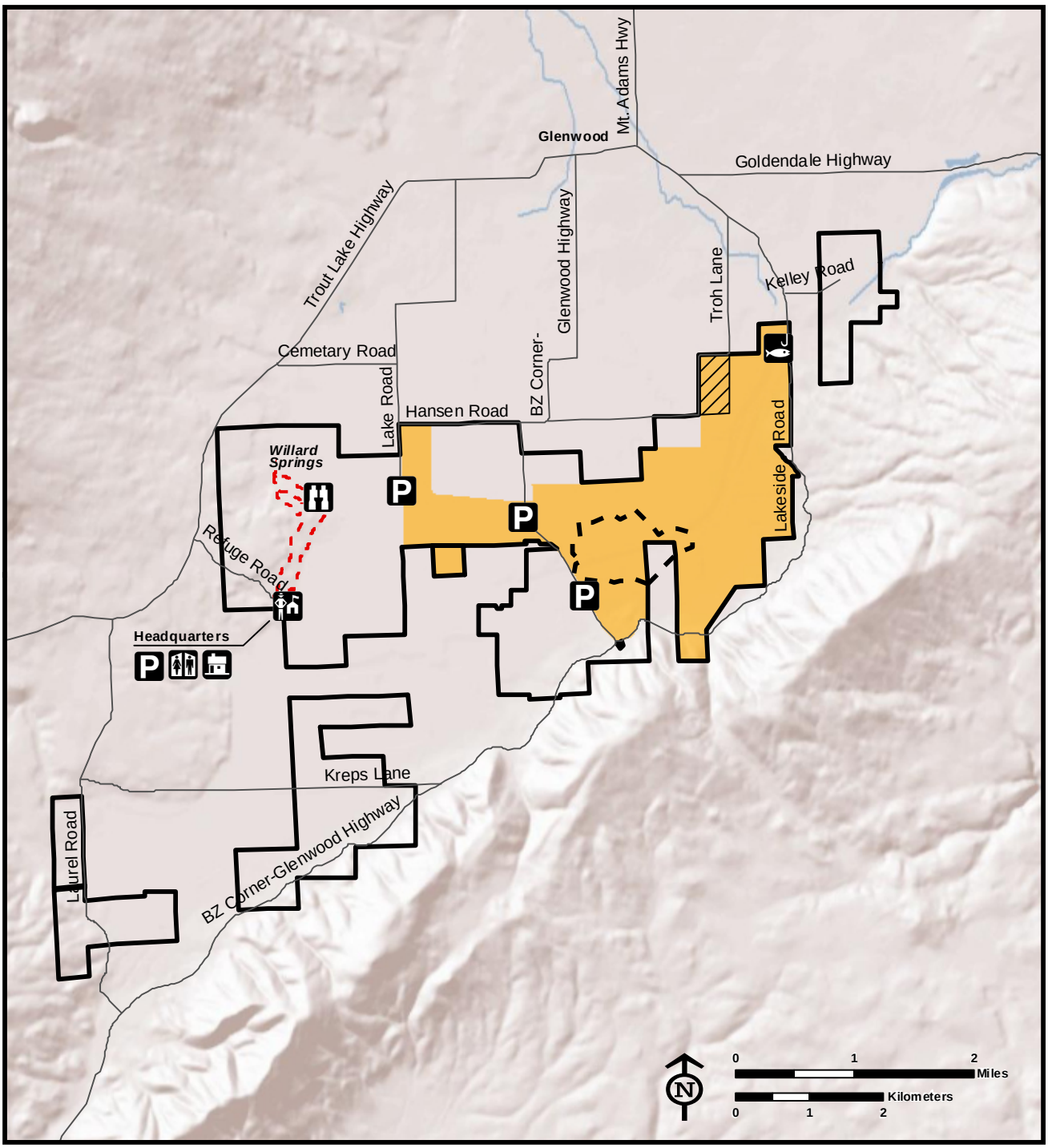
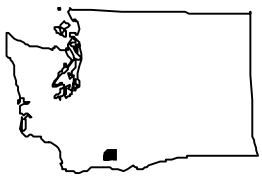
Map Date: 7/1/2013 File: 12-154-3.mxd
Data Source: USDA National Agriculture Imagery Program 2011, ESRI World_Shaded_Relief

Map 4 ***Visitor Facilities & Access - Alternative 1***



Fee Title Refuge Boundary
Meander Line
Deer Hunt Area
Migratory Bird Hunting
Roads
Trail

Refuge Office
Observation Platform
Historic Cabin
Restrooms
Parking
Public Fishing



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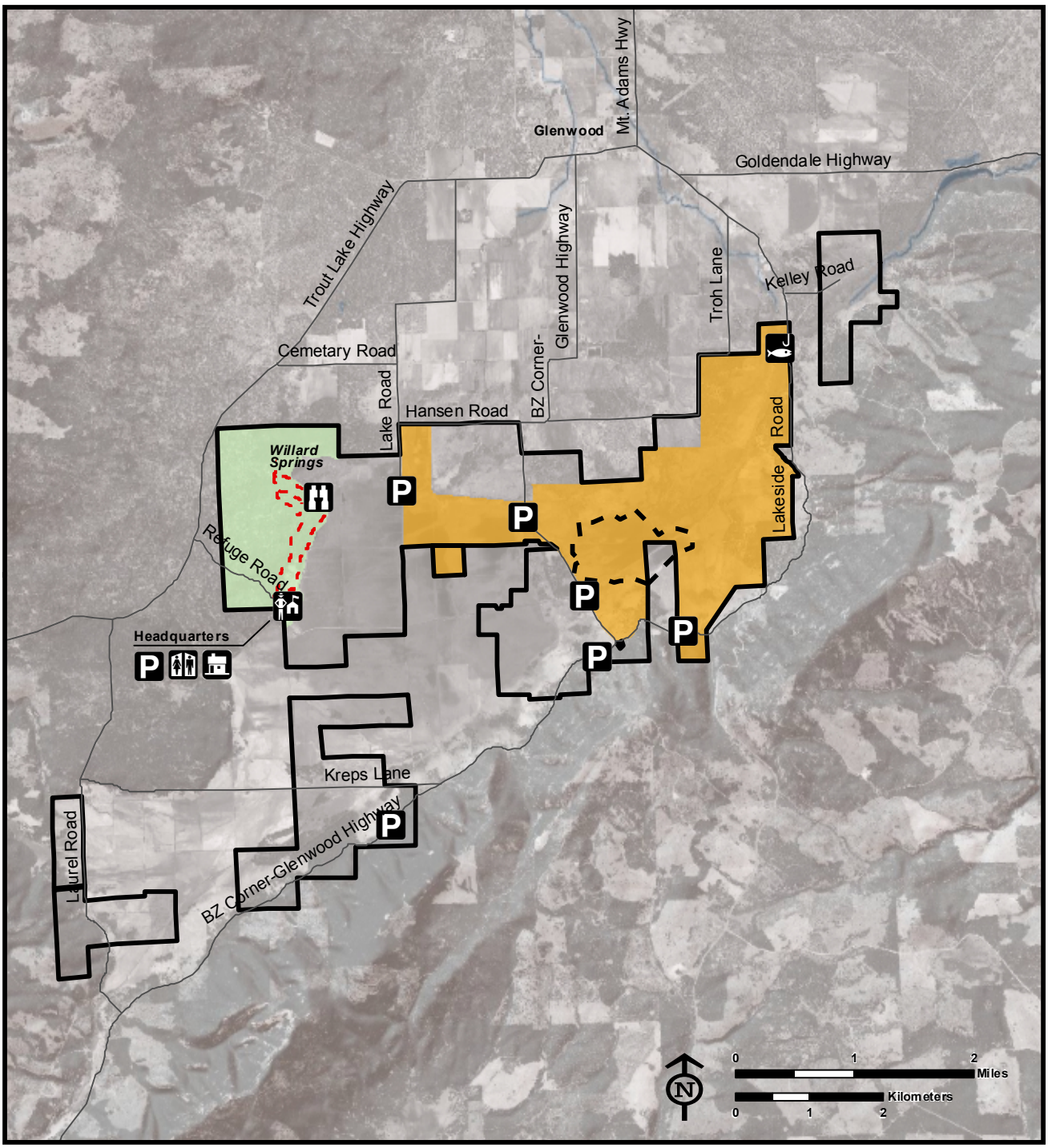
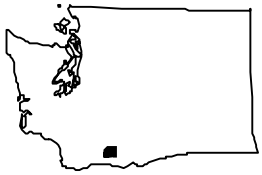
Data Source: USDA National Agriculture Imagery Program 2011, ESRI World_Shaded_Relief

Map 5 ***Visitor Facilities & Access - Alternative 2***



Fee Title Refuge Boundary
Meander Line
Free Roam Area
Migratory Bird Hunting
Roads
Trail

Refuge Office
Observation Platform
Historic Cabin
Restrooms
Parking
Public Fishing



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Map Date: 7/1/2013 File: 12-154-5.mxd
Data Source: USDA National Agriculture Imagery Program 2011, ESRI World_Shaded_Relief

Camas blooms. Lisa Wilson/USFWS

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National Wildlife Refuge System Information
1 800/344 WILD

January 2014

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.

Cover Photo:
Oregon spotted frog. ©Chuck and Grace Bartlett