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 Service s best estimate of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service 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.

Turnbull National Wildlife Refuge

Comprehensive Conservation Plan

Prepared by:
Turnbull National Wildlife Refuge
26010 S. Smith Road
Cheney, Washington 99004

and

U.S. Fish and Wildlife Service
Division of Planning and Visitor Services
911 NE 11th Avenue
Portland, Oregon 97232

March 2007

Approved: _____ MAR 27 2007
Acting Regional Director, Region 1 — Date
Portland, Oregon

Turnbull National Wildlife Refuge,
Comprehensive Conservation Plan
Approval Submission

In accordance with the National Wildlife Refuge System Administration Act, as amended, a Comprehensive Conservation Plan (CCP) has been prepared for Turnbull National Wildlife Refuge. The purpose of the CCP is to specify a management direction for the Refuge for the next 15 years. The CCP charts a vision of the Refuges' future desired conditions, the types of habitat that will be provided, land protection, public use, and partnership opportunities, and the management actions needed to achieve that vision. This CCP is submitted for approval by the Regional Director.

Submitted by:

Nancy Curry — 3/9/07
Nancy Curry — Date
Project Leader

Concur:

Linda Watters — 3/21/07
Forrest Cameron for — Date
Refuge Supervisor

Carolyn A. Bohan — 3/22/07
Carolyn Bohan — Date
Regional Chief, National Wildlife Refuge System

FINDING OF NO SIGNIFICANT IMPACT

Turnbull National Wildlife Refuge
Comprehensive Conservation Plan
Spokane County, Washington

The U.S. Fish and Wildlife Service (Service) has completed the Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) for Turnbull National Wildlife Refuge (Refuge). The CCP will guide management of the Refuge for the next 15 years. The CCP and EA describe the Service's proposals for managing the Refuge and their effects on the human environment under four alternatives, including the no action alternative.

Decision
Following comprehensive review and analysis, the Service selected Alternative 3 for implementation because it is the alternative that best meets the following criteria:

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

As described in detail in the CCP and EA, implementing the selected alternative will have no significant impacts on any of the environmental resources identified in the CCP and EA.

Public Review
The planning process incorporated a variety of public involvement techniques in developing and reviewing the CCP. This included one public workshop, six planning updates, numerous meetings with partners, elected officials, and neighbors, and public review and comment on the planning documents. The details of the Service's public involvement program are described in the CCP.

Conclusions
Based on review and evaluation of the information contained in the supporting references, I have determined that implementing Alternative 3 as the CCP for management of Turnbull National Wildlife Refuge is not a major Federal action that would significantly affect the quality of the human environment within the meaning of section 102(2) (C) of the National Environmental Policy Act of 1969. Accordingly, the Service is not required to prepare an environmental impact statement.

This Finding of No Significant Impact and supporting references are on file at the Turnbull National Wildlife Refuge, 26010 S. Smith Road, Cheney, Washington, 99004 and U.S. Fish and Wildlife Service, Division of Planning and Visitor Services, 911 NE 11th Avenue, Portland, Oregon, 97232. These documents can also be found on the Internet at http://pacific.fws.gov/planning/. These documents are available for public inspection. Interested and affected parties are being notified of our decision.

Supporting References
U.S. Fish and Wildlife Service. 2005. *Environmental Assessment for the Draft Refuge Comprehensive Conservation Plan, Turnbull National Refuge.*

U.S. Fish and Wildlife Service. 2007. *Turnbull National Wildlife Refuge Comprehensive Conservation Plan..*

Acting Regional Director

MAR 27 2007
Date

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CHAPTER 1

Introduction and Background

Great Blue Heron. Photograph by Nancy J. Curry

1.1 INTRODUCTION

Turnbull National Wildlife Refuge is located on the eastern edge of the Columbia Basin in the Channeled Scablands region of Spokane County in eastern Washington (Map 1). The City of Spokane, a major metropolitan area of nearly 200,000 people, is located 20 miles northeast of the Refuge. The Refuge is located next to the town of Cheney.

In amending the National Wildlife Refuge System Administration Act of 1966 (Refuge Administration Act) with the National Wildlife Refuge System Improvement Act (NWRSIA) (16 U.S.C. 668dd-668ee) in 1997, Congress mandated that Comprehensive Conservation Plans be developed for each of the more than 500 refuges in the National Wildlife Refuge System.

The CCP will be used as a tool by the Refuge staff and other partners in Refuge management. It will guide management decisions over the next fifteen years and identify strategies for achieving Refuge goals and objectives.

1.2 PURPOSE AND NEED

The purpose of the CCP is to provide a coherent, integrated set of management actions to help attain the Refuge vision, goals, and objectives. It identifies the Refuge's role in support of the mission of the National Wildlife Refuge System, provides information on the Service's management actions, and provides a basis for Refuge budget requests.

The CCP is needed for a variety of reasons. Most urgently, Refuge purposes could be threatened without action to protect sources of Refuge water. Groundwater is especially critical to migratory waterbirds breeding in Refuge wetlands. Both shallow and deep aquifers underlying the Refuge are, however, being increasingly tapped for residential and urban development. In addition, widespread land conversion to agricultural and residential uses in the surrounding area has threatened the connectivity of the Refuge to other native habitats, undermining biological integrity.

The Channeled Scablands, of which the Refuge is a piece, is an area of regional and national conservation importance. Crossing several counties in eastern and central Washington State, the Scablands contain densities of wetland basins rivaling the Prairie Pothole region, and at intact sites, waterfowl production exceeds that of the Potholes region. Yet most of the larger wetland basins have been drained and very little of the original Channeled Scablands area is under any kind of public ownership or protected in any other fashion.

Numerous plans attest to the biological significance of the area: it is identified as an important site in the Partners in Flight Columbia Plateau Plan (Altman and Holmes 2000), the Nature Conservancy's Columbia Plateau Ecoregion Plan (Soper 1999), the Draft Intermountain West Waterbird Conservation Plan (Ivey and Herziger 2003), and the Draft Recovery Plan for Water Howellia (Shelley and Gamon 1996).

In addition, the Refuge is currently designated as an Important Bird Area by the Audubon Society. The Channeled Scablands also host the majority of the last remnants of the Palouse steppe vegetation community which is recognized both nationally and at the state level as a critically endangered ecosystem.

The CCP is also needed to address the problem of aspen browsing by an increasing elk population. Aspen clones are not successfully regenerating in many places on the Refuge, in part because of heavy browsing by elk.

Finally, the CCP is also needed to evaluate and manage Refuge visitor uses and needs in light of regional recreation trends and demands and in compliance with the Refuge System Administration Act. The NWRSIA requires refuges to facilitate compatible wildlife-dependent recreation for six Refuge System priority public uses, namely hunting, fishing,

wildlife observation and photography, environmental education and interpretation.

1.3 SUMMARY OF THE CCP

The CCP includes many elements, which are detailed in Chapter 2. The key elements of the CCP are summarized here:

(1) The Service will strive, with partners, to protect water resources that support Refuge wetlands and wildlife, and to protect and restore additional wetlands, rare Palouse steppe habitat, aspen / riparian habitats, and pine forests within the Channeled Scablands. To do this, the Service will implement a Land Protection Plan (found in Appendix A). Key elements of this plan include the following:

- Establishing a Stewardship Area surrounding the Refuge which would encompass 44,324 acres. This area includes the 4,723 acres within the current Approved Refuge Boundary not acquired in fee. The Stewardship Area would function as an informally designated conservation zone surrounding the Refuge. Within the Stewardship Area, the Service would actively work with partners and neighbors for voluntary, cooperative activities that protect habitat and water resources. Key tools include but are not limited to: conservation easements, enrollment in the Wetlands Reserve Program, and technical assistance programs. Key partners include but are not limited to: Intermountain West Joint Venture, Spokane County, State of Washington, Inland Northwest Land Trust, Ducks Unlimited and The Nature Conservancy.

- In addition, the Service would seek to protect, as part of the National Wildlife Refuge System, up to 12,000 acres of priority lands from willing sellers within the Stewardship Area, through fee, easement or agreement. Priority lands are described in Appendix A.

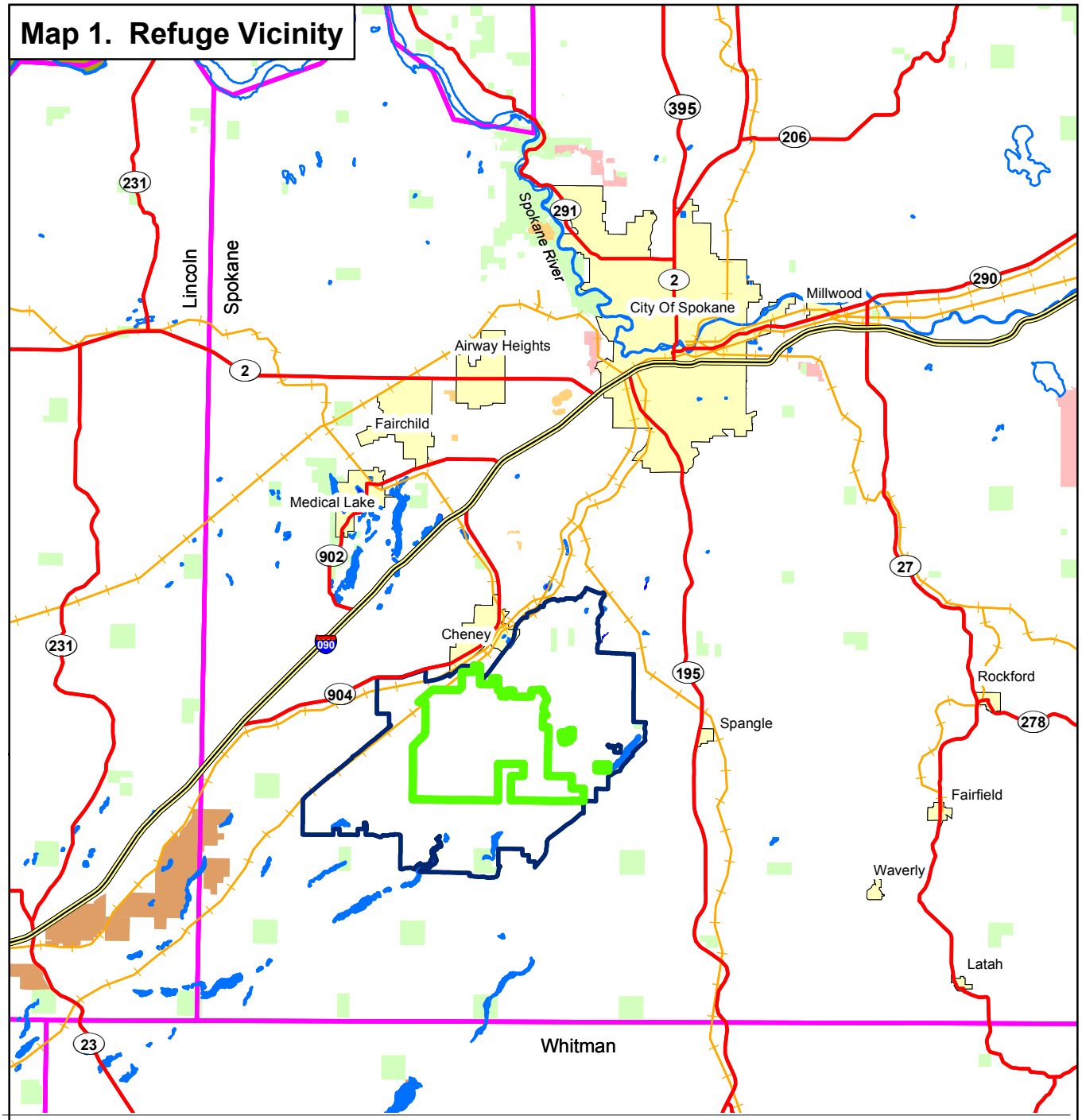
- Land conservation is proposed to address the key threats to Refuge purposes and integrity, in particular threats to surface water and groundwater resources, and the lack of connectivity with surrounding habitats. In addition, land conservation would provide opportunities for protection and restoration of Palouse steppe, wetland, aspen/riparian, and ponderosa pine forest habitats and would provide additional opportunities for wildlife-dependent recreation. These habitats also support several threatened species.

(2) To address habitat damage caused by elk browse, and to provide a recreational opportunity, the Service would approve an annual elk hunting program at the Refuge. The number of permits, length of the seasons, and number of seasons offered would vary depending upon the amount of aspen damage observed each year. The Service would also offer a youth waterfowl hunt each year on the weekend designated by the State for this season each year.

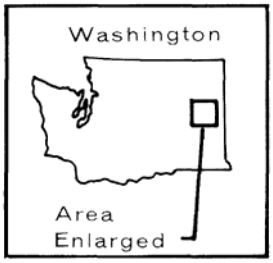
(3) The Service would increase the Environmental Education program, both on and off-Refuge, increase viewpoint and interpretive opportunities on the Refuge, add a small interpretive exhibit area (co-located with new office space), provide more trail miles, and link the Public Use Area to the cross-State Columbia Plateau Trail with a bike trail. If the Refuge were to acquire contiguous additional lands, up to 10 additional trail miles could be added as well as several thousand more acres for elk or waterfowl hunting.

These actions best achieve the Refuge purpose, vision, and goals, and contribute to the Refuge System mission. These actions address the significant issues, are consistent with principles of sound fish and wildlife management, and fulfill necessary mandates under NWRSIA and other applicable laws.

Map 1. Refuge Vicinity



TURNBULL NATIONAL WILDLIFE REFUGE COMPREHENSIVE CONSERVATION PLAN, 2006



Refuge Fee Title Ownership
Stewardship Area
County Boundaries
Lakes or rivers
Railways
Dept of Defense
County owned
State owned
Tribal Land
Bureau of Land Management

N 0 2.5 5 Miles

1:400,000

Map produced by: U.S. Fish and Wildlife Service, 16507 SW Roy Rogers Rd., Sherwood, OR 97140 (503) 590-6596

1.4 CONTENT AND SCOPE OF THE CCP

This CCP provides management guidance for maintenance, restoration, and use of Refuge resources during the next 15 years. Specifically, the CCP for Turnbull Refuge:

- Sets a long term vision, goals, and objectives for the Refuge;
- Implements a Land Protection Plan, including an informally designated Stewardship Area surrounding the Refuge, and describe objectives and conceptual management strategies for areas that may be acquired through fee, easement, or lease;
- Establishes public use management goals, objectives, and strategies and evaluate existing and proposed activities for compatibility with the purposes of the Refuge;
- Integrates the Habitat Management Plan goals and objectives that were outlined in 1999; and
- Outlines projects, staff, and facilities necessary to support the goals and objectives.

The CCP provides a framework for future Refuge management. The Plan was developed at a broader scale. It is not a detailed site plan and does not have precise locations for facilities or detailed descriptions of programs.

In order to study the areas within and adjacent to the Refuge that were most critical in terms of hydrologic influence and habitat connectivity, the planning team designated a Study Area encompassing 60,000 acres. The planning team specifically analyzed aspects of hydrology, habitat quality, recreation, and land use within the entire Study Area. The Study Area is shown on Map 2. Most of the Study Area was ultimately incorporated into the Stewardship Area described in Section 1.3.

Other sections of text refer to the "Refuge vicinity." This is an area that was not specifically outlined, but generally extends outside the Refuge for approximately 5 to 7 miles in each direction.

The CCP guides Refuge management activities only. In some cases, the CCP makes recommendations that the manager and staff work with private landowners or other management agencies for greater conservation benefit on private lands. In no cases would any project be undertaken on private land without the consent of the landowner.

Habitat and fire management actions to be taken upon currently owned Refuge lands will continue to be guided by the Habitat Management Plan (USDI 1999) and Fire Management Plan (USDI 2001).

1.5 BRIEF DESCRIPTION AND HISTORY OF THE REFUGE AND STUDY AREA

The Refuge and Study Area are located within a globally unique geological area known as the Channeled Scablands, created by massive scouring from Ice Age floods 15,000 years ago (Map 2). An extensive complex of deep permanent sloughs, semi-permanent potholes and seasonal wetlands formed in the depressions left in the scoured landscape, while soils only centimeters thick on upland sites, support primarily ponderosa pine intermixed with grasslands (steppe) and exposed basalt cliffs. Aspen is scattered throughout the area. The juxtaposition of all these contrasting habitats in such close proximity is unique to the Channeled Scablands and creates conditions of exceptional wildlife and plant diversity.

Prior to settlement, ducks, geese, and other waterbirds nested in the area in large numbers. Many waterfowl also used the productive marshes and lakes during the spring and fall migrations.

Because of its unique resources, this area was also important to local indigenous cultures. The Northern Plateau peoples frequented this vicinity in spring to dig the roots of camas, bitterroot, wild onion and numerous species of lomatium, and to gather waterfowl eggs.

Pioneers arrived in the late 1800s and rapidly began altering the landscape. Many of the marshes were drained to expand crop areas for hay. By the late 1920s few wetlands remained; instead a network of drainage ditches became the more common feature of the landscape. In addition, as in most developing communities, timber was harvested, native plant communities were grazed by livestock, exotic plants were introduced, and fire, a natural part of the ecosystem, was suppressed. The wildlife values of the area would have been seriously compromised if it had not been for the failure of the drained lakebeds to produce crops.

The Refuge was established by President Franklin D. Roosevelt in 1937, through Executive Order 7681, as a refuge and breeding ground for migratory birds and other wildlife. Local activists, sportsmen, and naturalists were instrumental in obtaining the area's designation as a National Wildlife Refuge. The Refuge was named after early settler Cyrus Turnbull, who built a cabin on the north end of Turnbull Slough and lived there with his wife and children from 1880 to 1886.

1.5.1 HABITAT MANAGEMENT

Since Refuge establishment, the primary focus of habitat management was waterfowl, and in recent years it was directed more specifically at production of redheads. Early management focused on restoring Refuge wetlands that had been drained, and producing grain crops for migratory waterfowl. In later years, management moved from restoration to enhancement, the goal always being to improve habitat conditions to increase or maintain waterfowl populations. Enhancement involved creating additional semi-permanent wetland habitat for breeding diving ducks, especially redheads, and the creation of numerous nesting islands for upland nesting ducks.

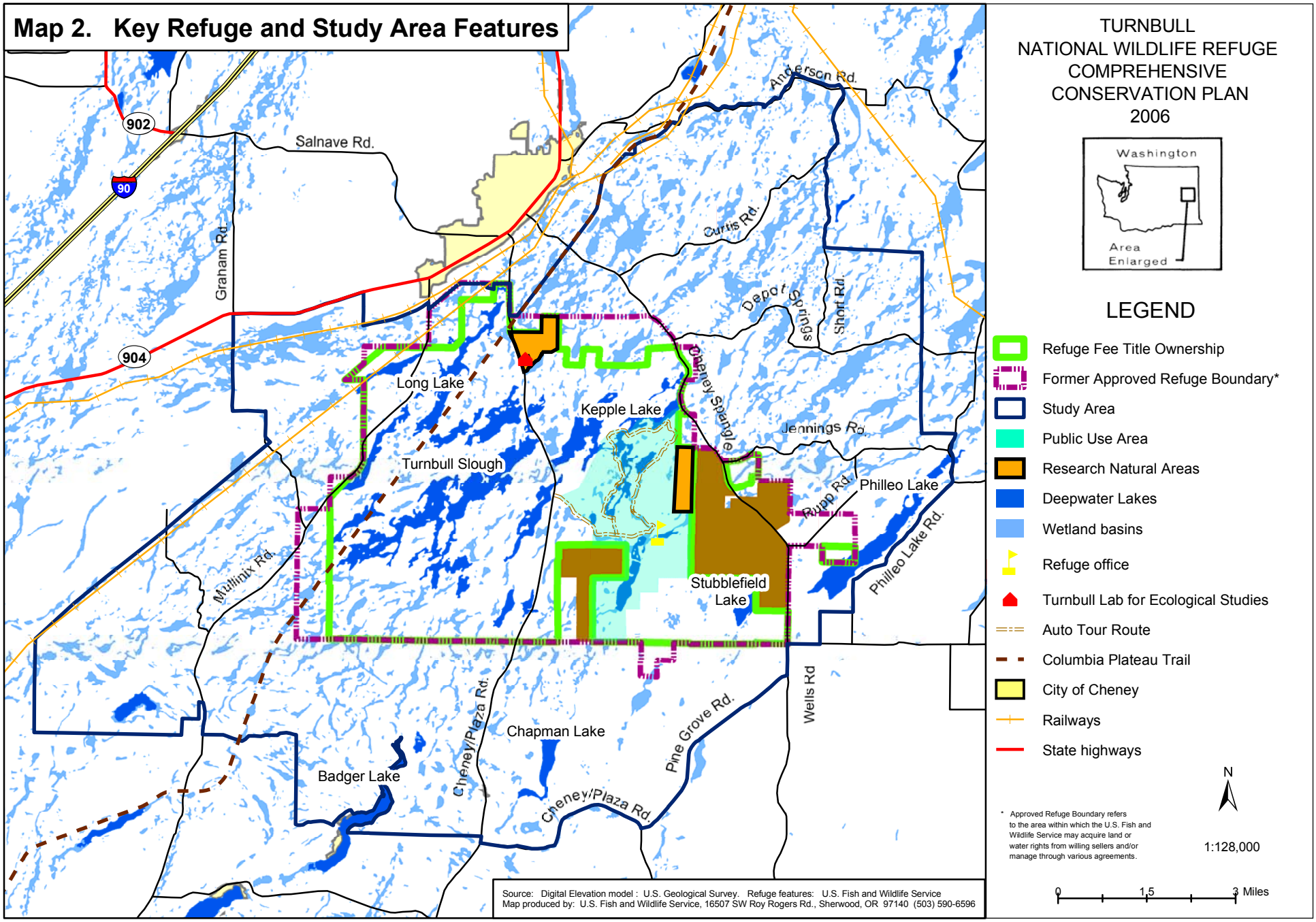
Habitat manipulation for redheads involved deepening seasonal and temporary marshes and increasing the interspersion of open water to emergent vegetation with heavy equipment. In the early decades the Refuge also allowed economic uses including timber harvest, grazing, and trapping. Trapping and timber harvest were suspended in 1975 and grazing was discontinued in 1993. The Refuge continues to use prescribed burning, has begun small scale non-commercial thinning, and reinstated commercial thinning to reduce fuel accumulations and promote forest health.

With completion of the Habitat Management Plan (HMP) in 1999, the Refuge adopted a mission statement based on the Refuge's purposes and the outstanding wildlife and habitat needs of the area. Under management goals and objectives adopted under the HMP, Refuge habitats are managed to sustain the diversity of the flora and fauna native to the Channeled Scablands.

1.5.2 PUBLIC USES

For many years, the Refuge has maintained a 2,200-acre area open to the public (Public Use Area). Approximately 30,000 visits are made each year to the Refuge. Wildlife observation is the major activity, and an Auto Tour Route leads visitors to the key observation points. Visitors also hike, take nature photographs, ride bicycles, jog, or cross-country ski. Hunting and fishing have never occurred at the Refuge. Outside the Public Use Area, the Refuge has historically been closed to general visitor use. At times, opportunities are offered within this area for special interpretive tours or community service projects.

The Refuge has had some form of environmental education (EE) for most of its existence. Early in its development, EE was very informal and only a handful of local schools and civic groups visited the Refuge annually. These early groups


Map 2. Key Refuge and Study Area Features
TURNBULL
NATIONAL WILDLIFE REFUGE
COMPREHENSIVE
CONSERVATION PLAN
2006
Washington
Area
Enlarged
LEGEND
Refuge Fee Title Ownership
Former Approved Refuge Boundary*
Study Area
Public Use Area
Research Natural Areas
Deepwater Lakes
Wetland basins
Refuge office
Turnbull Lab for Ecological Studies
Auto Tour Route
Columbia Plateau Trail
City of Cheney
Railways
State highways
* Approved Refuge Boundary refers to the area within which the U.S. Fish and Wildlife Service may acquire land or water rights from willing sellers and/or manage through various agreements.
N
1:128,000
0
1.5
3 Miles
902
90
904
Salnave Rd.
Graham Rd.
Anderson Rd.
Curtis Rd.
Depot Springs
Short Rd.
Long Lake
Kepple Lake
Cheney Spangle
Jennings Rd.
Turnbull Slough
Rupp Rd.
Philleo Lake
Philleo Lake Rd.
Mullinix Rd.
Stubblefield Lake
Wells Rd
Cheney/Plaza Rd.
Chapman Lake
Pine Grove Rd.
Badger Lake
Cheney/Plaza Rd.
Source: Digital Elevation model : U.S. Geological Survey. Refuge features: U.S. Fish and Wildlife Service
Map produced by: U.S. Fish and Wildlife Service, 16507 SW Roy Rogers Rd., Sherwood, OR 97140 (503) 590-6596

were provided a talk or nature walk by the Refuge staff member who was free on the day of their visit.

As the local population grew, the Refuge recognized the need for a more formal approach. A self-conducted program was initiated, with the development of an EE classroom and teacher workshops offered in spring and fall. This program, with some enhancement was in operation until 1995 with nearly 2,500 students visiting the Refuge annually.

In 1996, a Refuge Friends group formed and more than $80,000 in grants was raised via fundraising activities. The funds were used to hire a contractor to coordinate activities and develop a curriculum. The EE program reached nearly 15,000 students over the next two years.

In the years since, the Refuge has tried to continue to meet this demand by offering a year-round, multi-faceted program facilitated primarily by Americorps members, Student Conservation Association (SCA) volunteers, student interns, and community volunteers. Because of the lack of a stable funding base, and the time commitment involved in training new EE staff yearly, the challenge is to maintain a consistent, high quality program from one year to the next.

1.5.3 LAND STATUS

Like most refuges, Turnbull Refuge was acquired incrementally over time after its original establishment. The process of adding to the Refuge System is ongoing and will likely continue in a similar incremental pattern. For every refuge, the Approved Refuge Boundary identifies the area within which the Service may acquire lands or interest in land from willing sellers. The Approved Refuge Boundary may contain roads, right-of-ways, or other portions of property that a refuge would not be interested in acquiring. An Approved Refuge Boundary can be modified by an executive order, legislation, congressional legislation, or administrative procedures of the Service.

Currently, the Turnbull Approved Refuge Boundary totals 20,640 acres. Table 1-1 shows the current acres and percent of this area in fee title ownership, lease, and agreement.

Table 1-1. Turnbull NWR Land Status

Land Status	Current Acres*	Percent of Approved Refuge Boundary
Fee title ownership	15,859	77%
Lease (no hunting) or agreements	2,076	10%
Subtotal managed under NWRS	**17,935**	**87%**
Inholdings within Approved Refuge Boundary	2,705	13%
Total Acreage within Approved Refuge Boundary	**20,640**	**100%**

* Rounded to nearest acre. Source: RPMIS, May 2006 and Service GIS layers.

Of the 15,859 acres under Refuge ownership, approximately 66 percent were purchased with Migratory Bird Conservation Commission funds (Duck Stamp monies).

1.6 IMPLEMENTATION AND RELATIONSHIP TO PREVIOUS AND FUTURE REFUGE PLANS

1.6.1 IMPLEMENTATION

Implementation of the objectives and strategies in the CCP will be dependent upon the Refuge receiving adequate funds. Funding will not be immediately available to implement the CCP in full. Project implementation will be guided partly through priorities as outlined in Appendix F - Implementation. If funding for any particular project is not received through appropriations, or obtained through partnerships or private sources, the Service will normally default to the corresponding no action strategy for any particular item.

1.6.2 PREVIOUS PLANS AND DECISIONS

The CCP has evolved from previous planning efforts and/or decisions, including:

- Determination that grazing is incompatible with Refuge purposes (1990). This determination resulted in a decision to phase out grazing over five years. However, a subsequent court case brought by Defenders of Wildlife and Audubon resulted in a ruling ending incompatible uses immediately.
- Operational review completed by the Service in 1990.
- Management Plan by Don White, Parts 1 and 2, 1986.
- Environmental Assessment (1973) covering Operation, Maintenance, and Development.
- Master Plan, 1966.

While the life-span of the CCP is 15 years, periodic reviews will occur. The CCP may be amended as necessary at any time under the principles of adaptive management.

1.6.3 STEP-DOWN PLANS

Under Service planning policy, the CCP is meant to serve as broad guidance to all Refuge management programs. Specifics needed for implementation are generally developed in "step-down management plans" for individual program areas. All step-down plans require appropriate NEPA compliance. Project-specific plans, with appropriate NEPA compliance, may be prepared outside of these step-down plans. Two important step-down plans–the Habitat Management Plan (HMP) and the Fire Management Plan (FMP)–were completed, together with NEPA compliance, in advance of the CCP (see USDI 1999, and USDI 2001). Those plans are integrated in the CCP with the following important caveats:

- The CCP shall act as the umbrella planning document for the Refuge. The CCP's final overall goals for the Refuge supersede those listed in the HMP and FMP.
- The HMP's habitat objectives, strategies and guidelines prevail over any habitat objectives or guidelines listed in the FMP, in case of conflict.
- The FMP should be regarded primarily as an operational plan. "Goals" "objectives" and "strategies" listed in that plan pertain primarily to fire management actions and should not be taken out of that context.

The status of other step-down plans is listed in Table 1-2.

1.7 FEDERAL MANDATES AND REFUGE PURPOSES

Refuges are guided by various federal laws, executive orders, Service policies, and international treaties. Fundamental to refuge management are the mission and goals of the National Wildlife Refuge System (NWRS or Refuge System) and the designated purpose of a refuge unit as described in establishing legislation, executive orders, or other documents establishing, authorizing, or expanding a refuge.

Key Refuge System concepts and guidance are covered in the National Wildlife Refuge System Administration Act of 1966, the Refuge Recreation Act of 1962, Title 50 of the Code of Federal Regulations, the Fish and Wildlife Service Manual, and, most recently, the National Wildlife Refuge System Improvement Act of 1997.

1.7.1 NATIONAL WILDLIFE REFUGE SYSTEM IMPROVEMENT ACT

Of all the laws governing activities on National Wildlife Refuges, the Refuge Administration

Table 1-2. Step Down Management Plans Status

Completed Plans (Date Completed)	**Plans Needed Subsequent to CCP**
Habitat Management Plan (1999)	Public Use Management Plan
Fire Management Plan (2001)	Hunt Plan
2002 Emergency Action Plan for Lower Pine Lake Reviewed annually.	Law Enforcement Plan
Continuation of Operations Plan (2002)	Integrated Pest Management Plan
Safety Plan (2000)	Cultural Resources Management Plan
Sign Plan (1993) Needs to be updated.	Biological Research Plan
Wildlife Inventory Plan (1990) Needs to be updated.	Annual Water Management Plan

Act undoubtedly exerts the greatest influence. The National Refuge System Administration Act of 1966 was amended by the National Wildlife Refuge Improvement Act (NWRSIA) in 1997 by including a unifying mission and goals for all National Wildlife Refuges as a System, a new process for determining compatible refuge uses, and a requirement that each refuge be managed under a CCP, developed in an open public process.

The Refuge Administration Act states that the Secretary shall provide for the conservation of fish, wildlife and plants, and their habitats within the System as well as ensure that the biological integrity, diversity, and environmental health of the System is maintained.

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

Additionally, the NWSIA identifies six priority wildlife-dependent recreational uses. These uses are hunting, fishing, wildlife observation and photography, environmental education and interpretation. As priority public uses of the Refuge system, these uses are to receive enhanced consideration over other uses in planning and management.

When preparing a CCP, Refuge managers must reevaluate compatibility of all general public, recreational, and economic uses (even those occurring to further habitat management goals) proposed or occurring on a Refuge, including priority public uses. No Refuge use may be allowed or continued unless it is determined to be compatible. A compatible use is a use that, in the sound professional judgment of the Refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the Refuge. Updated compatibility determinations for existing and proposed uses for Turnbull Refuge are in Appendix E.

Section 5 of the Refuge Administration Act also states “In administering the System, the Secretary shall . . .(F) assist in the maintenance of adequate water quantity and water quality to fulfill the mission of the System and the purposes of each refuge; (G) acquire, under State law, water rights that are needed for refuge purposes...”

The Refuge Administration Act also requires that, in addition to formally established guidance, the CCP must be developed with the participation of the public. Issues and concerns articulated by the public play a key role in guiding alternatives considered during the development of the CCP, and together with the formal guidance, can play a role in design of the final CCP.

1.7.2 OTHER LAWS, POLICIES, AND ORDERS

Many other federal authorities, including laws, treaties, executive orders, interstate compacts and memoranda of agreement govern Service and Refuge System lands. A list and brief description of each can be found at http://laws.fws.gov.

Over the last couple of years, the Service has developed or revised numerous policies and Director's Orders to reflect the mandates and intent of the Refuge Administration Act. Some of these key policies include the Biological Diversity, Health, and Environmental Health Policy; the Compatibility Policy; the Refuge Planning Policy; the Director's Order on Responsibility of Federal Agencies to Protect Migratory Birds in Accordance with Executive Order 13186; and the Director's Order regarding Coordination and Cooperative Work with State Fish and Wildlife Agency Representatives on Management of the National Wildlife Refuge System. Text of these policies and orders as well as others in draft or under development can be found at: http://refuges.fws.gov/policy-makers/nwrpolicies.html.

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

1.7.3 NATIONAL WILDLIFE REFUGE SYSTEM MISSION AND GOALS

The mission of the National Wildlife Refuge System is:
"To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." (National Wildlife Refuge System Administration Act)

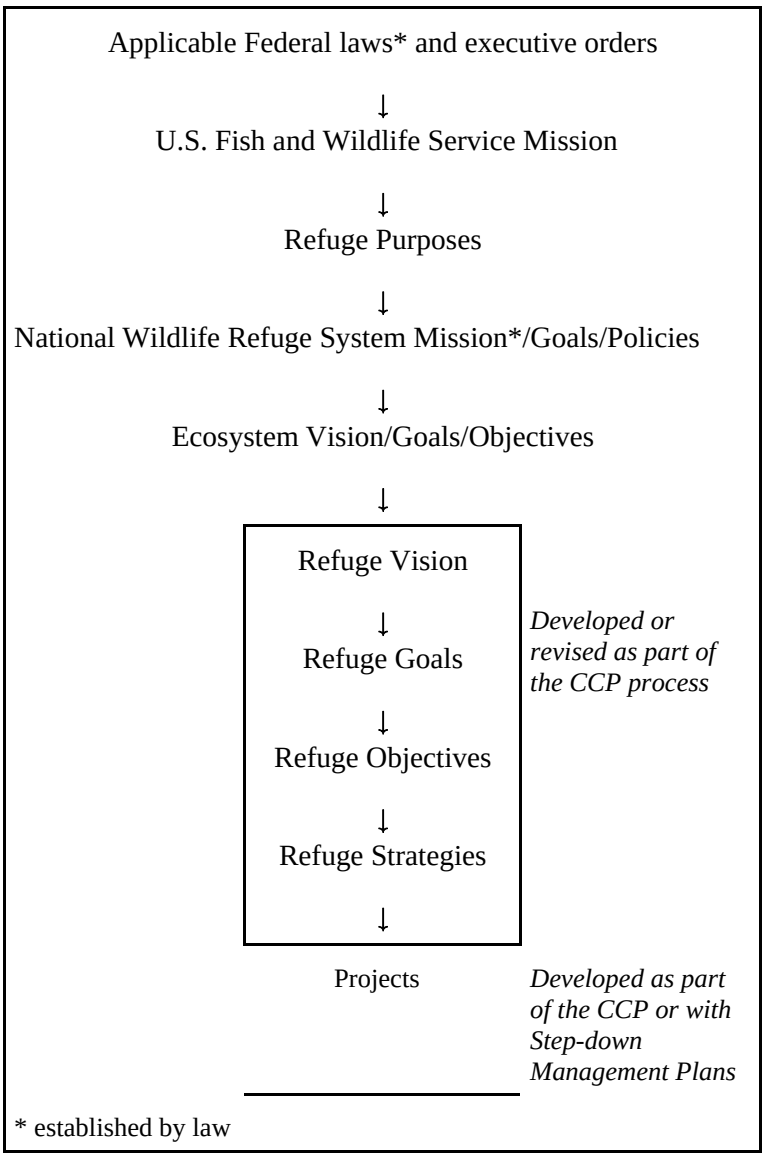
The goals of the National Wildlife Refuge System are: (601 FW1, finalized July 26, 2006)

- 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 interjurisdictional fish, and marine mammal populations that is strategically distributed and carefully managed to meet important life history needs of these species across their ranges.
- Conserve those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or underrepresented in existing protection efforts.
- Provide and enhance opportunities to participate in compatible wildlife-dependent recreation (hunting, fishing, wildlife observation and photography, and environmental education and interpretation).
- Foster understanding and instill appreciation of the diversity and interconnectedness of fish, wildlife, and plants and their habitats.

1.7.4 SIGNIFICANCE OF THE REFUGE PURPOSE

The purpose for which a refuge was established or acquired is of key importance in refuge planning. Purposes must form the foundation for management decisions. By law, refuges are to be managed to achieve their purposes. When a conflict exists between the Refuge System mission and the purpose of an individual refuge, the refuge purpose may supersede the Refuge System mission (Improvement Act, Section 5(a)(3)(D)).

Figure 1. Hierarchy of Guidance within the National Wildlife Refuge System



The Service defines the purposes of national wildlife Refuges when a Refuge is established or when new land is added to an existing Refuge. Service realty files document purposes used to acquire lands or to receive transferred lands. At times, purpose statements define specific uses allowable on the Refuge. Purpose statements often identify the wildlife species or groups of species that receive management emphasis on any particular Refuge.

1.7.5 PURPOSES FOR TURNBULL NATIONAL WILDLIFE REFUGE

As explained previously, the following purposes form the foundation for management decisions at Turnbull Refuge, including the development of goals, objectives, and strategies.

"...as a refuge and breeding ground for migratory birds and other wildlife..." (Executive Order 7681, dated July 30, 1937)

"...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) and "...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 and Refuge Recreation Act 16 U.S.C. 460k-460k-4, as amended).
"...for the development, advancement, management, conservation, and protection of fish and wildlife resources..." (16 U.S.C. 742f(a)(4)) "...for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." (16 U.S.C. 742f(b)(1) Fish and Wildlife Act of 1956).

1.7.6 MEANING OF TERMS IN PURPOSE

Migratory Birds. Migratory birds are those defined as such by the following treaties. The birds are listed at 50 CFR § 10.13.

- The treaty between the United States and Great Britain for the protection of migratory birds concluded August 16, 1916 (39 Stat. 1702).
- The treaty between the United States and the United Mexican States for the protection of migratory birds and game mammals concluded February 7, 1936 (50 Stat. 1311).
- The Convention between the Government of the United States and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction, and their Environment concluded March 4, 1972.
- The Convention between the United States and Union of Soviet Socialist Republics for the Conservation of Migratory Birds and their Environment concluded November 19, 1976 (16 USC 715j).

Inviolate Sanctuary. The original intent of the term "inviolate sanctuary" is found in the Migratory Bird Conservation Act (first passed in 1918 as the Migratory Bird Treaty Act and amended in 1934 and 1938). This Act originally required that all refuges be inviolate sanctuaries and deemed refuges' primary purposes were as breeding grounds and habitat for migratory birds. Migratory bird hunting was prohibited on migratory waterfowl areas by the Act, but most other human uses were not addressed. The 1938 amendment to the Act gave refuge managers authority to decide if, when, and how bird hunting would be allowed. After World War II, public demand for opening refuges to recreation increased. The 1949 Duck Stamp Act allowed waterfowl hunting on refuges, but restricted the percentage of each refuge open to hunting. Current policy states that portions of a refuge are considered "inviolate sanctuaries" if they were (a) acquired with the approval of the Migratory Bird Conservation Commission (MBCC) for the purpose of an inviolate sanctuary; (b) acquired with MBCC approval or Land and Water Conservation Funds to protect a threatened or endangered species; or (c) established by an instrument or document which states the intent to manage the area as an "inviolate sanctuary for migratory birds" or to fulfill the purpose of the Migratory Bird Conservation Act. Policy further allows migratory game bird hunting on no more than 40 percent of the area considered inviolate sanctuary if compatible with a refuge's purposes and mission. Inviolate sanctuary classification imposes no limits on hunting non-migratory birds, fur bearers, or other game species.

On Turnbull NWR, 13,650 acres were purchased with MBCC funds and fall within the "inviolate sanctuary" provision. Since its inception, the Refuge has been closed to hunting of all kinds. Key advocates for the establishment of the Refuge in the 1930s included the Spokane Sportsman's Association, who believed that the area should include a sanctuary where hunting would not be permitted.

Incidental Fish and Wildlife-Oriented Recreational Development. The Refuge Recreation Act does not specifically define these terms (although the term "secondary" is also used with "incidental" in several places), but it does emphasize the following points:

"...any present or future recreational use will be compatible with, and will not prevent accomplishment of, the primary purposes for which the said conservation areas were acquired or established..."
"...such public recreation use shall be permitted only to the extent that is practicable and not inconsistent with other previously authorized Federal operations or with the primary objectives for which each particular area is established..."

Development, Advancement, Management, Conservation, and Protection. These terms were not defined in the Fish and Wildlife Act (as amended). However, the Refuge Administration Act does define some of these terms as follows: "Conserving" "conservation" "manage" "managing" and "management" mean to sustain, and where appropriate, restore and enhance healthy populations of fish, wildlife, and plants utilizing, in accordance with applicable Federal and State laws, methods and procedures associated with modern scientific resource programs. Such methods and procedures include, consistent with provisions of the Act, protection, research, census, law enforcement, habitat management, propagation, live trapping and transplantation, and regulated taking.

1.8 RELATIONSHIP TO REGIONAL CONSERVATION GOALS

The Refuge System, when and where possible, also tries to assist in meeting conservation goals established by other divisions of the Service, and by other legitimate and credible organizations. Some of these organizations are other federal agencies or interagency groups. Others are state agencies or coalitions of government and nongovernment partners, such as Partners in Flight. Listed below are brief statements of ecosystem goals and objectives that apply within the Refuge vicinity.

> The Refuge is a partner in an ongoing effort by 14 organizations to protect and restore wetlands and riparian areas within the Channeled Scablands. Two million dollars in federal grants were recently awarded to this project. Partners have put up nearly ten million dollars in matching and in-kind funds.

1.8.1 INTERMOUNTAIN WEST JOINT VENTURE

The 1998 Intermountain West Joint Venture *Channeled Scablands Focus Area Implementation Plan* (1998) includes two goals relevant to the Refuge CCP: increasing the quantity and quality of Channeled Scabland wetland, upland, and riparian habitats for breeding, migrating, and wintering waterfowl, as well as other species of management concern; and restoring degraded wetland and upland habitat for waterfowl and other species.

Two federal North American Wetland Conservation Act (NAWCA) grants were awarded recently in the amount of nearly two million dollars for protection and restoration of wetland and riparian habitats in Spokane, Lincoln, and Adams Counties. These first two grants fund Phases 1 and 2 of a five phase project plan for the Intermountain West Joint Venture Channeled Scablands Focus Area (CSFA), to which the Refuge is a partner.

Fourteen public and private organizations provided matching and in-kind funds in the amount of $3.2 million (Phase II) and $6.2 million (Phase I). Numerous private landowners are also partners in the project. The goals of Phase I and Phase II of the project are to acquire, restore and enhance over 15,000 acres of wetland, riparian, and adjacent upland habitat within the area covered by the CSFA Implementation Plan.

1.8.2 PARTNERS IN FLIGHT, COLUMBIA PLATEAU PLAN

The primary goal of the *Conservation Strategy for Landbirds in the Columbia Plateau of Eastern Oregon and Washington* (Altman and Holmes 2000) is to ensure long-term maintenance of healthy populations of native landbirds in shrub-steppe and riparian habitats. The Partners in Flight Conservation Strategy includes an objective to "Initiate actions to increase the size and connectivity of existing riparian and steppe patches through restoration and acquisition efforts."

1.8.3 BIRDS OF CONSERVATION CONCERN 2002

Based on the efforts and assessment scores of three major bird conservation efforts (Partners In Flight, the U.S. Shorebird Conservation Plan, and the North American Waterbird Conservation Plan), this report identifies, by Service region and by Bird Conservation Region (BCR), the bird species most in need of conservation attention (the list does not include threatened or endangered species or hunted species). Turnbull Refuge straddles BCRs 9 and 10. BCR 9 contains 29 species listed in this report and BCR 10 contains 28 species (USFWS 2002).

1.8.4 GAP ANALYSIS PROGRAM REPORT, WASHINGTON STATE

The 1997 report *Role of Washington State's National Wildlife Refuges in Conserving the State's Biodiversity* (Cassidy et al. 1997b) recommended acquisition priorities for specific zones in the State of Washington. For the east side forest zones and the steppe zones of Washington, the Gap Analysis Program (GAP) authors recommended acquiring areas with the following characteristics: "Oak and ponderosa pine forest, especially where these types are combined with wetlands, and not isolated from upper forest and lower steppe zones, and where maintenance of a natural fire regime is feasible." Within the steppe zones, the GAP authors recommended acquiring: "Upland steppe on deep soil; the palouse zone adjacent to Turnbull Refuge has the highest priority, but deep soil sites in any steppe zone are a high acquisition priority. Wetlands in steppe, especially where wetland protection can be combined with protection of adjacent uplands."

1.8.5 WATER HOWELLIA DRAFT RECOVERY PLAN

The goal of the recovery plan is "to provide an adequate level of conservation for the species and its habitat so that there will be self-sustaining populations distributed throughout its extant range" (Shelley and Gamon, 1996). According to the draft plan, recovery efforts should "focus on development and implementation of habitat management plans for occurrences on public lands; promotion of voluntary protection on private lands; conducting biological and habitat management research; monitoring and surveys of known occurrences and potential habitat; dissemination of educational information; promotion of state-level legal protection; and evaluation of the appropriateness and feasibility of reintroducing water howellia into portions of its historic range."

1.8.6 THE NATURE CONSERVANCY CONSERVATION STRATEGY, COLUMBIA PLATEAU ECOREGION

The Nature Conservancy (TNC) conducted a strategic analysis of the Columbia Plateau Ecoregion to identify sites that could conceivably maintain all viable native species and communities within the Ecoregion (Soper 1999). They concluded that protection of approximately 139 sites would achieve their goals. They further prioritized this list, identifying 27 sites to work on over the next five years. Several of the priority sites are within the Palouse steppe area, as well as within the Channeled Scablands ecosystem.

1.8.7 THE SERVICE'S COLUMBIA RIVER BASIN ECOREGION

The Service's Columbia River Basin Ecoregion Goal #1 reads as follows: "Prevent species decline, expedite recovery of candidate, threatened, and endangered species, and preclude future species listings by conserving and restoring a diversity of native fish, wildlife, and plant species and their habitats in the Columbia River Basin".

1.8.8 INTERIOR COLUMBIA BASIN ECOSYSTEM MANAGEMENT PLAN

This project was an ambitious effort covering the majority of the Inland Northwest (an area the size of France) and is a good source 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 (Quigley et al. 1996). Within the vicinity of Turnbull Refuge, report authors listed the primary opportunities to address the risks to ecological integrity as: "maintenance or restoration of riparian conditions; restoration of productive aquatic areas; and conservation of fish strongholds and unique aquatic areas."

1.8.9 SPOKANE COUNTY COMPREHENSIVE PLAN

Spokane County completed an update of its Comprehensive Plan in 2002 (Spokane County 2002). The Plan calls for minimization of habitat fragmentation. Furthermore, the County's Critical Areas Ordinance requires the protection of a variety of priority habitats, including wildlife corridors and landscape linkages. A University of Washington Department of Urban Design and Planning class analyzed the County's biodiversity and habitat to assess which lands, if protected, would conserve all the biodiversity of the County under the most efficient design possible. The students ultimately recommended a map of reserves; wildlife corridors and landscape linkages that would meet this objective (see http://depts.washington.edu/rsal/GAP/spokane_brochure/index.html; also Stevenson 1998; University of Washington 1998). Much of the area surrounding Turnbull Refuge is encompassed in the area the students recommended be maintained as a reserve and wildlife corridor. The County has incorporated the recommendation by designating many of these areas as "open space" in its plan and zoning others under a low density "Rural Conservation" category.

1.9 REFUGE VISION

Turnbull National Wildlife Refuge will be key to preserving the unique Channeled Scablands habitat of Eastern Washington, with its broad diversity of plants and animals. The area will serve as an important link in migrations for at least 139 species of birds, but its best function will be as a production area for at least 100 bird species. Habitat diversity will provide a stable, productive and flexible resource to ensure that the native faunal diversity of the Refuge is maintained. The Refuge will restore and maintain ecosystem processes that provide for a natural diversity of flora and fauna native to the wetland, aspen/riparian, steppe, and ponderosa pine communities of Eastern Washington. Maintenance of biodiversity will be further supported by the conservation of threatened and endangered species. Partnerships with neighbors, non-profit organizations, and other government agencies will ensure the maintenance of biologically effective landscape linkages and corridors between the Refuge and other intact areas of vegetation zones representative of this ecoregion. Efforts will be made to conserve and restore additional Channeled Scabland habitats and wetlands.

Wetland habitats will have a legally secure water supply based on annual precipitation and runoff. The quality of water entering the Refuge will be monitored and maintained at a standard suitable for ensuring ecological integrity. Water management facilities make for more efficient use of water, bypassing high flows, maintaining desired food and cover plants, and providing optimum diversity.

Grassland steppe habitats will be healthy and diverse, sustaining a variety of both migratory and resident birds as well as other indigenous plants and wildlife. Healthy forested uplands managed by the reintroduction of fire will provide a natural distribution and diversity of structural and successional stages to benefit forest dependent wildlife.

Research and environmental education opportunities will be provided. Visitor and education facilities will assist with interpreting the values of wildlands and wildlife to the public. Visitors will experience the quiet solitude that only nature can provide. Opportunities for outstanding aesthetics, wildlife observation, and other compatible uses will be provided.

Volunteers will support Refuge public use programs, Refuge monitoring and research, and habitat restoration. Partnerships with Friends of Turnbull Refuge, the Spokane chapter of the Audubon Society, the Inland Northwest Land Trust, the Inland Northwest Wildlife Council and other non-profit organizations, neighbors, and other federal, state and county agencies will enhance opportunities to realize Refuge goals and objectives.

1.10 REFUGE GOALS

Goal 1: Contribute to protection of local watersheds to maintain adequate water quality and quantity for native Refuge wetland species.

Goal 2: Provide habitat conditions essential to the conservation of birds and other wildlife within a variety of wetland complexes**.**

Goal 3: Restore Refuge aspen and ponderosa forest to a natural distribution of stand structural and successional stages to benefit forest-dependent wildlife.

Goal 4: Protect and restore the natural distribution and diversity of grassland and shrub steppe habitats to benefit wildlife.

Goal 5: Support the conservation of threatened and endangered species in their natural ecosystems.

Goal 6: Support the maintenance of biologically effective landscape linkages and corridors between the Refuge and other intact areas of vegetation zones representative of this ecoregion.

Goal 7: Foster appreciation of and support for the Refuge and the Channeled Scablands ecosystem through quality environmental education, interpretation, wildlife-dependent recreation, and outreach compatible with the Refuge purposes and mission.

Goal 8: Encourage and support research that substantially contributes to our understanding of the Channeled Scablands ecosystem.

1.11 PUBLIC INVOLVEMENT IN THE DEVELOPMENT OF THE CCP

Public involvement was sought throughout the development of the CCP, starting in the summer of 1999. Public involvement strategies emphasized face-to-face meetings with key agencies, tribes with ancient links to the area, elected officials, and Refuge neighbors. The Refuge also held open houses, conducted a planning workshop, sent newsletters, conducted surveys, and gave presentations at community organizations to inform the public, invite discussion and solicit feedback.

A mailing list of approximately 900 persons and organizations is maintained at the Refuge and was used to distribute planning updates, public meeting announcements, and to notify the public of the release of the Draft CCP/EA. Appendix K contains a brief summary of the events, meetings, and outreach tools that were used in CCP public involvement efforts.

1.12 ISSUES

Under the National Environmental Policy Act (NEPA), federal agencies may identify numerous issues after scoping is completed. However, only major issues drive the formulation of alternatives. Based on the scoping efforts undertaken, the following major issues were identified for the Turnbull Refuge CCP.

Issue 1. Elk Management and Hunting

Archeological evidence suggests that elk may have once been fairly widespread in eastern Washington and were hunted by native Americans residing in the area. However, elk appear to have been eliminated by the time of Euro-American settlement. Elk reintroductions in the early 1900s resulted in expanding herds throughout much of the forested portions of eastern Washington. From these reintroductions and subsequent transplants, elk populations increased dramatically in the mid-twentieth century. Elk were first observed on the Refuge in the late 1950s. Although increasing numbers were observed on the Refuge and in most of southern Spokane County since their first appearance, dramatic increases did not occur until the early 1980s. The herd that inhabits the Refuge and local vicinity (Hangman Creek subherd) was estimated at 115 to 219 animals in 1997 (95 percent confidence interval, population estimate from Meyers 1998). In November 2004, 354 elk were counted in the herd, with 100 off-Refuge and the rest on the Refuge.

Research underway by the State and Eastern Washington University indicates that the Refuge is disproportionately important to the local elk population as a security zone. As a result, there has been heavy browsing of young aspen and other deciduous shrubs and trees on the Refuge. In addition, several neighbors have complained of elk damage to their hay, other agricultural crops, fences, and ornamental shrubs since the early 1990s and feel that the Refuge should take a more active role in limiting elk numbers. Since 1992, two claims have been paid by the State for elk damage to agricultural crops. Complaints have declined since 1999 as a result of several local landowners leasing their lands for hunting.

On Refuge hunting of big game and/or waterfowl has been proposed at various times in the past (1959, 1966, and 1987) but never was widely supported by the community and has never been permitted on the Refuge for any species.

Surveys conducted in 1999 when the CCP was initiated indicated 82 percent of the public surveyed (485 respondents) believed that the Refuge should remain closed to hunting. Half of the 88 respondents who felt that the Refuge should be opened to hunting also felt that all types of hunting should be allowed. Eighteen respondents felt that only big game hunting should be allowed (EDAW 1999). Respondents to other surveys distributed at the public scoping meetings in the spring of 2000 indicated that 29 percent of the participants identified the prohibition of hunting as an important Refuge issue. However, nearly 13 percent felt that the most important issue was allowing hunting as a management tool.

Washington Department of Fish and Wildlife and others advocated hunting or other management tools to bring the elk population numbers down to a level considered “socially acceptable” (i.e. a level which does not trigger many depredation complaints).

Issue Summary: What kinds of elk management tools, if any, should the Refuge utilize to address habitat damage and depredation problems?

Issue 2. Recreational Development and Opportunities, Allowable Uses, and Visitor Access

For many years, the Refuge has maintained a 2,200-acre area open to public driving, wildlife viewing, photography, hiking, and environmental education. The remainder of the Refuge is closed to public use. Interpretive opportunities are fairly limited and trail lengths are short.

An opportunity to inquire into what the public values at Turnbull Refuge occurred during public scoping at the outset of the CCP. As part of this process, the Service distributed a short survey to its mailing list and to attendees of the public scoping meetings in February and March, 2000. Eighty-six participants completed the survey. The majority of the respondents to the survey indicated that wildlife is what makes Turnbull special to them. Nature, interpretation and environmental education were also important reasons for visiting the Refuge. Ninety-three percent of the individuals surveyed agreed that Refuge facilities were adequate. A segment of the public is interested in seeing a higher level of interpretive and trail facilities for public enjoyment and use.

The environmental education program (EE) has been underway for more than thirty years. The EE program provides students from the Spokane area an opportunity for field-based science learning and supports teachers in meeting state educational requirements. However, the program has no permanent funding, and many requests go unmet because of limited staff and facilities. To date, the EE program has been supported by volunteers, an active partnership program, and fluctuating Refuge funds supplemented by grants. Many members of the public have expressed interest in expanding the EE program.

In May of 2000, the Washington State Parks and Recreation Commission (WSPRC) opened the 130-mile long Columbia Plateau Trail on an abandoned railroad right-of-way in Eastern Washington. The trail lies adjacent to some of the Refuge's most productive waterfowl lakes, Long Lake and Ballinger Lake. When fully developed, the trail will run from Pasco to Fish Lake and traverse five miles of the Refuge, through the heart of the Refuge's closed area. Projections of use for this section of trail are 30,000 people annually. State Parks and some users have asked the Refuge to create side trails off of the Columbia Plateau trail so that they can loop through the area. Concerns remain, however, about potential disturbance to waterfowl, disturbance to big-game populations in this area, and potential for trespass from the Columbia Plateau Trail into the closed area of the Refuge.

Public participation in nature activities, including wildlife observation and photography and visiting interpretive centers, is projected to grow by approximately 30 percent from 2002-2017 in the state of Washington (IAC, 2002a). An assessment completed by IAC (IAC 1995) identified trails and environmental education as the two highest outdoor recreation needs in the State.

Hunting is one of the six wildlife-dependent public uses identified in the Refuge Improvement Act of 1997. Hunting participation in the State is expected to decrease over the next fifteen years (IAC, 2002a). All wildlife-dependent public uses must be accorded enhanced consideration during CCP development.

Issue Summary: What kind of public recreational opportunities should the Refuge seek to provide over the next 15 years, and how should the Refuge manage these uses to maintain compatibility with its purposes?

Issue 3. Protection of Habitats, Water Quality and Quantity Off-Refuge

Refuge wildlife and their habitats are connected to and depend upon the surrounding landscape. The Refuge Improvement Act of 1997 requires maintenance of the Refuge System's biological integrity, diversity and environmental health. The Act also directs the Secretary to maintain adequate water quality and quantity to fulfill the purposes of each Refuge and acquire, under State law, water rights needed for Refuge purposes.

In consideration of these mandates, the planning team considered whether Turnbull Refuge encompasses sufficient habitat to maintain the wildlife it was established to protect. The team also considered whether water supplies that feed Refuge wetlands are adequate for the future, and whether they are free of pollutants.

For most of the Refuge's existence, surrounding land use has mostly complemented the Refuge by maintaining open space, providing a larger habitat base, and serving as critical linkages to other undisturbed habitats. The situation around the Refuge is, however, changing. Spokane County's population has increased by 30 percent over the past 20 years. Accelerated home construction, business developments, and the transportation infrastructure to service this growing population have begun to isolate the Refuge from surrounding habitats. This development increases the potential for threats to wildlife and their habitats, such as contamination of air and water, altered or depleted supplies of surface and ground water, loss of connectivity to other suitable or complimentary habitats, and the invasion of exotic plant and animal species that erode the integrity of the Refuge.

It is likely that the biological integrity, diversity and environmental health of the Refuge will be at risk over the long term if the Refuge is managed as an isolated island of habitat without attention to maintaining water supplies and connectivity to adjacent habitats.

Several scientific assessments in the area (Cassidy et al. 1997a, Wisdom 2000, Soper 1999) indicate that much of Eastern Washington's wildlife and habitats remain unprotected.

Mechanisms for land protection could include: cooperative agreements, conservation easements, fee title acquisition, leases, donations, transfers, and exchanges. Only willing participants would be considered for any of these approaches.

Issue Summary: How can the Refuge best ensure protection of water supplies and healthy wildlife habitats within the Refuge vicinity, to provide long term benefits for its species and habitats?

CHAPTER 2

Management Direction

Elk cow and calf. Photograph by Nancy J. Curry

2.1 OVERVIEW

2.1.1 CONSIDERATIONS IN THE DESIGN OF THE CCP

In thinking through appropriate actions for this long term conservation plan, the Service reviewed and considered a variety of resource, social, economic, and political aspects important for managing the Refuge. These background conditions are described more fully in Chapter 3. As is appropriate for a National Wildlife Refuge, resource considerations were fundamental in designing the CCP. Aquatic species at Turnbull depend on water, so careful consideration was allotted to hydrology, especially the delineations of watersheds providing surface water to the Refuge. After planning began and several members of the public mentioned water quality as an issue, the Service commissioned a water quality study to provide information on current stream water quality parameters. In addition, the team consulted groundwater specialists, to estimate groundwater movements, and the team identified a groundwater "area of influence" - i.e. an area within which groundwater withdrawals, recharges, and/or contamination would be most likely to affect Refuge wetlands.

The planning team utilized aerial photo interpretation to map and rate the quality of all terrestrial habitats within the Study Area. The team utilized National Wetlands Inventory data to locate all Study Area wetlands and identified each wetland as drained or undrained. The team considered the potential for wetland restoration especially with regard to wetlands crossing multiple property ownerships. The team considered habitat connectivity and areas inhabited by threatened and endangered species. The team also consulted with Washington Department of Fish and Wildlife to get the latest information on elk herd sizes and locations frequented by elk within the area. The team reviewed scientific reports and studies to better understand ecosystem trends and the latest scientific recommendations for species and habitats.

The team reviewed State reports on outdoor recreation trends and catalogued nearby recreation opportunities. The team used surveys, meeting questionnaires, and comments to try to determine the kinds of experiences desired by Refuge visitors.

The Service met with local, State, and federal agency staffs and elected officials to ascertain priorities and problems as perceived by others. Refuge staff met with neighbors, Refuge users, non-profit groups, and community organizations to ensure that their comments and ideas were considered during CCP development.

In addition, the planning team held a workshop attended by approximately three dozen local citizens to review seven preliminary alternatives. Based on the input received at that workshop and further internal review, the Service refined the CCP alternatives to the four presented in the Draft CCP/EA, released in June 2005.

Additional changes were made after public review of the document. The goals, objectives, and strategies below comprise the actions to be adopted in this final CCP.

2.1.2 GENERAL GUIDELINES

General guidelines for implementation of the CCP follow:

- *On-Refuge Habitat and Fire Management*
- *Implementation Subject to Funding Availability*

CCP actions will be implemented over a period of 15 years as funding becomes available. Project priorities are designated in Appendix F, Implementation.

Habitat management actions will continue to be guided by the direction set forth in the Refuge Habitat Management Plan (USDI 1999). This plan was analyzed and publicly reviewed under an Environmental Assessment released in 1999. Fire management was similarly analyzed and a Fire Management Plan was finalized in 2001.

- *Inholdings*

The Fish and Wildlife Service will continue to seek ways for acquiring interest in private lands within the existing Approved Refuge Boundary, from willing landowners. This interest could be secured through management, easements, exchange or purchase of the approximately 4,723 acres of inholdings (this includes lease and agreement lands) within the boundary. Outside the Approved Refuge Boundary, small acquisitions from willing sellers may be completed consistent with national policy.

- *Leases*

The Refuge will continue to maintain mutually agreed upon leases on 2,018 acres of lands within the Approved Refuge Boundary. Under these leases, two adjacent landowners agree to prevent hunting from occurring on their property. Another area is managed under a year to year agreement for the same purpose. The leased properties are fenced and carry Refuge signs. These leases were set up to protect waterfowl and to minimize public safety concerns adjacent to the Refuge's Public Use Area. The leases do not incur a cost to the U.S. government.

- *Easements*

The Service manages two conservation easements: Wildrose in northern Spokane County and R.D. Smith in Whitman County. Both areas contain riparian habitat that is managed to exclude livestock.

- *Maintenance of Existing Research Natural Areas (RNA)*

Two existing Service designated Research Natural Areas (RNAs) on the Refuge will be maintained and restored for the values for which they were established in 1966. In practice, this means that they will be managed similarly to other Refuge habitats as described in the Refuge Habitat Management Plan. Research activities may occur within the RNAs, but will not be confined to these areas.

Active management within both RNAs will continue with the objective of returning both RNAs to a more natural stand condition. After an initial thinning, Pine Creek RNA will be maintained with regular underburning. Turnbull Pines will be managed as a control area until the completion of all other uplands habitat management units, and then it may be restored in the same manner as other forested areas of the Refuge.

- *Tribal Coordination*

Increased regular communication with Native American Tribes who have an interest in the Refuge will occur. The Spokane Tribe, Coeur d'Alene Tribe, Kalispel Tribe, and the Confederated Tribes of the Colville Reservation are four local Tribal groups the Service will work with regarding issues of shared interest. Currently, the Service allows Tribal members to gather roots and tubers in appropriate locations on the Refuge and seeks their assistance in interpreting traditional Native American lifeways as part of the Refuge's environmental education program.

- *State Coordination*

Similarly, the Service will continue to maintain regular discussions with the Washington Department of Fish and Wildlife. Key topics of discussion will be coordination on elk management strategies and law enforcement.

- *Volunteer Opportunities and Partnerships*

Volunteer opportunities and partnerships will continue to be important. These are recognized as key components of the successful management of public lands and vital to implementation of Refuge programs, plans, and projects.

- *Refuge Revenue Sharing Payment*

Annual payments to Spokane County will continue according to the established formula and subject to payments authorized by Congress. If lands are acquired and added to the Refuge, the Service's annual payment will increase accordingly.

- *Firewood Cutting by Permit*

The firewood cutting permit system will remain the same as at present**.** The number of permits issued, cords allowed, and locations will vary from year to year based on slash produced by forest management practices.

- *Maintenance and Updating of Existing Facilities*

Periodic maintenance and updating of Refuge buildings and facilities will be necessary for safety and accessibility and to support staff and management needs.

- *Protection and Management of Cultural Resources*

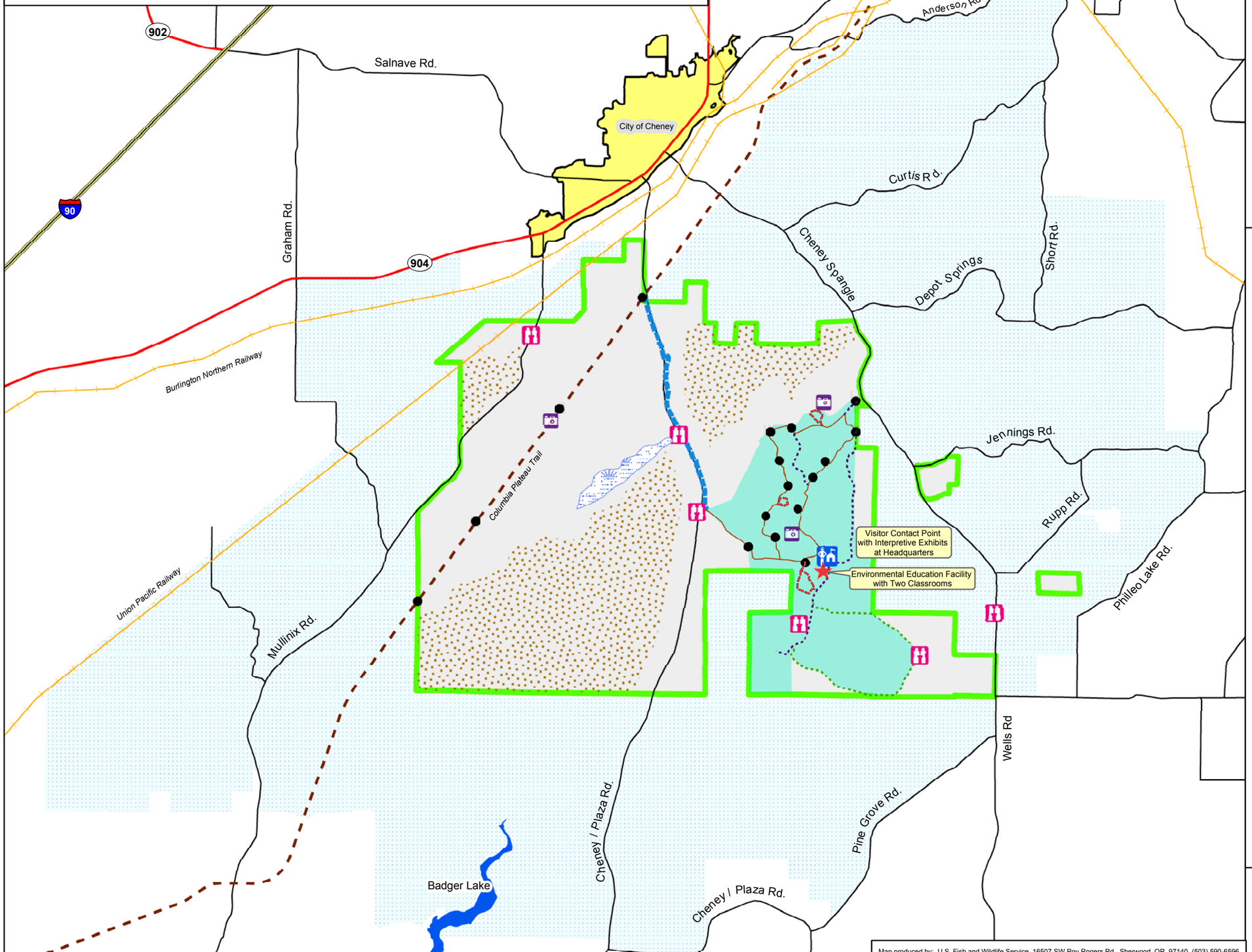
The Service will continue to uphold federal laws protecting cultural resources, including the National Historic Preservation Act (NHPA), Archeological Resources Protection Act, and Native American Graves Protection and Repatriation Act. These laws also require consultation with Native American tribes, the State Historic Preservation Office, and other preservation partners. The NHPA requires all projects that use federal funding, permitting, or licensing to be reviewed by a cultural resource professional to determine if there is the potential to affect cultural resources. If needed, an inventory must be conducted and appropriate actions to mitigate effects must be identified, prior to implementation of the project. A site specific determination is needed for all of the HMP, FMP and CCP projects including:

- new or expanded Refuge management and public use facilities and activities
- elk management actions
- federal easements, cooperative agreements, and other stewardship projects off the Refuge.

- *Management of Minor Recreational Uses*

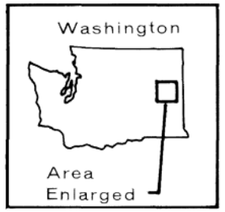
Minor recreational activities are occasionally pursued on the Refuge. Other recreational activities not specifically addressed in this document may be allowed on Refuge lands if the Refuge Manager finds they do not conflict with wildlife or habitat objectives.

Map 3. Main Elements of the Comprehensive Conservation Plan, 2006



Map produced by: U.S. Fish and Wildlife Service, 16507 SW Roy Rogers Rd., Sherwood, OR 97140 (503) 590-6596

TURNBULL
NATIONAL WILDLIFE REFUGE
COMPREHENSIVE
CONSERVATION PLAN
2006



LEGEND

Land Conservation Features

Stewardship Area ***

*** Stewardship Area: An informally designated conservation zone surrounding the Refuge. Within this area, the Service will actively work with partners and neighbors for voluntary, cooperative activities that protect habitat and water resources. Key tools include but are not limited to: conservation easements, use of conservation grants and/or enrollment in various habitat reserve programs, well casing, and technical assistance programs.

In addition, Service acquisition of up to 12,000 acres from willing sellers could occur on priority lands within the Stewardship Area.

New Public Use Features

- New viewpoints
- New photoblinds
- New hiking trails
- Youth waterfowl hunt area
- Elk hunting area
- New designated 2.7 mile bike trail
- Expanded Public Use Area
- Interpretive trails

Existing Features

- Existing viewpoints
- Existing hiking trails
- Columbia Plateau Trail
- Auto tour route
- Railways
- Refuge Fee Title Ownership

N

1:77,000

0 1 2 Miles

Table 2-1. Summary Table of CCP Actions

THEMES	CCP Action
ON- REFUGE HABITAT MANAGEMENT	
Management of Refuge Pine Forests, Wetlands, Aspen, and Steppe Habitats	Continue implementation of Habitat Management Plan (1999) and Fire Management Plan (2001). See Appendix B for HMP summary and objectives; see Appendix C for Fire Management Summary.
ELK MANAGEMENT	
State Coordination	Continue discussions with State to share information on elk, including herd population estimates, reports of off-Refuge damage, viable methods for reducing elk numbers, etc. Conduct annual elk population survey together with State.
Elk Hunting	Allowed, after preparation of a Hunting Plan and publication of Federal Register notice. Length of season, number of permits issued and/or seasons offered will vary based upon the level of aspen damage observed on the Refuge each year. Hunt will be managed as a high quality, limited entry opportunity, in cooperation with State.
Use of Other Tools to Reduce Elk Numbers	Other tools to reduce elk population numbers or damage will be considered together with State. Potential tools to consider include: Relocation, biobullets (implant of reproduction suppression chemicals), facilitation of State technical assistance, and other methods.
WATERFOWL AND GAME BIRD HUNTING	
Waterfowl Hunting	Youth hunt one weekend each year, in conjunction with educational program. Additional areas could be designated if Refuge acquires additional lands.
Other species	Maintain possibility of permitted turkey hunt depending on turkey population trends. Encourage research to investigate turkey ecology on Refuge.
OFF- REFUGE LAND CONSERVATION FOCUS AND TOOLS	
Land Conservation Goals	- To ensure greater protection of the Refuge's water quality and quantity by protection of surface and ground watersheds. - To ensure greater protection and conservation of the critically endangered Palouse steppe habitat - To enhance and restore the outstanding wetland resources of the Channeled Scablands - To provide greater connectivity to other ponderosa pine habitats and to ensure greater protection for aspen habitats.
LAND CONSERVATION TOOLS	
Stewardship Area/ Partnerships	The Stewardship Area is an informally designated conservation zone surrounding the Refuge. Within this area, the Service will actively work with partners and neighbors for voluntary, cooperative activities that protect habitat and water resources. Key tools include but are not limited to conservation easements, enrollment in the Wetlands Reserve Program, well casing, and technical assistance programs. Key partners include but are not limited to: Intermountain West Joint Venture, Ducks Unlimited, Spokane County Parks and Recreation Dept, Spokane County Conservation District, Washington Dept. of Fish and Wildlife, Bureau of Land Management, Natural Resources Conservation Service, Avista Corporation, U.S. Farm Services Agency, Inland Northwest Wildlife Council, Inland Northwest Land Trust, Friends of Turnbull National Wildlife Refuge, Spokane Audubon Society, and The Nature Conservancy.
Stewardship Area Size	44,324 acres

THEMES	CCP Action
Protection Under the National Wildlife Refuge System	Protection of up to 12,000 acres by fee, easement, or agreement from willing sellers on priority lands within the Stewardship Area.
PUBLIC USE AREA	
Size and Location	3190 acres (hunting would occur annually on an additional 5,000 plus acres outside the Public Use Area)
Accessibility Times and Areas	Open year-round. Off trail use not permissible.
WILDLIFE OBSERVATION / WILDLIFE PHOTOGRAPHY	
Location of Viewpoints and Pulloffs	Public use area; Columbia Plateau Trail; Cheney-Plaza Road; Cheney-Spangle Road; Mullinix Road
Designated Viewpoints	25 viewpoints (19 existing plus 6 new sites). Most/all viewpoints will include interpretive sign. New sites developed in the following areas. *Within existing Public Use Area:* Cheever Lake *From Cheney-Plaza Road:* Upper Turnbull Slough (elevated platform) McDowell Lake (elevated platform) *Other locations:* Helms Marsh from Mullinix Road Stubblefield Lake (elevated platform), Pull off on Cheney-Spangle Road where there is view of Stubblefield Lake and steppe.
Photo Opportunity Blinds	Pine Lake (not accessible to persons with disabilities), Kepple Peninsula (accessible), East side of Blackhorse (accessible), Long Lake, but only in conjunction with Long Lake bypass (accessible).
Visitor Welcome Areas	Interpretive panels overlooking Winslow Pool (4 panels) Staffed visitor contact point with small interpretive exhibit area included in new or added on office space.
ENVIRONMENTAL EDUCATION PROGRAM ON REFUGE	
Degree of Facilitation	All visiting classes and groups facilitated by Refuge staff, teachers, volunteers, or other partners.
Teacher Support	Two to four teacher workshops annually
Number of Students Served Annually	8,000-10,000
Coordinator Status	Year round Environmental Education Specialist
Target Audience Emphasis	All ages, (students and non-students) diverse backgrounds and affiliations, inner city kids, at risk kids and seniors. From schools and other groups up to 150 miles away.

Field EE Sites	Four hardened sites with one in rest at all times. Each site used 4 days per week or less. Piers established into wetlands to facilitate aquatic studies and diminish shoreline impact. Add fifth site if needed.
THEMES	**CCP Action**
ENVIRONMENTAL EDUCATION PROGRAM OFF REFUGE	
Materials	EE supplies, videos and displays loaned out as needed.
Number of Individuals served	3,000 - 4,500 (120-180 classes or groups/year)
Percent Facilitated	25
Links to Other EE Programs	member of State-wide consortium
Depth of Programs	year round program, Eastern Washington ecosystems emphasis
Target Audience Emphasis	All ages, diverse backgrounds and affiliations, inner city kids, at risk kids and seniors
ENVIRONMENTAL EDUCATION FACILITY	
EE Facility	Add second classroom to existing facility. Role of center is to serve as a regional environmental education center.
Number of Persons Accommodated in the EE Classroom Facility	Add on to existing classroom at Headquarters. Facility will have 2 adjoining classrooms accommodating 50 people each; can be combined to create multipurpose presentation room seating 100.
TRAILS	
Trail Mileage and Location	15.25 miles. Additional trail miles may be added in the future if opportunities arise through acquisition of properties contiguous to Public Use Area. Stubblefield trail will terminate in elevated viewing platform. No off trail use.
Surface Type and Accessibility	Most dirt surfaces. One wheelchair accessible boardwalk. Bark on EE site short trails. Two trails (Kepple Peninsula Trail and Pine Lake Loop Trail) with accessible surfaces, 48" widths, appropriate grades for accessibility, and accessible trailheads. These trails will traverse each major habitat type.
Boardwalk	Replace to meet standards of updated accessibility guidelines
Trail Lengths	Stubblefield trail added with length of 3.7 miles. In future, should additional trails be added on newly acquired properties, trails could be longer.
Loop Trails	Loop trail of up to 9.6 miles (Pine lakes/Headquarters/Stubblefield loop/bike loop).
Bike Trails	A designated 2.7 mile bike trail connecting Public Use Area to one point on the State Columbia Plateau Trail. Bike Trail would follow the old Cheney Plaza Highway roadbed inside the Refuge (adjacent to Cheney Plaza Road.) Consider packed gravel to cut the dust.

THEMES	CCP Action
COLUMBIA PLATEAU TRAIL	
Interpretive Signs and Facilities	Existing signs and facilities, plus a sign-in book at Refuge entry points and more benches. Support State Parks initiative to develop public facilities in the vicinity of the Refuge for the Columbia Plateau Trail.
Monitoring	Systematic monitoring of recreational use, including: visitor numbers, trespass occurrences, and wildlife disturbance utilizing pre-established scientific protocol. Experimental manipulations with EWU class plus study of real-time actual use and disturbance correlations over 1-2 nesting seasons. Monitoring of visitation frequency
Minimize Disturbance to Long Lake and Other Sensitive Areas	Consider planting hawthorn to prevent trespass and minimize disturbance near Long Lake Consider possibility of developing a bypass trail to reduce disturbance along sensitive parts of the CPT. Consider education, concentrating use, or seasonal closures as other tools
INTERPRETATION	
Interpretive Trails	(Generally short trails designed especially for the educational benefit of casual or new visitors; trails have multiple interpretive signs or markers supported with brochure) Boardwalk (7 signs) Pine Lake Loop Trail (4 signs) Kepple Peninsula Trail (markers with interpretive brochure)
Interpretive Services (naturalist)	Day, evening, and weekend programs.
Number of Wheelchair Accessible Points/Trails	Boardwalk Trail, Kepple Peninsula Trail, Pine Lake Loop Trail, and Turnbull Slough. Most interpretive signs would follow ADA guidelines.
Space for Non-Profit Gift Store	Provide space in Visitor Center for Friends of Turnbull NWR store
CULTURAL RESOURCE EDUCATION AND INTERPRETATION	
Education Materials	artifact replica kit, additional hands-on activities and curriculum
Interpretive Materials	pamphlets, signs, exhibits
Number of Individuals served and Target Audience	Proportional to on and off Refuge EE programs. Target audience would be Refuge visitors as well as local students.
CULTURAL RESOURCE MANAGEMENT AND PROTECTION	
Data Management	Develop GIS layer with appropriate locks for sensitive information
Partnerships	Develop partnership with Tribes for cultural resources inventory, evaluation, and monitoring Work with educational institutions, historical societies, and other preservation partners for inventory, evaluation, and monitoring.

2.2 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 Refuge System Mission.

A CCP describes management actions that help bring a refuge closer to its vision. A vision broadly reflects the refuge purposes, the Refuge System mission and goals, other statutory requirements, and larger-scale plans as appropriate. Goals then define general targets in support of the vision, followed by objectives that direct effort into incremental and measurable steps toward achieving those goals. Finally, strategies identify specific tools to accomplish objectives (USDI 2002).

The goals for the Turnbull Refuge for the next 15 years under the CCP are presented below. Each goal is followed by the objectives that pertain to that goal.

Below each objective statement are the strategies that could be employed in order to accomplish the objectives.

Some objectives pertain to multiple goals and have simply been placed in the most reasonable spot. Similarly, some strategies pertain to multiple objectives.

Only new objectives and strategies that were developed during the CCP planning process are listed here. Objectives developed for the Refuge Habitat Management Plan are listed here, but not explained, partly because the NEPA document analyzing those objectives was completed in 1999 and partly because these objectives are part of the current Refuge management direction regardless of which CCP alternative is chosen. The complete text of the HMP objectives, strategies, and guild management guidelines can be found in Appendix B. The FMP objectives and strategies were not restated here or in Appendix B as that plan is primarily an operational plan dealing with wildfire suppression, fire prevention, and prescribed fire. The goals, objectives and strategies listed in that plan should be treated within that context only. The FMP objectives prevail over all other Refuge objectives for fire suppression, firefighter safety, and life and property protection in case of wildfire. When not dealing with fire suppression situations, HMP or CCP objectives supersede FMP objectives when there is any conflict in habitat type objectives.

GOAL 1:	Contribute to protection of local watersheds to maintain adequate water quality and quantity for native

Objectives 1A through 1D were developed as part of the HMP. They can be found in greater detail in Appendix B.

OBJECTIVE 1A. WATER RIGHTS REVIEW
OBJECTIVE 1B. WETLANDS WATER LEVEL MONITORING
OBJECTIVE 1C. WATER YIELD OF REFUGE WATERSHEDS
OBJECTIVE 1D. WATERSHED QUALITY COORDINATION

OBJECTIVE 1E. WATER AND LAND CONSERVATION: In partnership with private landowners, other federal agencies, local and state governments, and private organizations, the Service will work to protect the water resources supporting Refuge wetlands and wildlife, and will protect, conserve, and restore wetland, steppe, and forest habitats in the Refuge vicinity.

Strategies

- Designate informal Stewardship Area of approximately 44,324 acres surrounding Refuge-owned lands. The intent of the Stewardship Area is to encourage voluntary and cooperative protection and restoration of high and medium quality habitats, and to protect water quality and quantity within the surface and ground watersheds affecting the Refuge. Work with neighboring landowners and partners utilizing tools such as conservation easements, enrollment in the Wetlands Reserve Program, well capping, and technical assistance to achieve Stewardship aims.

- Implement Land Protection Plan (Appendix A) and establish new Approved Refuge Boundary to the extent of the Stewardship Area.

- Within new Approved Refuge Boundary, the Service shall seek to protect, as part of the National Wildlife Refuge System, up to 12,000 additional acres, as described in the Land Protection Plan, from willing sellers, through fee, easement, or agreement.

- Hire staff person to conduct intensive outreach to achieve habitat conservation objectives by voluntary and cooperative means within Stewardship area. Partner with Ecological Services as needed.

Rationale for objective and strategies:
The Refuge's wildlife species are connected to and depend upon the larger landscape. The Turnbull NWR comprises one of the only protected areas within the Channeled Scablands. Most of the original habitats of the Scablands have been highly altered, as detailed in Chapter 3. Yet the potential of the Scablands to support biodiversity is quite high; as one example, wetland basin density rivals that of the Prairie Pothole region and at intact sites, waterfowl production exceeds that of the Potholes (see Chapter 3

of this document, Sections 3.2 and 3.1, and the Refuge Habitat Management Plan [USDI 1999] for more detail). The intermingling of four different habitat types in such close proximity creates conditions of unique habitat diversity.

Some attendees at the public alternatives workshop in June, 2002 were interested in developing the voluntary stewardship idea. A Stewardship Area helps to raise public awareness of the unique conservation value of these lands and the roles that can be played by both public and private sector entities in conservation. This awareness in turn could potentially lead to decisions by multiple private landowners, the State, and other conservation partners (i.e. The Nature Conservancy, Inland Northwest Land Trust, and others) to recognize this area as a priority area for the protection and enhancement of habitats; conservation and management of water, and restoration of drained wetlands. Thus, conservation benefits could potentially be realized in a very efficient manner. The Stewardship Area includes most of the lands included in the Study Area used in the EA. It encompasses lands in varying conditions. The distribution and quality of wetland, aspen / riparian, ponderosa pine, and Palouse steppe habitats within this area is mapped and discussed in Chapter 3, and analyzed further in Chapter 4 of the Draft CCP/EA (USFWS 2005).

Protection under the Refuge System of up to 12,000 acres of land within the new Approved Refuge Boundary will assist in sustaining the values of the highest quality lands within the Study Area, including the lands most important for surface and ground water quality and quantity protection; the lands with superior pine, aspen and/or steppe habitats; and the lands most feasible for restoration of wetlands.

Protection and restoration, using the variety of tools proposed in partnership with neighbors and interested conservation partners, will greatly contribute to the long term maintenance of environmental health and biodiversity in this area of Washington. See Land Protection Plan in Appendix A for further details.

OBJECTIVE 1F. IMPROVE WATER QUALITY AND QUANTITY: Work to ensure current or improved levels of the quality and quantity of water entering the Refuge from the four major drainages (Company, Kaegle, Phillips, and Philleo) so as to manage existing Refuge wetlands at objective levels identified in the Habitat Management Plan.

Strategies

- Complete water quality study in progress. Conduct similar study at five year intervals to determine if water quality entering Refuge is improving.

- Partner with landowners, County, Natural Resources Conservation Service and Department of Ecology outside Refuge ownership boundaries, but with particular focus within Stewardship Area, to implement measures that could conserve water quality and quantity. Such measures may include: distribution of information about best management practices, enrollment in the Wetlands Reserve Program, and other conservation practices; provision of technical assistance or matching funds for conservation and restoration work, etc.

- Within new Approved Refuge Boundary, acquire lands from willing sellers as funds become available.

- Encourage land trusts such as The Nature Conservancy, Trust for Public Lands, and Inland Northwest Land Trust to work actively within the Channeled Scablands and especially within the Stewardship Area to conserve lands.

- Together with partners, monitor groundwater resources through the placement of monitoring wells and use of the piezometer well identified in the HMP.
- Together with partners, reduce density and intensity of future well development to prevent over utilization of groundwater resources.
- Consider a study on groundwater resources, to investigate the hypothesis that there has been a drop in well levels from historic to current times.

Rationale for objective and strategies:
Maintaining adequate water quantity flowing into the Refuge is essential for wetlands to function as primary breeding and foraging habitats for all species that may potentially use these habitats. Because of the regional nature of the drainage system, Turnbull NWR is dependent on inflow of water to supply and manage its wetlands.

The proximity and growth of Spokane, Cheney, and other communities in the Spokane metropolitan area has the potential to affect the quality of both groundwater and surface run-off waters. Septic systems continue to be the primary method of domestic waste disposal in the area. Increased septic system loading increases the potential for non-point source pollution of groundwater that ultimately feeds Refuge wetlands.

Water quality has been a concern for the Refuge for some time. During the last 11 years, two studies of water quality around and on the Refuge were completed. The 2002 study found the highest nutrient concentrations in the subwatersheds with the greatest area in dairy and/or dryland farming (see Chapter 3, Section 3.1). Left unresolved, water quality problems will degrade Refuge wetland habitats and other habitats downstream.

GOAL 2:	Provide habitat conditions essential to the conservation of migratory birds and other wildlife within a variety of wetland complexes.

Objectives 2A through 2F were developed as part of the HMP. They can be found in greater detail in Appendix B.

OBJECTIVE 2A. OPEN WATER ACREAGE
OBJECTIVE 2B. EMERGENT PLANT STRATA PERCENT
OBJECTIVE 2C. WATER DEPTHS IN EMERGENT PLANT ZONE
OBJECTIVE 2D. RESTORATION OF NATURAL HYDROLOGY
OBJECTIVE 2E. RESTORATION OF NATURAL BASINS TOPOGRAPHY
OBJECTIVE 2F. REED CANARYGRASS CONTROL

OBJECTIVE 2G. RESTORE WETLANDS: Strive to maintain existing and restore additional wetland habitat to benefit key wetland indicator species.

- Within the Stewardship Area, protect or restore up to 7,110 acres of wetlands through voluntary partnerships and stewardship activities.
- Within new Approved Refuge Boundary, protect, as part of the National Wildlife Refuge System, up to 2,156 acres of wetland habitat from willing sellers only.

Strategies

- Throughout Stewardship Area, work with landowners to encourage wetlands restoration activities. Provide education on the values of wetlands through outreach programs; provide technical assistance as feasible; and provide information to landowners on technical and financial assistance programs available through federal, state, or local agencies and private organizations.

- With partners, prepare interpretive brochure describing wetlands restoration desired outcomes and techniques. Use brochure for field trips, outreach activities, etc.

- Within new Approved Refuge Boundary, acquire lands from willing sellers as funds become available.

Rationale for objective and strategies:
Approximately 7,110 wetland acres are found within the Study Area outside of the Refuge ownership, of which 5, 006 acres are drained. The potential of the Channeled Scablands vicinity to support wetland habitats and species is very high. Analysis shows that the Channeled Scablands rival or exceed the Prairie Pothole Region for wetland depth, size, and abundance in almost every wetland type category (see further discussion, Chapter 3). Additionally, the Channeled Scablands have a greater proportion of the total area in wetlands. In areas such as the Refuge where the wetland complex is still intact, duck breeding pair densities of several species is actually greater than in the Prairie Pothole region, which is globally known for its waterfowl production. Positive conservation action is needed, however, to realize these habitat

benefits. As the situation currently stands, most of these wetland acres have been drained and now provide only ephemeral habitat for wetland dependent species.

Key wetland indicator species are listed in the Refuge Habitat Management Plan (USDI 1999).

See Land Protection Plan in Appendix A for further details.

OBJECTIVE 2H. IDENTIFY AND PROTECT VERNAL POOLS: Identify locations of high quality and intact rare vernal pool habitat within Stewardship Area and strive to further protect these areas.

Strategies

- In cooperation with landowners, inventory grassland areas within the Stewardship Area to ascertain vernal pool presence.
- Throughout Stewardship Area, work with landowners to encourage vernal pool protection. Provide information on the values of vernal pools through outreach programs; provide technical assistance as feasible; and provide information to landowners on technical and financial assistance programs available through federal, state, or local agencies and private organizations.
- Within new Approved Refuge Boundary, acquire lands from willing sellers as funds become available.

Rationale for objective and strategies:
Vernal pools, typically located in the biscuit and swale steppe habitat of the Channeled Scablands region, warrant special consideration. These vernal pools occur in shallow depressions with a perched water table. Standing water is usually present for less than two months in most years. Because of the relatively short lived nature of these wetlands they are host to a unique plant and animal community.

Because of their small size and ephemeral nature, most vernal pools are not readily detectable with remote sensing imagery and have been largely overlooked by the National Wetlands Inventory. Because of this, their actual locations in the Study Area are generally unknown.

GOAL 3:	Restore Refuge aspen and ponderosa pine forests to a natural distribution of stand structural and successional stages to benefit forest dependent wildlife.

Objectives 3A through 3D were developed as part of the HMP. They can be found in greater detail in Appendix B.

OBJECTIVE 3A. RESTORATION OF PONDEROSA PINE
OBJECTIVE 3B. SNAG RECRUITMENT
OBJECTIVE 3C. ASPEN/RIPARIAN RESTORATION WITHIN CLIMAX PINE STANDS
OBJECTIVE 3D. COARSE WOODY DEBRIS

OBJECTIVE 3E. REDUCE ELK DAMAGE: In cooperation with the State, undertake actions to reduce elk damage to Refuge habitats. In particular, ensure that damage to Refuge aspen groves does not exceed levels above which aspen stands cannot be regenerated or sustained.

Strategies

- Continue work to identify a sound indicator for measuring the damage to aspen habitats. Investigate use of percent of current annual growth (CAG) browsed or percent of twigs browsed. Utilize Albrecht (2003) study.
- Continue discussions with Washington Department of Fish and Wildlife to share elk information, including herd population estimates, reports of on-refuge and off-refuge damage, and viable methods for reducing elk numbers.
- Consider a variety of tools to reduce elk population numbers or damage, including relocation, implant of reproduction inhibiting chemicals, working with private landowners, and other methods as feasible. (Hunting will be employed as a tool - see Objective 7M).
- Monitor aspen habitats annually using established indicator.
- Monitor and track seasonal shifts in elk populations and distribution on Refuge.
- Encourage Washington State University continuation of Master's level theses dealing with elk/ aspen interactions.

Rationale for objective and strategies:
Research underway by the State and Eastern Washington University indicates that the Refuge is important to the local elk population as a security zone. As a result, there has been heavy browsing of young aspen and other deciduous shrubs and trees on the Refuge. In addition, several neighbors have complained of elk damage to their hay, other agricultural crops, fences, and ornamental shrubs since the early 1990s and feel that the Refuge should take a more active role in limiting elk numbers. Since 1992, two claims have been paid by the State for elk damage to agricultural crops. Complaints have declined since 1999 after several local landowners began leasing their lands for hunting.

Aspen stands typically regenerate themselves after disturbance by producing new shoots, also called suckers. A high level of elk browse on an aspen stand can ultimately impede the stand's capacity to regenerate and grow into a mature stand. Current literature was reviewed to investigate the issue of how much elk use on aspen is sustainable or in other words, does not impede a stand's regeneration and capacity to grow into a mature stand. A set of management recommendations for regenerating aspen stands, published by Bates et al. (2002) indicates that 4000-5000 well-spaced suckers per acre at age two is adequate for regenerating the stand, though a higher number of suckers per acre is desirable for unexpected losses from disease or injury. Other authors, including Debyle (1985) and Campbell et al. (2001) have recommended retaining at least 500 stems per acre at year 6 or when the aspen close is approximately 2.5 meters tall.

The Refuge maintains twelve study plots in aspen habitat. Albrecht (2003) investigated aspen regeneration under variable elk use on the Refuge and discovered that aspen in areas where elk concentrate are much more intensively browsed. Specifically, he discovered that in areas categorized as "low-use" by elk, less than 20% of the stems under 2.5 meters tall received moderate to high intensity browsing. This appeared to be an acceptable level in that these stands were showing recruitment of an adequate number of stems per acre.

Management that reduces elk densities in an area during the winter by either removal or redistribution can decrease browsing intensity enough to allow aspen escapement and height growth beyond the reach of elk. Hunting can be an effective elk population management strategy. Because of the high proportion of leased private land and current no hunting areas such as the Refuge and several private tracts, limited elk hunting opportunities exist in the Refuge vicinity.

See also Objective 7M; Initiate a High-Quality Elk Hunting Program.

OBJECTIVE 3F. PROTECT ASPEN HABITAT: Strive to protect and restore additional aspen and deciduous shrub habitat to benefit key aspen indicator species.

- Within the Stewardship Area, protect and restore up to 380 acres of aspen through voluntary partnerships and stewardship activities.
- Within new Approved Refuge Boundary, protect, as part of the National Wildlife Refuge System, up to 115 acres of aspen habitat from willing sellers only.

Strategies

• Throughout Stewardship Area, work with landowners to encourage stewardship and restoration of aspen groves and deciduous shrub riparian habitats. Provide education on the wildlife values of aspen habitat through outreach programs, provide technical assistance as feasible, and provide information to landowners on technical and financial assistance programs available through federal, state, or local agencies and private organizations. Integrate outreach and assistance

programs with the Wildland Urban Interface program (WUI) and funds as per the National Fire Plan.

- With partners, prepare interpretive brochure describing aspen restoration desired outcomes and techniques. Use brochure for field trips, outreach activities, etc.

- Within new Approved Refuge Boundary, acquire lands from willing sellers as funds become available.

Rationale for objective and strategies:
Although aspen occurs in small amounts relative to other habitats within the Study Area, it is important to a large portion of the local wildlife, particularly neotropical migratory songbirds. Almost 75% of the aspen stands within the Study Area are considered high quality (deduced from aerial photo interpretation). Cover type mapping completed by the Refuge in 1992 indicated that the area occupied by aspen and deciduous shrub riparian habitats had been reduced by approximately 65 percent from previously. Causes for this decline included competition by encroaching ponderosa pine, clearing for pasture improvement, and finally by livestock and elk browsing which suppresses aspen and shrub regeneration. Simplification of habitat structure in aspen (loss or suppression of understory shrubs, grasses, forbs, and regenerating trees, as well as loss of snags) reduces the suitability of this habitat for shrub and tree cavity nesters and cavity using wildlife species. Human development nearby also encourages competitive or predatory wildlife such as starlings, house sparrows, raccoons, and cats.

Key aspen indicator species are listed in the Refuge Habitat Management Plan (USDI 1999).

See Land Protection Plan in Appendix A for further details.

OBJECTIVE 3G. PROTECT PONDEROSA PINE HABITAT: Protect and restore additional ponderosa pine forest habitat to benefit key pine indicator species.

- Within the Stewardship Area, protect and restore up to 20,090 acres of ponderosa pine habitat through voluntary partnerships and stewardship activities.
- Within new Approved Refuge Boundary, protect, as part of the National Wildlife Refuge System, up to 6,092 acres of ponderosa pine habitat, from willing sellers only.

Strategies

- Within Stewardship Area, work with landowners to encourage conservation and restoration activities for ponderosa pine forests. Provide information on the values of pine forests through outreach programs; provide technical assistance for restoration as feasible; and provide information to landowners on technical and financial assistance programs available through federal, state, or local agencies and private organizations. Integrate outreach and assistance programs with the Wildland Urban Interface program (WUI) and funds as per the National Fire Plan.

- With partners, prepare interpretive brochure describing pine forest restoration desired outcomes and techniques. Use brochure for field trips, outreach activities, etc.

- Within new Approved Refuge Boundary, acquire lands from willing sellers as funds become available.

Rationale for objective and strategies:
The Study Area contains approximately 20,090 acres of ponderosa pine forest. Nearly all large diameter open stands of ponderosa pine forest have been harvested from large regions of Oregon, Washington, and Idaho. Ponderosa pine provides valuable wildlife habitat in its large-diameter late-seral stage. Timber harvest has severely affected these habitat types because of the high value of the trees and the fact that, located at lower elevations, these habitats have been more accessible than higher elevation types. Fire exclusion has also played a role in the loss of this habitat, resulting in a gradual shift in stand composition from shade-intolerant tree species such as ponderosa pine to shade-tolerant species such as Douglas-fir and grand fir. See further discussion in Chapter 3, Section 3.2.

The late-seral ponderosa pine cover type has declined throughout its range in the Columbia Basin but portions of the Basin show declines that are particularly severe. In the Northern Glaciated Mountains Ecological Reporting Unit (ERU) which measures 17.6 million acres and includes part of the northeast section of the Study Area, late-seral, single layer ponderosa pine has declined from historic levels by over 99 percent. In the Columbia Plateau ERU (24.3 million acres), where the rest of the Study Area is located, late-seral, single layer ponderosa pine has declined from historic levels by over 93 percent (Hann et al., 1997).

Conservation and restoration of large diameter pine forests is necessary in order to protect and restore habitats for the unique suite of species reliant on such forests.

Key ponderosa pine indicator species are listed in the Refuge Habitat Management Plan (USDI 1999).

See Land Protection Plan in Appendix A for further details.

GOAL 4:	Protect and restore the natural distribution and diversity of grassland and shrub steppe habitats to benefit wildlife.

Objectives 4A through 4D were developed as part of the HMP. They can be found in greater detail in Appendix B.

OBJECTIVE 4A. LITTER COVER PERCENT
OBJECTIVE 4B. ENCROACHING PINES REMOVAL
OBJECTIVE 4C. EXOTIC PLANT SPECIES CONTROL
OBJECTIVE 4D. IDENTIFICATION OF INTACT GRASSLAND AND STEPPE

OBJECTIVE 4E. PROTECT PALOUSE STEPPE HABITAT: Strive to protect and restore additional Palouse steppe habitat to benefit key steppe indicator species.

- Within the Stewardship Area, protect and restore up to 11,955 of Palouse steppe habitat through voluntary partnerships and stewardship activities.
- Within new Approved Refuge Boundary, protect, as part of the National Wildlife Refuge System, up to 3,637 acres of Palouse steppe habitat from willing sellers only.

Strategies

- Within Stewardship Area, work with landowners to encourage Palouse steppe protection and restoration activities. Provide information on the values of steppe through outreach programs; provide technical assistance as feasible; and provide information to landowners on technical and financial assistance programs available through federal, state, or local agencies and private organizations.

- Within new Approved Refuge Boundary, acquire lands from willing sellers as funds become available.

Rationale for objective and strategies:
Nearly 90 percent of the original Palouse Prairie steppe habitat has been converted to dryland farming (Cassidy et al. 1997a). The extent of this loss places this ecosystem on the list of critically endangered ecosystems in the United States (Noss et al. 1995) and the Washington GAP Analysis authors rated Palouse steppe as the highest conservation priority in the State.

Key steppe indicator species are listed in the Refuge Habitat Management Plan (USDI 1999).

GOAL 5:	Support the conservation of threatened and endangered species in their natural ecosystems.

Objectives 5A through 5E were developed as part of the HMP. They can be found in greater detail in Appendix B.

OBJECTIVE 5A. HOWELLIA RESEARCH AND MONITORING
OBJECTIVE 5B. HOWELLIA PRECAUTION
OBJECTIVE 5C. REDUCTION OF REED CANARYGRASS COMPETITION
OBJECTIVE 5D. HOWELLIA EDUCATION
OBJECTIVE 5E. HOWELLIA HABITAT PROTECTION

OBJECTIVE 5F. CONSERVE WATER HOWELLIA HABITAT: Protect up to 885 acres of potential water howellia habitat within the Stewardship Area and/or up to 511 acres within new Approved Refuge Boundary to support recovery efforts identified in the Draft Water Howellia Recovery Plan (Shelly and Gamon 1996).

Strategies

- Within Stewardship Area, work with landowners to encourage conservation of water howellia. Provide information on identification of the plant in outreach programs; provide technical assistance as feasible; and provide information to landowners on technical and financial assistance programs available through Natural Resources Conservation Service, private partners, or the Service's Private Lands Program.

- Within new Approved Refuge Boundary, acquire lands from willing sellers as funds become available.

Rationale for objective and strategies:
Small, semi-permanent wetlands on the Refuge, and within the near vicinity, support one of the largest known metapopulations of water Howellia within its range (Shelly and Gamon 1996). Although very little of its potential habitat has been surveyed in the Refuge vicinity, there are numerous wetlands within that have the same habitat attributes as the known occurrences on the Refuge. Expanding the number of protected sub-populations will further conserve this meta-population.

OBJECTIVE 5G. PROTECT SPALDING'S SILENE HABITAT: Endeavor to protect up to 6,502 acres of potential Spalding's Silene habitat within the Stewardship Area and/or up to 1,971 acres within the new Approved Refuge Boundary in support of recovery for this species.

Strategies

- Implement all recovery actions that are appropriate and can be undertaken at Turnbull NWR.
- Actively promote conservation of Palouse steppe habitat through outreach and education programs.
- Protect potential Spalding's silene habitat through acquisition from willing sellers as funds become available.

Rationale for objective and strategies:
Spalding's silene, also known as Spalding's catchfly, was recently listed as a threatened species under the Endangered Species Act. The species has been documented on the Refuge and 28 populations have been identified in eastern Washington (Spokane, Lincoln, Whitman, and Asotin Counties). This species is primarily restricted to Palouse steppe habitat. Actions undertaken by the Refuge to promote conservation of Palouse steppe habitat could also aid in the long term recovery of this species.

GOAL 6:	Support the maintenance of biologically effective landscape linkages and corridors between the refuge and other intact areas of vegetation zones representative of this ecoregion.

Objectives 6A through 6B were developed as part of the HMP. They can be found in greater detail in Appendix B.

OBJECTIVE 6A. PARTICIPATION IN COUNTY AND MUNICIPAL PLANNING
OBJECTIVE 6B. MAINTENANCE OF NATIVE LAND COVER

GOAL 7:	Foster appreciation and support of the Refuge and the Channeled Scablands ecosystem through quality environmental education, interpretation, wildlife-dependent recreation, and outreach compatible with the Refuge purposes and mission.

OBJECTIVE 7A. PROVIDE A QUALITY ENVIRONMENTAL EDUCATION PROGRAM ON-REFUGE: Provide a quality, on-site environmental education program for 8,000 to 10,000 students and citizens annually. This program shall emphasize the wildlife and habitat of the Channeled Scablands as well as the role and importance of national wildlife refuges. The on-Refuge environmental education program shall:

- focus on community groups and schools within 150 miles;
- tier to (or achieve) Washington state educational objectives;
- incorporate specific learning objectives and utilizes audience-appropriate curricula;
- feature class facilitation balanced between Refuge staff, teachers, volunteers, and partners; and
- be coordinated by a permanent full time Environmental Education Specialist.

Strategies

- Every two years, review EE curricula with focus group of educators at primary, secondary, and university levels. Update curricula and materials as necessary to ensure specific, age-appropriate learning objectives are articulated and that proper emphasis is placed on Refuge System, current ecosystem science of Channeled Scablands, current management issues, and adherence to current State environmental education standards.

- Implement user and administrative stipulations specified in the Environmental Education and Interpretation Compatibility Determination (Appendix E).

- Design all instructional materials to encourage development of an environmental ethic and commitment to land stewardship in addition to conveying scientific knowledge.

- Consider membership in a statewide environmental education consortium, with the Refuge program emphasis on Channeled Scablands and Eastern Washington ecosystems.

- Establish permanent, full time Environmental Education Specialist position.

- Establish a permanent seasonal Environmental Educational Specialist position.

- Establish temporary park rangers for EE program.

- Hold 2 to 4 teacher workshops per year to train educators and facilitators.

Rationale for objective and strategies:
The Refuge's EE program has been active for over 30 years. Based on feedback obtained during CCP scoping, the Service recognizes that of all the programs and services provided by the Refuge, the EE program is probably the most highly valued by the public. Many people support an expanded EE program. We feel it is imperative to ensure that this program receive the staff and funding emphasis that will ensure quality environmental educational opportunities for a diversity of students and community groups for the next 15 years.

OBJECTIVE 7B. EXPAND ENVIRONMENTAL EDUCATION FACILITIES:

Within seven years, expand the existing EE facility to allow use by two groups at a time. Provide two adjoining classrooms, accommodating 50 people each, which can be combined to create a multipurpose room for 100.

Strategies

- Implement user and administrative stipulations specified in the Environmental Education and Interpretation Compatibility Determination (Appendix E).
- Explore funding opportunities such as a capital campaign, etc.
- Maintain a vault toilet at each EE site, and maintain parking areas to accommodate buses.
- Establish a permanent shelter at each EE site.
- Maintain four field EE sites, with one in rest /rotation at all time.
- Add a fifth field EE site if necessary.
- Ensure all EE facilities and field sites are accessible to individuals with disabilities.

Rationale for objective and strategies:
Existing environmental education facilities have worked well in the past, but they limit the potential of the program. There is a need to be able to schedule two classes at a time. Expanded classroom facilities will provide an opportunity for presentations and educational activities for larger audiences. The public is very supportive of the environmental education program and would like to see more activity in this area.

OBJECTIVE 7C. PROVIDE ENVIRONMENTAL EDUCATION PROGRAM OFF-REFUGE:

Provide an off-Refuge environmental education program to community groups and schools that fosters understanding, appreciation and support for Refuges, and the habitat and wildlife of the Channeled Scablands ecosystem. The off-Refuge environmental education program shall:

- be coordinated by a staff Environmental Education Specialist;
- complement on-Refuge environmental education opportunities;
- reach audiences not reached by on-Refuge programs;
- focus on groups and schools within an hour's drive;
- reach 3,000 to 4,500 individuals (120-180 classes) annually, at least 20 percent of these from non-traditional audiences;

- include at least 25 percent facilitated educational opportunities;
- incorporate Washington state educational objectives; and
- incorporate specific learning objectives and utilize audience-appropriate curricula.

Strategies

- Maintain lending library of EE materials (videos, skins, curriculum guidelines, etc.).
- Recruit retired teachers and other volunteers for off refuge facilitated opportunities.
- Coordinate this program closely with the on-refuge EE program. In general, implementing the on-refuge program will benefit the off-Refuge program as well.
- Post curricula and other learning materials on the Refuge web site.
- Actively advertise off-refuge environmental education program to teachers, schools, and groups.

Rationale for objective and strategies:
Off-Refuge educational programs can greatly expand the level of awareness and knowledge of the Refuge and the Channeled Scablands ecosystem. The Refuge can accommodate only 125 students per day on site, but many more students per day could potentially learn about the wildlife and aquatic ecology of the Channeled Scablands through off-site programs, especially those provided through a lending library. Even with these programs, however, the Refuge will aim to have at least 25 percent of the off-refuge programs facilitated, as staff has found that facilitated programs are generally more effective at achieving the learning objectives.

OBJECTIVE 7D. DEVELOP CULTURAL RESOURCES INTERPRETIVE AND EDUCATION PROGRAM: In partnership with the Spokane, Coeur d'Alene, Colville, and Kalispel Tribes, historical societies, and other preservation partners, develop a program for the education and interpretation of cultural resources of the Refuge that:

- instills an ethic for the conservation of our cultural heritage;
- promotes an appreciation for the Native American culture and perspective on cultural resources;
- translates the results of cultural research into media that can be understood and appreciated by a variety of people; and
- relates the connection between cultural resources and natural resources and the role of humans in the environment.

Strategies

- Consult with the Tribes, historical societies, and other preservation partners to identify the types of cultural resource information appropriate for public interpretation.
- Prepare interpretive media (e.g., pamphlets, signs, and exhibits) that depict Native American and Euro-American cultural resources on the Refuge.
- Develop lending library of education materials for use in local schools and museums concerning cultural resources, the discipline of archaeology, the perspective of Native Americans, Euro-American settlement history, and conservation of cultural resources. These materials could include an artifact replica kit with hands-on activities and curriculum prepared in consultation with the local school district, historical societies, and the Tribes.

- Develop an outreach program and materials so that the cultural resource messages become part of cultural events in the area, including: Washington Archaeology Month, National Wildlife Refuge Week, and appropriate local festivals.

- Create storage and use plans for museum property to facilitate appropriate uses as part of the education program.

- Train an EE Specialist in cultural resource education and interpretation. Training could be provided by the Service's cultural resource team members.

Rationale for objective and strategies:
The Refuge has several known prehistoric sites, at least 38 farmsteads, and two rural schoolhouse sites. More sites will likely be discovered in coming years. Most cultural resources are not renewable. The education and interpretation of cultural resources can instill a conservation ethic among the public and others who encounter or manage them.

OBJECTIVE 7E. INCREASE COMMUNITY SUPPORT: With partners, increase community support and appreciation for the Refuge, its purpose and management programs, focusing particularly on adjacent landowners, Cheney community groups and leaders, and Spokane County community groups and leaders, to accomplish the following:

- Outreach themes shall focus on wildlife, habitat and conservation needs of the Channeled Scablands ecosystem.
- Outreach efforts shall incorporate practical conservation advice and tips and information at every opportunity. Examples: how to conserve water at home or build a nest box for bluebirds may be an appropriate outreach topic for a general audience, while how to enroll in the Wetlands Reserve Program may be an appropriate topic for landowner audience.
- The Refuge shall hold at least six face-to-face outreach events to focus audiences annually.
- The Refuge shall hold a booth at a minimum of three community fairs or festivals annually.
- The Refuge shall hold at least four community work days per year.
- Outreach efforts shall persuade landowners and partners to undertake at least two conservation projects annually within the Stewardship Area.
- The Refuge shall establish and maintain a diversity of partnerships within the private sector, with non-governmental organizations, educational institutions, and other government agencies.
- Partners should assist the Refuge in fundraising and providing matching funds where appropriate.

Strategies

- Hire part-time outreach specialist.

- Designate focus audiences, including at minimum: landowners in the Stewardship Area, community political, economic and social leaders.

- Create portable, lendable outreach presentation tool kit.

- Work with the Friends of Turnbull to create a volunteer speaker's bureau to speak to groups on behalf of the Refuge.

- Continue recruiting, training, and utilizing volunteers for support of Refuge programs and activities.
- With partners, incorporate evening and weekend programs into the schedule of activities.
- Update and maintain Refuge web page.

Rationale for objective and strategies:
Outreach differs from off-refuge environmental education in one key attribute - outreach has no specific learning objectives while environmental education does. Outreach is also not simply coordination with existing or potential partner agencies or groups. Outreach is complementary to these by targeting audiences who may not have an expressed interest in the Refuge, but nonetheless may influence the Refuge by their actions or proximity. Outreach efforts have the potential to build understanding, curiosity, and support, especially when geared towards groups that might not have the inclination to actually visit the Refuge. Ultimately, outreach is aimed at building new partnerships and spurring conservation action in the community. We feel communication efforts are an important aspect of conservation and an important component of Refuge management.

OBJECTIVE 7F. PROVIDE VISITOR CONTACT POINT AND INTERPRETIVE EXHIBIT AREA: With partners, provide visitor contact and information facilities in conjunction with an interpretive exhibit area within seven years as follows:

- Staffed visitor contact point provide orientation and a jumping-off point for Refuge wildlife-dependent recreational activities.
- Visitor contact point includes a small exhibit area containing quality non-static interpretive materials that increase awareness of the Channeled Scablands ecosystem, the Refuge System, and Turnbull Refuge management practices. Interpretive materials instill a sense of stewardship and environmental ethic.
- Visitor contact center is designed to accommodate persons of all abilities.

Strategies

- Update interpretive prospectus to include Refuge management interpretive themes. Utilize interpretive prospectus to guide exhibit themes.
- Implement user and administrative stipulations specified in the Environmental Education and Interpretation Compatibility Determination (Appendix E).
- Explore diverse funding opportunities for capital improvements.
- Consider new facility or add on to existing facility as funding allows.

Rationale for objective and strategies:
At the present time, the Refuge does not have any central interpretive area for the public. This limits the use of the Refuge by those who are constrained by time or physical ability from exploring the trails and viewpoints directly. A staffed central interpretive area will be a strong focus for visitor contacts and will directly advance public understanding of the Refuge and the surrounding ecosystem.

OBJECTIVE 7G. PROVIDE DIVERSITY OF WILDLIFE OBSERVATION VIEWPOINTS, WITH INTERPRETIVE MATERIALS: Within five years, provide a diversity of permanent wildlife viewing points to the public as follows:

- Most viewpoints shall contain high quality interpretive signs or materials that follow Americans with Disabilities Act guidelines. Focused messages on interpretive media should evoke emotion, raise awareness of local ecology, and promote understanding of refuge management practices.
- Include 15 viewpoints inside the Public Use Area and 4 viewpoints along the Columbia Plateau Trail (CPT).
- Include one viewpoint inside Refuge at Stubblefield Lake.
- Include five viewpoints along local County roads and highways to increase knowledge and enjoyment of casual drive-through visitors and in support of the Watchable Wildlife site and Audubon Important Birding Area designations.
- Design viewpoints to maximize wildlife viewing experiences while minimizing disturbance or impacts to wildlife.
- Establish viewpoints in a diversity of habitats so that visitors can gain greater understanding of the different wildlife and plants inhabiting the Refuge's pine forests, aspen forests, grasslands, and wetlands.

Strategies

- Implement user and administrative stipulations specified in the Environmental Education and Interpretation Compatibility Determination (Appendix E).
- Establish interpretive signs at the following locations in the Public Use Area: Swan Pond, Kiosk at Winslow Pool, Kepple Overlook, Blackhorse Lake control structure, Photo Blind at Pine Lake, Wheeler Memorial, Restored Pine area, Kepple Peninsula, North Bluebird Trailhead and Camas Meadow.
- Establish interpretive signs and develop pulloff and short accessible trail to new viewpoint at Upper Turnbull Slough, visible from Cheney-Plaza Road.
- Establish interpretive signs and design an elevated platform at Stubblefield Lake in conjunction with the new loop trail.
- Establish interpretive signs and develop pulloffs on County roads as needed at the following viewpoints visible from County roads: McDowell Lake, Stubblefield view from Cheney-Spangle, and Helm Marsh from Mullinix Road.
- Establish interpretive signs at Cheever Lake (in Public Use Area).
- Maintain the four existing interpretive signs at north end of the Columbia Plateau Trail, south end of the Columbia Plateau Trail, Ballinger Lake, and Long Lake.
- Provide information to visitors about the best techniques for minimizing disturbance to wildlife while observing or photographing wildlife.
- Display photographers' ethics guidelines.

- With the help of volunteers, ensure development of three accessible photo blinds at Kepple Peninsula, the east side of Blackhorse Lake, and Long Lake. Retrofit Pine Lake photo blind for accessibility.
- Update and implement interpretive prospectus with the strategies above. Also provide enhanced interpretive materials on elk and waterfowl viewing and photography.
- Consider adding additional viewpoints with interpretive signs if the Refuge acquires additional land.
- Consider adding bolted down aids such as spotting scopes or telescopes to enhance wildlife viewing from certain viewpoints.
- Seek alternative funding sources to support the objective.
- Design new interpretive signs to be easily read from a vehicle.
- Establish vegetative screening at viewpoints where necessary.
- Link interpretive materials to EE and all management programs.

Rationale for objective and strategies:
Part of the Refuge vision is to support visitor education. The Refuge staff sees a prime opportunity to support education of the solitary or casual visitor through the use of interpretive media at the Refuge's outstanding viewpoints. Such interpretive material can greatly enhance visitor ecological understanding, ultimately contributing to their enjoyment of the Refuge and its wildlife.

OBJECTIVE 7H. IMPROVE PUBLIC FACILITIES: Improve visitor infrastructure so as to enhance safety, sanitation, comfort, and access for the visiting public, including citizens with disabilities.

Strategies

- Improve Refuge signs, vehicle access routes, pullouts and parking in the Public Use Area, using Transportation Equity Act -21 or other available funds.
- Move gate and fee station closer to Cheney Plaza Road.

(Also see strategies under Objectives 7B, 7F, 7G, 7J, and 7I for more information about facilities and access).

Rationale for objective and strategies:
Improvement of Refuge facilities provides an opportunity to enhance the visitor experience and improve visitor compliance with rules. The Refuge also needs to implement current Americans with Disabilities Act (ADA) standards and guidelines and provide a greater diversity of facilities to individuals with disabilities.

OBJECTIVE 7I. EXPAND PEDESTRIAN-ONLY TRAIL NETWORK: Within 10 years, expand and enhance the Refuge pedestrian trail network as follows:

- Designate at least two trails for universal access (accessible to current ADA standards);

- Locate all trailheads within the Public Use Area;
- Provide 15.25 miles of pedestrian only trails with some trail routes of 2 miles or more; provide potential for trail links and more loop trails; and
- Provide improved interpretation on some trails and leave other trails as natural as possible.

Strategies

- Implement user and administrative stipulations specified in the Wildlife Observation and Photography Compatibility Determination as well as those specified in the Bicycling, Jogging, and Cross-Country Skiing Compatibility Determination (Appendix E).
- Replace Boardwalk Trail at West Blackhorse Lake with another boardwalk type trail meeting current ADA standards.
- Establish trail to Stubblefield Lake and ensure users do not adversely affect unique qualities of this area by going off trail.
- To minimize disturbance to waterfowl on the lake during peak waterfowl use periods, consider a bypass near Long Lake on the Columbia Plateau Trail, or establish natural screening.
- Monitor number of visitors and visitor use patterns in the Public Use Area, using established sampling techniques.
- Develop four interpretive panels at Winslow Pool.
- Prohibit bicycle use on pedestrian trails except possibly Bluebird Trail and Stubblefield Lake Trail.
- Consider adding additional trails if Refuge acquires additional land.

Rationale for objective and strategies:
Many people have expressed a desire for a greater variety of trails and more loop trails. The Service sees an opportunity to provide this at the Refuge. However, trail establishment outside the Public Use Area is not justified at this time, partly because additional trails will be made available within the Public Use Area, and partly because of the need to separate trail users from hunting, which will occur outside the Public Use Area. If the Refuge were to acquire additional lands, more trails could be considered.

OBJECTIVE 7J. SUPPORT COMPATIBLE COLUMBIA PLATEAU TRAIL USE:

Support hiking, biking, and equestrian use on the portion of the Columbia Plateau Trail that crosses Refuge land and ensure that trail use remains compatible with Refuge purposes.

Strategies

- Continue to co-manage the 4.75-mile section of the Columbia Plateau Trail that runs through Refuge land together with the Washington State Parks and Recreation Commission under the parameters of the existing cooperative agreement.
- Every five years, review and update the cooperative agreement for the Columbia Plateau Trail.

- Implement user and administrative stipulations specified in the Wildlife Observation and Photography Compatibility Determination as well as those specified in the Bicycling, Jogging, and Cross-Country Skiing Compatibility Determination (Appendix E).
- Encourage State to lead effort to plan and develop additional public facilities at the Cheney Plaza intersections with the Columbia Plateau Trail.
- Establish a vault toilet north of Ballinger Lake.
- Place benches at strategic viewpoints and place a sign-in book at the north and south points where the trail enters the Refuge.
- Partner with the State to establish regular and accepted visitor counting techniques so that the Refuge has reliable visitor estimates on this trail.
- Conduct systematic monitoring of trail use to determine patterns of use, degrees of disturbance, and consequences to wildlife, if any.
- In cooperation with the State, consider a variety of tools to prevent trespass and disturbance to key wildlife areas, including vegetative plantings, public education efforts, concentrating use at key facility points (i.e. benches), establishing of bypass trail at Long Lake, or using seasonal closures.

Rationale for objective and strategies:
The Columbia Plateau Trail, built on an abandoned railroad track through the Rails to Trails program, is a new recreational asset for Eastern Washington. When fully complete, it will traverse 130 miles of the state, extending from Ice Harbor Dam on the Columbia River to Fish Lake near Cheney. Because it crosses an area of the Refuge that has been closed to the public for 60 to70 years, there is no real knowledge of how wildlife using the area will respond. The Service supports the trail and also wants to ensure that trail use remains compatible with Refuge purposes. Continued cooperative management with State Parks and Recreation and ongoing monitoring are the best strategies for achieving this objective.

OBJECTIVE 7K. ESTABLISH A DESIGNATED AND SIGNED BIKE TRAIL LINK:

Establish a designated, signed, trail link for biking and hiking between the Columbia Plateau Trail and the Public Use Area via the old Cheney Plaza Highway roadbed within five years.

Strategies

- Plan trail in cooperation with Washington Department of Transportation, State Parks and Recreation, and Spokane County.
- Seek joint funding for trail construction.
- Implement user and administrative stipulations specified in the Bicycling, Jogging, and Cross-Country Skiing Compatibility Determination (Appendix E).
- Consider paving trail to minimize dust.

Rationale for objective and strategies:
There is value in direct and safe non-motorized access to the Refuge Public Use Area for users coming from Spokane or Cheney. Currently, the most direct and safest route is by way of the Columbia Plateau Trail (CPT); however, there is no clear designated link from the CPT to the Public Use Area on the Refuge. Establishing such a link will enable non-motorized users to leave the CPT near Overpass Pond and travel on a safe route to the Public Use Area. The abandoned Cheney Plaza Highway roadbed is located inside the Refuge to the east of the current Cheney Plaza Highway. Converting this roadbed to a designated bike trail will make bike access to the Refuge much safer as bikes will no longer have to share the actual highway.

OBJECTIVE 7L. PROVIDE A HIGH-QUALITY WATERFOWL HUNT FOR YOUTHS:

Initiate a safe, high quality, low-impact youth waterfowl hunt on the annual State youth hunt weekend. Emphasize education, possibly requiring a waterfowl identification or natural history class for youths participating in the hunt.

- Safety means: no injuries or safety incidents; 98 percent of all hunters report feeling safe.
- High quality means: uncrowded conditions (hunters spaced at 300 yards or more) and minimal conflicts with other priority public uses.
- Low-impact means: limited vehicle access; designated stationary hunting areas on the north side of Upper Turnbull Slough; no boats; and walk- in/walk-out access.

Strategies

- Publish Hunting Plan and Federal Register Notice before first hunt season.
- Manage hunt in cooperation with State.
- Implement user and administrative stipulations specified in the Waterfowl Hunting Compatibility Determination (Appendix E).
- Ensure that one full-time or two collateral duty law enforcement officers are monitoring the hunt on each hunting day.
- Enforce maximum of 25 shells per hunter, non-toxic shot only.
- Thoroughly evaluate youth waterfowl hunting program after five years.
- Consider adding additional hunting areas if Refuge acquires additional land.
- Ensure reasonable accommodation is provided for disabled hunters.

Rationale for objective and strategies:
Some people have expressed interest in the Refuge hosting a waterfowl hunt and the National Wildlife Refuge System Improvement Act requires consideration of all priority public uses during the CCP process. Opportunities for waterfowl hunting at Turnbull NWR are quite limited for several reasons, including loss of habitat and the shift in the waterfowl migration to the west.

Within the upper reaches of the Channeled Scablands where the Refuge is located, fall waterfowl habitat is very limited as a result of extensive drainage of the large, historically permanent wetland sloughs in the

early 1900s. Over 70 percent of the wetlands in this area have been drained. The remaining fall habitat occurs on the Refuge and on several deepwater lakes in the vicinity of the Refuge. These off-Refuge lakes receive intense pressure from recreationists, primarily anglers, but also from a few waterfowl hunters where hunting is allowed.

As a result of the extensive drainage of fall migration habitat in the Refuge vicinity and extensive development of irrigation wasteways and agriculture in the central Columbia Basin, much of the fall waterfowl migration has shifted west of the Refuge. Increases in waterfowl use of the Refuge in the fall during above average precipitation years, however, indicate that restoration of fall migration habitat will likely increase waterfowl populations in this area.

Although nineteen percent of the Refuge is wetlands, many of these wetlands are dry by fall, because of their naturally shallow profiles. Those 800 acres that do still contain water at the onset of waterfowl hunting season are usually open less than one month before freezing. Opening the Refuge to a waterfowl hunt for the one month period before freeze-up would result in decreased use of this habitat by waterfowl. The Service believes, however, that a limited youth hunt, to occur on one weekend (usually in September) per year, can be accommodated and will help the Refuge facilitate hunting as a priority use, as required under the NWRSIA. The Refuge proposes land conservation as a key element of the CCP. These land conservation actions (see Appendix A) should result in a significant amount of additional wetland habitat protected and restored. If the Refuge can acquire or protect additional fall wetland habitat outside the current boundaries, opening additional acres to waterfowl hunting could be considered.

OBJECTIVE 7M. INITIATE A HIGH-QUALITY ELK HUNTING PROGRAM:

Initiate an annual, safe, high quality, walk-in, limited-entry elk hunting program as follows:

- High quality means: uncrowded conditions, with less than 2 people per square mile, and
- <10 percent of hunters report feeling crowded. In addition, at least 80 percent report satisfaction with their hunting experience.
- Walk-in means: vehicles are left in designated parking areas; there is walk- in/walk-out access only; and no motorized or equestrian retrieval is permitted.
- Safe means: no firearm related injuries or safety incidents and 98 percent of all hunters report feeling safe.

Strategies

- Manage annual hunt in cooperation with State. Publish Sport Hunting Plan and Federal Register Notice before first hunt season. Length of season, number of permits issued, and/or seasons offered will vary annually. Season recommendations will be based on an annual assessment of elk damage to Refuge aspen groves and will be developed each year together with Washington Department of Fish and Wildlife. All classes of hunter will be initially considered and the hunt could be targeted at one or more classes if implemented. Potential hunt areas will be separated from areas used by other recreational Refuge users. Special needs for hunters with disabilities will be considered and accommodated as reasonable. Ensure that law enforcement officers are monitoring the hunt on each hunting day.

- Implement user and administrative stipulations specified in the Elk Hunting Compatibility Determination (Appendix E).

- Thoroughly evaluate elk hunting program after five years.

- Consider adding additional hunting areas if Refuge acquires additional land.

Rationale for objective and strategies:
Some people have expressed interest in the Refuge hosting an elk hunt and the National Wildlife Refuge System Improvement Act requires consideration of all Refuge System priority public uses during the CCP process. For these reasons, as well as because elk browsing is causing damage to aspen habitats, the Service will open the Refuge to high-quality elk hunting under the CCP. The benefits of an annual, limited-entry hunt for elk include providing recreation, some population management of the elk sub-herd that uses the refuge, and reduced impacts by elk on aspen and associated shrubs. All of these benefits are consistent with the Refuge Vision and Goals. In addition, an annual limited entry hunt contributes to the Washington Department of Fish and Wildlife goal for the Hangman sub-herd of the Selkirk elk population, i.e. "Maintain elk numbers that are compatible with local agriculture and suburban expansion." The hunt level will be tied to aspen damage rather than population levels for four reasons: a) the relationship between aspen damage and elk use on Turnbull NWR has been documented by a recent study by Albrecht (2003); b) a specific population objective for the Hangman sub-herd has not been defined; c) the Refuge land area that could accommodate hunting is too small to make a major impact on the sub-herd populations through hunting alone (other tools for managing population tools can be used and are explored more fully in Objective 3E); and d) elk move off and on the Refuge easily and population counts are inherently subject to more variation and potentially inaccurate conclusions.

Hunting, along with other priority public uses of the Refuge System, will also be considered on any newly acquired lands. See also Objective 3E, which addresses other methods of limiting elk damage to aspen habitats.

OBJECTIVE 7N. EXPLORE TURKEY MANAGEMENT/HUNTING OPPORTUNITY:

Consider possibility of permitted turkey hunt depending on turkey population trends.

- Encourage research to investigate turkey ecology on Refuge.
- Initiate study to explore impact of turkey populations on non-natives.

Rationale for objective and strategies:
Anecdotal evidence suggests that the local turkey population is on the rise. Depending on the population trends and results of studies, the Refuge may be able to support a turkey hunt at some point in the future. Such a hunt would be designed primarily for population management of turkeys to prevent turkey populations from impacting other ground foragers such as sparrows, towhees, bluebirds, or solitaires.

OBJECTIVE 7O. PROTECT WILDLIFE AND HABITAT FROM INCOMPATIBLE PUBLIC USE:

Limit human disturbance and habitat degradation as much as possible. Keep off-trail use restricted.

Strategies

- Monitor use levels by activity and evaluate impacts of increased human uses on the Refuge. Using established visitor counting techniques, prepare seasonal activity estimates for visitors by type of use and location.
- Ensure public is aware that the Refuge is day use only and that dogs must be kept on a leash at all times.

- Prohibit the following non-wildlife dependent uses: snowmobiling, dog sledding, off-road vehicle use, concerts, camping, military training activities, orienteering, boating, animal/dog training or trials, swimming, collecting, ice-skating, team sports, sport training, pet abandonment or unauthorized introductions of wildlife. In addition, prohibit fishing (a wildlife-dependent use) as no suitable fishery exists on the Refuge.

- Discourage the following non-wildlife dependent uses: weddings, ash dispersal, and large public events not oriented towards wildlife education.

- Further investigate disturbance effects with on-site studies. Develop a protocol for monitoring impacts to habitats at EE sites.

Rationale for objective and strategies:
Laws and policy encourage wildlife-dependent recreation on National Wildlife Refuges, as long as the activities remain compatible with the Refuge purposes. There is a clear need to monitor both the degree and type of human activity on the Refuge as well as any effects this may currently or in the future have on wildlife. This data will be critical in the design of adaptive management strategies, if needed, to refine programs and minimize wildlife disturbances.

GOAL 8:	Encourage and support research and monitoring that substantially contributes to our understanding of the natural and cultural resources of the Channeled Scablands ecosystem.

OBJECTIVE 8A. ENCOURAGE APPLIED RESEARCH: Ensure ongoing, high quality, applied research on the Refuge that contributes to questions of particular refuge management interest as follows:

- Encourage the initiation of at least one graduate or senior-thesis level research project from the Refuge research needs list each year.
- Refuge staff shall review each proposal to ensure that permitted research projects minimize potential for cumulative impacts with other studies and activities; are compatible with refuge purposes; and have undergone peer review.
- Limit research activities outside the Turnbull Laboratory for Ecological Studies site to no more than six per year.

Strategies

- Collaborate annually with Eastern Washington University and other institutions.
- Prepare a summary of the Refuge proposal review process and distribute to key institutions and departments.
- Ensure that any research activity with the potential to impact listed species receives a Section 7 review under the Endangered Species Act.
- Seek additional funding from internal or external sources to support at least one quality, in-depth study per year.
- Update and share the Refuge research needs list annually.
- Implement user and administrative stipulations specified in the Research and Monitoring Compatibility Determination (Appendix E).

Rationale for objective and strategies:
Through the years, Turnbull Refuge and Eastern Washington University have enjoyed mutual benefits from a close association. The Refuge gains serious research which expands the biological knowledge base at the Refuge and enhances the professionalism of the biological program. The University gains a field site and a place for their laboratory. The Service wishes to continue this close association, under guidelines that will ensure research remains compatible and helps fill Refuge management data gaps.

OBJECTIVE 8B. MONITOR WILDLIFE AND HABITATS: Continue to monitor wildlife habitats and populations to validate and evaluate population responses to habitat management.

Strategies

- Continue to implement the Refuge Habitat Management Plan biological monitoring plan. Develop and implement an objective driven habitat monitoring program capable of evaluating the effectiveness of management strategies in achieving habitat objectives. Develop habitat monitoring procedures that measure conditions and variables identified in habitat objectives (see HMP Table 10).
- Develop and implement wildlife monitoring procedures to document population trends of key indicator species in order to evaluate the effectiveness of management strategies and the validity of habitat objectives.
- Continue participation in national monitoring programs for neotropical migratory landbirds, amphibians, marshbirds, and waterfowl.
- Hire additional permanent full time biologist.
- Hire two additional biological technicians to aid in monitoring work.
- Implement user and administrative stipulations specified in the Research and Monitoring Compatibility Determination (Appendix E).

Rationale for objective and strategies:
Monitoring data and information provides critical support to Refuge resource management and contributes to the Service's ability to modify management practices as needed. This is the cornerstone of adaptive management.

OBJECTIVE 8C. IMPLEMENT A PROACTIVE CULTURAL RESOURCES PROGRAM: Implement a proactive cultural resource management program that focuses on meeting the requirements of the National Historic Preservation Act, including consultation, identification, inventory, evaluation, protection, and monitoring of cultural resources.

Strategies

- Identify archaeological sites that coincide with existing and planned roads, facilities, public use areas, and habitat projects. Evaluate threatened and impacted sites for eligibility to the National Register of Historic Places. Prepare and implement activities to mitigate impacts to sites as necessary.
- Develop a GIS layer for cultural resources that can be used with other GIS layers for the Refuge, yet contains appropriate locks to protect sensitive information.
- Develop partnership with the Tribes for cultural resources inventory, evaluation, and project monitoring, consistent with cultural resource regulations.
- Develop relationships with educational institutions, historical societies, and other preservation partners for the inventory, evaluation, and monitoring of cultural resources at the Refuge.

Rationale for objective and strategies:
Various federal historic preservation laws and regulations require the Service to implement the kind of program described under this objective. Inattention to these responsibilities may obstruct the Refuge in its other land, habitat, and wildlife management efforts.

CHAPTER 3

Refuge and Resources Description

Downingia spp. Photograph by Bob Griffith.

3.1 PHYSICAL ENVIRONMENT

3.1.1 CLIMATE

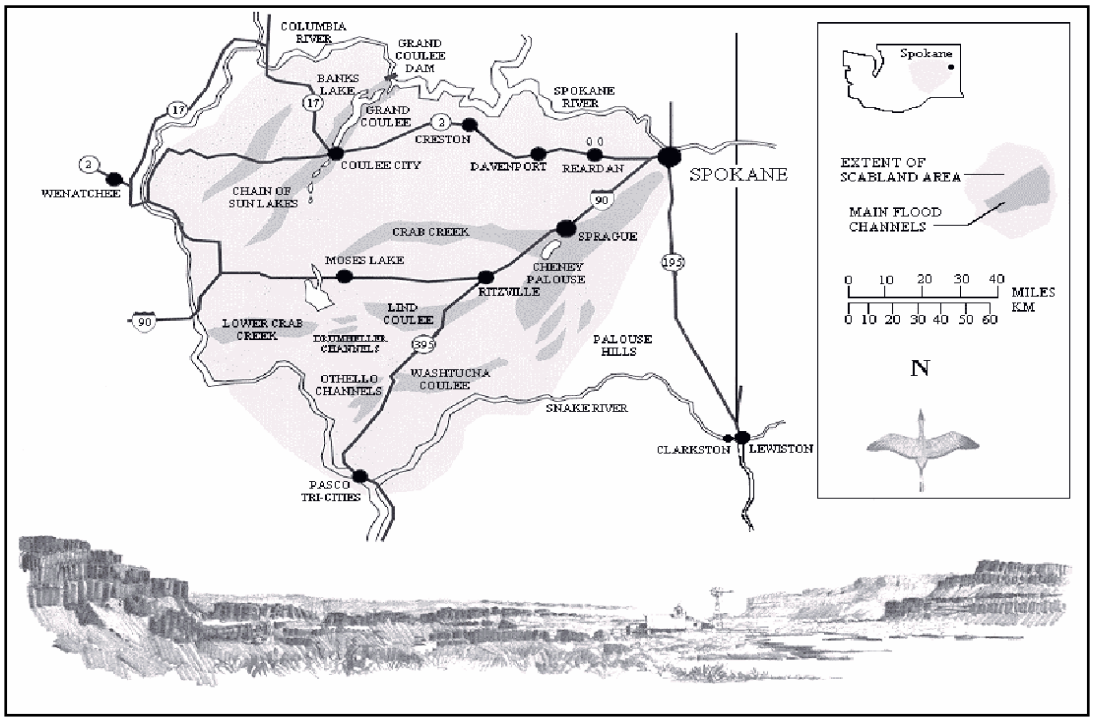
The climate at Turnbull Refuge is semi-arid with an average annual precipitation of 16.5 inches. The majority of precipitation falls as snow from November to February with a yearly average of 50 inches. Above average snow-years occur three out of every ten years. Drought periods are common. Summers are warm and dry with average daily highs above 80 degrees Fahrenheit. Winter months are cool with mean daily temperatures between 25 and 30 degrees Fahrenheit.

3.1.2 GEOLOGY AND SOILS

The Refuge is part of a much larger landform, called the Columbia Plateau. The Columbia Plateau is the result of numerous lava flows that spread over the area and hardened between 16 and 6 million years ago. These flows, originated as far east as Idaho, and flowed down broad valleys of the Columbia River Basin all the way to the coast. Over 200 flows piled up layer upon layer of lava to a total thickness measured in thousands of feet and covering an area of around 80,000 square miles (Baker 1978). The immense weight of the covering of basalt resulted in settling and tilting of the plateau from the northeast to the southwest.

During the two million years of the last ice age, periodic extensions and retreats of the continental ice sheet left exposed glacial outwash sediments on the plateau that were picked up by strong winds blowing off the expansive ice sheets. These dust-like particles were redeposited on the eastern side of the Columbia Plateau, covering the basalts to depths of up to 150 feet thick. This thick covering of loess became the rolling grass covered hills referred to as the Palouse Formation.

Figure 2. Location of Channeled Scablands formations in Eastern Washington State
(figure used with permission from Maurice Vial)



The Channeled Scablands formation extends over approximately 2,000 square miles on the Columbia Plateau (See Figure 2). The Scablands were formed in a series of dramatic events approximately 15,000 years ago at the end of the last great ice age. At that time, a lobe of the continental ice sheet dammed the Columbia River and drainage of the Clark Fork River creating three glacial lakes, two on the Columbia River and the other comprising ancient Lake Missoula on the Clark Fork which covered 2,900-square-miles of northwestern Montana (Allen et al. 1986). As the rising water of the lake lifted the ice dam terminus of Lake Missoula, the lake emptied resulting in catastrophic floods that scoured away the wind deposited soils of the Palouse Formation in large tracts exposing the underlying basalt. Numerous channels and depressions were eroded in the basalt. Subsequent deposition of glacial outwash sediments and ash from the eruption of the volcanoes of the Cascade Range resulted in the formation of a diverse complex of lakes, sloughs and ponds in the flood tracts. In contrast to the deep and more uniform soils of the Palouse Formation, the uplands of the flood tracts of the Channeled Scablands are a mosaic of exposed, fractured basalt, small mounds of deeper soils and swales comprised of shallow lithosols. This unique patterned is often referred to as biscuit and swale topography (Daubenmire 1970).

The soils of the Scabland uplands are primarily of the Hesseltine complex with the major portion mapped as Hesseltine very rocky complex, with 0 percent to 30 percent slopes (Donaldson and Giese 1968). This soil mapping unit includes from 25 percent to 50 percent basalt rock outcrops and unnamed very stony, very shallow soils in the swales. The mounds or biscuits are primarily Hesseltine silt loam with topsoil 16 inches deep underlain by coarse gravel and stones to a depth of 60 inches over basalt bedrock. Hesseltine soils are either covered by steppe grassland vegetation or forested.

3.1.3 HYDROLOGY (WATER QUANTITY, DISTRIBUTION, USE, RIGHTS, AND QUALITY)

Surface Watersheds/Drainage

The Refuge encompasses the upper portions of three watersheds: Hangman Creek, Rock Creek, and Cow Creek. The Hangman Creek watershed drains toward the northeast and the Spokane River. Both the Cow Creek and Rock Creek watersheds drain to the south and southeast into the Palouse River. Few natural drainages occur on the Refuge as a result of low relief and the topography created by Ice Age floods. Pine Creek, which originates on the eastside of the Refuge and flows into Rock Creek, is the only natural perennial stream course on the Refuge.

The diverse complex of lakes, sloughs and ponds, so prominent in the Channeled Scablands, were not uniformly valued by early settlers. The lakes and marshes were drained in an attempt to create or find land suitable for agricultural development, after the dry, rocky uplands proved too difficult to farm. Early settlers formed a drainage district, constructing numerous ditches which connected the previously separate lakes and wetlands. Between 1910 and 1912, all of the lakes in the area now encompassed by the Refuge (except Stubblefield Lake) were drained. Most of the large lakes and wetlands located within the Stewardship Area were also drained at the time. These drains and ditches form four separate drainage networks which traverse the Refuge vicinity. The four main networks, or subwatersheds, are Company, Philleo, Kaegle, and Phillips. Company contributes to the Cow Creek watershed; Philleo terminates at Philleo Lake and at Stubblefield Lake on the Refuge. Both Kaegle and Phillips drain into the Rock Creek watershed. Map 4 shows the location of ditches and the outlines of the four main drainage “sub-watersheds” or networks that extend from the surrounding private lands into the Refuge. Surface water recharge for 1,952 acres of Refuge wetlands now comes from local run-off within these subwatersheds (Table 3-1).

Wetlands

Alteration and Restoration: Pre-settlement, most surface waters in the Channeled Scablands were isolated in individual wetland basins. Some wetlands were briefly connected in spring during years of above average rainfall. Wetland depths were dictated by the basin's depth or the topographic low separating wetland basins from each other or from the natural drainages of the region. As previously discussed, many of the wetland basins in the Channeled Scablands area were connected to a manmade drainage system to provide additional acreage for farming. As a consequence, wetlands throughout the Channeled Scablands formation were drained.

In 1937, the Turnbull Refuge was established and restoration of the natural wetland habitats began. This was accomplished by plugging the drainage ditches in smaller wetlands and the building dikes and water control structures at outlets of larger sloughs and lakes. There are now 17 low dikes varying from 40 feet to 800 feet in width across the Refuge. There are also 22 water control structures used to manage water distribution and depth amongst the now connected wetlands and lakes.

There are few known water control structures within the Stewardship Area. Sixty percent of the wetlands within the Stewardship Area continue to be drained annually through the ditch network providing pasture for cattle. Historically, the wetlands represented larger more permanent wetland basins such as those on the Refuge. Map 5 shows the distribution of drained and undrained wetlands within the Refuge's vicinity.

Wetland Recharge: Because of the regional nature of the drainage system, surface water from several drained wetland basins on private land flow through a chain of Refuge wetlands to the south through the Rock Creek and Cow Creek drainages to the Palouse River. As a result, some Refuge wetlands receive supplemental water from these off-Refuge sources, and control structures allow limited management of water levels. Other wetlands that were drained occur at the "head" of a drainage system and do not receive supplemental water from other wetlands. The wetlands of the Refuge and the surrounding area receive water primarily from spring rains and snowmelt. Surface runoff is intermittent, localized, and generally ceases by late April. Wetlands not recharged by perennial surface water or groundwater sources begin to drawdown as a result of groundwater seepage and evapotranspiration beginning in May. Within the Stewardship Area, wetlands range in size from vernal pools less than 0.1 acres to large permanent wetlands over 400 acres in size. The average wetland density is 10 per square mile with nearly 16 percent of the landscape consisting of wetlands.

Groundwater

The groundwater system underlying scabland wetlands consists of three major formations in Miocene Basalts: a deep, confined aquifer (Grande Ronde Basalts), a shallow, unconfined aquifer (Wanapum Basalts), and a confining bed (Wanapum-Grande Ronde Interbed) comprised of fine sediments and clays that impede water movement between shallow and deep aquifers (Vaccaro 1999). Both Wanapum and Grande Round Basalts consist of numerous lava flows.

Table 3-1. *Regional; Subwatersheds Affecting Refuge Wetlands*

Drainage	Sub-Watershed Size Off-Refuge (acres)	Land Uses	Refuge Wetland Acres Affected
Company	4,397	Dairy, farming, livestock grazing, domestic	1,282
Kaegle	1,708	Livestock grazing, domestic, forestry	501
Phillips	6,973	Livestock grazing, domestic, forestry	120
Philleo	9,403	Dryland farming, livestock grazing	49

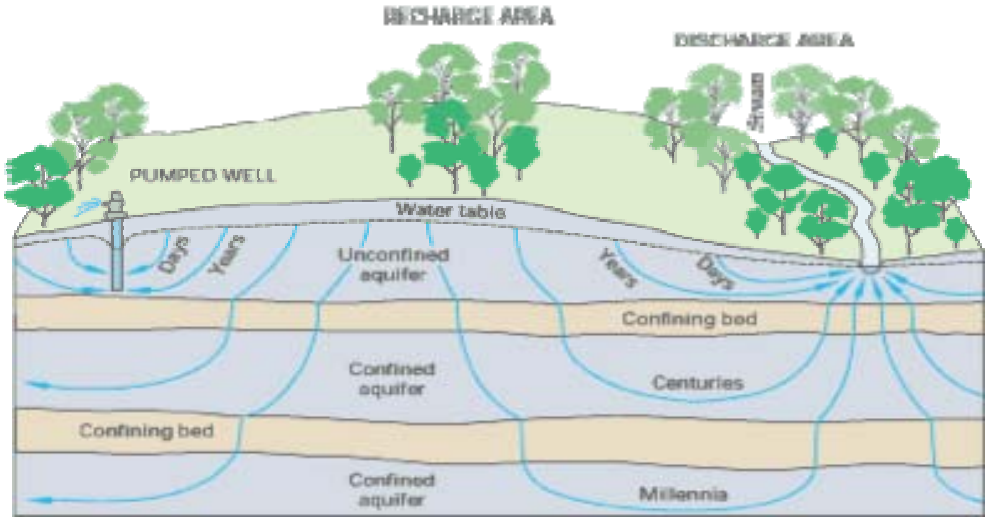
The major water conductance and storage portions of these aquifers are at the contact zone of individual flows, which consists of rubbly basalt, cinders, and ash (Luzier and Burt 1974). The centers of individual flows are very dense and relatively impervious to water movement except along vertical fracture lines. The result is numerous water bearing layers of rock that are increasingly confined with depth. Since the Wanapum Basalts occur near the surface and the upper layers are relatively unconfined, water levels in this aquifer in general constitute the local water table.

The major areas of recharge for these aquifers are along the northern and eastern edge of the Plateau including the Refuge area where outcrops of Wanapum basalts occur. Vertical recharge to the system is on the order of one to two inches per year (Vaccaro 1999).

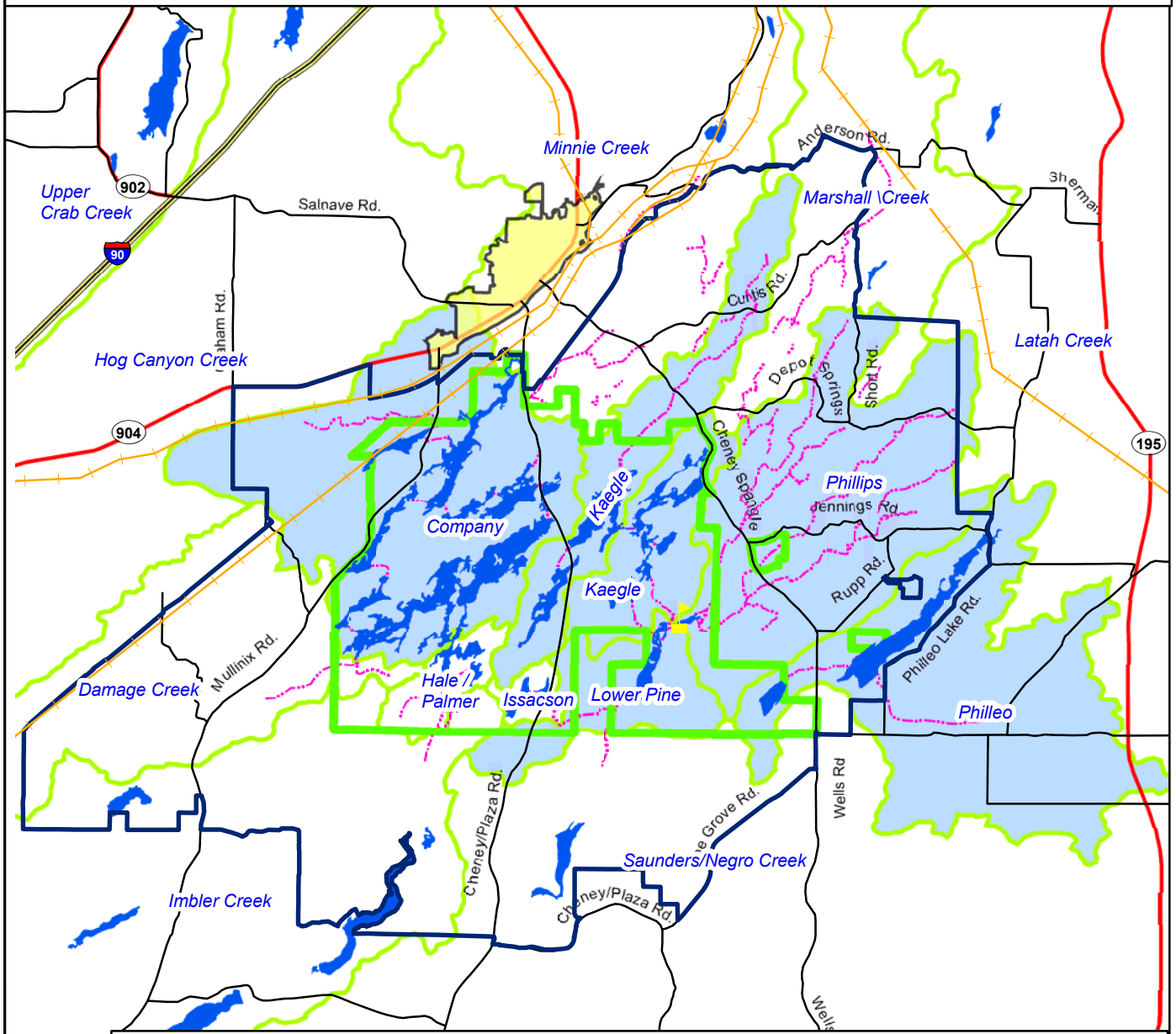
In the Refuge area, the basalt formations are relatively thin and highly variable as they pinch out near the edge of the plateau and amid ridges and humps of pre-Miocene granite. The Wanapum Basalts in this area range from less than one foot to 400 feet in thickness and the Grand Ronde Basalts range between 10 feet and 400 feet in thickness. The granite humps create a groundwater divide approximately two miles northeast of the Refuge (Luzier and Burt 1974). Southwest of the divide, groundwater flows slowly toward the Refuge and further southwest. Northeast of the divide, groundwater flows slowly toward the Refuge and further southwest. Northeast of the divide, groundwater flows toward Hangman Creek and Spokane River. The result of these conditions is a much lower groundwater storage capacity and a smaller area of potential recharge making this area vulnerable to groundwater depletion from overuse.

Most wetlands in the Channeled Scablands are directly influenced by groundwater as they are a surface expression of water levels in the underlying shallow, unconfined aquifer. The relationship of wetlands to groundwater depends on their topographic position. When wetlands occur near topographic highs, such as on ridges or the tops of buttes or plateaus, they tend to lose water to the shallow, unconfined aquifer and are

Figure 3. Graphical depiction of water flows between underground aquifers, recharge and discharge areas. *From Winter et al. 1988. Used by permission.*



Map 4. Surface Watersheds and Drainage Features with Influence on Refuge



Source: Surface watersheds - Aerial photo interpretation from U.S. Geological Survey 1:24,000 quad maps by Mike Rule, USFWS. Drainage ditches: derived from USGS quad maps and USGS orthophotos.
Map produced by: U.S. Fish and Wildlife Service, 16507 SW Roy Rogers Rd., Sherwood, OR 97140 (503) 590-6596

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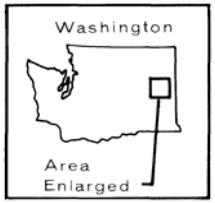


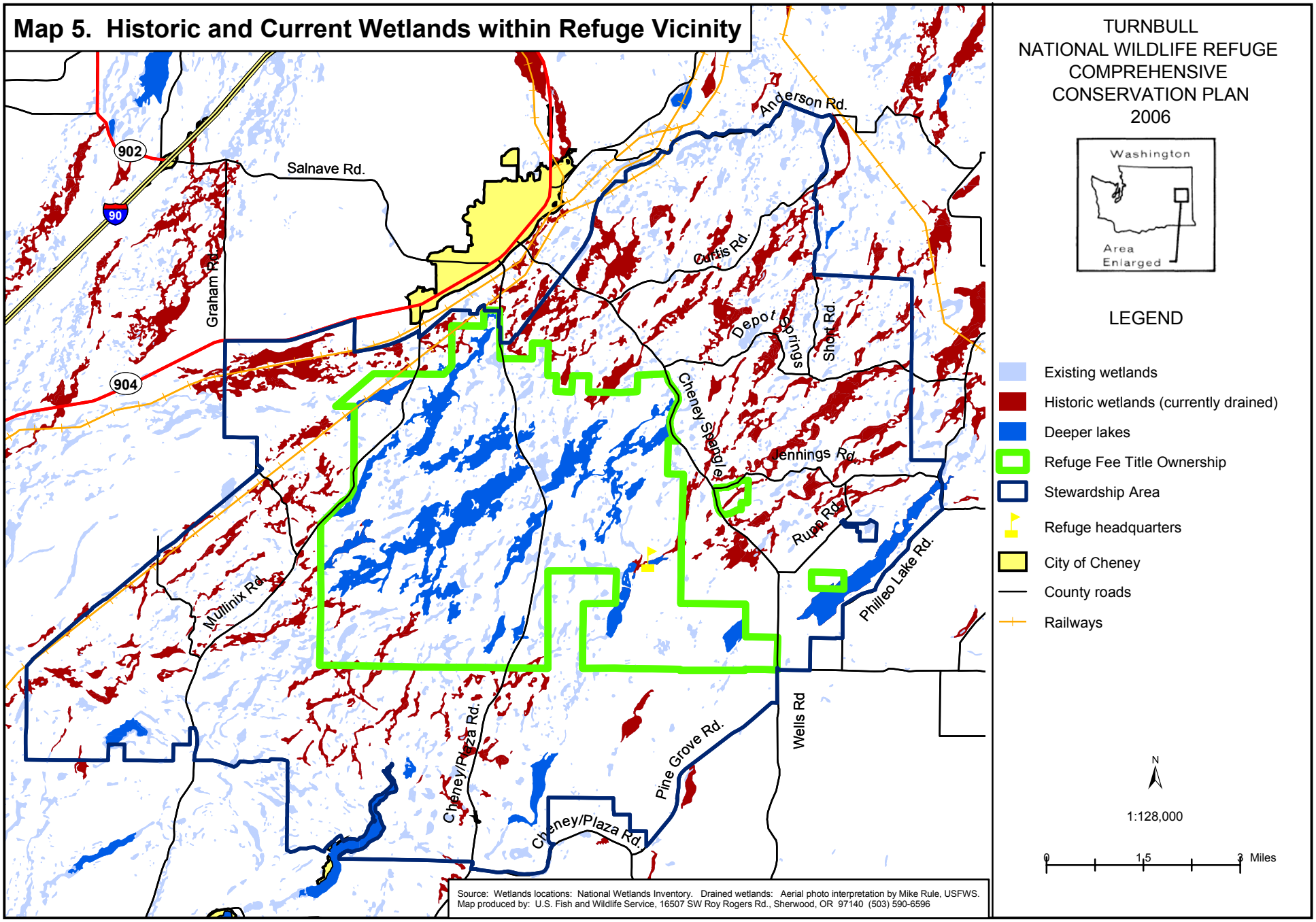
LEGEND

- Subwatersheds draining into Refuge wetlands
- Other subwatershed boundaries
- Drainage ditches
- Deeper lakes
- Refuge Fee Title Ownership
- Stewardship Area
- City of Cheney
- Refuge headquarters
- County roads
- Railways

N

1:150,000

0 2 4 Miles


Map 5. Historic and Current Wetlands within Refuge Vicinity
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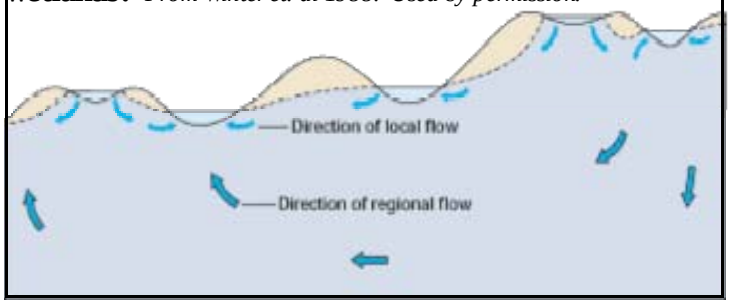
2006
Washington
Area
Enlarged
LEGEND
Existing wetlands
Historic wetlands (currently drained)
Deeper lakes
Refuge Fee Title Ownership
Stewardship Area
Refuge headquarters
City of Cheney
County roads
Railways
N
1:128,000
0
1.5
3 Miles
902
90
904
Salnave Rd.
Graham Rd.
Anderson Rd.
Curtis Rd.
Depot Springs
Short Rd.
Cheney Spangle
Jennings Rd.
Rupp Rd.
Phillco Lake Rd.
Mullinix Rd.
Cheney/Plaza Rd.
Pine Grove Rd.
Wells Rd
Source: Wetlands locations: National Wetlands Inventory. Drained wetlands: Aerial photo interpretation by Mike Rule, USFWS.
Map produced by: U.S. Fish and Wildlife Service, 16507 SW Roy Rogers Rd., Sherwood, OR 97140 (503) 590-6596

Figure 4. Relationship of groundwater flows to wetlands. *From Winter et. al 1988. Used by permission.*



often referred to as recharge wetlands. Wetlands or streams situated in regional lows generally receive inputs from groundwater and are called discharge wetlands. When wetlands are located at inter-mediate elevations, they can be both recharge and discharge wetlands (Winter et al. 1998).

When water levels decrease in the unconfined, shallow aquifer as a result of drought or pumping, the water table declines (Heath 1998). Groundwater recharge from wetlands will then increase and discharges to wetlands will decrease (Winter et al. 1998). The result is shallower, temporary wetlands more prone to drought. Marsh edge species, including introduced species such as reed canary grass, then encroach into the basin. This negatively affects the production of waterfowl and other waterbirds by decreasing the number of acres of open water and brood rearing habitat in summer.

Recent monitoring of groundwater and wetland water levels on the Refuge clearly demonstrated that wetland water levels are supported through the summer months by inflow from the shallow water table (Roland 2000). Based on the general direction of groundwater flow, the area that influences the Refuge's groundwater supply extends off the Refuge approximately one mile north and east, and one half mile south and west pumping within this zone could directly affect Refuge wetland levels.

Water Use and Water Rights

Groundwater: There are at least 200 wells located within one mile of the Refuge boundary (Map 6). Most of these are located northeast of the Refuge and are small domestic systems that do not trigger a permitting and review process for drilling or annual use. Most of these wells are removing water from the shallow Wanapum Basalts aquifer.

In addition to these numerous small domestic wells, the city of Cheney has recently added additional deep municipal wells that penetrate into the lower aquifer (Grande Ronde Basalts). Although this aquifer is confined primarily by the Wanapum-Grande Ronde Interbed, "vertical conductivity" (or passage of water between aquifer layers) does occur in the shallower Wanapum Basalts. To clarify, when drill holes penetrate the shallow aquifer to reach the deeper aquifer, water cascades from the shallow aquifer down to the lower aquifer. Major declines in the shallow Wanapum aquifer could have long-term impacts on the local water table. "Casing" the well can prevent water from cascading down the drill hole.

Most of the current and future domestic and industrial development in the area is reliant on groundwater withdrawals from the local shallow aquifer. The number of new wells and lack of regulations to curb groundwater "mining" pose a threat to the shallow aquifers in the area. Using the aquifer's water faster than its recharge rate will result in lowering the watertable.

> Groundwater pumping within one mile of the Refuge boundary has the potential to directly affect Refuge wetlands.

Surface water: The Service has claims on all major drainages flowing onto the Refuge but only five water rights have been adjudicated. Hence, the majority of the Refuge's water rights are still unadjudicated claims. The State of Washington has no immediate plans to complete the adjudication of claims in this area. It will likely be many decades before the Refuge has a final determination of its water rights. Although the Refuge's claims are valid water rights, which

allow for the diversion and use of water in the Refuge wetlands, the State's water rights process does not provide protection for unadjudicated water rights. Therefore, the existing surface water supply is neither protected nor reliable. This, coupled with an increasing population and the fact that most scientists agree that the global warming trend will continue and could cause a drying effect in this area, causes concern about maintaining and protecting the local surface water supply.

Landowners to the east of the Refuge have stated that they are unwilling to continue to maintain levees on Rock Creek. Disintegration of the levee system will cause Rock Creek to flood out of its banks and greatly reduce the water flow to Stubblefield Lake (a unique playa lake) on the Refuge. In addition, the Philleo Duck Club has a water right claim on Rock Creek. If adjudicated, this right could result in a water diversion to Philleo Lake and less water for Stubblefield Lake. The loss of an adequate water supply to Stubblefield Lake would lead to a significant loss of waterfowl and waterbird maintenance and production habitat.

Water Quality

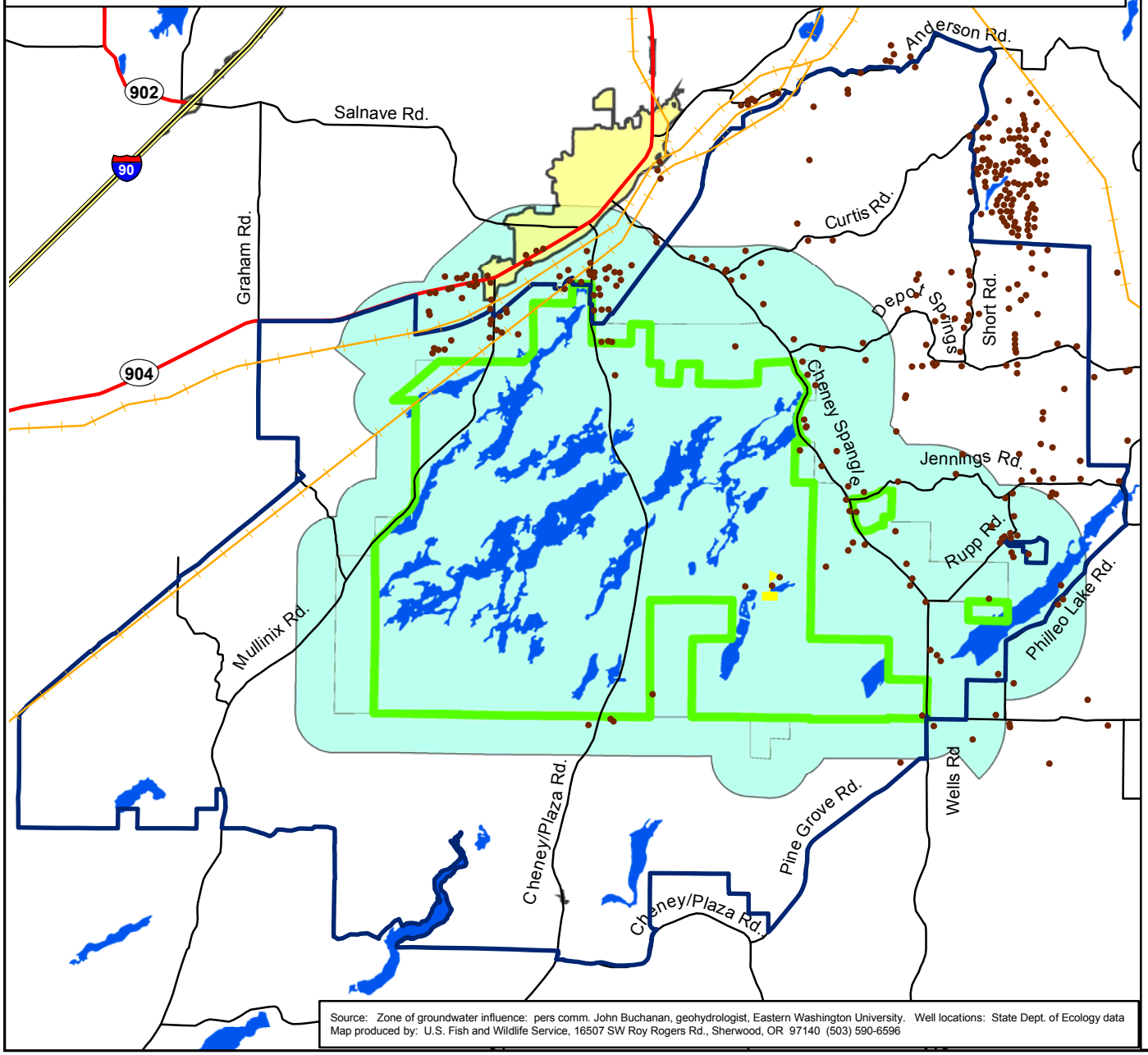
Until recently, little water quality information was available specific to the Refuge's watersheds. Over the past 30 years, bodies of water in the Pine Creek Drainage of the Refuge have consistently supported extensive mats of algae. Refuge records note several accounts of fish kills frequently attributed to oxygen depletion from large standing crops of respiring and decaying algae. The most recent die off occurred in 1987, caused by low dissolved oxygen concentrations coupled with high ammonia nitrogen, a toxic combination.

Negative effects from excessive algal production and associated changes in water quality are not limited to lethal effects on fish. Dense algal mats compete with submerged aquatic plant species for light and space resulting in decreased biomass and seed production. The roots, seeds and foliage of submerged aquatic plant species are important food resources for many waterfowl species and other wetland dependent wildlife. These plants are also an important substrate for aquatic invertebrate species that are the most important source of protein and fat for prefledging waterfowl. These dense mats of algae also prevent young waterfowl from physically accessing important foraging areas.

In response to this problem, a study was initiated in 1991, under contract with Eastern Washington University. The major goal of this study was to determine if nutrient loading from off-Refuge sources was significantly impacting Refuge waters, and if the enrichment was substantial enough to support excessive algal growth. The study looked specifically at two major drainages that enter the Refuge through private lands, the Kaegle System and the Phillips System, both of which contribute to the Pine Creek System. The study found that nutrient concentrations were higher in the Pine Creek drainage on the Refuge than off the Refuge, and that nutrient loads tended to increase as the flow proceeded through the Pine Creek wetlands. Nutrients were possibly contributed by other surface inflow, groundwater inflow, and/or sediment release from past nutrient inputs to wetlands. Conclusions on source were limited by the sampling scheme and the low runoff conditions that year. In the Kaegle Ditch System, nutrient levels were found to be higher just inside the Refuge boundary than in the upper part of the drainage. Livestock grazing practices and cattle feedlots off-Refuge appear to be responsible for the elevated levels

In 2002, a more extensive nutrient study was undertaken to determine if nutrient loads have changed significantly since 1991, evaluate the effectiveness of remediation actions taken in the Pine Creek System, and monitor other surface water inflows not studied in 1991. Preliminary results indicate that water entering the Refuge from both Company Ditch to the northwest and Philleo Ditch to the southeast are carrying total phosphorus and nitrogen concentrations several orders of magnitude higher than the mean concentrations in either the Phillips and Kaegle System or in Refuge wetlands with no inputs from private land. Company Ditch originates below a dairy and the Philleo Ditch redirects

Map 6. Groundwater Zone and Features with Influence on Refuge Wetlands



Source: Zone of groundwater influence: pers comm. John Buchanan, geohydrologist, Eastern Washington University. Well locations: State Dept. of Ecology data
Map produced by: U.S. Fish and Wildlife Service, 16507 SW Roy Rogers Rd., Sherwood, OR 97140 (503) 590-6596

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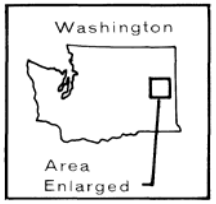


LEGEND

- Zone of groundwater influence on Refuge
- Wells **
- Deeper lakes
- Refuge Fee Title Ownership
- Stewardship Area
- Refuge headquarters
- City of Cheney
- County roads
- Railways

* * Wells are not mapped completely here. There are additional existing wells not shown.

N

1:128,000

0 1.25 2.5 Miles

Rock Creek whose watershed is dominated by dryland agriculture. Water entering the Refuge from the other two drainage systems, flows through a series of drained wetlands used for hay and pasture.

The proximity and growth of Spokane, Cheney, and other communities in the Spokane metropolitan area has the potential to affect the quality of both groundwater and surface run-off waters. Septic systems continue to be the primary method of domestic waste disposal in the area. Increased septic system loading increases the potential for non-point source pollution of groundwater that ultimately feeds Refuge wetlands.

3.1.4 AIR QUALITY

Air quality is a particularly sensitive issue within the region surrounding the Refuge. Portions of Spokane County have been designated as non-attainment areas for PM_{10} (particulate matter 10 microns or less in size) under the provisions of the Clean Air Act (Public Law 95-95). The Clean Air Act established "National Ambient Air Quality Standards" and allows the states primary jurisdiction in air quality management. Under the act, states are required to identify areas which have air pollutant levels not meeting national standards (non-attainment areas) and develop regulations and a state implementation plan to bring these areas into compliance. Significant sources of particulate matter in the region are silvicultural and agricultural field burning, dust from gravel and dirt roads, automobile emissions, windblown dust from tilled agricultural fields, smoke from wood burning stoves and fireplaces, and burning of yard waste.

3.1.5 CONTAMINANTS

There are no known sources of contaminants within the current Approved Refuge Boundary. Four sites have been identified in proximity to the Refuge that are potential sources of contamination. These include an auto-wrecking yard, a dairy, a heavy equipment training school, and an old crop-duster airstrip. Specifics are not known at this time. Contaminants associated with agricultural lands, old homesteads, and confined animal operations are likely present on some properties.

3.2 REFUGE AND STUDY AREA HABITATS

The Stewardship Area straddles the Northeast and Columbia Basin Ecoregions of Washington state, as defined by the Washington State Gap Analysis (Cassidy et al. 1997a). The Northeastern Corner Ecoregion is characterized by extensive areas of coniferous forests. The Columbia Basin Ecoregion consists primarily of steppe communities, large portions of which have been converted into agricultural fields.

3.2.1 HABITAT TYPES

Wetlands

As discussed in more detail above in the Hydrology section, approximately 7,110 acres of wetlands are located in the Stewardship Area. They range from tiny vernal pools to large permanent wetlands over 400 acres in size. There is a great diversity of plant species found in these wetlands, dictated by water depth and the length of time a portion of a wetland basin is flooded.

The Stewardship Area includes numerous historically permanent and semi-permanent wetlands that were drained in the 1920s and have subsequently been used for ranching. Since peat soils and a cold growing season create unfavorable conditions for farming, most of these former wetlands were farmed only a few years then converted to pasture. The larger basins have low spots where remnant wetland plant communities persist. Restoration could be easily and inexpensively accomplished by plugging drainage ditches and allowing natural basins to flood.

The potential of the Channeled Scablands vicinity to support wetland habitats and species is potentially very high. Figure 5 compares a 7.5 minute quadrangle (area = 32,345 acres) within the local vicinity of the Channeled Scablands

with a 7.5 minute quadrangle (same area) within the Prairie Pothole region in the north-central United States and Canada, an area renowned for its waterfowl. The analysis shows that the Channeled Scablands rival or exceed the Prairie Pothole Region for wetland depth, size, and abundance in almost every category. Additionally, the Channeled Scablands had a greater proportion of the land in wetland area. In areas such as the Refuge where the Refuge complex is still intact, duck breeding pair densities of several species is actually greater than in the Prairie Pothole region, which is globally known for its waterfowl production.

Vernal pools are a unique ephemeral wetland type located in the Palouse steppe portions of the Stewardship Area that warrant special consideration. Vernal pools occur in shallow depressions with a perched water table. Standing water is usually present for less than two months in most years. Because of the relatively short lived nature of these wetlands they are host to a unique plant (Bjork 1997) and animal community (Rabe 1997).

The small, semi-permanent wetlands of the Channeled Scablands also support the threatened plant species, water howellia (*Howellia aquatilis*). The Refuge and vicinity support one of the largest known metapopulations of this species within its range (Shelly and Gamon 1996). Although very little of its potential habitat has been surveyed in the Refuge vicinity, there are numerous wetlands that have the same attributes of the known occurrences within the Stewardship Area. Expanding the number of protected sub-populations would further conserve this meta-population.

The Refuge also falls within the suspected range of Ute ladies'-tresses (*Spiranthes diluvialis*), an orchid species federally listed as threatened. This species was discovered in Washington State for the first time in 1997. It is found in wetland and riparian areas generally below the lower margin of montane forest in transition, open shrub and grasslands zones. The species is found in early and mid-seral communities, usually in relatively open vegetation with sparse canopy in full sun to partial shade.

Ute ladies'-tresses has not been documented on the Refuge. Several plant surveys have been conducted on the Refuge since 1984 without documenting its presence. Hooded ladies'-tresses *(Spiranthes romanzoffiana*), a similar species, has been found on the Refuge. Suitable habitat may occur here, but is generally dominated by reed canarygrass. This invasive grass species forms a dense thatch layer that can prevent the germination and growth of herbaceous plant species such as Ute ladies'-tresses which appears to require early successional habitats. It is unlikely that it occurs on the Refuge.

Aspen/Deciduous Shrub Riparian Forests

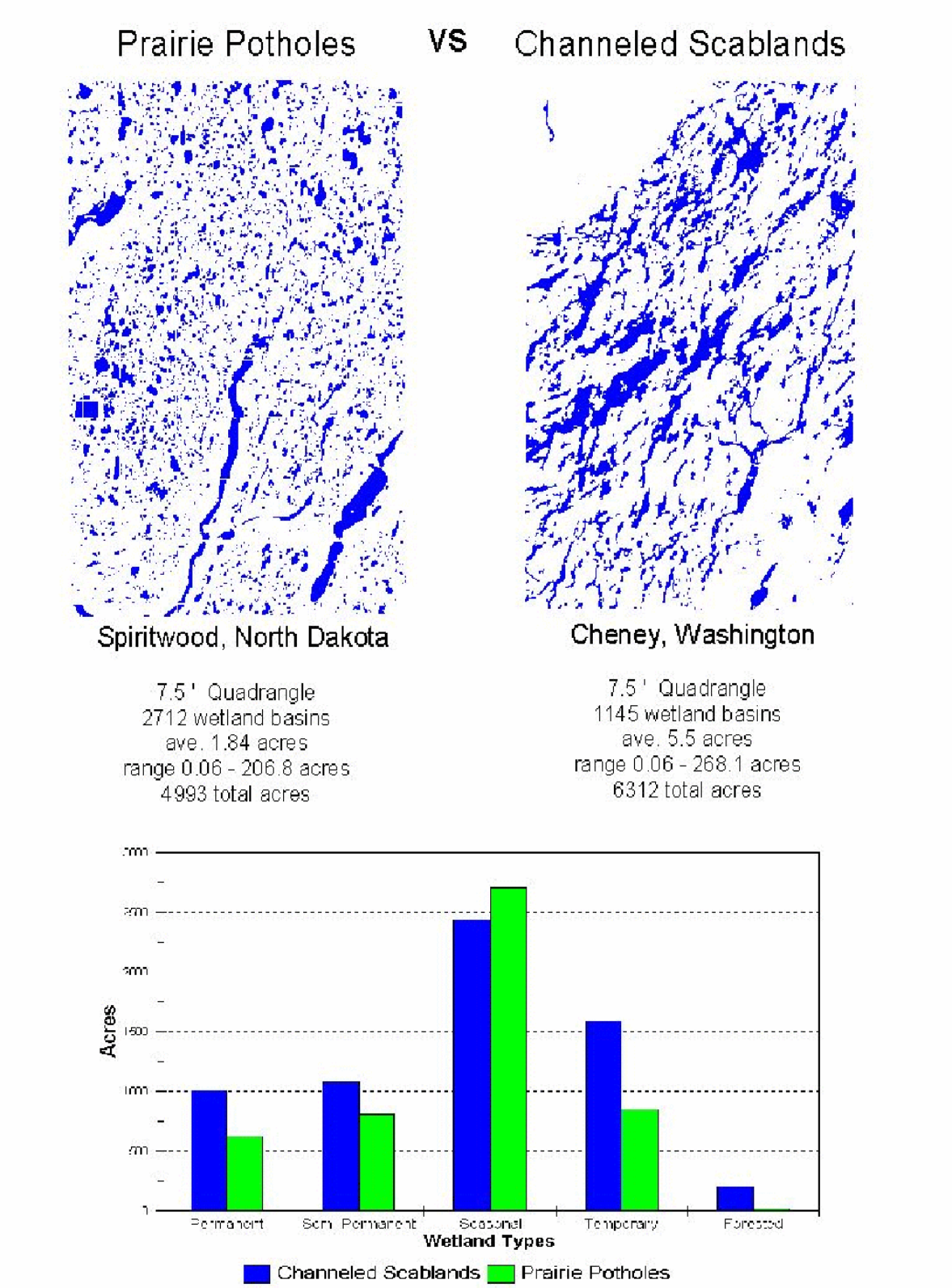
Approximately 380 acres of aspen forests occur within the Stewardship Area. Map 7 shows the distribution of aspen habitat within the Refuge vicinity.

Aspen communities, including waterbirch, alder, and hawthorn, occur mostly as narrow bands along the edge of meadows and large sloughs, and around the margins of pothole wetlands. Aspen dominated stands are a critical resource for wildlife species requiring both cavities and deciduous foliage in tree and shrub canopies for breeding and foraging.

This habitat has been significantly reduced in the Refuge vicinity by competition from encroaching ponderosa pine and the suppression of aspen and shrub regeneration by grazing livestock. In recent years, a growing Rocky Mountain elk population may have been contributing to this problem (see further discussion in Section 3.4). Many of the existing stands are dominated by over mature trees with little regeneration. In the past, periodic fire removed encroaching pines and encouraged regeneration of aspen and understory shrubs.

Small scale riparian restoration projects have been implemented such as the Centennial Riparian Restoration Project on Pine Creek and the Reeves Lake Riparian restoration project.

Figure 5. Comparison of Channeled Scablands Wetlands Density, Size, and Type with Prairie Potholes Region.



Grasslands (Steppe)

Approximately 11,955 acres of open grasslands (or areas that can be restored to open grasslands) occur within the Stewardship Area. Map 8 shows the location of current steppe habitat and former (historic) steppe habitat in the Refuge vicinity.

The open grassland habitats of the Stewardship Area fall into a broad category of plant associations referred to as Palouse steppe (also known as "meadow steppe"). Meadow steppe plant associations form a chain around the periphery of the Columbia Basin Ecoregion between areas of extensive forests to the north and east and the drier shrub-steppe areas of the lower Columbia Basin. These plant associations occur on two distinct landforms, the rolling Palouse Prairie hills, and the unique "biscuit and swale" patterned ground of the Channeled Scablands. The Idaho fescue/common snowberry *(Festuca idahoensis and Symphiocarpos albus* respectively*)* association is common to both landforms, and together with other plant associations found in the grasslands, can support a diverse community of native plant species including some that are endemic to the northern Columbia Basin. One of these species, Spalding's silene, is a federally listed threatened species. Several populations have been located on the Refuge and the surrounding area on remnants of high quality steppe.

Nearly 90 percent of the original Palouse Prairie steppe habitat has been converted to dryland farming (Cassidy et al. 1997a). The extent of this loss places this ecosystem on the list of critically endangered ecosystems in the United States (Noss et al. 1995). Most of the remnant Palouse Steppe is found in small fragments on north slopes too steep for plowing or within the "biscuit and swale" land form of the Channeled Scablands. The Stewardship Area includes approximately 1,000 acres of land with the potential to restore from farmed agricultural use back to functioning steppe habitat.

Although 54 percent of the remaining steppe habitat within the Stewardship Area is in good ecological condition, many acres have been impacted through partial conversion to agriculture, rural development, introduction of exotic species and heavy grazing. Reductions in livestock grazing, control of exotic species, restoration of farmed areas and minimizing further subdivision would greatly improve habitats for these species as well as protect rare vernal wetland habitat and the habitat of Spalding's silene.

Washington State completed its first GAP analysis in 1997. GAP analysis seeks to identify habitat types and species not adequately represented in the network of areas managed for biodiversity. Vegetation is used as the primary filter in GAP analysis, because vegetation patterns are determinants of overall biodiversity patterns (Levin, 1981; Noss 1990, Franklin 1993). Gap analysis assumes that most plant and animal species will be adequately represented if all vegetation types are adequately represented in biodiversity management areas.

According to the Washington Gap Analysis (Cassidy et al. 1997), "the most glaring gap in the protection of biodiversity in Washington is in the steppe zone." The Gap Analysis delineated each vegetation type in the state, determined the percentage of each vegetation zone under different land protection management and compiled the information into an overall Conservation Priority Index (CPI) to sift out the vegetation zones most lacking in protection. The Palouse Steppe rated highest of all vegetation types in Washington on the CPI index. The Gap Analysis authors stated:

> *With this CPI, the Palouse is ranked, by far, as the zone with the highest conservation priority because of the small percentage of its area on protected land, its near total conversion to agriculture, and its moderately large size. (Volume 5, p. 78)*
>
> *Because of the high CPI of the Palouse, lands in the Palouse zone should also be an acquisition priority. Since there are virtually no Palouse grasslands left to acquire, acquisition would have to be accomplished by restoration. The restoration of Palouse lands, if attempted, would be an excellent joint*

project between the Refuge and researchers interested in restoration.

Ponderosa Pine Forests

Approximately 20,090 acres of ponderosa pine forests occur within the Stewardship Area (Map 9). The shallow rocky soils of the flood channels provide an avenue for a narrow extension of the Ponderosa Pine Zone of the Northeast Corner Ecoregion into the steppe habitats of the Columbia Basin.

The two pine associations found in the Stewardship Area are ponderosa pine (*Pinus ponderosa*)/Idaho fescue and ponderosa pine/snowberry (Daubenmire 1952 and Franklin and Dyrness 1973). The distribution of these associations is influenced primarily by soil moisture regime.

The ponderosa pine/fescue occurs on drier sites with shallow rocky soils. These stands are often found on flat to gently sloping terrain and the low ridges between wetland drainages. The under-story is comprised of an abundance of other perennial grasses and perennial forbs including bluebunch wheatgrass, Sandberg's bluegrass, prairie junegrass *(Koeleria cristata),* arrowleaf balsamroot, grass widow *(Sisyrinchium inflatum),* deer vetch *(Lotus nevadensis),* and fringecup. Canopy cover is typically less than 50 percent.

The ponderosa pine/snowberry association is found mostly in shallow depressions, at the bottom of slopes near wetlands, and on the north aspects of basalt bluffs. Soils are deeper, less well drained and consist primarily of silt loams of the Hesseltine complex. The understory of this association can consist of a dense growth of common snow-berry, Wood's rose, bearberry *(Arctostaphylous uva-ursi*), and Oregon grape *(Berberis repens)* with a suppressed herbaceous layer consisting of bluebunch wheatgrass, several *Poa* species, pinegrass (*Calamagrostis rubescens*) and starry Solomon-plume (*Smilacina stellata*). In wetter sites, pinegrass can assume dominance of the herbaceous layer. Associated herbaceous species may include rhizomatous bluebunch wheatgrass, starry Solomon-plume, cinquefoil *(Potentilla gracilis),* and strawberry *(Fragaria vesca*). At the edge of wetlands and in deeper depressions, a tall deciduous shrub layer may occur, comprised of such species as *Spiraea sp.,* serviceberry *(Amelanchier alnifolia),* chokecherry *(Prunus virgiana),* golden currant *(Ribes cereum),* and Wood's rose. Quaking aspen, mountain alder (*Alnus incana),* and water birch *(Betula occidentalis)* may also be represented in the understory. Trees on these sites grow quickly and tend to be densely stocked due to the uniform nature of the soil and higher moisture conditions that reduces fire frequency. Canopy cover on these sites often exceeds 50 percent.

Within the Stewardship Area these associations are intermixed on uplands with both steppe and edaphic climax plant associations.

Although ponderosa pine is a widespread ecosystem, most large-diameter, late-seral ponderosa pine trees are now gone from their former range throughout the Western states, lost to timber harvest and changes in fire regimes. Timber harvest has severely affected these habitat types because of the high value of the trees and the fact that, located at lower elevations, these habitats have been more accessible than higher elevation types. Fire exclusion has also played a role in the loss of this habitat, as fire exclusion has resulted in a gradual shift in stand composition from shade-intolerant tree species such as ponderosa pine to shade-tolerant species such as Douglas-fir and grand fir.

Less than 4 percent of the ponderosa pine habitat within Washington State is included in lands where conservation of biodiversity is the primary objective (Cassidy et al. 1997). Species such as white-headed woodpecker, white-breasted nuthatch, pygmy nuthatch, and Lewis' woodpecker are strongly associated with large diameter ponderosa pine trees. Within the entire Interior Columbia River basin (an area covering most of the states of Oregon, Washington, and Idaho as well as a good quarter of Montana and portions of Nevada and Utah), "source habitats"

(habitats in good enough condition to provide for successful breeding) for these species have declined about 50 percent for the first three species and 85 percent for the Lewis' woodpecker (Wisdom et al. 2000). Within the basin, late-seral, large-diameter ponderosa pine habitats have declined 81 percent decline from historic levels (Hann et al. 1997; Wisdom et al, 2000). The magnitude of decline in historical vegetation structure and composition has been greater for this forest habitat type than for any other forest habitat types in the Interior Columbia Basin. As a consequence, the suite of species dependent on this cover and structural type is among those considered at highest risk within the Basin (Wisdom et al. 2000).

For more site-specific analysis, the authors of the Interior Columbia Basin Assessment divided the 145-million acre basins into smaller areas known as Ecological Reporting Units (ERUs). The Turnbull NWR and Stewardship Area straddle two ERUs, each show declines even greater than that seen basin-wide for the late-seral ponderosa pine cover type. In the Northern Glaciated Mountains ERU (17.6 million acres), which includes part of the north-east section of the Stewardship Area, late-seral, single layer ponderosa pine has declined from historic levels by 99.3 percent. In the Columbia Plateau ERU (24.3 million acres), where the rest of the Stewardship Area is located, late-seral, single layer ponderosa pine has declined from historic levels by 93.9 percent (Data from Hann, et al. 1997).

Within the Stewardship Area, only 40 percent of the ponderosa pine forest stands are considered high quality wildlife habitat. These high quality stands have a mature tree component, are contiguous with existing Refuge stands, and are relatively unfragmented. The remaining pine forests in the Stewardship Area have been degraded through logging and fire suppression. The results are over-stocked stands of suppressed second growth, at risk for loss by wildfire, insects and disease, which provide only marginal habitat for wildlife. Many of these lower quality stands have been fragmented by rural development, clearing for agriculture and road and fence construction.

3.2.2 MAJOR WILDLIFE VALUES

Based on the distribution of habitats within the Stewardship Area, Refuge information, and modeling performed by Washington State Gap Analysis (Grue et al. 1995), 7 amphibian species, 10 reptile, 45 mammal and 203 bird species are predicted to occur within the Stewardship Area. Among these species, several have special conservation status including federally listed, proposed and candidate species, State listed species, and others of management concern (Table 3-2).

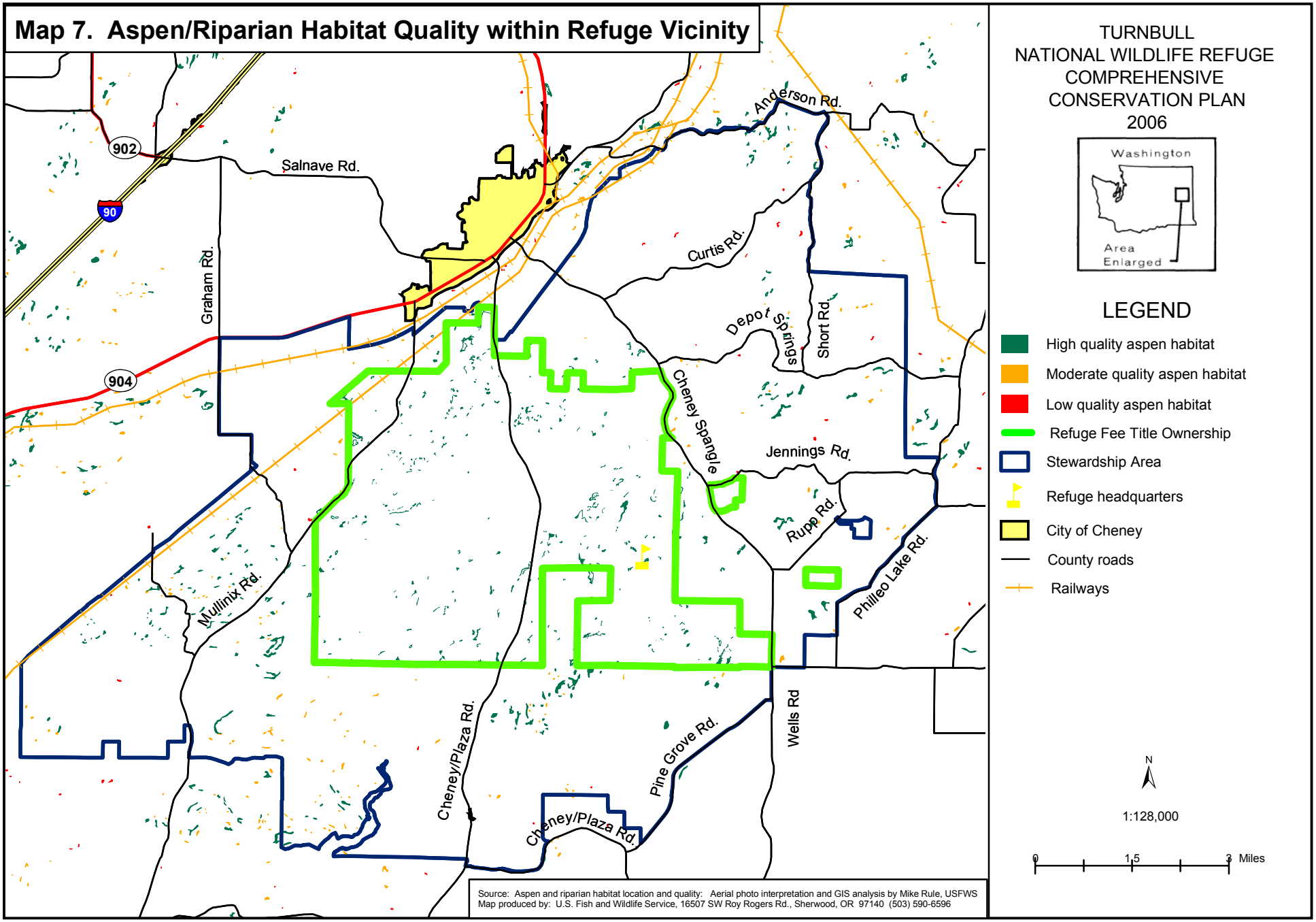
Wetland Wildlife

Located within the Pacific Flyway, the large, historically permanent wetland basins within the Stewardship Area are shallow flooded in the spring providing migration habitat for peak waterfowl populations of over 100,000 birds, principally mallards, northern pintail and American widgeon. In addition, as many as 2,000 tundra swans utilize the same wetlands in the spring. These concentrations of birds also attract bald eagles in moderate numbers. Numerous undrained wetlands currently provide breeding habitat for 17 waterfowl species, numerous marshbirds including sora, Virginia rails, American bittern, and black terns, yellow-headed black birds and Columbia spotted frogs.

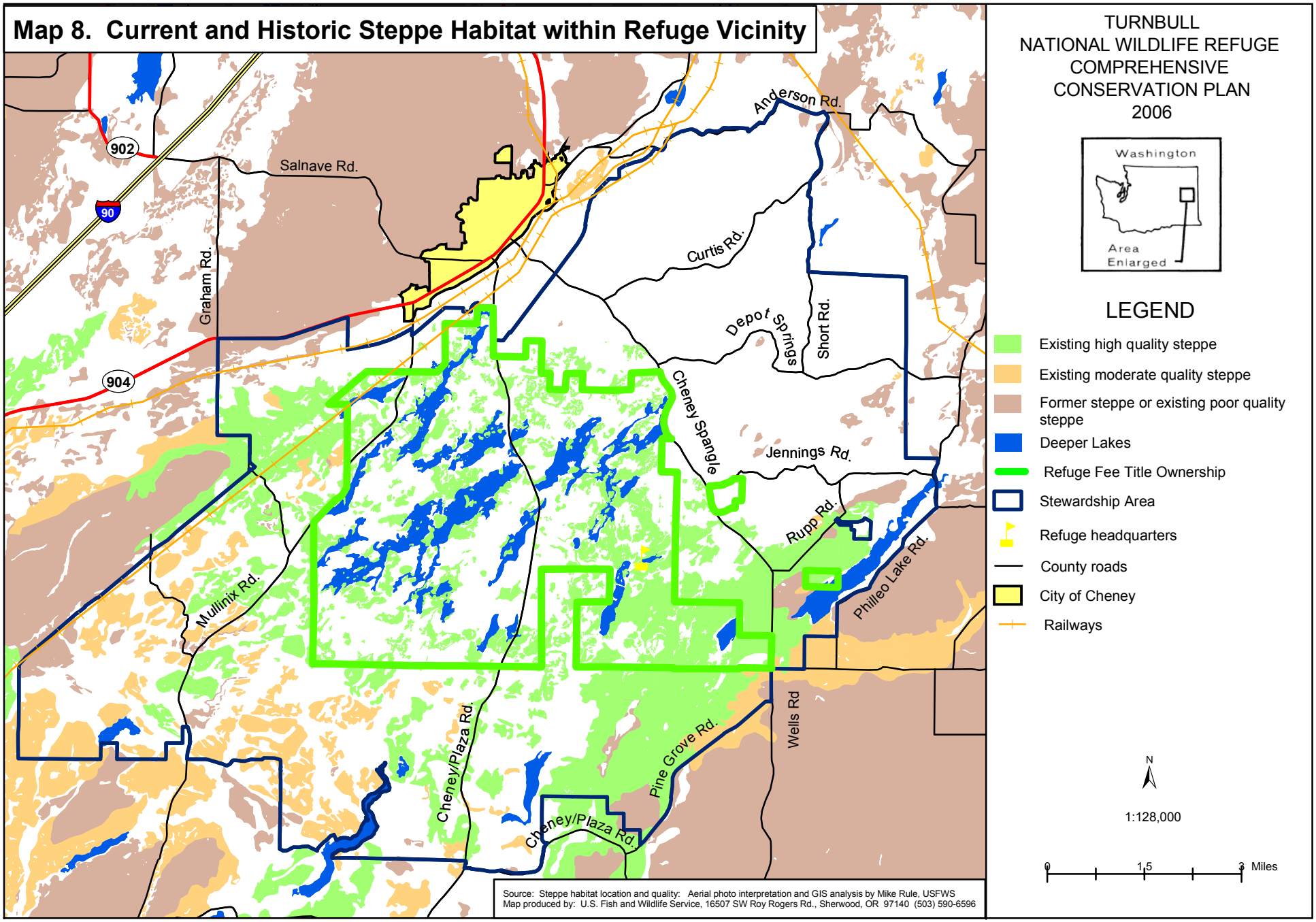
As these same wetlands naturally drawdown in late summer they also provide important shallow foraging habitat along their shorelines for up to 25 species of migrating shorebirds such as the western, least and Baird's sandpiper, greater and lesser yellow-legs, and long-billed dowitchers.

The few existing undrained large permanent wetlands found in the Stewardship Area provide important fall migration and wintering habitat for waterfowl and bald eagles until freeze up in late November. At the current time, fall waterfowl habitat within the Stewardship Area is very limited as a result of extensive drainage of the large, historically permanent wetland sloughs in the early 1900s. Over 70 percent of the wetlands in this area have been drained. The remaining fall habitat occurs on the Refuge and on Refuge and on several deepwater lakes in the

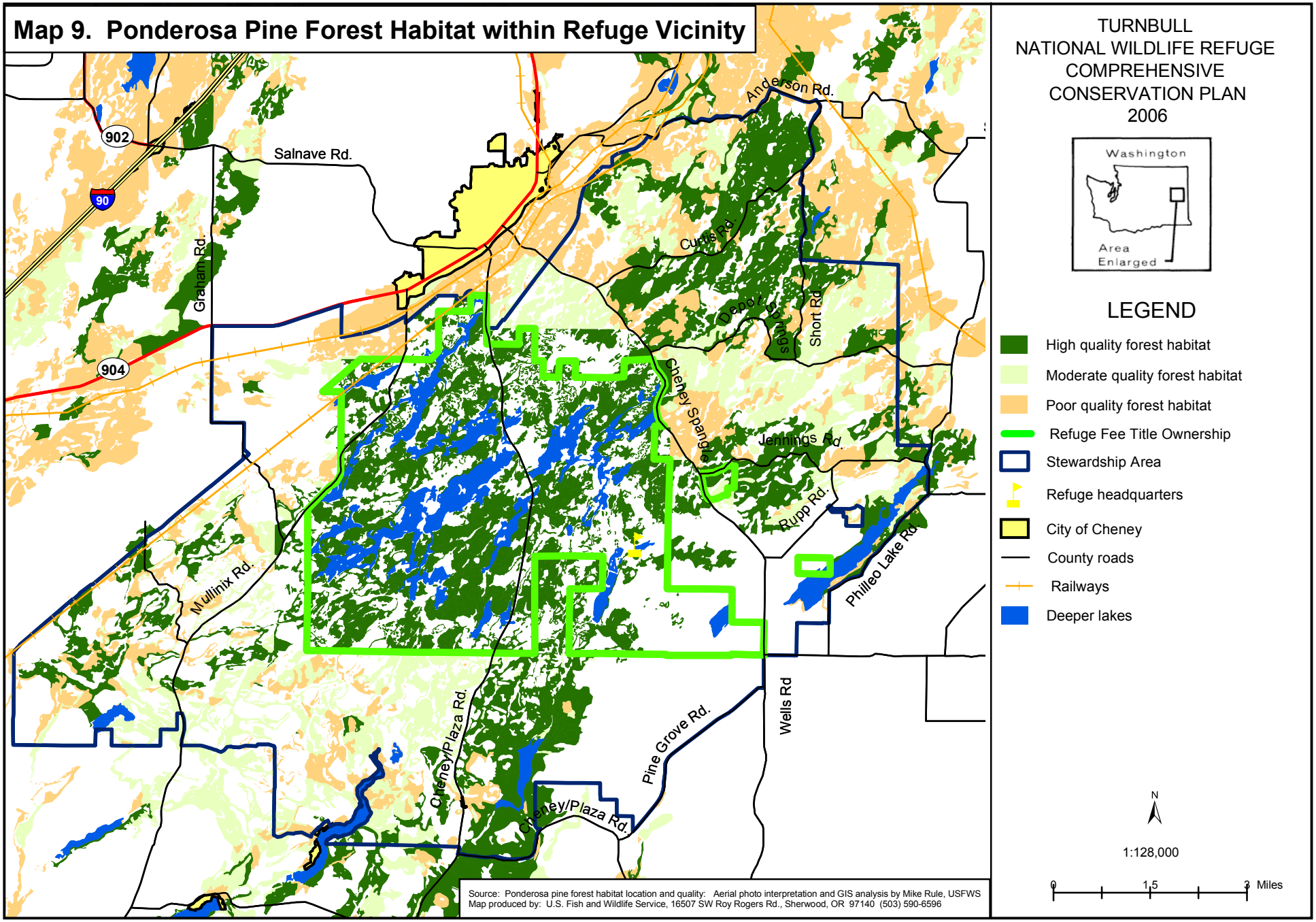
Map 7. Aspen/Riparian Habitat Quality within Refuge Vicinity



Map 8. Current and Historic Steppe Habitat within Refuge Vicinity



Map 9. Ponderosa Pine Forest Habitat within Refuge Vicinity



vicinity of the Refuge. As a result of the extensive drainage of fall migration habitat in the Refuge vicinity and extensive development of irrigation wasteways and agriculture in the central Columbia Basin, much of the fall waterfowl migration has shifted west of the Refuge. Increases in waterfowl use of the Refuge in the fall during above average precipitation years, however, indicate that restoration of fall migration habitat would likely increase waterfowl populations in this area.

Restoration of the large, drained wetland basins in the Stewardship Area would increase breeding habitat for all of the above-mentioned species especially redheads, lesser scaup, and black terns. These restored wetlands would significantly increase the amount of fall migratory waterfowl and shorebird and wintering bald eagle habitat that is currently limited in the area surrounding the Refuge.

Steppe Wildlife

The Palouse steppe habitat in the Stewardship Area has the potential to support substantial populations of several ground nesting passerines including the grasshopper, savannah and vesper sparrows. Many of these species are experiencing declining population trends regionally and have been identified as species of concern (Table 3.2).

These habitats also support large small mammal populations including the Columbia ground squirrel, Great Basin pocket mouse, vagrant shrew and northern pocket mouse. This abundant prey base supports a diverse community of predators consisting of several raptor species, coyotes, and badgers.

Aspen/Riparian Wildlife

Aspen and riparian habitats support the highest diversity of wildlife species of all habitats within the Stewardship Area. Sixty-five of the 124 breeding birds in this area frequent the aspen and deciduous shrub riparian plant communities for either reproduction or foraging. The aspen community type is the primary foraging and breeding habitat for ten of these species, including the willow flycatcher, yellow warbler and red-naped sapsucker (all neotropical migrants). The substantial insect populations associated with the high structural diversity and vegetation density in these habitats also makes them a focal point for many insectivorous species such as bats and neotropical migratory landbirds. Several species of bats, including the big brown bat, hoary bat, and silver-haired bat, utilize either aspen foliage or cavities in aspen trees and snags for roost.

The dense cover of aspen/riparian habitats also provides critical fawn rearing habitat for white-tailed deer and important winter browse for Rocky mountain elk and white-tailed deer.

Ponderosa Pine-dependent Wildlife

There are twenty eight species of wildlife that utilize the ponderosa pine forest in the Refuge vicinity as breeding and foraging habitat. Although most of the Stewardship Area's ponderosa pine forest stands have been heavily logged and now consist of dense unhealthy stands of small diameter trees, habitat exists for several tree canopy nesting birds such as the chipping sparrow and cavity using wildlife species, including several bat species of concern. The potential exists to restore these forest stands to more natural stand conditions supporting large diameter trees and snags that will provide improved habitat for such species as the western bluebird and the Lewis' woodpecker, a state candidate species.

Table 3-2. *Special Status Species that Likely Occur within the Stewardship Area (Including Plants).*

SPECIES	Stewardship Area USE
Federally Threatened ---- Total of 4 species	
• Bald eagle • Water howellia (*Howellia aquatilis*) • Ute's lady's tresses (*Spiranthes diluvialis)* • Spaulding's silene *(Silene spauldingii*)	transitory winter visitor small vernal wetlands wet meadow Palouse steppe endemic
Washington State Endangered ---- Total of 3 species	
• Sandhill crane • American white pelican • Upland sandpiper	Rare spring migrant Summer visitor on area lakes with fish Previously nested Stubblefield Lake area
Washington State Threatened ---- Total of 1 species	
Ferruginous hawk	Rare summer visitor
Washington State Candidate ---- Total of 6 species	
• Columbia sharp-tailed grouse • Townsend's big-eared bat • Northern goshawk • Lewis Woodpecker • Loggerhead shrike • Golden eagle	Extirpated Rare resident requiring caves or crevices Migrant and rare breeder Migrant and past breeder Rare fall visitor Summer visitor
North American Waterfowl Conservation Act Priority Waterfowl ---- Total of 7 species	
• Mallard • Pintail • Lesser scaup • Redhead • Wood duck • Canvasback • Ring-necked duck	Common breeder - marshes Common breeder - marshes Uncommon breeder - marshes Common breeder - marshes Breeder - marshes Breeder - marshes Breeder - marshes
Partners in Flight Priority Species * ---- Total of 30 species	
(Only five described here for brevity's sake) • Yellow-headed black bird (12) • Grasshopper sparrow (11) • Yellow warbler (11) • Eastern kingbird (9) • Chipping sparrow (9)	 Common breeder- marshes Uncommon breeder -steppe Uncommon breeder - riparian Common breeder- upland shrub Common breeder- open young forest
Region 1 Species of Management Concern * ---- Total of 10 species	
• American bittern • Black tern • Bewick's wren • Lark sparrow • Grasshopper sparrow • Lewis woodpecker • Short-eared owl • Loggerhead shrike • Olive-sided flycatcher • Ferruginous hawk	Common breeder Common breeder Uncommon breeder -riparian Uncommon breeder -steppe Uncommon breeder -steppe Migrant and past breeder Winter visitor Rare fall visitor Uncommon spring migrant/potential breeder Rare summer visitor

* PIF Priority Index from Andleman and Stock (1994); only species with ratings of 9 or higher shown here.
** R-1 list established in 1995.

3.3 LAND STEWARDSHIP OVERVIEW

The Refuge (15,656 acres or 24.5 square miles) comprises one of the only protected areas within the Channeled Scablands. The vicinity map (Map 1) in Chapter 1 shows the locations of publicly owned lands within Spokane County. Turnbull NWR, managed by the Service, is the only major land management agency in the area geared toward wildlife habitat protection.

3.3.1 CURRENT LAND USE WITHIN STEWARDSHIP AREA

Most parcels within the Stewardship Area are in private ownership, and as shown in Table 3-1 earlier in this chapter, are used for livestock grazing, dairy, farming, domestic, or forestry.

The majority of tax lots within the Stewardship Area measure over 80 acres in size, although some subdivided parcels are as small as six acres. There are about forty landowners owning 250 or more acres within the Stewardship Area; six landowners have holdings of 1,000 acres or more. Many of the property owners are aging or retired and there could be significant ownership turnover and subdividing in the near future.

Although the current land uses are predominantly rural, over the last ten years a number of tracts have been subdivided into parcels intended for residential use. To date, only some of these have actually been sold and houses constructed.

There are nine State land parcels within the Stewardship Area, totaling about 875 acres (management by Washington Department of Natural Resources [DNR]). Other than these scattered parcels, there are few public lands in the area.

Public lands containing Palouse Prairie steppe habitat are especially rare. Bureau of Land Management is the only other federal land manager within forty miles of the Refuge. Their six tracts to the southwest average about 3,500 acres each. The Idaho Panhandle National Forest is located nearly 50 miles east from the Refuge at its nearest point. Little Pend Oreille NWR is located 90 miles to the north.

The Refuge comprises one of the few protected areas within the Channeled Scablands.

Riverside and Mount Spokane State Parks are located 25 and 50 miles away, respectively. These parks, though sizeable, are geared primarily towards providing recreational opportunities to the local population, not at providing wildlife and habitat protection

3.3.2 COUNTY ZONING WITHIN THE STEWARDSHIP AREA

Spokane County recently completed its Comprehensive Plan (Spokane County, 2002). The plan maps important County resources, updates County zoning, establishes goals and policies for future County growth, and establishes patterns of acceptable land uses.

Turnbull National Wildlife Refuge and most of the surrounding Stewardship Area are located within the newly designated Rural Conservation zone, a zone that was developed from Spokane County's Critical Areas program and from the University of Washington study *Wildlife Corridors and Landscape Linkages: An Approach to Biodiversity Planning for Spokane County* (University of Washington, 1998). This category encourages low-impact uses, and has a maximum density of 1 dwelling unit per 20 acres. Bonus densities are allowable when clustering is employed. Clustering is a new technique aimed at minimizing population density and retaining rural character. Rural clustering encourages the grouping of home sites on areas of the site best suited for development, while retaining the remainder of the site for open space. Clustering is thought to result in a number of environmental benefits, including (for the same amount of housing constructed) fewer road miles, ability to use a community well, and greater security against wildfire.

Spokane County is predominantly rural, but the average population density of 237 persons per square mile far exceeds the state average of 88 persons per square mile.

The Spokane County Division of Long Range Planning projects an increase of 68,114 people in the unincorporated areas of the County, for a total of 265,158 people by the year 2020 (Spokane County, 2002). This represents a projected increase of 35 percent over current population.

County Designated Open Space

Most of the Stewardship Area is mapped as part of the County system of Open Space Corridors. The County establishes several goals around open space in its recent update of the Comprehensive Plan. One applicable here is:

> PO.5a *Preserve and protect existing and designated open space areas and corridors throughout Spokane County.*

County Designated Critical Natural Resources

The Stewardship Area encompasses most of the wetlands-rich areas in the County. The Stewardship Area is also largely mapped as moderately susceptible to contamination of aquifers. Most of the Stewardship Area is mapped as a Fish and Wildlife Conservation Area. More specifically, these conservation areas include those areas mapped by WDFW as Priority Habitats / Species areas and also includes all naturally occurring ponds under 20 acres. The County established several goals related to wetlands protection, groundwater protection, and fish and wildlife critical areas. One is reiterated here:

> NE.24: *Protect, maintain, and improve critical fish and wildlife habitat conservation areas and habitats of local importance through a variety of methods including public ownership of the most critical areas and incentives for privately owned lands.*

3.3.3 LAND PROTECTION ACTIVITIES WITHIN REFUGE VICINITY

Ecosystem Management Initiatives and Goals

A number of entities have expressed support for additional protection of biodiversity in Eastern Washington specifically for habitats specified in this CCP. A portion of Chapter 1 (1.8 Relationship to Regional Conservation Goals) outlines some of the more pertinent plans, initiatives, and policies important to consider for this area.

Governmental Programs for Land Protection

The federal and State governments maintain numerous programs managed through a variety different agencies to promote land and water conservation, habitat protection, and improvement of environmental quality. Some programs are directed at private landowners, while others are directed at municipalities, tribes, agencies, conservation districts, non-governmental organizations, or others. The various programs usually utilize some kind of grant or payment; technical assistance program; or cooperative agreement to accomplish program goals. Program objectives may be directed at management, restoration, acquisition, planning, or other aspect of natural resource management. These programs are too numerous to list and describe here, but as a start, information may be obtained from agencies like U.S. Natural Resources Conservation Service (http://www.nrcs.usda.gov/programs/) and the U.S. Fish and Wildlife Service's Private Stewardship Grants program (http://www.fws.gov/endangered/grants/private stewardship/indes.html).

In addition to the federal and state programs, Spokane County has developed a Conservation Futures Program. This program provides a means for the county to acquire lands and habitats important to the preservation of wildlife, or lands having significant recreational, social, scenic or aesthetic values. The legislature granted counties a local option of a tax, up to 6.25 cents per $1,000 of assessed valuation, to acquire open space.

3.3.4 PRIVATE AND PARTNERSHIP LAND PROTECTION INITIATIVES

A number of private organizations, many working in partnership with federal, state, and local agencies, are active within the local area to protect and restore habitats and open space for the future (in particular, see North American Wetland Conservation Act section below).

A variety of land protections tools are utilized in partnership efforts and also independently by land trusts. Some common mechanisms for protecting land include: outright acquisition, conservation easements, outright land donation, bargain sale of land, donation of undivided partial interests, donations of land by will, donation of remainder interest in land with reserved life estate, and restrictive covenant. Most of the tools result in income and estate tax reductions to the landowner. A number of these mechanisms allow a landowner to gain the benefit of income tax reductions while still occupying and using the land.

A conservation easement is a legal agreement between a private landowner and an organization. It allows landowners to pledge their land for conservation values, scenery, or open space while retaining title. The conservation easement specifies which activities can take place upon the land, as well as which activities are restricted. Allowed activities typically include farming, forestry, recreation, and limited construction. Restricted activities usually include development, subdivision, surface mining, dredging, and other actions that would damage the conservation values of the property.

Each conservation easement is tailored to meet specific needs and conservation purposes of the signatory parties. The easement stays with the property no matter who owns it, much like a road or utility easement. Future landowners are bound by the easement's terms. Landowners may receive cash for the value of the foregone development rights and/or tax credits.

North American Wetland Conservation Act (NAWCA)

Two NAWCA grants were awarded recently in the amount of nearly two million dollars for protection and restoration of wetland and riparian habitats in Spokane, Lincoln, and Adams Counties. These first two grants fund Phases 1 and 2 of a five phase project plan for the Intermountain West Joint Venture Channeled Scablands Focus Area (CSFA). Fourteen public and private organizations provided matching and in-kind funds in the amount of $3.2 million (Phase II) and $6.2 million (Phase I). The organizations include: Ducks Unlimited, Spokane County Parks and Recreation Department, Spokane County Conservation District, Bureau of Land Management, Natural Resources Conservation Service, U.S. Fish and Wildlife Service, The Nature Conservancy, Avista Corporation, U.S. Farm Services Agency, Washington Department of Fish and Wildlife, Inland Northwest Wildlife Council, Inland Northwest Land Trust, Friends of Turnbull NWR, and Spokane Audubon Society. Numerous private landowners are also partners in the project. The goals of Phase I and Phase II of the project are to acquire, restore and enhance over 15,000 acres of wetland, riparian, and adjacent upland habitat within the area covered by the CSFA Implementation Plan.

Inland Northwest Land Trust (INLT)

INLT is a local, non-profit, non-political organization with 300 members. According to this organization, 10,000 acres of open space are being lost each year in Spokane County. Primarily through donated conservation easements, the INLT has preserved over 4,000 acres of wetlands, shorelines, farmlands, and forests in eastern Washington and northern Idaho since 1994. The INLT ensures compliance with the terms of conservation easements by committing to regular monitoring and annual visits to the property.

The Nature Conservancy

The Nature Conservancy's mission is to preserve the plants, animals and natural communities that

represent the diversity of life on Earth by protecting the lands and waters they need to survive. Through a strategic, science-based planning process called Conservation by Design, TNC identifies the highest-priority places that, if conserved, promise to ensure biodiversity over the long term. TNC identified approximately 139 sites of conservation interest within their Columbia Plateau Ecoregional Assessment, including Turnbull NWR and the surrounding area (Soper 1999).

TNC works with all of the land protection tools mentioned above. Its acquisition program often works with the goal to transfer properties over to other land management agencies, rather than keeping all acquired properties under TNC ownership in perpetuity. Within the local area, TNC recently acquired two properties on the eastern boundary of the Refuge that the Service later purchased.

Trust for Public Land

Trust for Public Land is another national land conservancy but with a slightly broader mission than TNC. TPL is the only national nonprofit working exclusively to protect land for human enjoyment and well-being. TPL helps conserve land for recreation and spiritual nourishment and to improve the health and quality of life of American communities. Though most of its Washington activities have centered in the Western portions of the state, TPL has recently expressed interest in broadening its programs within the Spokane Area.

In the Northwest, TPL works with individual landowners through the Northwest Working Landscapes Program. Working landscapes include agriculture lands such as farms, ranches and orchards; forestlands and woodlots that are the sources of wood products; and estuaries, tidelands, lakes and rivers that support commercial fishing. These lands are valuable not only because of their economic impact and commodity production, but also for their benefits as undeveloped land for wildlife habitat, scenic open space, protecting water quality and acting as buffers to existing preserved land. By offering a variety of conservation solutions for critical farmland, forests and fish-bearing watersheds, TPL can give private landowners alternatives to development while protecting natural resources.

3.4 ELK MANAGEMENT

3.4.1 HISTORY OF ROCKY MOUNTAIN ELK IN REFUGE VICINITY

Although archaeological evidence suggest that elk may have once been fairly widespread in eastern Washington and were hunted by native Americans residing in the area, the earliest written records of Rocky Mountain elk in eastern Washington exist from the late 1800's for only the Okanogan, Blue Mountains, and Yakima areas. Elk, if historically present in the Refuge area and the forested portions of northeastern Washington, appear to have been eliminated by the time of settlement. Reintroductions in the early 1900's, however, resulted in expanding herds throughout much of the forested portions of eastern Washington. From these reintroductions and subsequent transplants, elk populations increased dramatically in the 40's, 50's and 60's. Rocky Mountain elk were first observed on the Refuge in the late 1950's. Although increasing numbers were observed on the Refuge and in most of southern Spokane County since their first appearance, dramatic increases did not occur until the early 1980's. By the late 1980's, the elk population in the Refuge vicinity was estimated at between 60 to 80 animals, based primarily on incidental observations. As the elk population grew in size so did interest in its management. In 1993, the elk of southern Spokane County were designated the Hangman Creek sub-herd by the Washington Department of Fish and Wildlife and managed as part of the Selkirk Herd of northeastern Washington.

3.4.2 RECENT ELK POPULATION ESTIMATES

The first aerial survey of this elk population was completed during the spring of 1993. The estimated population size was between 271 and 384 (95 percent confidence interval) with 60 elk

observed on the Refuge. Additional aerial surveys were conducted in 1994 and 1995. These surveys indicated a growing population with high productivity. During an aerial survey conducted by the State in 1997, 93 elk were observed on the Refuge and the estimated population for the sub-herd was between 115 and 219 animals (95 percent confidence interval). This population decrease for the entire sub-herd is likely the result of the any-bull strategy and offering either-sex and antlerless hunts with extended seasons for muzzle loaders and Advanced Hunter Education graduates. The most current survey data from 2004 found 254 elk on the Refuge, with an additional 100 elk in the vicinity, for a total estimated herd size of 354.

3.4.3 ELK ISSUES

Because this elk population is well established, three primary issues concerning this population have developed, including impacts to aspen-dominated habitats, damage to private lands, and recreational hunting opportunities.

Although aspen habitats occur in small amounts relative to other habitats on the Refuge, they are particularly important to a large portion of the wildlife on the Refuge, as previously discussed. Elk use and preference for aspen and other deciduous browse is well documented. Under high populations and limited habitat, elk browsing can have a significant negative impact on the regeneration of aspen. In areas of suburban development or intense hunting pressure, elk use of such places like Turnbull NWR - that provide both security cover and forage - increases. Increasing use of this security zone is evidenced by the increase in elk numbers observed on the Refuge from 1993 to 1997 (62 to 94) when the sub-herd population decreased.

Currently research is being conducted by the State and Eastern Washington University to determine the extent that the Refuge acts as a security zone for this sub-herd. Preliminary results indicate that radio-collared elk are utilizing the Refuge disproportionately to other areas. Over 90 percent of the relocations made during the day have been recorded on the Refuge. During the hunting season radio-collared elk seldom leave the Refuge during daylight hours.

This high elk use has resulted in heavy browsing of young aspen and other deciduous shrubs and trees on the Refuge, especially in recently burned areas. Whether this use is sustainable has yet to be determined. Research has been initiated to quantify the impact of elk on this habitat. The possibility exists that current elk use of Refuge aspen is having a significant negative impact on the structure and sustainability of this important habitat.

Although the Refuge is receiving the greatest proportion of elk use in this area, the Washington Department of Fish and Wildlife has received numerous complaints of elk damage to hay, other crops, fences, and ornamental shrubs within the Hangman Creek sub-herd’s range since the early 1990's. Since 1992, two claims have been paid by the State for elk damage to agricultural crops. Claims have declined since 1999 as a result of several landowners in the area leasing their lands for hunting.

Hunting and trapping were once popular activities in the area with settlers before the Refuge was established. In the 1930s when the Refuge was established the prevailing public view was that there should be no hunting at the Refuge. The original advocates for Refuge establishment included the Spokane Sportsman’s Association, who wanted a sanctuary where hunting would not be permitted. They hoped to create a place where wildlife could flourish and act as a source for adjacent hunted lands. Hunting was not then and has never since been permitted at the Refuge.

Some hunting advocates have expressed the desire to open the Refuge to elk hunting primarily to mitigate for some of the depredation that occurs occasionally on adjacent lands.

The Washington Department of Fish and Wildlife has openly advocated an elk hunt on the Refuge over the past 10 years primarily to help

alleviate problems with elk depredation on private lands around the Refuge. In the Washington State Selkirk Elk Herd Plan (Zender and Hickman 2001), one of the objectives for the Hangman Creek PMU which includes the Refuge is to "stabilize elk numbers at levels tolerable with landowners and suburban expansion." One of the strategies proposed to achieve this objective besides extended seasons and liberal either-sex recreational hunts in the area is to "encourage the Turnbull National Wildlife Refuge to consider a limited entry season for antlerless elk to address the increasing number of elk using the Refuge during hunting seasons."

Staff members from the State and the Refuge have met on several occasions during this time period to discuss the elk issue and options for population control. The Service position has been that a hunt on the Refuge could not be offered as an alternative without a better understanding of the ecology of this population and the impacts the herd is having on Refuge habitats. The State and the Refuge have cooperated on research to answer these questions. The State's desire for a Refuge hunt has not been as strong lately as a result of decreasing damage claims. Several landowners in the area have responded to elk damage by leasing their land for hunting to reduce damage and provide income.

3.5 REFUGE INFRASTRUCTURE AND ADMINISTRATIVE FACILITIES

3.5.1 ENTRANCES AND ROADS

There is one public entrance to the Refuge at Smith Road, off Cheney Plaza Highway, which accesses the Public Use Area. Other roads access the Refuge but none are public entrances.

The Refuge includes a network of paved, gravel and dirt roads totaling approximately 69 miles. Only the paved roads and the gravel-covered Auto Tour Route are open to the public. These roads are open year round, while the native surface roads are often closed during winter.

The interior road network serves as the backbone of fire breaks, as well as providing quick and efficient access for fire suppression activities. At one time, the Refuge maintained a peripheral fire break surrounding the Refuge, but this has not been maintained in fifteen years. The road network within the Stewardship Area also serves as the main fire break there.

Paved Roads

There are a total of 5.8 miles of paved roads within the Approved Refuge Boundary; however, all are maintained by the county. Cheney-Spangle Road runs northwest-southeast on the Refuge's eastern border; and Mullinix Road, runs north-south along the western border. Cheney-Plaza Road, running north-south, bisects the Refuge interior.

Primary Roads

The 5.5-mile auto tour route as well as the entrance road (Smith Road) are surfaced with gravel or a combination of gravel and native materials and are maintained by the Refuge. Two miles of entrance road and 5.5 miles of auto tour route were improved in October 2003. The gravel surface of both roads was brought up several inches, the auto tour route was widened and several pullouts installed along it for observation (and possible future interpretation sites). A small portion of the entrance road was paved. Culverts were replaced as well.

There are a total of 7 miles of gravel roads within the Public Use Area and these are also considered primary roads.

Dirt Roads

Single lane roads with mostly a native surface road bed comprise the remainder of the Refuge road inventory and are maintained by the Service. These roads access the more remote areas of the Refuge, and are closed except for administrative purposes. This category also includes fire roads and non-maintained roads

that are impassable to vehicles. A total of 56 miles of dirt roads are located within the Approved Refuge Boundary.

3.5.2 ADMINISTRATIVE FACILITIES

On the Refuge, existing administrative facilities have been developed over a long period beginning in the early 1940s. The Refuge headquarters covers approximately 30 acres adjacent to Pine Creek. Buildings at headquarters include one residence, two offices, a shop-service building, two equipment and supply storage pole barns, two vehicle storage buildings, a hazardous storage building, and two well houses. The headquarters also includes a rest station and environmental education building that includes a classroom and Friends of Turnbull book store, both built and maintained for the public.

Other buildings on the Refuge include a residence on the former Helm tract (property purchased by the Refuge in 1987) and a house, garage, barn and equipment shed located on the former Goodwin tract. The Helm's farmhouse (originally the Cosselman house) is currently being used as a bunk house for Refuge volunteers and seasonal employees. The house, shop, and garage on the Goodwin Tract is currently occupied or being used under a life-time use arrangement with the former owners. The other existing structures on the Goodwin Tract are vacant.

Drainage Network, Dikes, and Water Control Structures

Seventeen low dikes, varying from 40-800 feet in width, are located at lake and wetland outlets across the Refuge. There are also 22 water control structures used to manage water depth and distribution amongst the now connected wetlands and lakes.

Drains and ditches form 4 separate drainage networks that traverse the Stewardship Area. Map 4 shows the location of ditches and the outlines of the four main drainage "watersheds" or networks that extend from the surrounding area into the Refuge.

Five lakes in the Pine Creek Drainage (Windmill Pond, Headquarters Pond, Winslow Lake, Pine Lake and Cheever Lake) are not natural but were created through construction of a series of dams and dikes.

Turnbull Laboratory for Ecological Studies

In 1973, a laboratory owned and maintained by Eastern Washington University was constructed on Refuge lands. The Refuge co-manages the lab, known as the Turnbull Laboratory for Ecological Studies (TLES). The TLES facility is located on the northwest shore of Findley Lake in the northern part of the Refuge, approximately two miles south of Cheney on the Cheney Plaza Road. The lab is operated by the biology department at Eastern Washington University (EWU), and provides opportunities to EWU students for study and research in ecology and natural history. The facility is furnished with an analytical lab, a dry lab, a general to special purpose area, a library conference room and offices. The building also houses a display area for public education. The laboratory measures approximately 3,800 square feet.

3.6 PUBLIC USE FACILITIES, ACTIVITIES AND PROGRAMS

3.6.1 OVERVIEW

Currently, an estimated 30,000 visitors come to the Refuge to participate in the environmental education program, observe wildlife, hike or bike, enjoy nature, photograph wildlife in a natural setting, and cross-country ski. Visitation was also estimated at approximately 30,000 visitors in the mid-1970s. Total visitation estimates rose to as high as 50,000 in the early to mid 1980s. Some of the increase may have been due to a variety of non wildlife-dependent uses that were encouraged during those years. The fee station that was constructed in 1987 established an entry fee of $2.00 per vehicle (increased to $3.00/vehicle in the late 1990s) and Refuge staff believe that visitation dropped slightly as a result of the new fee.

3.6.2 VISITOR USE PATTERNS

Visitor Origin

In 1999, the Friends of Turnbull Refuge and Refuge staff conducted a visitor survey to identify visitor use patterns, preferences, and needs. A total of 531 surveys were administered at nine different locations in Spokane County. The results of the surveys were analyzed by EDAW, Inc., a private consulting firm.

According to the survey results, 95 percent of the non-school group visitors to the Refuge were from Spokane County. This high percentage emphasizes the importance of the Refuge as a recreation and education resource for residents of the greater Spokane area and county.
As a validation, visitor use data was analyzed from eight months of entrance fee envelopes, March, 1995 through October, 2000 (n=13,383 fee envelopes). School groups do not fill out these envelopes, so this analysis helped to deduce visitor origin for the non-EE activities available at Turnbull. The data showed that an average of 46 percent of visitors using the Refuge came from the city of Spokane, while 16 percent came from the nearby city of Cheney.

Seventy percent of the visitors were from Spokane County, and an additional 10 percent of all visitors came from other parts of eastern Washington. Seven percent came from western Washington, and 13 percent came from outside the state of Washington. In summary, this data shows that the majority of non-school group visitors are local and a small but significant percentage comes from outside the local area to enjoy Turnbull's amenities.

3.6.3 PUBLIC FACILITIES

Amenities available to visitors include approximately nineteen scenic overlooks (viewpoints) supported by vehicle pulloffs or parking areas (some of these constructed during 2003), four environmental education sites and an environmental education classroom, several short hiking trails, a disabled-accessible boardwalk, and one long cross-state trail (Columbia Plateau Trail) that passes through the Refuge. Four interpretive sites and four benches are located on the Refuge portion of the Columbia Plateau Trail. Five interpretive panels are installed on the Blackhorse Boardwalk. A photo/observation blind is located on Pine Lake. A 5.5-mile long self-guided Auto Tour Route winds through pine forest, past lakes and basalt rock outcrops and is open year-round. Except for the Columbia Plateau Trail, all visitor facilities are located within the Public Use Area, a 2,200-acre area in the southeastern portion of the Refuge. The public is not allowed access to the other areas of the Refuge except by special permit. The Public Use Area comprises approximately 14 percent of the total 15,656 Refuge owned acres. See Map 10 for details of facilities within the Public Use Area.

Viewpoint - any area that has been designed specifically for the wildlife viewer in mind and includes areas with pulloffs, panels, blinds or "short" access trails (less than 1/10 mile).

The Refuge Environmental Education Classroom is maintained for hosting onsite activities for schools and organized groups of all ages. The classroom contains numerous animal mounts and skins, live specimens, track casts, preserved aquatic invertebrates, pressed plants, a landscape mural, and other natural history specimens. Through the assistance of over 100 volunteers and a fiscal year 2000 challenge grant, the building's interior was completely renovated during the winter of 2000-2001. In this remodeling, a corner of the building was designated for the Refuge's Friends group who opened a small store specializing in nature books, T-shirts and sweatshirts, and other articles. Profits from this store, which is staffed entirely with volunteers, go directly toward the Refuge's Environmental Education Program.

An accessible public restroom (located a quarter mile west of the headquarters) and four vault toilets are located within the Public Use Area and maintained for the visiting public. Another

vault toilet is located along the Columbia Plateau Trail, near Ballinger Lakes.

Funds are being sought for design and construction of an information kiosk that will be placed near the public restrooms at the start of the Auto Tour Route.

The Refuge maintains a fee station near the public entrance on Smith Road. Visitors pay $3 per car per day.

Trails

Table 3-3 displays the current trails located on the Refuge, together with the kind of surface, use, and length, in miles, of each trail.

Native Surface Trails: The Refuge Public Use Area has an estimated 7.7 miles of trail, some of which originated as maintenance roads. Most are short trails that terminate at a wetland. The Pine Lake Trail follows segments of shoreline along Winslow Pool and Pine Lake, meandering through ponderosa pine forest before looping back to wetlands again. This old service road has been converted to an asphalt surfaced accessible trail. The Bluebird Trail follows an old road along the eastern boundary of the Public Use Area and intersects the auto tour route near Kepple Lake.

The Headquarters Trail begins at Refuge Headquarters and follows the chain of Pine Creek wetlands south to Cheever Lake, ending at a riparian area below the lake. The Bluebird Trail and the Headquarters Trail both double as service roads and need to be graded annually. In addition, each of the EE sites on the auto tour route have a short loop trail (half a mile to three-quarters of a mile long) winding through wetland, grassland, forest, and riparian habitats. Volunteer groups are recruited to replace the bark on the EE trails every two years on a rotational basis. This ensures that the trails remain in good condition.

Disabled persons access trail at Blackhorse Lake: The Blackhorse Lake boardwalk (0.2 miles) was built in 1989 and was designed to provide access to persons in wheelchairs. The structure is in need of major reworking to comply with new Americans with Disabilities Act (ADA) guidelines.

Columbia Plateau Trail: In May, 2000, a new trail was opened for public use in the western portion of the Refuge. The Columbia Plateau Trail (CPT) encompasses 130 miles of an abandoned railroad right-of-way extending from East Pasco to Fish Lake near Cheney, and passes through the Refuge. Currently, 23 miles of the trail between Lincoln County and Cheney are developed and open to the public. A connection to the city of Spokane is under development.

A Cooperative Agreement was signed on January 25, 1995, between the Washington State Parks and Recreation Commission (WSPRC) and the Service. This agreement addresses the 4.75 mile section of the abandoned railroad bed that intersects the western portion of the Refuge. Under the agreement, the Service will co-manage the trail through the Refuge portion in the same manner as it manages its Public Use Area, complying with existing rules and regulations pertaining to access and use. A notable exception to the Refuge regulations is that horseback riding is allowed on the section of the Columbia Plateau Trail traversing the Refuge. In addition to authorizing the Service to co-manage the public use section of trail and provide fire management presuppression and suppression activities, the WSPRC will assist the Service with law enforcement, noxious weed control, and maintaining the boundary fence on either side of the trail. The Refuge monitors use on the trail segment that crosses the Refuge.

Visitors may enter the Refuge portion of the trail from Cheney Spangle Road to the north or from Amber Lake to the south; these access points are not on the Refuge. The trail is developed for hiking, riding bicycles, or horses. Visitors using the trail are not required to pay a fee when crossing the Refuge, however, they pay a $5.00 parking fee at the State managed parking lot.

This new trail creates opportunities for new recreation and environmental education, as well as concerns about potential trail user impacts on adjoining wildlife and habitat. The Columbia

Plateau Trail crosses a segment of the Refuge that was closed to public use for over 60 years. A portion of the trail parallels Long Lake, a noted waterfowl production area. Disturbance of nesting waterfowl and other species is a concern.

There are four Service roads maintained for management access that cross the trail. Trespass has been noted at these sites. It is expected that the new trail will eventually become a popular destination for as many as 500,000 visitors each year over its entire length (pers. comm., Fraser, 1999), and the WSPRC expects approximately 20,000 visitors/year to pass through the Refuge portion each year. The trail has been open for approximately five years now. In 2003, the Refuge installed a traffic counter to provide usage estimates. During a five month period (March 23-August 30), 3,575 passages past the traffic counter were recorded. At least some of these included return visits.
Expected increased publicity about the trail will expose many more visitors to the Refuge in the future. To take advantage of this recreation and education opportunity, and to better manage potential user impacts, the USFWS and WSPRC have installed interpretation and education signs along the trail segment through the Refuge. This interpretation will help increase public awareness of this sensitive area and its fragile resources. Trail linkages between the CPT and the auto tour route may also be a consideration to further enhance the visitor experience.

Americans with Disabilities Act (ADA) Compliance

The 2000 U.S. Census found that 19 percent of Americans have disabilities. Approximately half of this number have physical mobility issues (http://www.census.gov/Press-Release/www/2002/cb02ff11.html. This number is expected to increase in the future with the aging of the U.S. population.

The Access Board, a federal agency that provides specific accessibility guidelines for buildings, facilities, recreation sites, and transportation devices that comply with the Americans with Disabilities Act can be found at http://www.access-board.gov/.

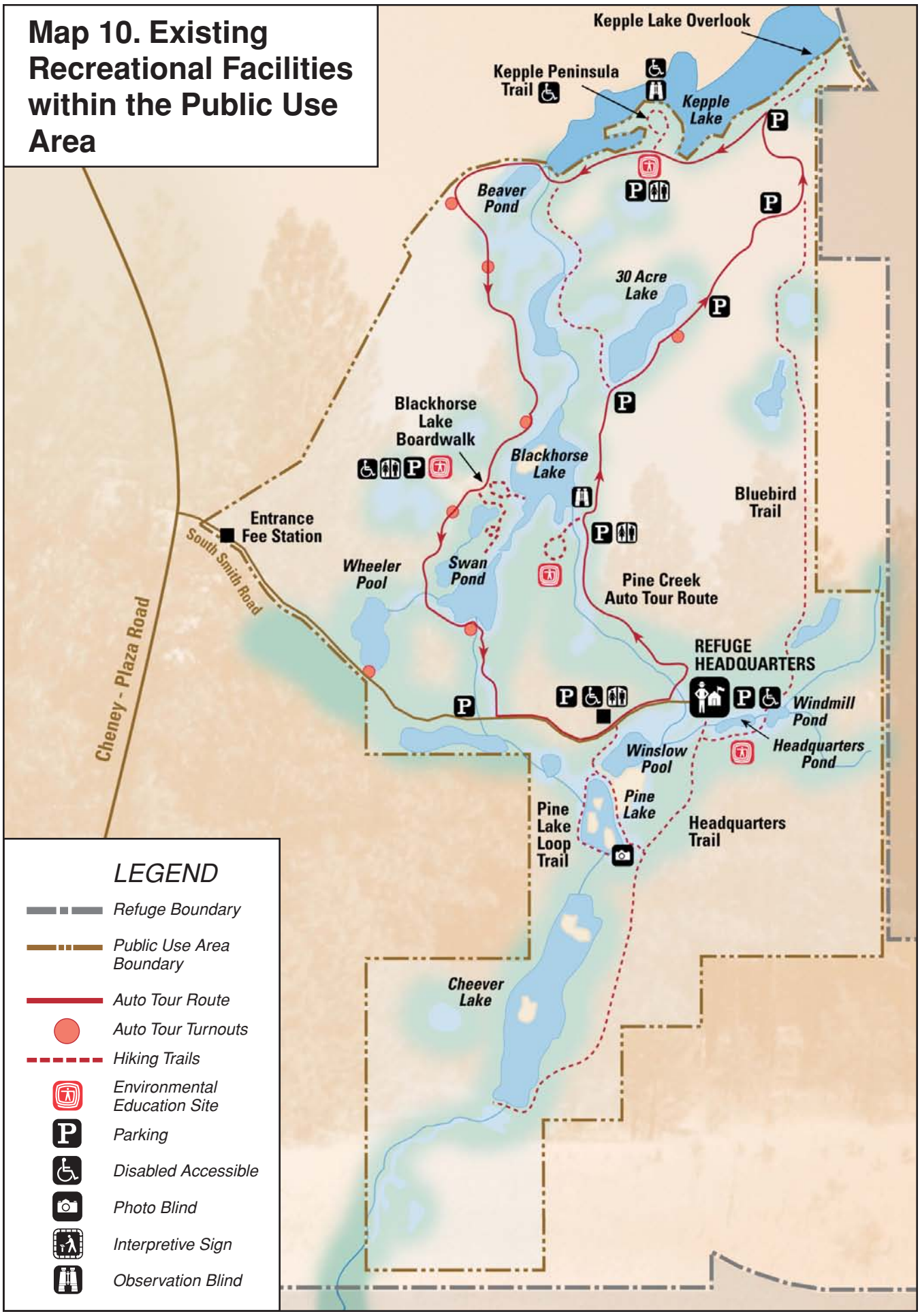
Facilities currently compliant with the ADA are the upstairs portion of the Refuge office, the environmental education building, maintenance building, public rest rooms, four vault toilets, and the Boardwalk.

Table 3-3 *Existing Trails*

TRAIL NAME	Surface	Open to:	Length (miles)
Columbia Plateau Trail	gravel	pedestrians, bikers, equestrian	4.75
Kepple Overlook	native	pedestrian	0.23
Kepple Peninsula (interpretive)	gravel/native	pedestrian	0.45
30-Acre Cutoff Trail	native	pedestrian	0.75
East Blackhorse EE Trail	native	pedestrian	0.45
Blackhorse Lake Boardwalk (interpretive)	wooden boardwalk	pedestrian	0.20
West Blackhorse EE Trail	native	pedestrian	0.29
Pine Lake Loop (interpretive)	asphalt	pedestrian	0.90
Headquarters	native	pedestrian	1.55
Bluebird	native	pedestrian	1.96
Total Length			**11.53**

Trail lengths calculated from GIS coverage (trailsarc)

Map 10. Existing Recreational Facilities within the Public Use Area



Two Small Visitor Facility Construction grants were received by the Refuge in 2004 for developing an accessible surface on the Kepple Lake Peninsula Trail and the Pine Lake Loop Trail. Work began on these two projects in 2004 and will be completed in 2005. Kepple Peninsula Trail will have a 1/4 mile packed gravel surface and an accessible observation/ photography blind. Two benches will be placed along the trail. The 1.25 mile Pine Lake Loop Trail will have a combination of packed gravel surface and 4 foot wide asphalt surface. Four benches will be placed along the trail edge. The Friends of Turnbull NWR were successfully awarded a grant that purchased two Sea Coast binoculars for placement on an overlook over Winslow Pool adjacent the new accessible Pine Lake Loop Trail.

Facilities in need of upgrades are the Fire Management Office, Helm's bunkhouse, and the photo blind.

3.6.4 RECREATION PROGRAM AND ACTIVITIES AT THE REFUGE

Visitor Preferences

As mentioned previously, in 1999 the Friends of Turnbull National Wildlife Refuge (Friends) conducted a visitor survey to identify visitor use patterns, preferences, and needs related to the Refuge. A total of 531 visitor surveys were administered at nine different locations in Spokane County. Results of the Friends survey showed that visitors to the Refuge participate in a number of recreational activities (see Table 3.4) with "enjoying nature" being the most popular activity among visitors.

The Refuge keeps its own data and estimates of visitation, including estimates of how many visitors participate in activities of interest.

Estimates are entered yearly into a database called the Refuge Management Information System (RMIS). Table 3-5 provides recent data on visitor estimates reported in RMIS. Annual discrepancies from year to year are a result of a) natural variability in visitation; b) staff member changes and consequent different methods of counting visits; and c) program variability (i.e. funding for EE program can vary substantially from year to year).

Table 3-4. *Most Common Visitor Activities at Turnbull NWR*

Activity	Percent
Enjoying nature	64
Birding	51
Hiking	45
Photography	23
Bicycling	12
Walking a dog	6
Running	4

Source: Friends survey, analyzed by EDAW (1999)

The most accurate numbers from RMIS are the EE program numbers. Because of uncertainty and annual fluctuations, Table 3-5 also includes a "Manager's baseline figure" that is the Refuge Manager's best baseline estimate of *current average* annual visitation by use type. Note that because many visitors participate in more than one activity, the total number of visits is smaller than the sum of visits in individual categories.

Wildlife Viewing and Photography

The focus of current observation and photography activity is the 200+ species of birds, 45 species of mammals, 7 amphibian and 10 reptile species that can be observed on the Refuge. Visitors coming to the Refuge utilize the Public Use Area, drive or ride bikes on the auto tour route, and hike trails to see and photograph the variety of wildlife inhabiting this relatively undisturbed area of the Channeled Scablands. Often visitors use their cars as blinds. Notably, the Refuge is identified in Washington's Watchable Wildlife Viewing Guide.

Interpretation

The Service is revising a 1986 Interpretive Prospectus. This document outlines the media and messages for each interpretive site. Interpretive trails are generally short trails designed especially for the educational benefit of the casual or new Refuge visitor. Interpretive

trails allow people to receive self-guided educational information through multiple signs or other media as they pass along a trail.

Currently, the Refuge has one interpretive trail at the Boardwalk (West Blackhorse Lake) with five signs. Another interpretive trail is being designed at Kepple Peninsula, with posts sunk into the ground at key points. Visitors will be able to pick up a brochure which describes the habitats and wildlife that can be seen at each post. The Columbia Plateau Trail also has multiple interpretive signs, but is not short or likely to be frequented by the casual visitor, thus it is not considered an interpretive trail like the other two mentioned above.

Environmental Education

An important component of recreation on the Refuge is the extensive Environmental Education (EE) program. Although the Refuge has had some form of EE for most of its existence, the program has greatly expanded in the past ten years. Currently 3,500 to 9,500 students participate annually in Turnbull's EE and outreach programs (dependent on grants, donations, and annual discretionary funding). The highest use period for EE on the Refuge is late March to mid-June. Over 85 school groups (K-12) from Spokane County and surrounding areas have participated in the Program. Moreover, numerous civic groups, from preschool children to senior citizens, are provided field trips, night hikes, tours, in-classroom activities, and guided nature walks on the Refuge throughout the year.

An EE classroom with capacity for 50 students and four designated outdoor study sites on the Refuge are the key facilities used and maintained for the EE Program. Each study site is designed to provide nature walks, studies in aquatic ecology, and a seating area for instruction and activities. The outdoor classrooms are used on a rotational basis to minimize disturbance. Classroom sessions preceding or following the outdoor field work have been found to be very helpful in reinforcing the learning objectives.

From the Earth and Sky Fall Field Trip

Grades 3 and up learn about the seasonal rounds of Northern Plateau peoples. Students are guided through hands-on activities such as building tule-mat shelters (summer), hunting (fall), listening to traditional stories in Salish and English (winter), and learning about native plants and root-gathering tools (spring). Throughout, students discover the role that native species play in tribal living and habitat stewardship.

An example learning objective for this project: 80 percent of participating students will understand the term semi-nomadic and the importance of seasonal cycles to the Northern Plateau culture.

EE program focus and learning objectives: The goal of the program is to instill a sense of environmental awareness and responsibility within individuals and communities. The program is designed to motivate participants to make wise decisions concerning the use and conservation of natural resources. The overall EE program objectives follow:

1. Involve participants in all areas of the Refuge ecosystem by providing an activity-based curriculum.
2. Inform, involve, and motivate people to be aware of and active in the operation and health of their ecosystems by providing environmental education materials and activities.
3. Build a responsible environmental ethic in our constituency by developing programs and activities for visitors.
4. Increase conservation background knowledge by providing ongoing training for regional teachers, college interns, and volunteers in ecosystem ecology and interpretation.
5. Involve students, educators, interested citizens and Service personnel in evaluating the program to better meet the community's changing needs.

Table 3-5. *Estimates of Visitation Reported in RMIS, Years 2000-2002, by Activity*

	Visit Category	Manager's Baseline Estimate	FY 2002	2002: percent of total visits	FY 2001	2001 percent of total visits	FY 2000	2000 percent of total visits
I.	Total Number of Visits[a]	30,000	23,970	100%	28,184	100%	28,000	100%
II.	Interpretation and Nature Observation (not sum of below)	20,000	20,357	85%	24,590	87%	26,450	94%
	a. Staff / volunteer conducted	1,600	1,678	7%	441	2%	440	2%
	b. Visitor center	6,000	6,176	26%	5,500	20%	7,050	25%
	c. Admin office	8,000	4,404	18%	7,974	28%	9,105	33%
	d. Kiosks[b]	0	10,403	43%	9,581	34%	0	0%
	e. Nature Trails	20,000	16,745	70%	20,996	74%	24,900	89%
	(foot)	12,000	11,677	49%	5,128	18%	24,900	89%
	(auto)	18,000	10,136	42%	18,432	65%	21,700	78%
	f. Towers/platforms/blinds	50	28	0%	28	0%	7,350	26%
	g. Other Wildlife Observation	6,500	6,500	27%	6,500	23%	800	3%
III.	Environmental Education (sum of below)	9,000	9,489	40%	11,149	40%	8,050	29%
	a. Staff / volunteer conducted	5,500	5,237		8,353		2,500	
	b. Non-staff conducted	3,500	4,252		2,796		5,550	
IV.	Recreation[c]	5,000	4,447	19%	5,327	19%	5,700	20%

[a] Total number of visits is not equal to the sum of any of the particular categories, since many visitors participate in more than one activity.
[b] Fee station visits were counted as kiosk visits in FY 2002 and 2001but not in FY 2000.
[c] "Recreation" category IV includes other non-wildlife dependent recreation such as biking, cross-country skiing, etc

6. Cultivate the program and its partnerships to become a model for regional, state, and national environmental education efforts.

Activities for students of all ages centers on four programs: Turnbull Spring Field Trip, Summer Interpretive Project, From Earth and Sky-The Natural World Fall Field Trip Project, and Discover Wildlife Outreach Project winter activities. Each EE program is designed with a curriculum and specific learning objectives tailored to the different grade levels.

The EE program is overseen by one permanent full-time staff (GS-9 Supervisory Park Ranger). The program is almost completely facilitated with the help of AmeriCorps volunteers, Student Conservation Association volunteers, other local volunteers (e.g., university students, retired educators). Staff focuses effort on training teachers; workshops are offered annually for teachers leading self-conducted classes. Trained volunteer facilitators donate approximately 5,000 hours/year to the EE program. These EE facilitators provide spring field trips, conduct classroom and outdoor activities on the Refuge and provide environmental education and outreach to the public through fairs, expos, and in-classroom presentations to local schools. The important regional role of the Refuge's EE

Program is reflected in the fact that the program typically has far higher demand than it can meet and that school groups have occasionally come from as far away as Yakima to participate in the program. The services offered by the Refuge are a significant component of the environmental education program in these schools, and provide valuable training to educators as well. The popularity of the EE Program is a reflection of the growing importance of environmental education as a component of classroom learning (Everett and Dedrick 2000).

The EE program operates with a limited amount of annual operational funding. Much of the necessary funding to support volunteer stipends and contract employees is obtained through grants and fundraising efforts by the Friends of Turnbull NWR. A secure source of annual funding is necessary to enable this program to expand as future demand increases.

Hunting

Hunting and trapping were once popular activities in the area with settlers before the Refuge was established. Limited information suggests that deer, antelope, or elk hunting could have occurred near or within the Refuge (Holstine et al 1992). In the 1930s when the Refuge was established the prevailing public view was that there should be no hunting at the Refuge. The original advocates for Refuge establishment included the Spokane Sports-man's Association, who wanted a sanctuary where hunting would not be permitted. They hoped to create a place where wildlife could flourish and act as a source for adjacent hunted lands. Hunting was not then and has never since been permitted at the Refuge.

In 1959, the Washington State Department of Game (WSDG) conducted an informal survey to explore opening a portion of the Refuge to public waterfowl hunting. The WSDG contacted individuals, including the Regional Director of the National Wildlife Federation for the states of Oregon, Washington and Alaska. A general consensus of those contacted was that the Refuge should remain closed to hunting, at least until fully developed.

The 1966 Refuge Master Plan (USDI 1966) also explored hunting big game, including deer and elk, on the Refuge. After thorough evaluation, the Service determined not to open the Refuge to hunting at that time. The rationale was based on the fact that at that time, there was no biological reason to reduce the big game population on the Refuge. Conflicts that could occur between a big game hunting season and migratory waterfowl hunting season as well as cattle grazing were also noted.

In May, 1987, the State and Service re-visited the issue of opening up the Refuge to white-tailed deer hunting. In response to this hunting proposal, the Refuge received over 1000 responses, with a 7-1 ratio against the idea of allowing hunting inside the Refuge (Cheney Free Press 1987). Because of the overwhelming opposition, the Service decided not to move forward with the proposal.

Some hunting advocates have expressed the desire to see the Refuge opened to elk hunting, primarily as a way to mitigate for some depredation that occurs occasionally on adjacent lands.

<u>Elk</u>: See the Elk Management section above (Section 3.4) for more detail on elk hunting.

<u>Waterfowl</u>: Waterfowl hunting on the Refuge has seldom been an issue with the hunting public. During recent public meetings, participants were nearly unanimous in their opposition to the opening of waterfowl hunting on the Refuge. Although the local officials of the Washington Department of Fish and Wildlife have not approached the Refuge concerning a waterfowl hunt, some interest was expressed for a hunt at the State Office level.

Interest in waterfowl hunting may also be tempered by the relatively low use of the Refuge vicinity by waterfowl in the fall. Fall waterfowl populations on the Refuge are fairly irregular as a result of periodic drought and early freeze up that limits the availability of open water. Waterfowl numbers are considerably lower than occurred in this area historically as a result of the drainage of many of the permanent and

semi-permanent wetlands and the development of irrigated agriculture in the arid steppe of Columbia Basin to the west (made possible by the Coulee Dam Project). These changes have shifted the fall migration to the farm fields, reservoirs and wasteways of the lower Basin.

When wetland and weather conditions result in good fall migration habitat, a portion of the southern migration still utilizes the restored wetlands of the Refuge and undrained deeper water habitats of the Stewardship Area. Refuge waterfowl counts indicate that numbers peak in mid-October in most years. In these good years, peak counts of mallards range from 10,000 to 25,000 birds in late October and represent 75 percent of the fall waterfowl populations. Other duck species peak earlier in October. By mid to late November Refuge wetlands freeze up in most years resulting in a forced emigration of most waterfowl with the exception of smaller populations of goldeneyes, Canada geese and a few hardy mallards. This relatively narrow window of available habitat limits waterfowl hunting opportunities in this area.

Turkeys: Only one native upland game bird, the ruffed grouse, is found in the area. Other upland game birds inhabiting the area are nonnative and have spread from releases.

Information on population size and population growth is lacking with the exception of incidental observations. Observations in other areas where the Rio Grande sub-species has been introduced indicate that populations can build quickly without hunting to remove some of the annual growth. The potential impact this growing population of nonnative gamebirds may have on native wildlife is largely unknown. After an extensive literature review Refuge staff found no work done on this subject with regards to wild turkeys.

Fishing

Historically, all Refuge wetlands with the exception of Pine Creek were fishless. This condition resulted in an aquatic ecosystem based on the absence of a significant vertebrate predator. In 1954, the State planted five- to six-inch rainbow trout in three of the Pine Creek wetlands. A second planting occurred in 1955. In 1956, the State began taking eggs, up to 90,000 total. However, the State subsequently decided to abandon the project for several reasons, including the tendency of spawners to go downstream, a conflict between spawning season and high spring run-off, and a summer die-off due to high water temperatures and low oxygen content (USDI 1966). As a result, the Refuge has never provided notable opportunities for fishing. A few exotic game fish do continue to survive in these lakes. The Refuge has no intention to plant nonnative fish again, since maintaining the biodiversity and proper function of Turnbull wetlands requires that they remain fishless as they were historically.

According to a recent study of the area's regional recreational supply and demand, fishing opportunities appear to be sufficiently available in the Refuge vicinity at the many surrounding lakes and rivers (Everett and Dedrick 2000). See more in Section 3.7.

Other Recreation

Some visitors hike or ride bicycles on the Refuge in addition to or as support for wildlife observation activities. Hiking and observation trails were described above. Bicycling is allowed on the entrance road, auto- tour route, and the Columbia Plateau Trail (CPT). Unauthorized bicycle use has occurred on foot trails in the Public Use Area and on service roads in the closed section of the Refuge by obtaining access from the auto tour route, Cheney Plaza Road and the CPT.

A few visitors jog or cross-country ski in the Public Use Area. Additionally, the public may participate in a variety of community service projects, such as trail maintenance, riparian planting, or weed control. Special events are sometimes hosted for the public, including bird walks, volksmarches, and various tours.

Activities Currently Prohibited on the Refuge

Activities that are not currently permitted on the Refuge include hunting, fishing, boating, off-road vehicle use, horseback riding (except on the Columbia Plateau Trail), camping, and on-ice activities. Typical law enforcement issues include unauthorized uses such as trespassing in closed areas, illegally taking plants and wildlife, dogs off leash, mock military exercises, artifact collecting, illegal hunting, and overnight camping.

3.7 REGIONAL RECREATION PERSPECTIVE

As part of preparation of this CCP, the Service contracted with EDAW consulting firm to understand the current and potential future role of the Refuge related to recreation. This report (Everett and Dedrick 2000) characterized the existing regional supply of compatible recreation relative to the Refuge and also presented state data for future trends in recreation needs. This data is useful in planning for the types of recreation activities and facilities provided at the Refuge over the next 15 years and beyond. The following text in Section 3.7.1 summarizes data from that report.

3.7.1 NEARBY RECREATIONAL OPPORTUNITIES

Within a 2-3 hour drive from Turnbull, there are numerous outdoor recreation opportunities that are managed by a variety of federal, state, local, and private entities. These resources include lakes, rivers, other Refuges, a ski area, interpretive facilities, wildlife management areas, Forest Service and BLM lands, and developed parks. Of the six Refuge-system priority uses, opportunities for viewing wildlife are probably most plentiful in the vicinity, while opportunities for environmental education and hunting are the least plentiful.

A small state agency known as the Interagency Committee for Outdoor Recreation (IAC) advises the State of Washington on matters of outdoor recreation. The IAC conducts inventory of outdoor recreation sites and opportunities, conducts studies of recreational participation and preferences, and periodically releases documents related to overall State Comprehensive Outdoor Recreation Planning (SCORP). The IAC divides the state into 13 regions to present information on regional recreation supply. Turnbull NWR is in Planning District 12, which includes Spokane and Whitman counties. As of 1995, there were a total of 362 local, state, federal, and private recreation sites in this region (6 percent of the state total) totaling 49,753 developed acres (4 percent of the state total). Local entities manage almost 80 percent of the sites, while the State of Washington has the greatest quantity of developed acreage (21,833 acres).

Fishing/Aquatic Recreation Opportunities

The Channeled Scablands provide a unique setting for abundant small-lake fishing, boating, wildlife observation/photography, and camping opportunities. Within 2 to 15 miles from the Refuge, 13 recreational lakes (Chapman, Philleo, Williams, Amber, Badger, Fish, Fishtrap, Hog, Silver, Clear, West Medical, Medical, and Rock Lakes) provide a diversity of water-oriented public recreational activities including fishing, boating, swimming, and camping.

Closest to the Refuge, Chapman Lake (146 acres) is located 2 miles south of the Refuge and is one of the deepest lakes in northeast Washington. This lake abounds with game fish, including silvers (kokanee), perch, crappies and trout. As such it is popular with anglers and offers a small private resort called Chapman Lake Resort. The State DNR owns the water and some adjacent land, however fishing access is private and not public. The lake is bordered by various landowners but seems to be managed in common to facilitate fishing. Maximum boat speed allowed is 5 mph. A resort located on the lakeshore has camping, cabins, a store, and hookups.

Hunting

Many local residents utilize private lands in the area for hunting, negotiating access with friends or neighbors. The nearest community hunting area within the vicinity is located at Philleo Lake, on the Refuge's eastern boundary. The upper end of Philleo Lake is owned by two private duck clubs who offer hunting and fishing to approximately six club members.

State and federal lands, some nearby and some located at some distance, provide various hunting opportunities. Bureau of Land Management provides hunting at Fishtrap and Hog Lakes about 10 miles southwest of the Refuge. The Service offers a range of hunting opportunities at Little Pend Oreille National Wildlife Refuge (90 miles north of Turnbull) and Columbia National Wildlife Refuge (100 miles southwest of Turnbull). Washington Department of Fish and Wildlife provides hunting at Swanson Lakes Wildlife Area (60 miles northwest of Turnbull).
Hunting opportunities are plentiful in other areas of northeast Washington and nearby in the Idaho Panhandle, specifically on the numerous National Forests, Wilderness Areas, and other lakes and rivers in the region.

Environmental Education/Interpretive Centers

Riverside State Park, located 25 miles north of the Refuge in Spokane, offers an interpretive center and wildlife viewing opportunities. Liberty Lake County Park, located about 30 miles north-east of the Refuge, offers interpretive facilities and an accessible boardwalk. This park is also used for EE programs by a local school district. Similar opportunities are available at Heyburn State Park at the south end of Lake Coeur d'Alene in Idaho, about 50 miles east of the Refuge. This Park features developed wildlife viewing areas, including an interpretive center.

Hiking

All of the nearby larger state and county parks also offer a variety of recreational opportunities including hiking, biking, skiing, wildlife observation/photography, camping, boating, fishing, and swimming. These include Mt. Spokane State Park, Riverside State Park, Liberty Lake County Park, and Heyburn State Park in Idaho. Planning District 12 showed a significantly lower portion of trail mileage than other planning districts delineated by IAC (1 percent of the state total); however, the trail total predated opening of the Columbia Plateau Trail (IAC 1990; IAC 1995).

Wildlife or Nature Observation

Turnbull NWR is the primary location within Planning District 12 focusing on wildlife observation, however, incidental wildlife and nature observation are provided in all or most of the other natural areas described above. Spokane County also owns 4,609 acres of open space, which offers some recreational/open space opportunities to area residents (Spokane County 2002). The County's goal is to manage these areas in a way that preserves and creates natural habitats while enhancing the quality of life for residents of Spokane County. Whenever possible, efforts are made to coordinate these objectives with other resource agencies such as the USFWS, WSPRC, and WDFW.

3.7.2 Recreational Activity Specific to the Stewardship Area

Very few developed recreational sites occur within the Stewardship Area. However, the Refuge is aware of the following uses:

- Hunting occurs by landowner permission; since there are few public lands available for hunting within the Stewardship Area (DNR owns about 875 acres). The kinds of hunting that occur are upland birds, big game, and some limited waterfowl hunting.

- Philleo Lake has waterfowl hunting opportunities as described above.

- Columbia Plateau Trail traverses the south-west corner of the Stewardship Area. The trail is open for hiking, biking, and equestrian use.

- There is frequent bicycling that occurs on the County roads within the Stewardship Area, including bike meets.
- Waterskiing and jetboat use is infrequent, but may be increasing.
- Swimming occurs in the lakes.
- The Eastern Washington University cross-country track team runs throughout the Stewardship Area.
- There is casual wildlife observation here and there (Philleo Lake has pelicans).
- There is a privately owned horseback riding stable where people board horses. There aren't however, any trails that they maintain for people to use. Except for the Columbia Plateau Trail, there are no other equestrian trails known.
- Hiking and walking may occur in small quantities around the lakes.
- There is a balloonist frequently in the area.

3.7.3 STATEWIDE AND REGIONAL PARTICIPATION RATES AND TRENDS

Current Participation Rates

The most recently released SCORP Assessment (IAC 2002a) identified 14 major categories of outdoor recreation, subdivided into 170 activities. Of these 14 major categories, walking/hiking and nature activities are the two most popular, with 53 percent and 43 percent of Washington's residents participating in these activities, respectively. The IAC also indicated that observing/photographing nature and wildlife have participation rates of 42 percent, and visiting interpretation centers has a participation rate of 7.5 percent. The IAC's 1990 and 1995 reports also provided participation rates, subdivided by Region. Region 4 (Eastern Washington) is a destination for fewer visitors compared to the other three SCORP planning regions in the state. One reason for this is the region's distance from Puget Sound, where most of the state's residents live.

Compared to other regions in the state, Region 4 attracts the highest statewide percentage of hunters, with about 18 percent of all hunting trips in the state occurring in this region (IAC 1990). Most (94 percent) of all hunting in the state is done by Washington residents.

Forecast of Future Regional Recreation Demand and Key Recreation Needs Identified by IAC

Overall, outdoor recreation activity in most activities continues to increase at high growth rates. In a recent technical report (IAC 2002b), IAC projected future participation in 13 of 14 major outdoor recreation use categories over periods of 10 and 20 years. Nine of these activities will experience double digit growth (see Table 3-6).

These most recent estimates of recreation trends were based on the National Survey on Recreation and the Environment Projections for the Pacific Region (NSRE), which includes Washington State. IAC adjusted the NRSE projections as necessary based on age group participation, estimates of resource and facility availability, user group organization and representation, land use and land designations; and "other factors" including the economy and social factors. Table 3-6 shows the percent change expected for Washington State by activity as reported by IAC.

The 1995 assessment identified trails and environmental education as the two highest outdoor recreation needs in the state. As depicted in Table 3-6, the kinds of uses that are compatible at Turnbull NWR are expected to show increases of 20 percent to 40 percent over from 2002 levels. The exception is hunting, in which participation is expected to fall at about the same rate.

If estimates from the 1987-2000 projections (IAC 1990) hold true for this next 10-20 year period, growth in activities will be somewhat

Table 3-6. *Projected Future Increase in Participation for Selected Outdoor Recreation Activities.*

Activity	Estimated Change Years 2002-2012	Estimated Change, Years 2002-2022
Walking	23%	34%
Hiking	10%	20%
Nature Activities (includes outdoor photography, observing wildlife and fish, gathering and collecting, gardening, and visiting nature interpretive centers)	23%	37%
Sightseeing (includes driving for pleasure)	10%	20%
Bicycle Riding	19%	29%
Cross Country Skiing	23%	No estimate
Hunting / Shooting	-15%	-21%

Source: IAC (2006).

lower in Eastern Washington compared to the state as a whole. This smaller percentage increase is due in part to the relatively smaller population growth (in terms of the actual number of people) in this part of the state as compared to the more populous and rapidly growing Puget Sound area. The population growth in the Puget Sound area and elsewhere in the state fuels much of the growth in outdoor recreation activity participation (see discussion in Section 3.11 Demographics/Social Setting for an understanding of population growth within the vicinity and within the State as a whole).

3.8 RESEARCH

3.8.1 BACKGROUND

Since the first lands were purchased establishing the Refuge, research projects (ranging from undergraduate class projects to post-doctoral studies) have been completed on the Refuge. In the past decade, the Refuge has hosted between 3 and 6 research projects annually. Research topics covered have included; parasitology of reptiles, wildlife habitat relationships, limnology, nesting ecology of waterfowl and cavity nesting birds, roosting ecology of bats, predator/prey interactions, effects of management actions on wildlife populations and habitats, evolution of predator defenses in zooplankton, insect/plant co-evolution, fire effects on the ecology of individual plant species, plant communities, animal/plant relationships, and impact of herbivory on plant growth and development.

Although researchers from as far away as University of Illinois, the University of Alberta, Canada and the University of California at Santa Cruz have conducted studies on the Refuge, the large majority of researchers have come from local colleges and universities including Eastern Washington University, Washington State University, Gonzaga University, University of Idaho, and the University of Washington. Eastern Washington University, which is just a few miles north of the Refuge in the City of Cheney, has been the most active. The Refuge has worked with several of these universities to complete research directed at filling information gaps that hinder the development of management strategies to achieve wildlife and habitat objectives. This type of research is given priority in the approval process. The Refuge maintains a research needs list that is shared with potential researchers.

All potential researchers are required to submit a research proposal for review and recommendation by the Refuge Biologist and approval by the Refuge Manager. The Refuge has limited on-going research projects to six per year. Proposals are reviewed for their potential benefit to the Refuge, Ecoregion and Region, their compatibility with the Refuge purposes, and the possibility of conflicts with on-going studies, Refuge monitoring efforts and management activities. Once a project is approved, a Special Use Permit is issued that may stipulate certain special conditions to minimize impacts to Refuge resources and conflicts.

3.8.2 TURNBULL LABORATORY FOR ECOLOGICAL STUDIES (TLES)

Eastern Washington University has operated a research facility on the Refuge under a cooperative agreement with the Service since 1973. This is the only facility of this type in the National Wildlife Refuge System. Its presence on the Refuge has resulted in a strong research relationship with the University which has resulted in a number of important studies beneficial to the understanding and management of Refuge habitats and wildlife.

The original cooperative agreement signed in 1973 allowed the University to construct and operate a facility within the boundaries of the Refuge for the purposes of conducting classes and environmental and biotic studies that would assist the Service in accomplishing Refuge objectives. The architectural design, plans, exterior colors, specifications, construction and location of the laboratory were all subject to Service approval. The University was required to comply with all Federal and State laws applicable to Turnbull NWR as well as with federal and state water quality standards for release of effluent from the operation. All research and study projects undertaken by the University that involve the use of the Refuge are to be approved in advance by the Service. The Service has the right to restrict the University from engaging in any projects when the Service determines that it is in its best interest to do so. Use of the lands upon which the laboratory is located and all use of the premises outside the building are coordinated with and subject to the approval of the Refuge Manager and will be compatible with Refuge objectives and operations. The Service may terminate this agreement for failure of the University to comply with any or all of the terms or conditions. This agreement was in effect for a period of 15 years. It was renegotiated in 1988 and was re-authorized in 2004. The University has expressed a desire to expand the facilities which will have to be addressed during the renegotiations.

In order to assure that the University is in compliance with the terms of the agreement, the Refuge meets quarterly with the laboratory directors and the facility is regularly inspected. At the quarterly meetings, the Refuge receives an updates on activities at the laboratory and the Refuge addresses issues associated with reporting on research projects, compliance with Special Use Permits and operational concerns.

3.9 SPECIAL STATUS LANDS

Two Research Natural Areas (RNAs) are found within the Refuge: Turnbull Pines and Pine Creek RNAs. The RNAs are part of a Federal system of such tracts established for research and educational purposes. Each RNA constitutes a site where some natural features are preserved for scientific purposes and natural processes are allowed to dominate. Their main purposes are to provide: 1) baseline areas against which effects of human activities can be measured; 2) sites for study of natural processes in undisturbed ecosystems; and 3) gene pool preserves for all organisms, especially rare and endangered types.

It is important to note that research on the Refuge is not limited to the RNAs. Research activity occurs in all areas of the Refuge. The RNAs do not contain enough habitat diversity nor are they large enough to function as complete representations of the Refuge, thus there has never been a compelling scientific reason to confine research to the RNAs.

According to the Standards and Policy Guidelines issued for RNAs (Dec. 1976 revision):

> *an RNA is a physical...unit in which current natural conditions are maintained, insofar as possible. These conditions are ordinarily achieved by allowing natural physical and biological processes to prevail without human intervention. However, under unusual circumstances, deliberate manipulation may be utilized to maintain the unique feature that the Research Natural Area was established to protect ... Restoration should be initiated on an Area that is no longer valued for its*

established purpose...Manipulation may be required to restore an Area...

Another guideline states:

Intense recreational use is not compatible with the objectives of Research Natural Areas. There may be some Areas where observational recreation can be conducted without prejudicing Area values. Other recreational activities such as rock collecting, berry picking, hunting, and fishing should not be encouraged, and should be prohibited if they are incompatible with Area objectives.

3.9.1 TURNBULL PINES RNA

Turnbull Pine RNA was established in 1966 to exemplify "nearly pristine ponderosa pine savanna at the transition from forest to grassland and a series of freewater potholes characteristic of the Channeled Scablands" (Franklin et al. 1972). Measuring a total of 197 acres, it is located along Cheney Plaza Road, surrounding the Turnbull Laboratory for Ecological Studies. The tract is mostly ponderosa pine forest with a few scattered groves of quaking aspen and wetlands.

Turnbull Pines gets more research use due to its greater proximity to the TLES. University class projects are frequently sited there.

While the first round of forest habitat management projects is underway, Turnbull Pines will be managed as a control area (until completion of all other uplands habitat management units - i.e. no tree removal or fire management over the next twenty years). There are a few other control areas on the Refuge, including Kepple Butte and the area north of Turnbull Slough. Once the forest thinning projects prescribed by the Habitat Management Plan have been completed in the rest of the Refuge, the Turnbull Pines RNA may also receive thinning and fuels treatment. In 2002, 40 acres were manually thinned just inside its northern boundary as part of a Wildfire Urban Interface (WUI) project.

3.9.2 PINE CREEK RNA

Located near the eastern boundary of the Public Use Area, the Pine Creek RNA was also established in 1966 to exemplify "relatively undisturbed savanna of ponderosa pine and bunchgrasses found in the forest-grassland transition at the northeastern edge of eastern Washington's steppes" (Franklin et al. 1972). This RNA measures 160 acres. Cheatgrass was noted in the southern half of the RNA by authors of the 1972 handbook (Franklin et al. 1972) and the handbook notes that "the area must be considered disturbed by livestock grazing."

In 1989, the Washington Natural Heritage Program surveyed the RNA and adjacent Refuge land. The survey report (Gamon 1990) recommended that the existing RNA should be expanded. The rationale stated involved incorporating a greater expanse of ponderosa pine forest, two populations of yellow lady slippers (*Cypropidia parviflora*, state threatened), a vernal pool with tufted hairgrass, a geologic feature of note known as stonenet scabland, and the complete watershed of one of the larger wetlands. The expansion would have doubled the size of the RNA. Although the Refuge Manager applied to expand the RNA boundaries in 1990, no expansion was authorized.

There is some concern that opening of the stands in forest habitat management may have a negative effect on *C. parviflora*. Under current Refuge management practices, there is an 82-foot zone around the wetlands in which mechanical equipment is not allowed (exceptions are made for particular wetland restoration activities).

C. parviflora populations are usually found within this 82-foot zone and will be protected by this management practice in numerous locations outside the RNA. Thus the expansion of the RNA is not seen as critical for protection of this species.

As part of the HMP planning process, the Refuge examined the features for which Pine Creek RNA was designated. After doing so, the

Refuge deemed that certain active management activities were necessary. In particular, overstocked stands of ponderosa pine threatened the long term sustainability of this RNA. As a result, the Refuge obtained permission to thin this RNA in 2001. RNA policy guidelines (Dec. 1976) normally prohibit commercial operation in RNAs, but fire management (without logging to prepare stands) has always been permitted in RNAs. After this thin, the Refuge intends to maintain the RNA stand condition with fire.

3.10 CULTURAL RESOURCES

3.10.1 NATIVE AMERICAN OVERVIEW

Comparisons of point forms and related archeological findings at Turnbull NWR with radiocarbon dated collections from surrounding areas indicates that human presence in the Channeled Scablands of eastern Washington dates back at least 8000 years. At the time of historic contact the area encompassing the Turnbull NWR was within the territory of the Upper Spokan Indians. Their territory included areas around the upper mainstem and tributaries of the Spokane River. They were bordered on the west by the Middle Spokan Indians which occupied the middle portion of the Spokane River and to the east by Coeur d'Alene Indians which occupied the areas surrounding Coeur d'Alene Lake, Coeur d'Alene River and the upper most portion of the Spokane River. To the south their neighbors were the Palus Indians. The Spokan Indians and their neighbors are considered part of the Plateau Culture whose major characteristics included a heavy reliance on salmon and other aquatic foods; highly developed fishing techniques; joint occupation of resource areas; expansion of kinship ties through intermarriage; development of extensive trade networks; and a simple political organization formed at the village level (Holstine et al. 1992).

The Spokan and other Columbia Plateau people were semi-nomadic, carrying out subsistence hunting, gathering and fishing by making frequent, calculated moves to identified resource areas during different seasons (i.e., seasonal subsistence rounds). This semi-nomadic strategy allowed them to collect food sources for nine months of the year, and then live on stored foods for the hardest months of the winter. Semi-permanent winter villages of the Spokan people were often situated adjacent to principal salmon fishing areas while temporary camps were set up at root digging grounds, berry collecting areas, and hunting locations. Salmon resources were not present at Turnbull NWR, and therefore the closest winter villages were located near fishing stations likely at Hangman Creek (Latah Creek) 10 miles east of the Refuge, and along the Spokane River about 15 miles to the north (Holstine et al.1992). While the Refuge lacks anadromous fish resources, it and adjacent areas had several other major traditional Native American food resources, especially bulbs and roots, waterfowl, waterfowl eggs, turtles, and marmots (Holstine et al. 1992, Bernard 1947). Deer, elk, and possibly antelope were also found here and may have been hunted, although the principal locations for hunting large game as well as for berry collecting were in the highlands north of the Spokane River. The only documented seasonal settlement in proximity to the Refuge was identified at the site of present-day Cheney, Washington. Accounts of local settlers say it was a gathering place during June or July for camas digging and for other activities including horse racing, gambling, and trading. Most likely many other campsites were also scattered about the landscape (Holstine et al. 1992).

Based on both their abundance and variety, bulbs and roots were probably the most significant resources found at the Refuge. Historically, Indian people from at least two separate groups are known to have harvested plant resources on the Refuge. The Spokan and Coeur d'Alene people came here in the spring to dig the roots of camas, kous, bitteroot, and wild onion (Holstine et al. 1992, Bernard 1947). Land use practices of the early Euro-American settlers, especially draining, tilling, and grazing, reduced the quantity and distribution of camas and other native plant foods both on and off the Refuge (Bernard 1947), however several large stands of camas remain viable today (Holstine et al. 1992). After the creation of the Refuge,

Native Americans were allowed to use some of the camas fields until the 1940s when this use was stopped due to concerns of impacting spring nesting of waterfowl (Holstine et al. 1992). More recently permits for root collecting have been granted almost yearly to various Spokans. Today's Native American collecting activities on the Refuge are primarily focused on teaching the younger generation traditional gathering methods.

3.10.2 EURO-AMERICAN OVERVIEW

In the early 1800s, most fur traders avoided the present day Refuge area when they traveled the Channeled Scablands from northeast Washington to the Snake River. All of the major travel routes in eastern Washington bypassed this area because travel through wetlands was always difficult. From 1859-1862 however, the U.S. Army constructed a 624 mile long road between Fort Walla Walla and Fort Benton on the Upper Missouri River in Montana. Named the Mullan Road after Lt. John Mullan who directed its construction, it crossed the southeast corner of the present Refuge. While the Mullan Road was infamous for being washed out and rough going, the portion crossing the open grasslands of the Refuge was probably one of the better stretches and was maintained as a principal route of localized travel for people who later settled along the road (Holstine et al. 1992).

Settlement on the Refuge lands occurred later than other areas of the Pacific Northwest because of the obstacle posed by the wetlands. Daniel Percival became the first settler to own land there when he purchased 120 acres in 1877. Most wetland settlers combined stock-raising with grain and hay production to make a living. Many of the early residents hunted or hauled freight to supplement their income. In 1880, a road was built that crossed the northern edge of the Refuge with bridges across the low marshy areas. This new improved road gave the few wetland settlers connections to nearby outposts of civilization, and a stage coach service between Cheney and Spangle began. By 1881 the Northern Pacific Railway Co. had laid track from Portland to Spokane. With it came new economic opportunities for local residents including providing timber for railroad ties and selling oats and hay (Holstine et al. 1992).

Cyrus Turnbull and his wife Mary Jane Williams built a cabin at the north end of Turnbull Slough and lived there with their children from 1880 - 1886 before moving to Idaho Territory. While Cyrus listed his occupation as farmer in the 1885 Auditor's census of Spokane County, family accounts indicate that hunting commanded the greatest share of his energy and interest while he lived on the Refuge (Holstine 1992). His oldest son Oliver distinctly remembered his father's tamed wild geese which were used as decoys (Bernard 1947). It is not known whether Cyrus Turnbull settled in the wetlands for the purpose of making a living from hunting, but in those days skillful hunters could earn a living providing wild meat to the newly established and rapidly growing town of Cheney (Holstine 1992). Cyrus Turnbull was not the first settler of the wetlands, never owned land there, and stayed only six years, yet his contemporaries named the area after him. Perhaps his success as a hunter may have inspired his neighbors to name his primary hunting grounds after him (Holstine et al. 1992). The foundation of Turnbull's cabin was still visible in 1946 (Bernard 1947), however, the site has not been found in recent years.

When the nearby transcontinental railroad line was completed in 1883, settlement accelerated to a flood as emigrants from the Midwest and East Coast arrived to claim or purchase vacant lands for farming and speculation. Settlement decreased during the Depression of 1893 and increased again in the early 1900s. Most of the residents on Refuge lands became subsistence farmers who dug ditches to drain their land. Cooperative drainage districts were later formed to drain more water over a larger area. Most of the drained land was unfit for long-term crop growing (Holstine et al. 1992).

In 1906 the Spokane, Portland, and Seattle Railway (SP&S) started construction on a regional railroad to provide more direct access to Portland for Spokane area produce and passengers. The line went through what is now

the western portion of the Refuge. Construction required extensive blasting through basalt rock, which old-timers claimed was responsible for lowering the water table in the wetlands.

Sometime during the railroad construction, crews of Italian laborers built rock ovens within the present Refuge. The workers baked bread in the ovens. Another strikingly similar oven is located in the Refuge but not near the railroad. This oven was possibly built by a settler who may have copied the technique used by the Italian laborers or it could have been constructed in association with ditch construction laborers. Dairying made modest profits for Turnbull settlers until the Washington Water Power electric railroad, which shipped milk to creameries in Spokane, was shut down in 1922.

The replacement of the horse with the automobile in the 1920s caused a decline in the price of hay which hurt the local economy. As the thin peat soils lost their fertility, profits declined, and the Great Depression approached, many Turnbull area farmers were forced to abandon their lands (Holstine et al. 1992). The establishment of the Turnbull National Wildlife Refuge was in part made possible because of the failing farm economy (Valentine 2000).

Despite their close proximity to a transcontinental railroad and later a regional railroad, settlers of Turnbull Lakes lived a relatively isolated existence. The roads were unpaved, poorly maintained and frequently impassable. Not a single farm ever received electricity or telephone service. When the government acquired the lands in the 1930s, the hardy descendants of the pioneers who first settled the area were still living out the final phase of the frontier era (Holstine et al. 1992).

3.10.3 CURRENT KNOWLEDGE OF LOCAL CULTURAL RESOURCES

Refuge Cultural Resource Surveys

Cultural resource investigations on the Refuge started in the early 1970s when Refuge staff made informal efforts to identify a few sites within Refuge boundaries. Beginning in the 1980s formal cultural resource surveys were conducted in association with proposed ground disturbing management projects including pond alterations, fenceline construction, and a new entrance road. A comprehensive survey of the Refuge (Holstine et al. 1992) was conducted by professionals from Eastern Washington University's Archaeological and Historical Services under a grant from the Service. This survey covered an estimated 1,500 acres and included a historical records search. The Refuge land holdings total 15,656 acres, of which 2,606 acres (or 17 percent) have been systematically surveyed to date for cultural resources.

A limitation of all surveys on the Refuge is poor ground surface visibility, especially in forested areas and areas where Mt. St. Helen's ash was deposited in 1980 (Holstine et al. 1992). That, combined with different survey techniques and purposes, can result in undiscovered sites even on previously surveyed areas. It is highly probable that over the coming years additional archeological and historical sites will be exposed by human actions or natural causes. Forested uplands are more likely to contain as yet undiscovered prehistoric lithic debris sites. Wetlands and agricultural fields are less likely to contain intact prehistoric sites due to intensity of disturbance during historic and recent times.

Refuge Cultural Resource Sites

Turnbull NWR has some truly unique, interesting prehistoric and historic properties. Refuge surveys have resulted in several recorded prehistoric sites. There are three rockshelters, naturally formed by flood-eroded basalt faces, on the Refuge. These are large enough to provide human shelter but their most important use was probably food storage.

At least nine rock pits in four different locations have been found on the Refuge. These pits probably held caches of either dried meat or plant foods, particularly roots. This storage method reduced the quantity of food lost to burrowing animals and the air circulation within the rocks helped reduce spoilage. Caches of this type were intended to blend into the surrounding rock to prevent raiding by other families or

groups. Foods were commonly stored near collection areas and extracted in late winter/early spring when food supplies were low. These storage pits were probably used within the last 200 years since these types of structures are destroyed over time due to rock creep/movement (Holstine et al. 1992).

Evidence of a roasting oven probably used for camas and dating back as much as 1,000 years has been found on the Refuge (Lyons 1993). Small lithic debris scatters that are estimated to be between 2,000 and 3,000 years old have been found. These are presumed to have been in locations of temporary food gathering camps. These sites, combined with information collected in other areas of eastern Washington, support the theory that during prehistoric times Refuge lands were used primarily on a seasonal basis for hunting and gathering (Holstine et al. 1992).

There are many historic sites on the Refuge including 38 farmsteads which have been recorded and several others known but not located. House foundations, fence jacks, and domestic detritus from the first quarter of the twentieth century including milk and tobacco cans, glass bottles, canning jars, and various metal objects remain to tell their story. More of these types of physical remains of historic sites are likely to be discovered throughout the Refuge.

Two rural schoolhouse sites occur on the Refuge. It is not known when the schools were built, but they were probably in use during the late 1800s, until 1923, when students in the Turnbull Lakes area began attending school in Cheney. Just over one mile of Mullan Road a significant historic travel route in the Pacific Northwest, crosses the Refuge's southeast corner. Another historic road that may have been an alternate route during wet seasons crosses the Refuge about a half mile east of Mullan Road.

The SP&S railroad grade still exists, and evidence from its 1906 construction, like the rock ovens built by Italian laborers, can be found along its length. Many water control structures in the form of dikes, ditches, and a tunnel under the SP&S railroad bed were constructed by early settlers, drainage district crews, and WPA workers in their efforts to improve agricultural production by draining the wetlands. After the Refuge was established in 1937, some of the original ditches were modified and other water control structures added for the opposite purpose of retaining water in the wetlands to enhance waterfowl habitat.

Cultural Resource Surveys and Sites within the Stewardship Area

A record search conducted in January 2000 found that only four systematic cultural resource surveys have been conducted in or near the Stewardship Area outside of Refuge lands. There are no recorded prehistoric sites; however, four historic sites have been formally recorded in this area. The four sites are as follows: 1) Mullan Military Road Marker monument - constructed in 1926 - indicating that remnants of this road are in the Stewardship Area as well as on the Refuge; 2) Campsite of General William T. Sherman during a 1877 tour. Sherman was visiting to site new military posts so as to quell Indian unrest of the times; 3) Dybdall Grist Mill, a custom wheat mill which operated from 1897 until 1955, and is listed on the National Register of Historic Places; and 4) Company Ditch, a portion of this canal is within the Refuge and is currently used to move water into the wetlands that it was originally constructed to drain.

The higher density of recorded historic and pre-historic sites located in Turnbull NWR is due to federal ownership and the mandates to survey federal lands. The density of sites within the Stewardship Area may be similar, but fewer surveys have been done (Valentine 2000).

3.11 REFUGE BUDGET AND REVENUE SHARING

3.11.1 ANNUAL FUNDING

In FY 2002 the Refuge was allocated $455,100 in 1261funds, $260,850 in 1262 funds, $1,500 in 1231 funds, $12,000 in 6860 funds, $5,000 in

1121 funds and $735,700 in fire program accounts. The large fire program at the Refuge receives 50% of the total allocated funds, and these are used for Pre-suppression, Hazardous Fuel Reduction and Wildland Urban Interface (funds used to reduce the wildfire hazard on private lands and along the boundary of the Refuge).

3.11.2 REVENUE SHARING

When private lands are acquired by the USFWS they are removed from the tax rolls. This is because the United States Government, like city, township, county, and state governments, is exempt from taxation. However, under provisions of the Revenue Sharing Act, the county receives annual revenue sharing payments which often equal or exceed the amount that would have been collected from taxes in private ownership. The revenue sharing fund consists of net income from sales of products or privileges. Some examples are timber sales, grazing fees, permit fees, oil and gas royalties, etc. If there is not enough money in the fund to cover the annual payments, Congress is authorized to appropriate money to make up the deficit. Should Congress fail to appropriate such funds, payments to the county are reduced accordingly.

The Refuge Revenue Sharing Act provides for a payment of the greater of 25 percent of net receipts, or 3/4 of 1 percent of the adjusted purchase price for purchased land, or $0.75 per acre. Payments can not be less than $0.75 per acre for all purchased and donated land. All lands administrated solely or primarily by the USFWS qualify for revenue sharing. USFWS lands are reappraised at least once every 5 years. Payments to counties can be used for any governmental purpose. Spokane County has traditionally used payments to support roads, schools and fire suppression.

3.11.3 ENTRANCE FEE PROGRAM

The Refuge currently has a seasonal entrance fee program. Visitors pay a daily fee of $3/car to enter the Refuge between March 1 and October 31. Visitors can also use the Federal Passport System's Golden Eagle, Golden Access, or Golden Age Passports which are annual passes to all open federal lands. The Federal Duck Stamp at $15/year allows entrance to all National Wildlife Refuges that charge an entrance fee, or visitors can use an annual $12 Refuge Annual Pass specifically for Turnbull NWR. Entrance fees currently generate about $6,000/year at Turnbull NWR. With a 30% increase in visitation expected over the next decade, this amount could rise to at least $8,000/year. Consideration could be given toward requiring an entrance fee year around instead of seasonally. These funds are used to purchase additional Refuge brochures, signs, and pay for other public use supplies and activities.

3.11.4 VOLUNTEERS

Volunteers provided 16,000 hours of service to the Refuge in FY 2002 at a value of $236,000. This is equivalent to 7.7 full time employees. The hours were categorized as follows: 4,108 hours in habitat and wildlife monitoring, 1,756 hours in habitat management, 722 hours in fish and wildlife management, 2,455 hours in resource protection, 6,359 hours in public use and recreation, 55 hours in planning and 2,883 in maintenance.

3.12 LOCAL SOCIAL AND ECONOMIC SETTING

The Refuge is situated entirely within Spokane County, in Northeast Washington. The nearest town, Cheney, sits just north of the Refuge's northern boundary. The City of Spokane, Washington's second largest city is approximately 20 miles to the northeast.

3.12.1 POPULATION, HOUSING AND INCOME

County-wide data

Population and social statistic data for Spokane County, and comparisons with the State of Washington as a whole, are shown in Table 3-7. Spokane County has grown rapidly in recent years with a 15.7 percent increase in population

since 1990, making it the third fastest growing county in the state during the 1990s.

Census figures of Spokane residents from the year 2000 show that 91.4 percent identify themselves as White. Persons of Latino or Hispanic origin represent the largest other racial category, with 2.8 percent reporting themselves in this category. An additional 2.8 percent identify themselves as of two or more races. Slightly over 11 percent of the entire population of Spokane County identify themselves as college graduates, compared with 12 percent in the State as a whole. Median household income is lower in Spokane County than in the State as a whole. Correspondingly, the poverty rate is slightly higher in Spokane County than in the State of Washington as a whole.

Rural Areas

The Refuge and the Stewardship Area are both located within Census Tracts 142 and 143. The City of Cheney is located within Census Tract 140.

Within Spokane County, several subareas were designated for the purposes of calculating population. Rural subareas encompass more than one Census Tract. The Refuge is situated within County Subarea "South Rural" and is just adjacent to the County subarea "West Rural." Table 3.8 shows population and housing data for these areas.

Urban Areas

Population data, and changes since 1990, are presented for several local towns in Table 3-9. The current population of the City of Spokane, located 20 miles (32 km) northeast of the Refuge, is 195,629 people, making it the second largest city in Washington State (U.S. Census 2000) (Table 3.9). This represents a 10 percent increase since 1990, a faster growth rate than either Seattle or Tacoma. The population of Cheney, just adjacent to the Refuge, has increased at a rapid rate since 1990 (Table 3-9).

Future Trends

The population increases observed over the last 10 years are forecasted to continue beyond 2015. By 2015, the population of Spokane County is expected to increase 23.3 percent to 510,971 while the population of the State will increase 24.1 percent to 7,142,144 (OFM 1999) (see Table 3-10). These increases in population are expected to be mirrored by similar growth in many communities surrounding the Refuge.

3.12.2 EMPLOYMENT AND BUSINESS

Table 3-11 shows some basic business and employment data for Spokane County, with comparison to Washington State as a whole.

3.12.3 ENVIRONMENTAL JUSTICE

In February 1994, the President issued Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations. This EO requires federal agencies to achieve environmental justice by identifying and addressing disproportionately high and adverse human health or environmental effect of its programs, policies, and activities on minority and low-income populations. Refuge activities usually do not have a high risk of adversely affecting human health and the environment. In reviewing the demographics of Spokane County, less than 10 percent of the county identified themselves as a minority and just over 12 percent of the population is estimated to be living below the poverty level.

Table 3-7. *Population and Associated Social Statistics, Spokane County and Washington State*

	Spokane County	Washington
Population, 2000	417,939	5,894,121
Population, percent change, 1990 to 2000	15.7%	21.1%
Persons under 18 years old, percent, 2000	25.7%	25.7%
Persons 65 years old and over, percent, 2000	12.4%	11.2%
High school graduates, persons 25 years and over, 1990	192,761	2,620,607
College graduates, persons 25 years and over, 1990	47,096	716,969
Housing units, 2000	175,005	2,451,075
Homeownership rate, 2000	65.5%	64.6%
Households, 2000	163,611	2,271,398
Persons per household, 2000	2.46	2.53
Households with persons under 18, percent, 2000	34.7%	35.2%
Median household money income, 1997 model-based estimate	$35,691	$41,715
Persons below poverty, percent, 1997 model-based estimate	12.2%	10.2%
Children below poverty, percent, 1997 model-based estimate	17.1%	15.2%

*Source: U.S. Census, 2000 (*http://quickfacts.census.gov/qfd/states/53/53063.html*)*

Table 3-8. *Summary of Population and Housing by County Subarea*

Subarea	Census Tracts included	2000 Population	2000 Housing
West Rural (includes City of Cheney),	104, 140, 139, 141	32,046	10,799
South Rural	133, 135, 142, 143	11,897	4,953 estimated

Source: Spokane County (http://www.spokanecounty.org/BP/Census/2000/2000cntysum.asp)

Table 3-9. *Recent Population Growth in Selected Cities near Turnbull NWR (1990-1999).*

Location	Population 1990	Population 2000	Percent Change 1990-2000
Spokane	177,196	195,629	10.0
Cheney (adjacent to Turnbull NWR)	7,723	8,832	14.3
Medical Lake	3,664	3,758	2.5
Spangle	229	240	4.8

Source: U.S. Census Bureau (*http://factfinder.census.gov*/home/saff/main.html?_lang=en

Table 3-10. *Estimated Population and Population Change in Selected Locations*

Location	Estimated Population in 2015	Percent Change from 1999-2015
Spokane	242,744	28.3
Cheney	11,235	31.4
Spokane County	510,971	23.3
Washington State	7,142,144	24.1

Source: OFM (1999)

Table 3-11. *Employment and Business Data*

Business Facts	Spokane County	Washington
Private nonfarm establishments, 1999	11,717	162,932
Private nonfarm employment, 1999	162,962	2,209,129
Private nonfarm employment, percent change 1990-1999	29.1%	25.4%
Nonemployer establishments, 1998	20,937	315,472
Manufacturers shipments, 1997 ($1,000)	3,994,582	78,852,486
Retail sales, 1997 ($1,000)	4,122,561	52,472,866
Retail sales per capita, 1997	$10,165	$9,363
Minority-owned firms, percent of total, 1997	5.1%	9.6%
Women-owned firms, percent of total, 1997	22.9%	27.5%
Housing units authorized by building permits, 2000	2,094	39,021
Federal funds and grants, 2000 ($1,000)	2,132,792	33,896,997
Local government employment - full-time equivalent, 1997	11,717	185,152

*Source: U.S. Census, 2000 (*http://quickfacts.census.gov/qfd/states/53/53063.html*)*

APPENDIX A:

LAND PROTECTION PLAN

Turnbull National Wildlife Refuge
Comprehensive Conservation Plan
Spokane County, Washington

March 2007

Approved by:

David Wesley

Acting Regional Director
U.S. Fish and Wildlife Service

MAR 2 7 2007
Date

Concurrence:

signed by H. Dale Hall
Director
U.S. Fish and Wildlife Service

January 10, 2007
Date

1. INTRODUCTION

The Turnbull National Wildlife Refuge Habitat Management Plan (USDI 1999) and the Refuge's Draft Turnbull Comprehensive Conservation Plan/Environmental Assessment (CCP/EA) identify the need to protect certain lands surrounding the Turnbull National Wildlife Refuge. The CCP/EA evaluates different alternative strategies for land protection, and considers the environmental consequences of each alternative, including taking no action.

This Land Protection Plan briefly describes the biological resources, threats, goals/objectives, and the protection methods being considered for the area under the Draft CCP/EA preferred alternative (Alternative 3). More detailed information is available in the Draft CCP/EA, especially Chapters 2 and 3. In tables and maps, the Land Protection Plan also displays parcels within the proposed Stewardship Area and each parcel's priority for protection. The extent of the land protection strategies enacted will be contingent on availability of funds.

The area studied for land protection in the Draft CCP/EA encompasses part of a globally unique geological area known as the Channeled Scablands. Its diverse landscape resulted from several massive Ice Age flood events that scoured potholes, sloughs, and deep canyons out of the pre-existing lava plains. An extensive complex of deep permanent sloughs, semi-permanent potholes and seasonal wetlands formed in the depressions left in the scoured landscape, while uplands were left with little to none of the original 400-foot deep loess soils that had been present before the floods. Today, soils only centimeters thick on upland sites support primarily ponderosa pine intermixed with grasslands (steppe) and exposed basalt cliffs. Aspen is scattered throughout the area. The juxtaposition of all these contrasting habitats in such close proximity is a distinctive marker of the Channeled Scablands and creates conditions of exceptional wildlife and plant diversity.

Due to the unusual topography and soil conditions rendered by the floods, Turnbull and its surrounding habitats in the Study Area comprise a unique assemblage of habitats in a semi-arid and fragile landscape. The Service is compelled to pursue protecting the integrity of the Channeled Scablands before habitat loss, fragmentation, and isolation compromise its habitat values.

Protection and conservation of lands as envisioned under this Land Protection Plan would provide an opportunity to protect, restore and enhance wetland, aspen/riparian, Palouse steppe, and ponderosa pine habitats; assist in the recovery of federally listed species, including water howellia (*Howellia aquatilis*); and preserve the rich biological diversity of a region that has been largely converted to agricultural or urban uses.

The current Approved Refuge Boundary[1] for the Turnbull National Wildlife Refuge measures approximately 20,640 acres. Within the Approved Boundary 15,859 acres have been acquired in fee by the Service (RPMIS) and an additional 2,076 acres are under lease or agreement (RPMIS). Eighty-seven percent (87%) of the Approved Boundary is managed under the NWRS.

[1] A project boundary which the Director of the U.S. Fish and Wildlife Service approves upon completion of the planning and environmental compliance process. An approved refuge boundary only designates those lands which the Fish and Wildlife Service has authority to acquire and/or manage through various agreements.

2. THREATS TO AND STATUS OF THE RESOURCE

A full and complete description of the resources contained within the Study Area and threats to these resources as well as existing Refuge land can be found in Chapter 3, Sections 3.1-3.3 of the Draft CCP/EA. To summarize very briefly here, the integrity of the Channeled Scablands habitats and the species depending on these habitats is threatened by encroaching urban development, excessive groundwater withdrawals, forest overharvest, intensive agricultural development, and ranching practices. The need for protection stems from the following reasons:

1) Refuge purposes could be threatened if action is not taken to protect sources of Refuge water. Groundwater is especially critical to support migratory waterbird breeding at Refuge wetlands but both shallow and deep aquifers are being increasingly tapped for residential and urban development.

2) Widespread land conversion to agricultural and residential uses in the surrounding area has threatened the connectivity of the Refuge to other native habitats, undermining biological integrity.

3) The Channeled Scablands, of which the Refuge is a piece, is an area of regional and national conservation importance. Crossing several counties in eastern and central Washington state, the Scablands contains densities of wetland basins rivaling the Prairie Pothole region, and at intact sites, waterfowl production exceeds that of the Potholes region. Yet most of the larger wetland basins have been drained and very little of the original Channeled Scablands area is under any kind of public ownership or protected in any other fashion.

4) The area is identified as an important site in the Partners In Flight Columbia Plateau plan, the Nature Conservancy's Columbia Plateau Ecoregion Plan, the Draft Intermountain West Waterbird Conservation Plan, and the Draft Recovery Plan for Water Howellia. In addition, the Refuge itself is currently designated an Important Bird Area by the Audubon Society.

5) A broadbased common vision and collective drive for conservation work of this kind is very much alive in this area, as evidenced by the partnership activity already well underway in the Channeled Scablands area. The Refuge is a partner to an ongoing effort by fourteen public and private organizations to protect and restore wetlands and riparian areas within the Channeled Scablands. Two million dollars in federal North American Wetland Conservation Act (NAWCA) grants were recently awarded to this project, and partners have put up a total of nearly ten million dollars in matching and in-kind funds.

6) The Channeled Scablands also host the majority of the last remnants of the Palouse steppe vegetation community which is recognized nationally as a critically endangered ecosystem (Noss et.al. 1995) and was furthermore identified as the top Conservation Priority by the State GAP analysis (Cassidy et al, 1996).

3. PROPOSED ACTION AND GOALS/OBJECTIVES

The Land Protection Plan encompasses a set of strategies to protect certain valuable habitats and resources within the Channeled Scablands geological formation. This action is being proposed to protect the water quality and quantity for the wildlife and habitat at the established Refuge; to protect a critically endangered ecosystem (Palouse steppe); to provide opportunities to restore numerous wetland basins to aquatic conditions; to provide further protection for intact wetlands, ponderosa pine, and aspen communities; and to provide further protection for species in decline over widespread areas of the Interior Columbia Basin.

The Service proposes to establish a Stewardship Area surrounding the Refuge, which would measure approximately 44,324 acres. This area includes the 4,723 acres within the current Approved Refuge Boundary not acquired in fee. The Stewardship Area would function as an informally designated conservation zone surrounding the Refuge. Within the Stewardship Area, the Service would actively work with partners and neighbors for voluntary, cooperative activities that protect habitat and water resources. Key tools include but are not limited to: conservation easements, enrollment in the Wetlands Reserve Program, and technical assistance programs. Another innovative measure that could be used is installing casing on deep wells (which would prevent water from the shallow aquifer from cascading down to the deep aquifer). Easements on wells could also be obtained to limit or prevent groundwater withdrawals.

In addition, the Service would seek to protect, as part of the National Wildlife Refuge System, up to 12,000 acres of priority lands from willing sellers within the Stewardship Area, through fee, easement or agreement. These 12,000 acres would be in addition to the 4,723 acres of inholdings and lease lands located inside the current Approved Refuge Boundary. Based on the percentages of habitat types estimated in the Study Area, this would equate to protection under the Refuge System of approximately 2,156 acres of wetlands; 3,637 acres of steppe; 6,092 acres of ponderosa pine; and 115 acres of aspen/ riparian.

The Service would work in partnership with others, adding to efforts already underway. Two NAWCA grants were awarded recently in the amount of nearly two million dollars for protection and restoration of wetland and riparian habitats in Spokane, Lincoln, and Adams Counties in Washington State. These first two grants fund Phases 1 and 2 of a five-phase project plan for the Intermountain West Joint Venture Channeled Scablands Focus Area (CSFA). Fourteen public and private organizations provided matching and in-kind funds in the amount of $3.2 million (Phase 2) and $6.2 million (Phase 1). The organizations include: Ducks Unlimited, Spokane County Parks and Recreation Dept., Spokane County Conservation District, U.S. Bureau of Land Management, U.S. Natural Resources Conservation Service, The Nature Conservancy, Avista Corporation, U.S. Farm Services Agency, Washington Dept. of Fish and Wildlife, Inland Northwest Wildlife Council, Inland Northwest Land Trust, Friends of Turnbull National Wildlife Refuge, and Spokane Audubon Society. Numerous private landowners are also partners in the project. The goals of Phase 1 and Phase 2 of the project are to acquire, restore, and enhance over 15,000 acres of wetland, riparian, and adjacent upland habitat within the area covered by the CSFA Implementation Plan.

Implementing the Land Protection Plan would contribute to the fulfillment of seven of the eight refuge goals and numerous objectives (the objectives are not listed here but are detailed in Chapter 2 of the Draft CCP/EA).

Goal 1: Contribute to protection of local watersheds so as to maintain adequate water quality and quantity for native refuge wetland species.

Goal 2: Provide habitat conditions essential to the conservation of birds and other wildlife within a variety of wetland complexes.

Goal 3: Restore Refuge aspen and ponderosa forest to a natural distribution of stand structural and successional stages to benefit forest dependent wildlife.

Goal 4: Protect and restore the natural distribution and diversity of grassland and shrub steppe habitats to benefit wildlife.

Goal 5: Support the conservation of threatened and endangered species in their natural ecosystems.

Goal 6: Support the maintenance of biologically effective landscape linkages and corridors between the Refuge and other intact areas of vegetation zones representative of this ecoregion.

Goal 7: Foster appreciation and support of the Refuge and the Channeled Scablands ecosystem through quality environmental education, interpretation, wildlife-dependent recreation, and outreach compatible with the Refuge purposes and mission.

If the proposed Land Protection Plan is approved together with the Draft CCP/EA, the Service would have the authority to enter into purchase agreements, conservation easements, and cooperative agreements with interested landowners within the boundaries of the Stewardship Area. Lands acquired by the Service would be managed as part of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966, as amended.

4. HABITAT PROTECTION METHODS

Service policy is to adopt habitat protection measures and strategies that involve acquiring the minimum possible interest or rights in lands and waters and still meet the defined resource objectives. It is also Service policy to acquire land from willing sellers and to enter into cooperative agreements with interested participants. Any landowner within the Stewardship Area who has no interest in selling his or her property would be under no obligation to sell to the Service. The Service is required by law to offer fair-market value for all land purchases. The value is based on a professional appraisal completed in accordance with the Uniform Standards for Federal Land Acquisitions. Appraisal values are based on the highest and best use of the property which considers current zoning and market conditions. Federal funds to acquire these lands would become available primarily through appropriations from Migratory Bird Conservation Fund or possibly annual appropriations by Congress from the Land and Water Conservation Fund.

Under the Uniform Relocation Assistance and Real Property Acquisition Policies Act, Federal agencies provide benefits to persons whose residences or businesses are displaced. Such benefits may include reimbursement of reasonable moving and related expenses; replacement housing payments; and reimbursement of certain necessary and reasonable expenses incurred in selling real property to the Federal government.

Although the Service would consider a wide variety of protection methods available (e,g. fee title, easement, lease, agreement, permit, license) to achieve land protection goals, the Service anticipates the following methods would be the preferred techniques for this project.

4.1 Fee Title Acquisition or Lease

The Service acquires land by fee title from willing sellers, assembling tracts into a manageable unit. Fee title is used when (1) the land's fish, wildlife, and plant resources require permanent protection which is not otherwise available; (2) the land is needed for development associated with a priority wildlife-dependent public use; or (3) a pending land use could otherwise harm wildlife or their habitats. Fee title may be acquired by purchase, donation, exchange, or transfer.

4.2 Conservation Easements

With a conservation easement, the landowner permanently sells or donates some, but not all, property rights to the Service as specified by mutual agreement. An easement could cover only a portion of the property or limit certain uses of the property.

4.3 Cooperative Agreements and Memorandums of Understanding

The Service can enter into cooperative agreements with landowners to improve wildlife and habitat management. Cooperative agreements may specify shared responsibilities or a transfer of funds from the Service to another entity or vice-versa for management purposes. The Service can also enter into Memorandums of Understanding with landowners for the Service to oversee certain aspects of resource management on lands the Service does not own.

5. LAND PROTECTION PRIORITIES

Each of the resource factors described in section 5.1 was mapped for the Study Area (see Chapter 3) and overlaid with the taxlot (parcels) map provided by Spokane County. Resource factors (if present) and associated weights were assigned to each taxlot. A total Resource Sum Value score was assigned based on the sum of the weighted resource values.

Taxlots with total scores of 18 or above or in the groundwater buffer zone were grouped into the first order priority group if they also measured at least 35 acres (size of tax lot was incorporated into the priority ranking because larger tax lots can contribute more towards connectivity and resource values). Second order priorities included those taxlots with scores 18 and above or in the ground water zone and measuring over 20 but less than 35 acres. Also included in the second order priority grouping were taxlots not in the groundwater buffer zone but with scores between 8 and 17 and measuring at least 20 acres but less than 35 acres. Third order priority taxlots included everything not in the high or medium groups.

Map 14 displays the Stewardship Area with each parcel colored by its priority grouping. Map 15 (overview map and additional sheets) shows locations of individual taxlots in the Stewardship Area in more detail (each taxlot is labeled with the Service tract number).

Table A.1 lists the parcels within the proposed Refuge expansion boundary. Each parcel is identified by the Service's tract number (several separate parcels owned by one landowner are generally given the same tract number), County APN Number (Assessor's Parcel Number or PID_ from the county database), the Service's unique numerical identifier (FWSNUM), landowner name, acres (as calculated under GIS), the resource factors present on that parcel, total score based on a sum of the weighted resource factors present, and Service priority for protection.

5.1 Resource Factors Considered in Prioritization

- Groundwater influence zone - ½ mile buffer to south and west of Refuge; 1 mile buffer to north and east - critical for maintaining wetland area and depth on Refuge especially during summer months and drought years *(See map 9 in Chapter 3)*
- Surface watersheds - critical for maintaining wetland area, depth, and water quality on Refuge *(See map 7 in Chapter 3)*
- Priority intact (undrained) wetlands and most likely restorable drained wetlands (those that straddle 2 ownerships or less) - significant migratory waterfowl habitat; also provides potential habitat for bald eagles, and threatened species *Howellia* and *Spiranthes* (*See map 8 in Chapter 3)*
- High quality Palouse steppe habitat - highest conservation priority under State GAP analysis; also provides potential habitat for threatened species *Silene*, several PIF focal species, and several Region 1 species of management concern *(See map 11 in Chapter 3)*
- High quality ponderosa pine - habitat for several Partners In Flight focal species; state candidate species; also provides connectivity to additional forest habitat to the northeast *(See map 12 in Chapter 3)*
- Potential for adding recreational opportunities to the Refuge, especially where hunting opportunities appear viable.

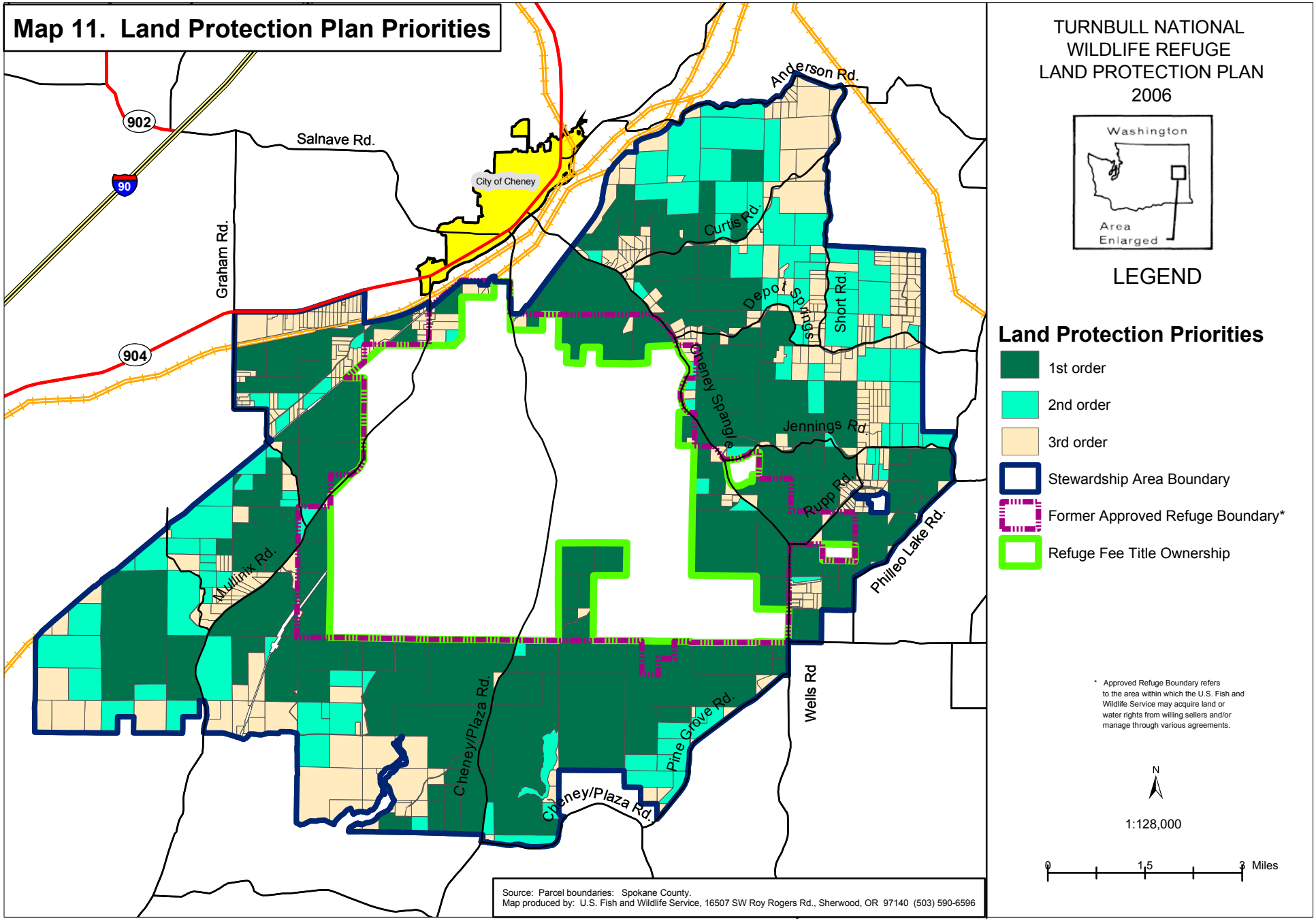
6. SOCIAL AND ECONOMIC IMPACTS

Enacting various land protection strategies could alter spending, land uses, and recreational opportunities within the area. See Chapter 4 of the EA for more analysis of the social and economic impacts of land protection together with other actions undertaken in the Draft CCP/EA.

7. COORDINATION

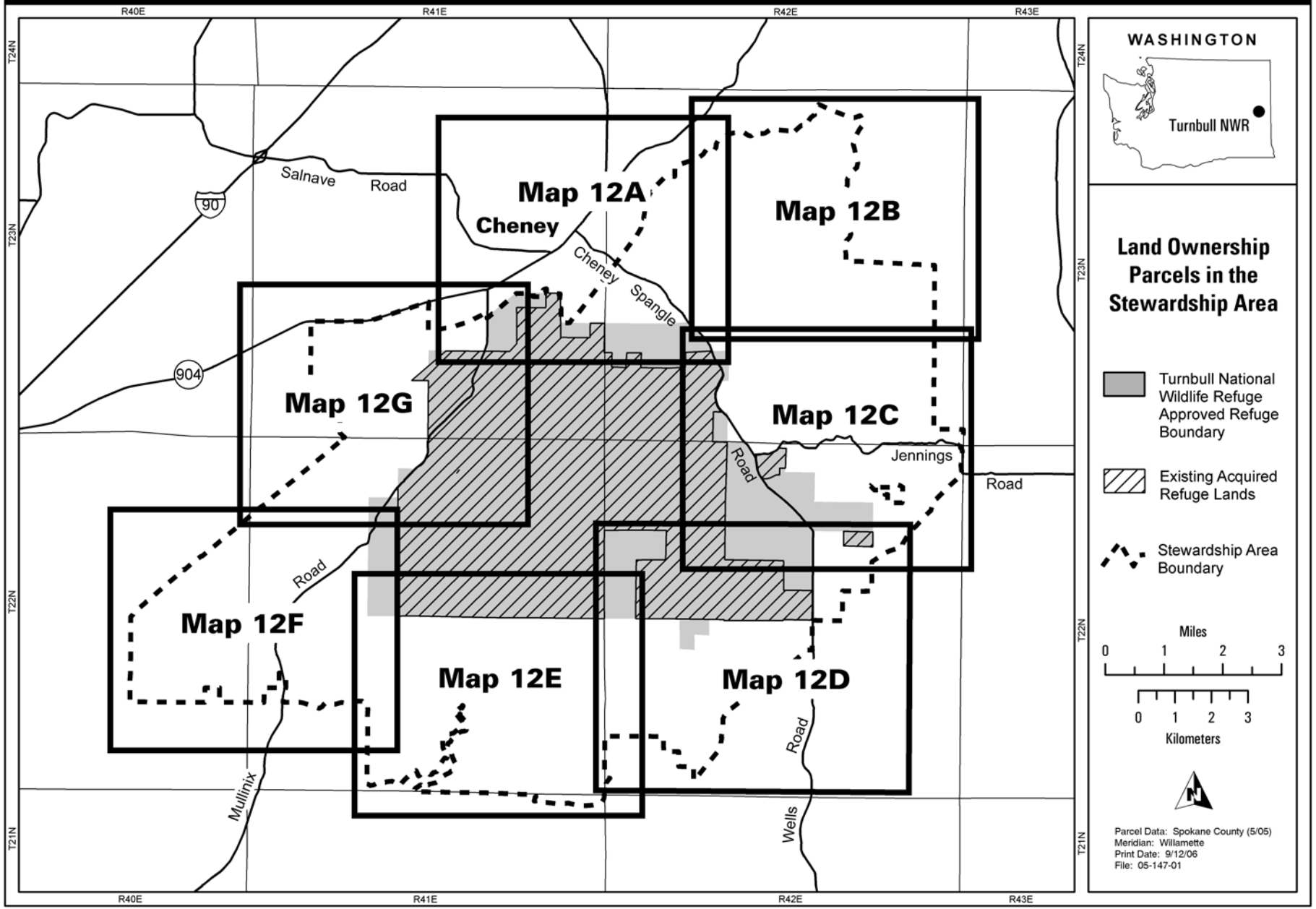
The Service encouraged input from landowners, other individuals in the community, conservation organizations, and Federal, Tribal, State, and local governments to identify concerns and issues and to explore alternative Refuge expansion boundaries. See Appendix K of the CCP/EA for the summary of public involvement that occurred during development of the CCP and the Refuge land protection proposal.

In addition, the Service has been integrally involved in the Channeled Scablands Focus Area partnership as described under section 3.


Map 11. Land Protection Plan Priorities
TURNBULL NATIONAL WILDLIFE REFUGE LAND PROTECTION PLAN 2006
Washington
Area Enlarged
LEGEND
Land Protection Priorities
1st order
2nd order
3rd order
Stewardship Area Boundary
Former Approved Refuge Boundary*
Refuge Fee Title Ownership
* Approved Refuge Boundary refers to the area within which the U.S. Fish and Wildlife Service may acquire land or water rights from willing sellers and/or manage through various agreements.
N
1:128,000
0 1.5 3 Miles
City of Cheney
Salnave Rd.
Graham Rd.
902
90
904
Anderson Rd.
Curtis Rd.
Depot Springs
Short Rd.
Cheney Spangle
Jennings Rd.
Rupp Rd.
Phillco Lake Rd.
Mullinix Rd.
Cheney/Plaza Rd.
Pine Grove Rd.
Wells Rd
Source: Parcel boundaries: Spokane County.
Map produced by: U.S. Fish and Wildlife Service, 16507 SW Roy Rogers Rd., Sherwood, OR 97140 (503) 590-6596

Map 12 Index Page

Turnbull NWR



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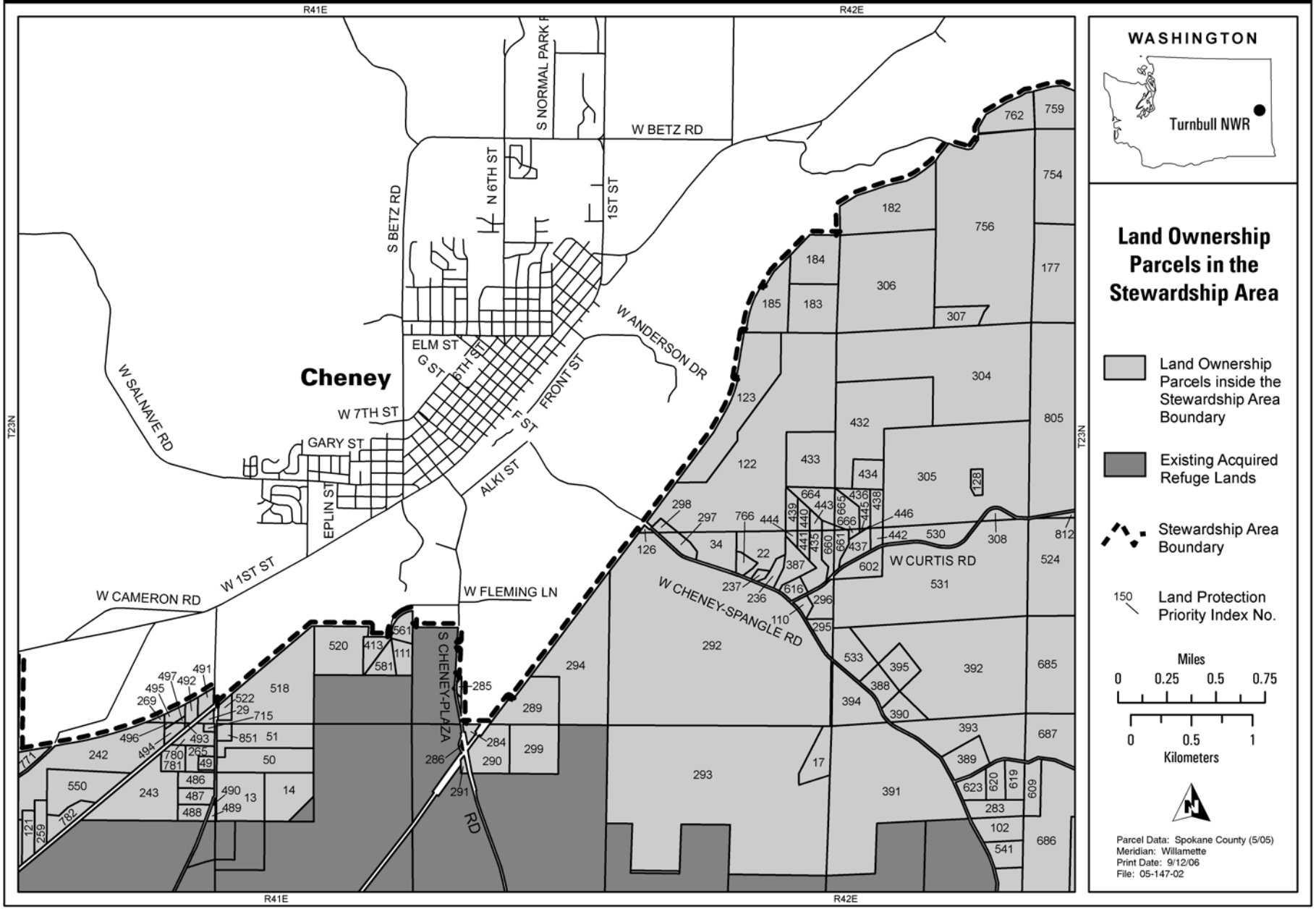

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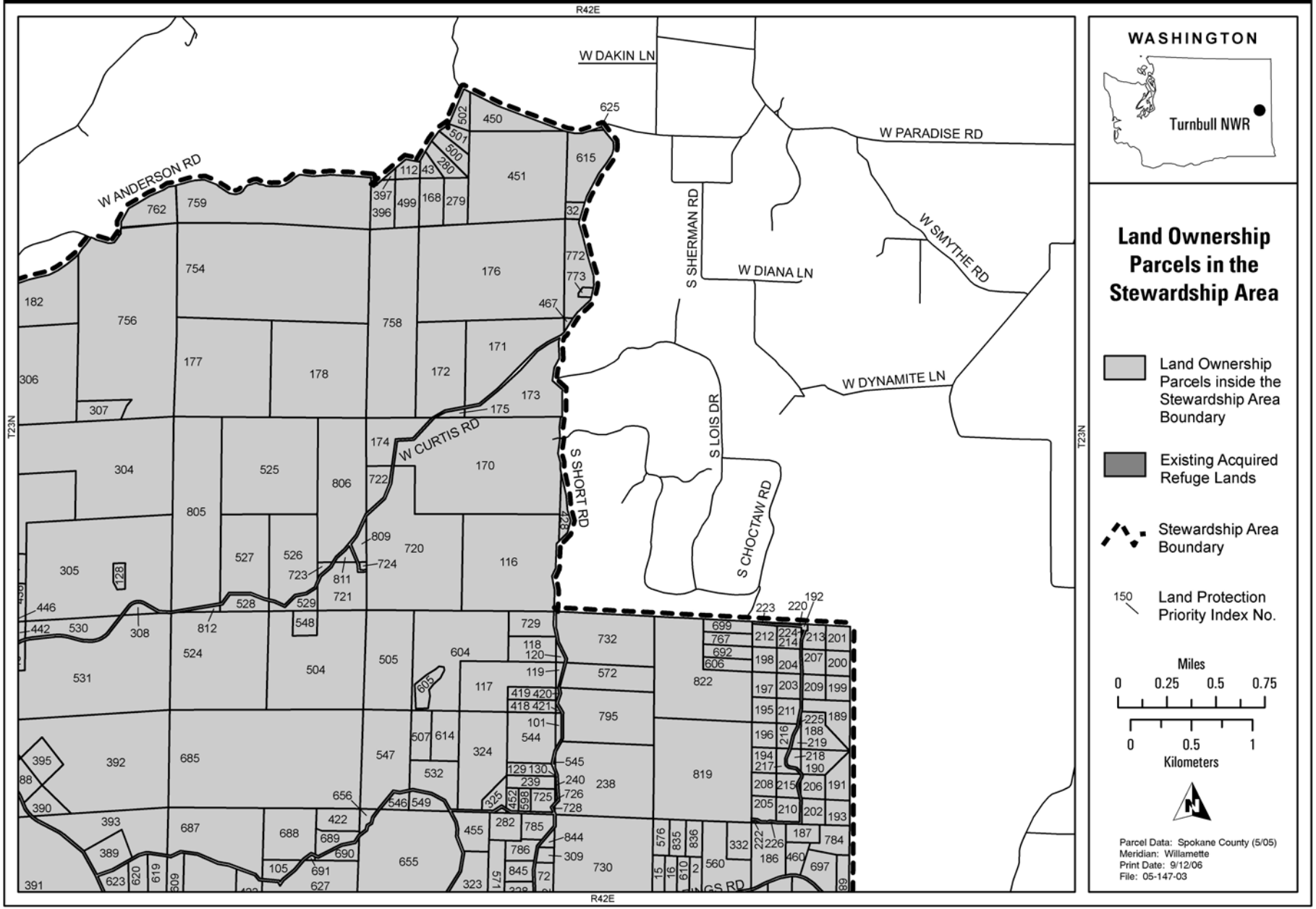
Turnbull NWR



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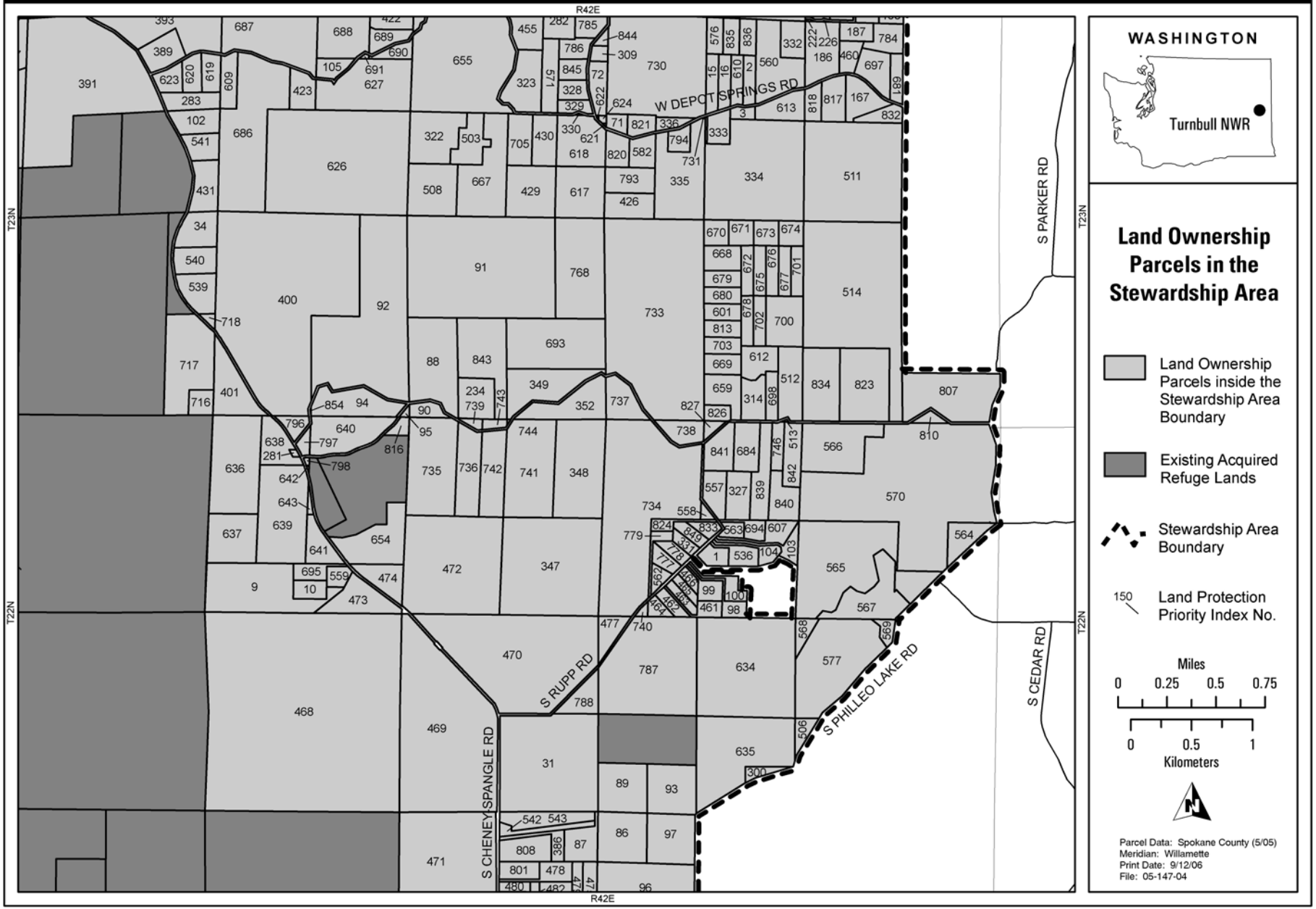

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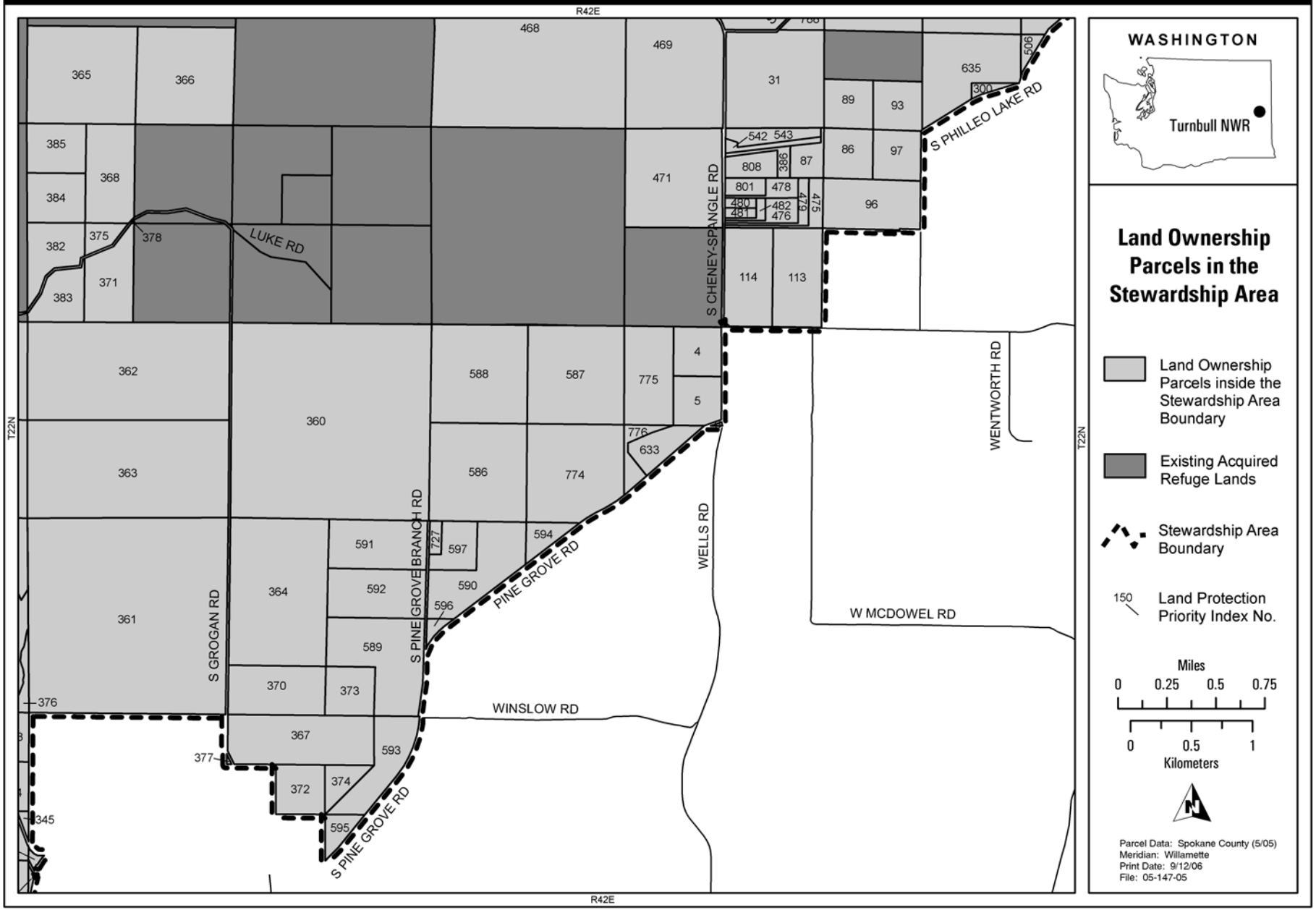
Turnbull NWR



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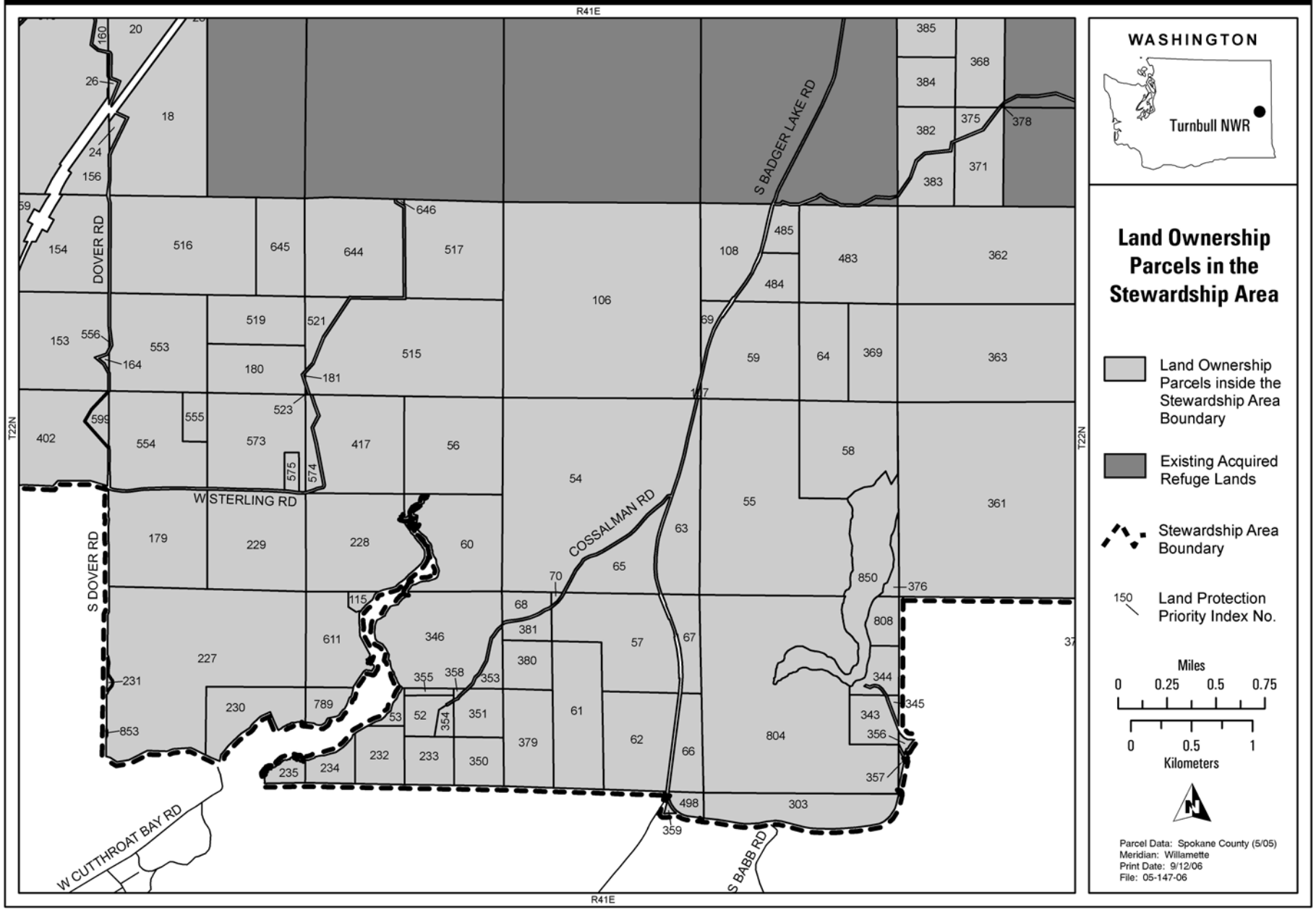

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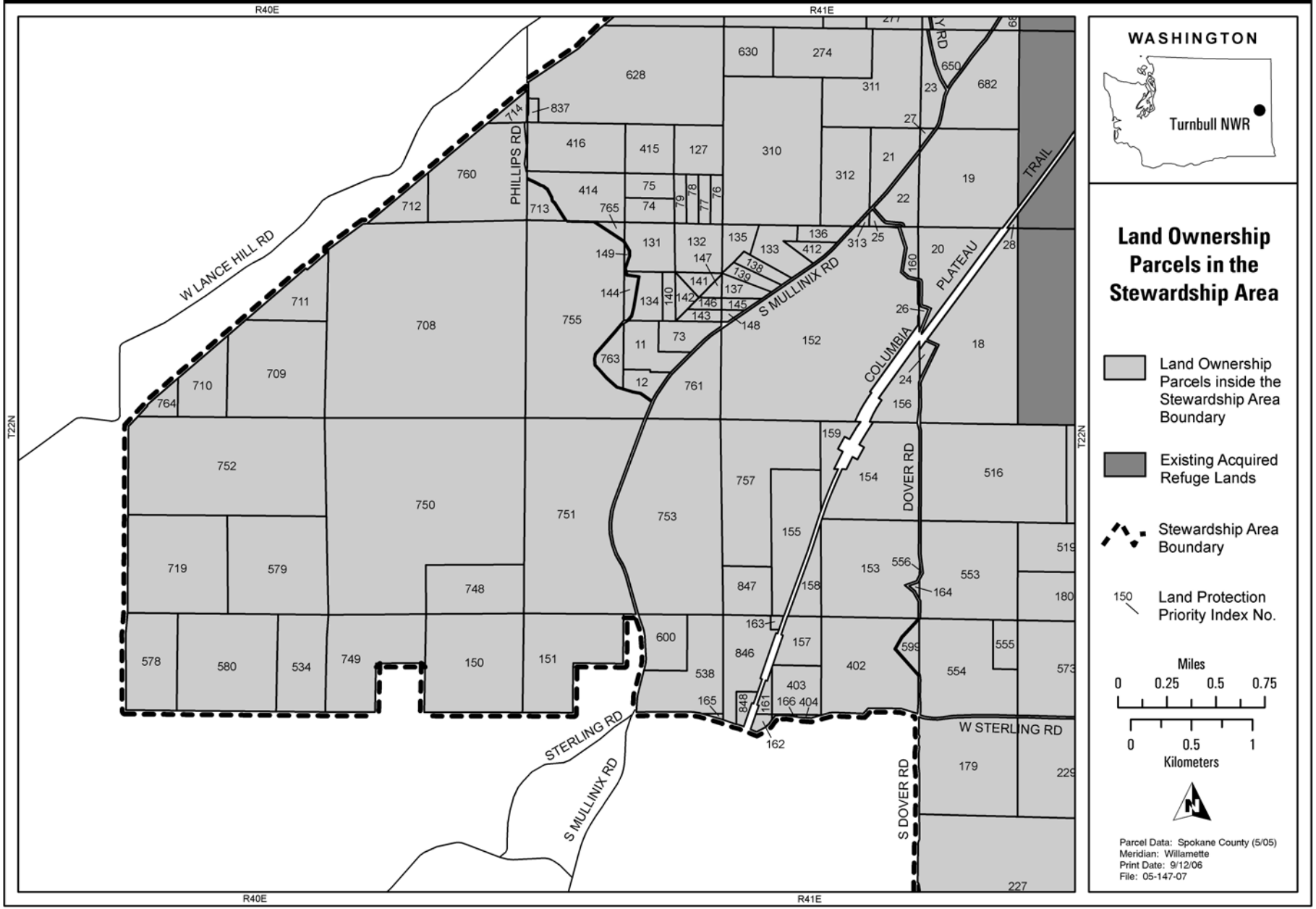

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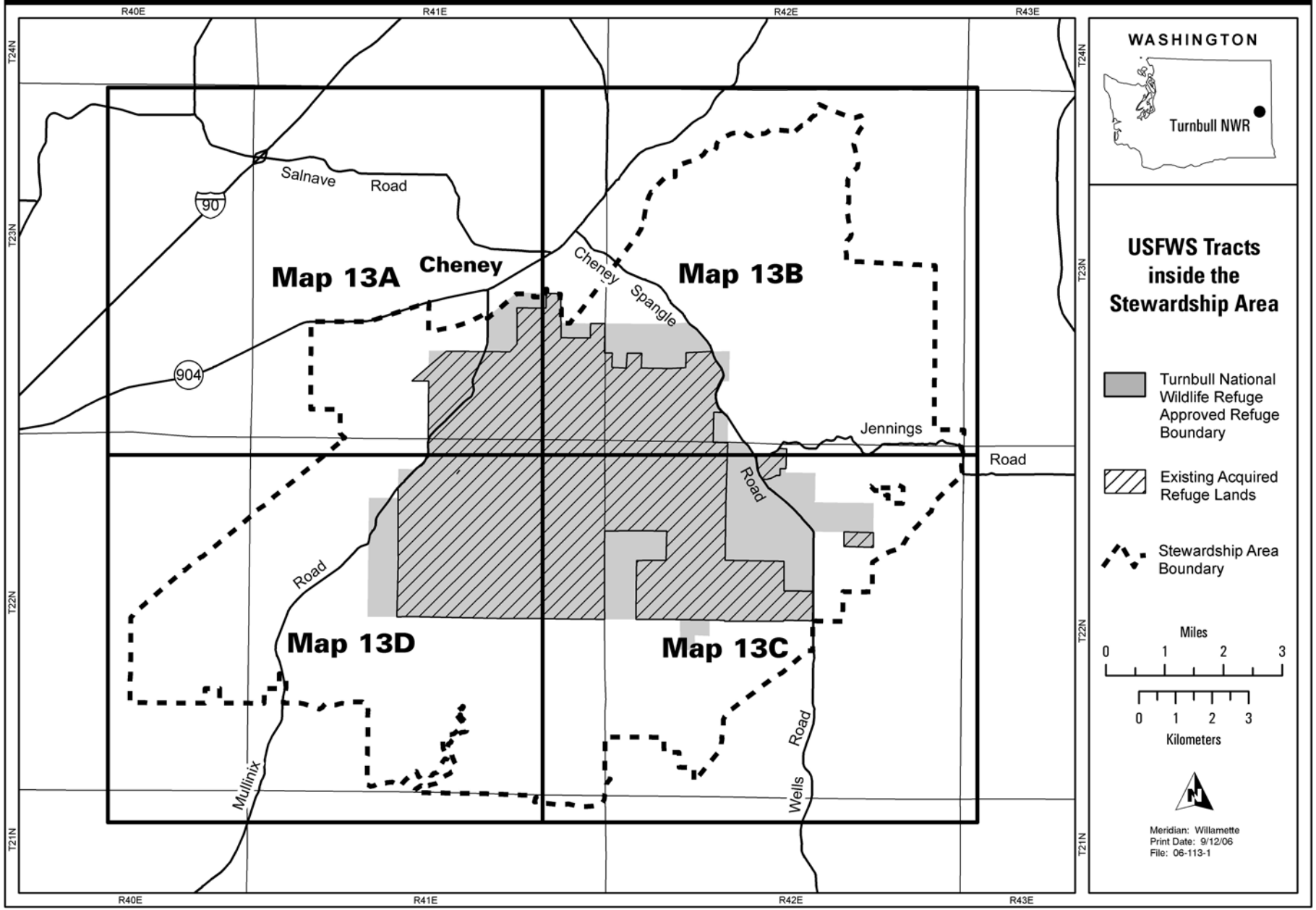
Turnbull NWR



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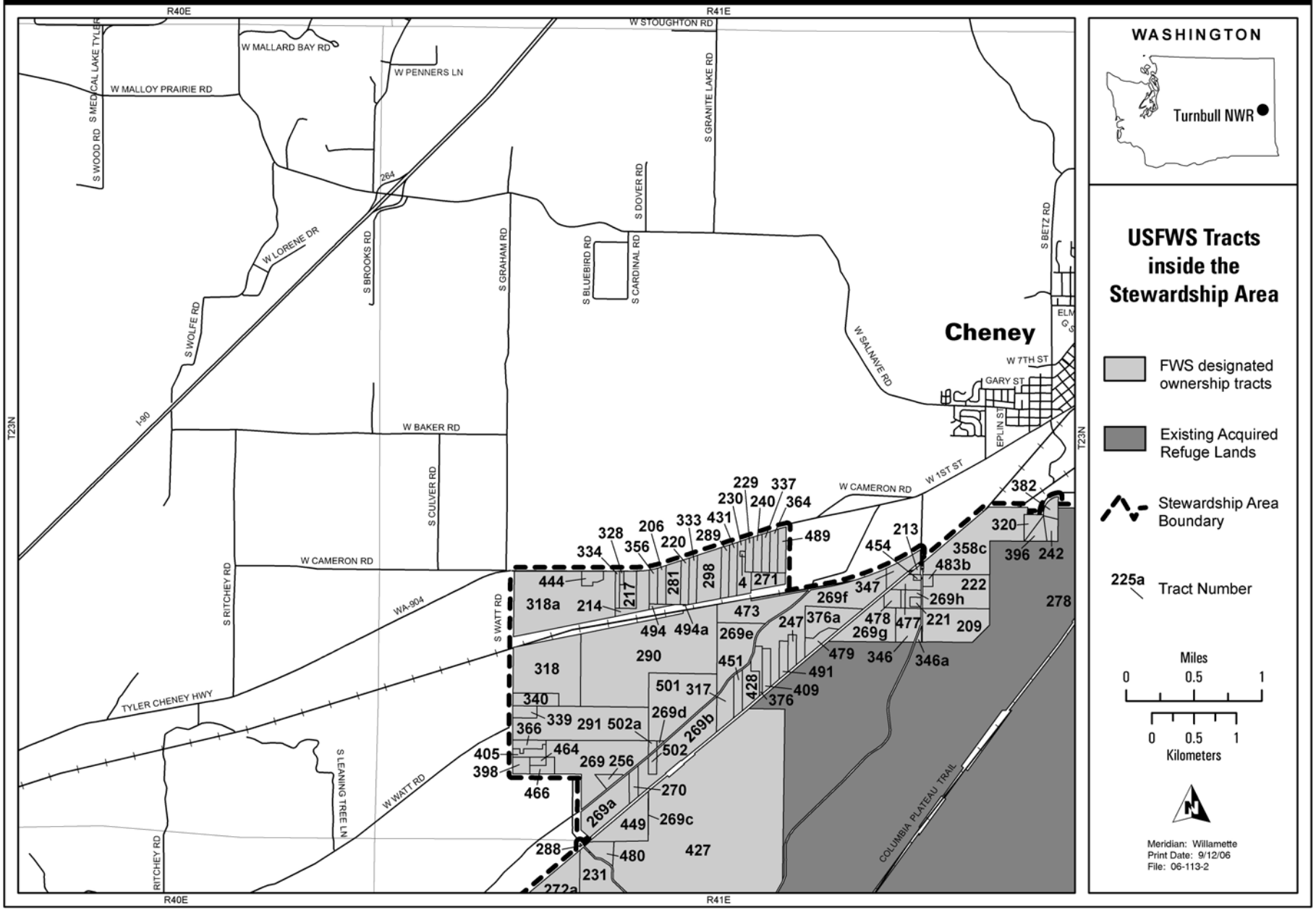

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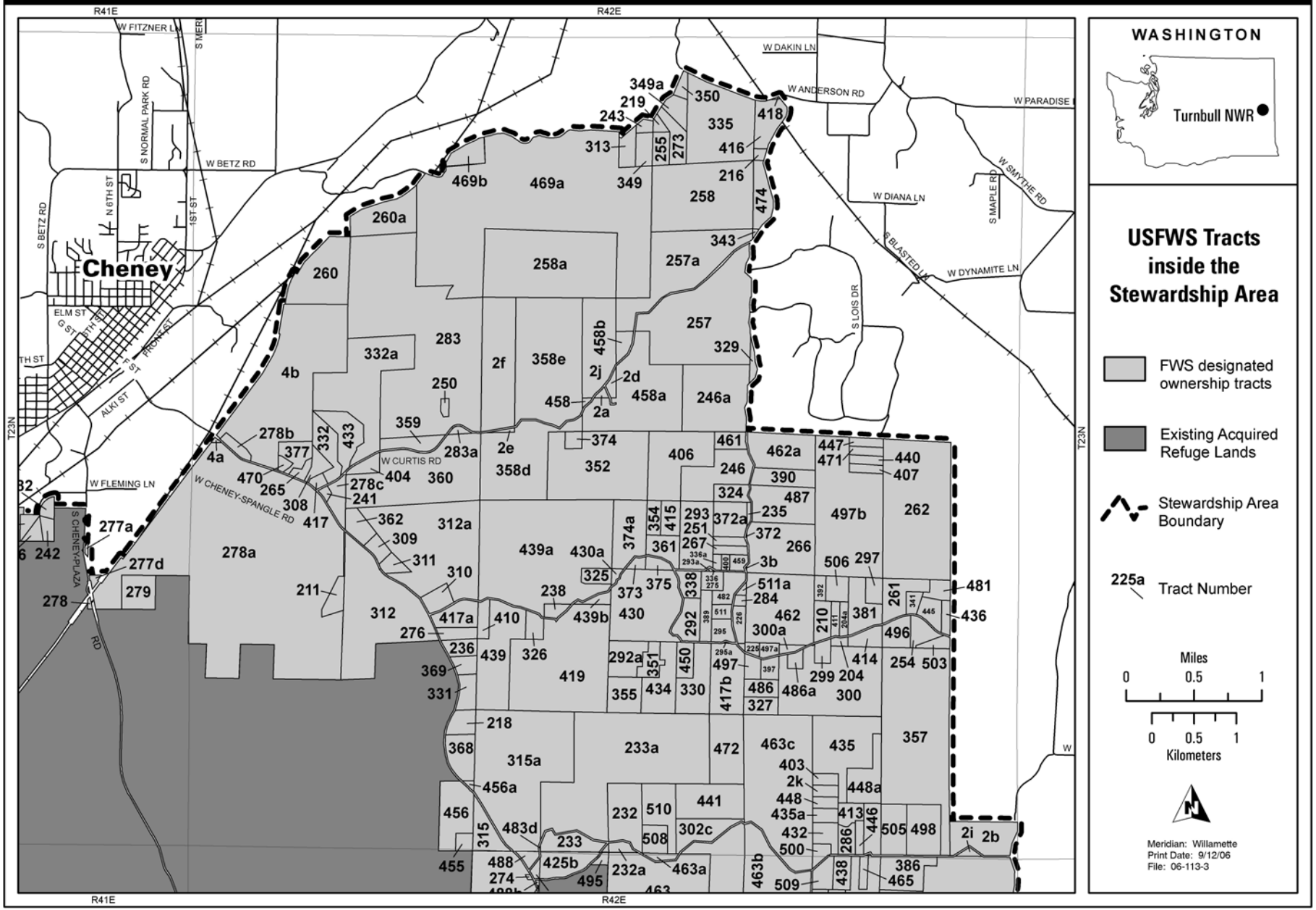

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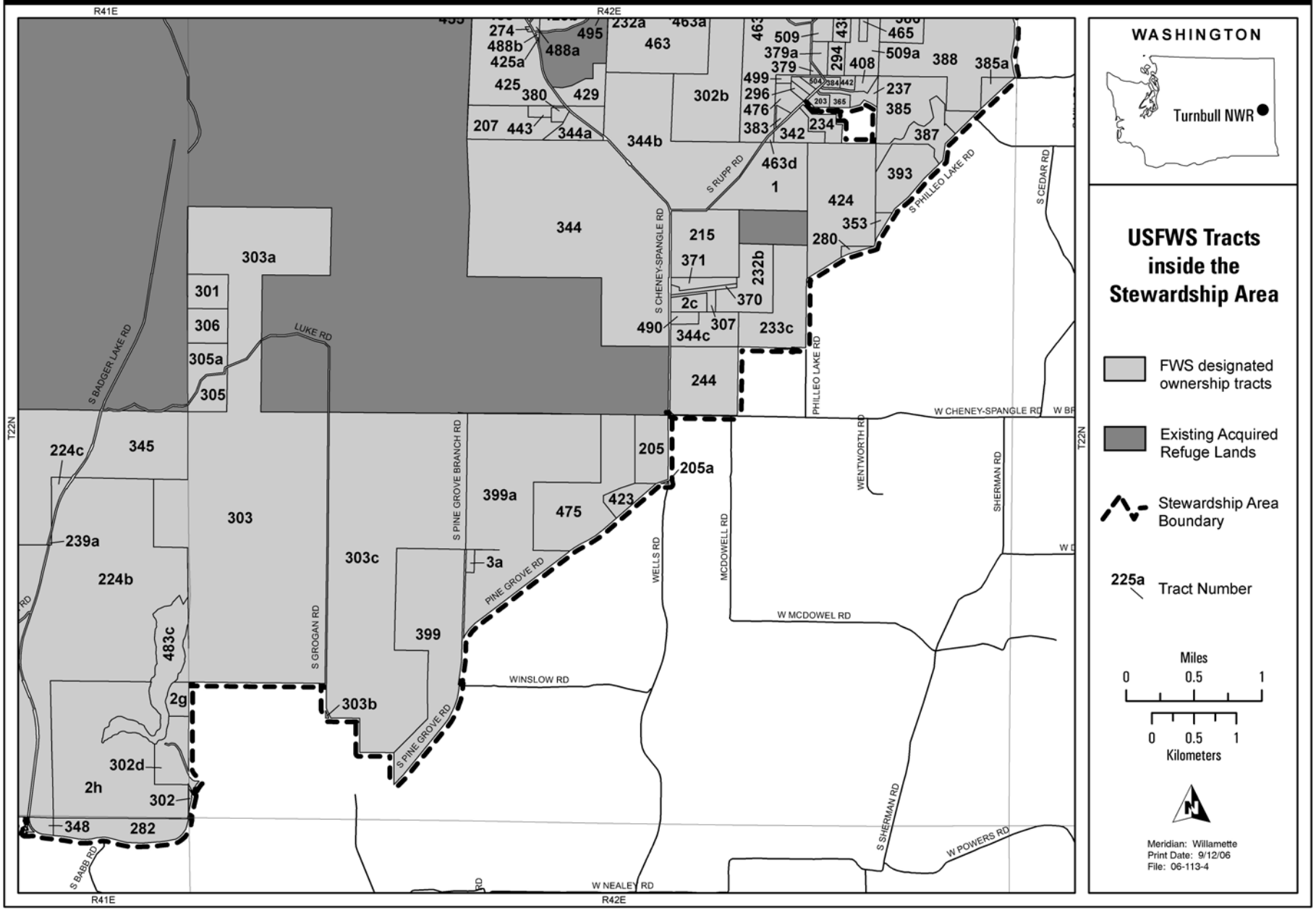

Map 13D Page 4 of 4 Turnbull NWR

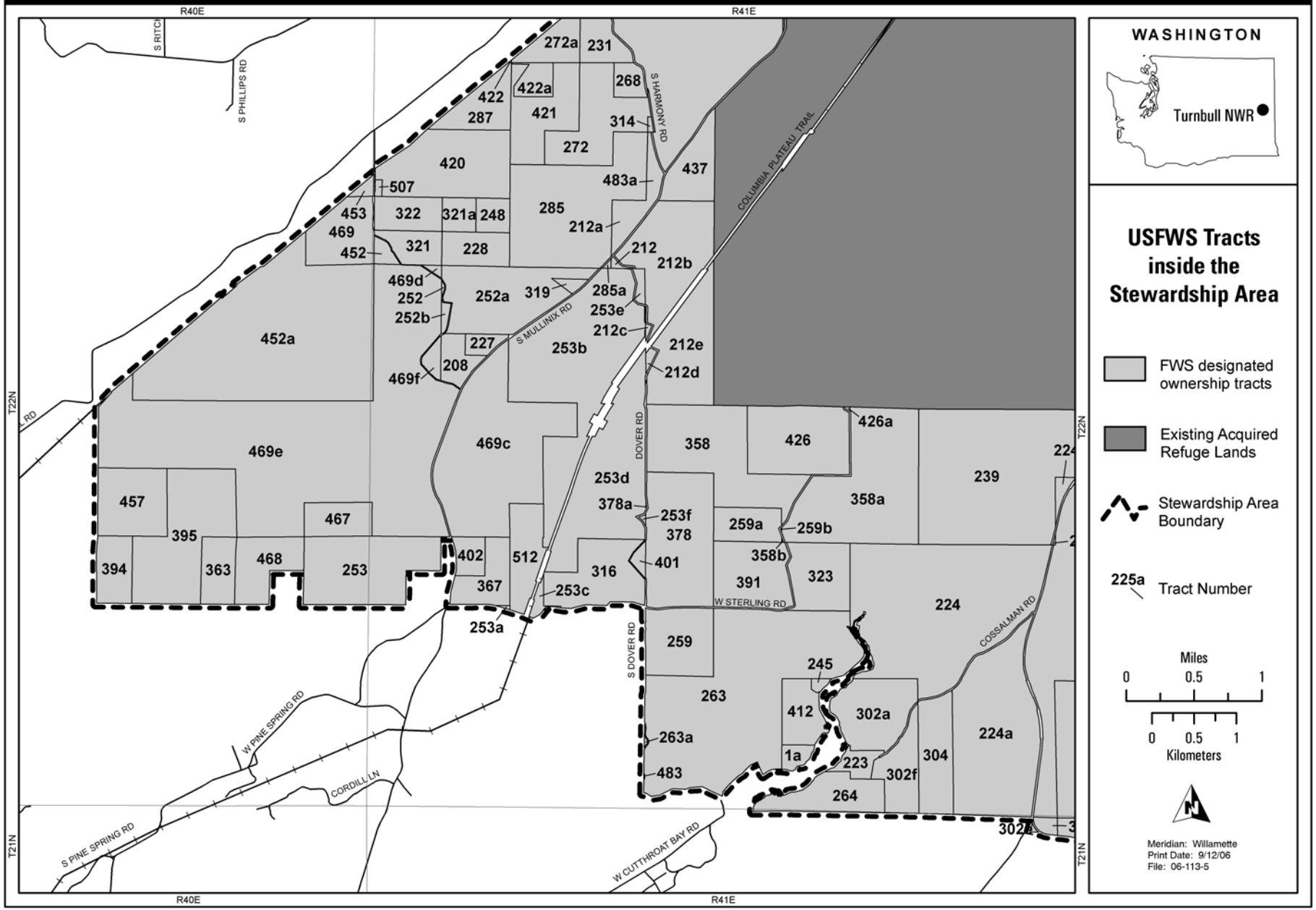

Table A-1. *Land Protection Priorities*

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
FIRST ORDER PRIORITY PARCELS: (71 landowners)														
ADVANTA USA, INC.	4	22222.9004	205	39.61	1st order	20	Y				Y			
ADVANTA USA, INC.	5	22222.9006	205	38.83	1st order	10	Y							
ALLEMAND, D M & KILGORE	9	22045.9026	207	81.43	1st order	0								
ANDERSON, C E	21	12084.9005	212a	42.86	1st order	23	Y			Y	Y			
ANDERSON, C E	20	12165.9002	212b	71.2	1st order	0								
ANDERSON, C E	19	12093.9005	212b	157.36	1st order	0								
ANDERSON, C E	18	12165.9002	212e	221.13	1st order	0								
ANDERSON, STEVEN C & DAWN R	31	22104.9002	215	159.04	1st order	27	Y	Y			Y		Y	
BELL, PEYTON A & MARC A	55	12255.9002	224b	408.28	1st order	25			Y		Y	Y	Y	Y
BELL, PEYTON A & MARC A	54	12265.9004	224	472.1	1st order	28			Y	Y	Y	Y	Y	Y
BELL, PEYTON A & MARC A	56	12271.9001	224	160.48	1st order	20				Y	Y		Y	Y

FIELD DEFINITIONS:

Owner - name of the person, persons, or entity owning the parcel according to Spokane County Records.
MapKey - a Service assigned number
County - Number assigned by Spokane County to separate taxlots. Drawn from the PID_ field in the parcels database obtained from Spokane County in September, 2002.
Tract - a Service assigned number. Often many or all of a landowner's separate taxlots will be given the same tract number.
GIS Acres - Acres of taxlot as calculated by a Geographic Information Systems. Not necessarily the same as the recorded acreage.
Protection Priority - Priority for action under the Turnbull CCP Land Protection Plan. 1st order indicates the highest degree of importance for protection, 2nd order indicates a lesser degree of importance for protection, etc.
Resource Sum Value - A "score" or value associated with each taxlot based on the presence of the resources of interest as described in Section 5.1.
GWAT - If Y value, parcel falls within the groundwater influence zone. Each Y value in GWAT was assigned weight of 10 points.
WSHED - If Y value, parcel falls within the surface watersheds draining into the Refuge. Each Y value in WSHED was assigned weight of 5 points.
WETS1 - If Y value, parcel contains a drained wetland that does not cross into any other ownerships. Each Y value in WETS1 was assigned weight of 5 points.
WETS2 - If Y value, parcel contains a drained wetland that does crosses into only one other ownership. Each Y value in WETS2 was assigned weight of 3 points
STEPPE - If Y value, parcel contains high quality steppe habitat. Each Y value in STEPPE was assigned weight of 10 points.
FOR - If Y value, parcel falls contains high quality ponderosa pine habitat. Each Y value in FOR was assigned weight of 3 points.
HUNT OPP - If Y value, parcel is located in an area where hunting opportunities could potentially be provided. Each Y value in HUNTOPP was assigned weight of 2 points.
INTACT - If Y value, parcel contains a high value intact wetland. Each Y value in INTACT was assigned weight of 5 points

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
BELL, PEYTON A & MARC A	57	12355.900	224a	156.69	1st order	23				Y	Y	Y	Y	Y
BELL, PEYTON A & MARC A	58	12251.900	224b	147.99	1st order	20					Y	Y	Y	Y
BELL, PEYTON A & MARC A	59	12243.901	224b	144.01	1st order	33		Y	Y	Y	Y	Y	Y	Y
BELL, PEYTON A & MARC A	62	12354.900	224a	114.26	1st order	20					Y	Y	Y	Y
BELL, PEYTON A & MARC A	63	12265.900	224b	86.23	1st order	25			Y		Y	Y	Y	Y
BELL, PEYTON A & MARC A	64	12244.900	224b	80.61	1st order	20					Y	Y	Y	Y
BELL, PEYTON A & MARC A	67	12355.900	224b	39.44	1st order	20					Y	Y	Y	Y
BELL, PEYTON A & MARC A	65	12265.900	224a	73.64	1st order	23				Y	Y	Y	Y	Y
BELL, PEYTON A & MARC A	61	12355.900	224a	122.21	1st order	20					Y	Y	Y	Y
BLEEKER, CAROLYN	83	12051.900	231	40.49	1st order	18		Y		Y	Y			
BRASH, GUY E	86	22142.900	232b	41.18	1st order	27	Y	Y			Y		Y	
BRASH, GUY E	89	22113.901	232b	40.22	1st order	27	Y	Y			Y		Y	
BRASH, GUY E	88	23343.901	232	71.94	1st order	23	Y	Y	Y			Y		
BRASH, RICK & BRENT	93	22113.901	233c	40.42	1st order	20	Y	Y				Y	Y	
BRASH, RICK & BRENT	96	22142.900	233c	80.9	1st order	27	Y	Y			Y		Y	
BRASH, RICK & BRENT	97	22142.900	233c	40.15	1st order	20	Y	Y				Y	Y	
BRASH, RICK & BRENT	92	23346.901	233a	202.17	1st order	28	Y	Y	Y			Y		Y
BRASH, RICK & BRENT	94	23346.901	233	35.47	1st order	18	Y	Y				Y		
BRASH, RICK & BRENT	91	23346.901	233a	250.66	1st order	23	Y	Y	Y			Y		
BUOB, ELMER D	106	12230.900	239	644.35	1st order	40	Y	Y	Y	Y	Y		Y	Y
BUOB, ELMER D	108	12242.900	239	90.94	1st order	38	Y	Y	Y	Y	Y	Y	Y	
CAMP, LESTER C	114	22154.900	244	79.46	1st order	20	Y				Y			
CAMP, LESTER C	113	22154.900	244	81.84	1st order	25	Y	Y			Y			
CHRISINGER, SHARON	127	12074.900	248	40.38	1st order	18			Y		Y	Y		
CITY OF CHENEY	122	23186.903	4b	265.29	1st order	18	Y					Y		Y
CORDILL, NELSON A	152	12175.901	253b	447.07	1st order	35	Y		Y		Y	Y	Y	Y
CORDILL, NELSON A	153	12204.900	253d	157.5	1st order	20	Y					Y	Y	Y
CORDILL, NELSON A	154	12201.900	253d	119.56	1st order	23	Y			Y		Y	Y	Y
CORDILL, NELSON A	156	12175.901	253d	36.76	1st order	25	Y				Y	Y	Y	
CURTIS, CHRIS & MICHAEL/GAMON	178	23094.900	258a	153.69	1st order	18		Y	Y			Y		Y
DONEL BELSBY FARMING & RANCHING	233	12344.901	264	40.1	1st order	18					Y	Y		Y

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
DONEL BELSBY FARMING & RANCHING	232	12343.900	264	47.5	1st order	18					Y	Y		Y
DOW, ALVIN A	243	13276.907	269g	59.4	1st order	33	Y	Y	Y	Y	Y			
DOW, ALVIN A	242	13276.907	269f	84.18	1st order	0								
DOW, WALLACE & LUELLA	274	12085.900	272	81.71	1st order	23	Y				Y	Y		
DOW, WALLACE & LUELLA	276	12054.902	272	79.7	1st order	36	Y	Y	Y	Y	Y	Y		
EMTMAN, JAMES R & DARLA M	289	13245.904	278a	39.54	1st order	10	Y							
EMTMAN, JAMES R & DARLA M	292	23195.904	278a	553.54	1st order	25	Y	Y	Y					Y
EMTMAN, JAMES R & DARLA M	294	13245.902	278a	109	1st order	15	Y		Y					
EMTMAN, JAMES R & DARLA M	293	23305.901	278a	469.1	1st order	0								
EMTMAN, RUSSELL	299	13251.900	279	40.12	1st order	0								
FIRGROVE INV INC	305	23175.900	283	227.61	1st order	28	Y	Y	Y			Y		Y
FORD ETAL, DONALD	312	12084.900	285	78.72	1st order	23	Y			Y	Y			
FORD ETAL, DONALD	311	12081.900	285	122.22	1st order	28	Y		Y		Y	Y		
FORD ETAL, DONALD	310	12085.900	285	243.55	1st order	26			Y	Y	Y	Y		Y
GESCHKE, F H	319	13295.901	290	189.56	1st order	28	Y	Y			Y	Y		
GESCHKE, F H	320	13285.900	290	145.25	1st order	25	Y	Y			Y			
GESCHLE, G L	321	13325.901	291	150.31	1st order	18		Y			Y	Y		
GILMOUR, ERNEST H	322	23273.901	292a	42.69	1st order	15	Y	Y						
GROGAN FAMILY REV LIVING TRUST	352	23344.900	302b	35.58	1st order	18	Y	Y				Y		
GROGAN FAMILY REV LIVING TRUST	349	23344.900	302c	43.82	1st order	18	Y	Y				Y		
GROGAN FAMILY REV LIVING TRUST	348	22031.900	302b	81.75	1st order	18	Y	Y				Y		
GROGAN FAMILY REV LIVING TRUST	347	22034.900	302b	161.55	1st order	33	Y	Y	Y		Y	Y		
GROGAN LAND COMPANY LLC	366	22074.900	303a	159.84	1st order	0								
GROGAN LAND COMPANY LLC	360	22200.900	303c	651	1st order	35	Y	Y	Y		Y			Y
GROGAN LAND COMPANY LLC	361	22300.900	303	650.21	1st order	20					Y	Y	Y	Y
GROGAN LAND COMPANY LLC	362	22195.900	303	329.89	1st order	38	Y	Y		Y	Y	Y	Y	Y
GROGAN LAND COMPANY LLC	363	22195.900	303	328.99	1st order	30	Y				Y	Y	Y	Y
GROGAN LAND COMPANY LLC	365	22073.900	303a	178.72	1st order	0								
GROGAN LAND COMPANY LLC	368	22182.900	303a	80.76	1st order	0								
GROGAN LAND COMPANY LLC	369	12244.900	303	80.68	1st order	20					Y	Y	Y	Y
GROGAN LAND COMPANY LLC	371	22183.900	303	63.62	1st order	0								

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
GROGAN LAND COMPANY LLC	364	22295.900	303c	241.57	1st order	32	Y		Y		Y		Y	Y
GROGAN RLT, WILLIAM J	380	12352.900	304	40.46	1st order	18					Y	Y		Y
GROGAN RLT, WILLIAM J	379	12353.900	304	81.27	1st order	18					Y	Y		Y
GROGAN, MICHAEL J	382	22183.900	305a	51.05	1st order	0								
GROGAN, MICHAEL J	383	22183.900	305	40.51	1st order	0								
GROGAN, RONALD	384	22182.900	306	48.39	1st order	0								
GROGAN-FERRANTE, RENEA	385	22182.900	301	49.03	1st order	0								
HAMPTON, ROBERT J	394	23203.901	312	34.35	1st order	18	Y	Y				Y		
HAMPTON, ROBERT J	393	23295.901	312a	65.68	1st order	23	Y	Y				Y		Y
HAMPTON, ROBERT J	392	23205.901	312a	210.38	1st order	0								
HAMPTON, ROBERT J	391	23295.901	312	224.88	1st order	0								
HARRINGTON, VERN D	401	23335.900	315	35.84	1st order	20	Y	Y						Y
HARRINGTON, VERN D	400	23335.900	315a	368.53	1st order	23	Y	Y				Y		Y
HELM, ROGER J & LAUREL	410	13295.902	318	133.79	1st order	18		Y			Y	Y		
HICKS, BARRY C & GAIL F	417	12272.900	323	140.37	1st order	18			Y	Y		Y	Y	Y
INLAND NORTHWEST LAND TRUST	432	23186.906	332a	112.22	1st order	0								
INLAND NORTHWEST LAND TRUST	433	23186.906	332a	45.37	1st order	0								
JOLLY JACK RANCH, L.L.C.	468	22090.900	344	641.75	1st order	0								
JOLLY JACK RANCH, L.L.C.	469	22105.900	344	249.43	1st order	0								
JOLLY JACK RANCH, L.L.C.	470	22105.900	344b	212.11	1st order	0								
JOLLY JACK RANCH, L.L.C.	472	22033.900	344b	159.51	1st order	0								
JOLLY JACK RANCH, L.L.C.	471	22152.901	344	161.01	1st order	0								
JORDAN REVOCABLE LIVING TRUST	484	12242.900	345	40.47	1st order	38	Y	Y	Y	Y	Y	Y	Y	
JORDAN REVOCABLE LIVING TRUST	483	12241.900	345	161.17	1st order	43	Y	Y	Y	Y	Y	Y	Y	Y
KIVER, EUGENE P	508	23273.901	355	42.81	1st order	20	Y	Y	Y					
LABISH FAMILY LIVING TRUST	515	12225.900	358a	293.11	1st order	23				Y	Y	Y	Y	Y
LABISH FAMILY LIVING TRUST	524	23212.900	358d	159.17	1st order	21	Y	Y		Y		Y		
LABISH FAMILY LIVING TRUST	526	23164.900	358e	66.15	1st order	18		Y	Y			Y		Y
LABISH FAMILY LIVING TRUST	518	13233.904	358c	89.53	1st order	0								
LABISH FAMILY LIVING TRUST	517	12221.900	358a	161.33	1st order	30	Y		Y	Y	Y		Y	
LABISH FAMILY LIVING TRUST	516	12215.900	358	237.97	1st order	33	Y			Y	Y	Y	Y	Y

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
LABISH, JIM	530	23205.900	359	26.42	1st order	13	Y					Y		
LABISH, JOE	531	23205.900	360	246.32	1st order	23	Y	Y	Y			Y		
MANSFIELD, TERRY M & KRISTIN G	553	12213.900	378	158.5	1st order	20	Y		Y	Y			Y	
MCKINLAY LIVING TRUST, WARREN & ANNA	565	22015.901	385	136.7	1st order	0								
MCKINLAY, ANNIE/DAELLENBACH	566	22012.901	386	55.7	1st order	0								
MCKINLAY, JACK/WILLSON	567	22016.901	387	44.65	1st order	0								
MCKINLAY, W C	570	22014.900	388	301.87	1st order	0								
MEADOW CONSERVATION	577	22122.901	393	100.35	1st order	0								
MOORE, MARGARET	591	22291.900	399	80.57	1st order	25	Y				Y			Y
MOORE, MARGARET	588	22212.900	399a	158.98	1st order	30	Y	Y			Y			Y
MOORE, MARGARET	587	22211.900	399a	159.47	1st order	30	Y	Y			Y			Y
MOORE, MARGARET	586	22213.900	399a	159.95	1st order	25	Y				Y			Y
PEGAU LIVING TRUST	626	23285.900	419	246.77	1st order	20	Y	Y	Y					
PEGAU LIVING TRUST	627	23281.900	419	70.97	1st order	23	Y	Y	Y			Y		
PENCE ETAL, R H	629	12053.901	421	121.79	1st order	21			Y	Y	Y	Y		
PHILEO DUCK & CC	634	22111.900	424	163.45	1st order	30	Y	Y			Y	Y	Y	
PHILEO DUCK & CC	635	22114.900	424	107.24	1st order	30	Y	Y			Y	Y	Y	
PHILLIPS, JOHN W	636	22042.900	425	80.65	1st order	0								
PHILLIPS, JOHN W	639	22045.900	425	80.23	1st order	0								
POINDEXTER, CLAY H & MELINDA J	645	12211.900	426	80.07	1st order	30	Y		Y	Y	Y		Y	
POINDEXTER, CLAY H & MELINDA J	644	12222.900	426	161.56	1st order	35	Y		Y	Y	Y		Y	Y
POOL LIV TRUST, FJ/POOL LIV TRUST	647	13335.901	427	486.47	1st order	43	Y	Y	Y	Y	Y	Y	Y	Y
POOL LIV TRUST, FJ/POOL LIV TRUST	649	12055.901	427	71.7	1st order	35	Y	Y	Y	Y	Y		Y	
POOL LIV TRUST, FJ/POOL LIV TRUST	648	12045.901	427	485.93	1st order	40	Y	Y	Y		Y	Y	Y	Y
PORTER, PETER S	654	22045.902	429	45.53	1st order	0								
POTTER, R B	655	23275.903	430	162.04	1st order	18	Y	Y				Y		
RIETZ, GILMOUR A	682	12092.900	437	97.54	1st order	0								
ROCKY PINE RANCH LLC	688	23281.901	439a	44.23	1st order	0								
ROCKY PINE RANCH LLC	687	23285.901	439a	85.38	1st order	26	Y	Y		Y		Y		Y
ROCKY PINE RANCH LLC	686	23285.901	439	125.81	1st order	31	Y	Y	Y	Y		Y		Y
ROCKY PINE RANCH LLC	685	23215.900	439a	316.92	1st order	23	Y	Y				Y		Y

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
ROUSE TRUST, ROMYNE E	693	23344.900	441	83.18	1st order	18	Y	Y				Y		
SCOTT, MILLIE	704	13324.901	449	51.17	1st order	22		Y	Y		Y		Y	
SHOWALTER CORP	708	02130.900	452a	643.68	1st order	18			Y	Y		Y	Y	Y
SMITH, BERT	717	23324.900	456	69.41	1st order	0								
STELZER, DARRELL	736	22032.900	463	35.85	1st order	18	Y	Y				Y		
STELZER, DARRELL	735	22032.900	463	79.96	1st order	21	Y	Y		Y		Y		
STELZER, DARRELL	734	22025.900	463b	221.63	1st order	33	Y	Y	Y		Y	Y		
STELZER, DARRELL	733	23355.900	463c	308.19	1st order	18	Y	Y				Y		
STELZER, DARRELL	742	22032.900	463	35.33	1st order	18	Y	Y				Y		
STELZER, DARRELL	741	22031.900	463	80.31	1st order	18	Y	Y				Y		
STRIEFF, RAYMOND	751	12190.900	469e	323.28	1st order	25			Y		Y	Y	Y	Y
STRIEFF, RAYMOND	750	02245.900	469e	569.15	1st order	28			Y	Y	Y	Y	Y	Y
STRIEFF, RAYMOND	757	12205.900	469c	162.47	1st order	25	Y				Y	Y	Y	
STRIEFF, RAYMOND	761	12185.901	469c	66.7	1st order	20			Y		Y	Y	Y	
TEEL DAIRY FARMS INC	770	13286.904	473	46.13	1st order	20	Y	Y	Y					
THOMPSON, RODNEY/ENGSTROM	775	22222.900	475	81.38	1st order	20	Y				Y			
THOMPSON, RODNEY/ENGSTROM	774	22216.900	475	150.16	1st order	30	Y	Y			Y			Y
US DEPARTMENT OF AGRICULTURE	787	22112.900	1	146.04	1st order	0								
WASH STATE DEPT NATURAL RESC	805	23165.900	2f	154.13	1st order	18		Y	Y			Y		Y
WASH STATE DEPT NATURAL RESC	804	12365.900	2h	507.93	1st order	25			Y		Y	Y	Y	Y
WILCOX, FRED & EDNA	829	13332.901	501	40.29	1st order	25	Y	Y			Y			
WILCOX, FRED & EDNA	828	13283.901	501	77.86	1st order	25	Y	Y			Y			
YOUNG, PRISCILLA M	843	23343.901	510	57.87	1st order	18	Y	Y				Y		
SECOND ORDER PRIORITY PARCELS: (65 landowners)														
AMES, ANNA L	14	13262.9005	209	34.83	2nd order	0								
ANDERSON, C E	23	12092.9003	212a	25.83	2nd order	27	Y	Y			Y		Y	
BELL, PEYTON A & MARC A	66	12354.9008	224b	45.29	2nd order	15					Y	Y	Y	
BIRCH, NANCY J/WOODGER	75	12074.9011	228	20.17	2nd order	13					Y	Y		
BIRCH, NANCY J/WOODGER	74	12074.9012	228	20.37	2nd order	20	Y	Y				Y	Y	
BLEEKER, CAROLYN	84	12051.9020	231	20.97	2nd order	28	Y	Y		Y	Y			
CCRH, LLC	118	23221.9013	246	20.31	2nd order	8		Y				Y		

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
CCRH, LLC	117	23221.9035	246	60.56	2nd order	8		Y				Y		
CCRH, LLC	116	23154.9003	246a	152.02	2nd order	8		Y				Y		
CITY OF CHENEY	34	23321.9008	4b	22.34	2nd order	18	Y	Y				Y		
CITY OF CHENEY	34	23186.9035	4b	25.57	2nd order	18	Y	Y				Y		
CORDER, CRAIG P & JUDITH A	132	12181.9031	252a	38.69	2nd order	0								
CORDER, CRAIG P & JUDITH A	131	12181.9030	252a	39.42	2nd order	0								
CORDER, CRAIG P & JUDITH A	134	12181.9019	252a	22.54	2nd order	17			Y		Y		Y	
CORDILL, NELSON A	159	12201.9001	253b	25.4	2nd order	10	Y							
CORDILL, NELSON A	151	12302.9004	253	123.83	2nd order	17					Y		Y	Y
CURTIS, CHRIS & MICHAEL/GAMON	177	23093.9003	258a	156.41	2nd order	16		Y		Y		Y		Y
DAHL LIVING TRUST, GARY & JENNIFER	179	12283.9003	259	160.44	2nd order	10				Y			Y	Y
DOUGLAS, JAMES T & LINDA L	238	23233.9040	266	118.21	2nd order	11		Y		Y		Y		
DOW, ALVIN A	249	13276.9076	269f	23.73	2nd order	18			Y		Y	Y		
DOW, ALVIN A	248	13332.9021	269b	30.71	2nd order	15	Y					Y	Y	
DOW, ALVIN A	247	13325.9038	269a	32.29	2nd order	0								
DOW, ALVIN A	246	13336.9019	269b	34.86	2nd order	10	Y							
DOW, ALVIN A	245	13325.9010	269	43.11	2nd order	15		Y			Y			
DOW, ALVIN A	244	13325.9031	269	44.52	2nd order	15		Y			Y			
DOW, WALLACE & LUELLA	275	12052.9009	272a	75.14	2nd order	13				Y	Y			
DOW, WALLACE & LUELLA	277	12056.9023	272	20.73	2nd order	25	Y			Y	Y		Y	
DOW, WALLACE & LUELLA	277	12056.9022	272	22.97	2nd order	25	Y			Y	Y		Y	
FICERE TRUST, VERNA E	303	11015.9003	282	98.28	2nd order	10						Y	Y	Y
FIRGROVE INV INC	306	23083.9004	283	158.2	2nd order	13			Y			Y		Y
FIRGROVE INV INC	304	23175.9001	283	239.33	2nd order	13			Y			Y		Y
FRANZ, H DARYL	315	12065.9004	287	102.36	2nd order	13					Y	Y		
GILMOUR, ERNEST H	323	23275.9047	292	32.52	2nd order	8		Y				Y		
GINSBURG, JOHN A & NATASCHA D	324	23224.9050	293	70.39	2nd order	8		Y				Y		
GREEN, R	334	23264.9028	300	157.42	2nd order	8		Y				Y		
GROGAN FAMILY REV LIVING TRUST	343	12364.9003	302d	36.31	2nd order	8						Y		Y
GROGAN FAMILY REV LIVING TRUST	350	12344.9011	302f	40.28	2nd order	8						Y		Y
GROGAN LAND COMPANY LLC	373	22294.9006	303c	40.28	2nd order	15					Y			Y

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
GROGAN LAND COMPANY LLC	370	22293.9004	303c	79.86	2nd order	12					Y		Y	
GROGAN LAND COMPANY LLC	367	22325.9002	303c	120.39	2nd order	12					Y		Y	
HEYER, DARCY	415	12074.9008	321a	40.26	2nd order	13					Y	Y		
HEYER, R LARRY	416	12073.9010	322	80.19	2nd order	8			Y			Y		
INL ASPHALT CO	431	23294.9008	331	22.18	2nd order	18		Y		Y	Y			
JOLLY JACK RANCH, L.L.C.	473	22044.9023	344a	29.97	2nd order	0								
JORDAN REVOCABLE LIVING TRUST	485	12242.9007	345	24.99	2nd order	20					Y	Y	Y	Y
KELLY LIVING TRUST, CECELIA M	504	23211.9005	352	150.6	2nd order	16		Y		Y		Y		Y
KUONEN, ROBERT B & NANCY J	511	23253.9003	357	162.77	2nd order	13		Y	Y			Y		
KUONEN, ROBERT B & NANCY J	512	23354.9016	357	30.11	2nd order	8		Y				Y		
KUONEN, ROBERT B & NANCY J	514	23365.9012	357	223.09	2nd order	8		Y				Y		
LABISH FAMILY LIVING TRUST	527	23163.9003	358e	65.52	2nd order	13		Y	Y			Y		
LABISH FAMILY LIVING TRUST	521	12223.9003	358	26.24	2nd order	10			Y	Y			Y	
LABISH FAMILY LIVING TRUST	519	12214.9004	358	80.29	2nd order	10			Y	Y			Y	
LABISH FAMILY LIVING TRUST	525	23165.9002	358e	156.05	2nd order	13		Y	Y			Y		
LANG, BRUCE Z	532	23223.9009	361	28.77	2nd order	11		Y		Y		Y		
LASSMAN, SHANNON L	533	23203.9015	362	24.5	2nd order	0								
LUNDGRIN, PAUL A & ESPERANZA O	539	23321.9012	368	21.81	2nd order	15	Y	Y						
MACY, DELTON E & CONNIE J	543	22151.9020	371	22.03	2nd order	10	Y							
MADSEN, DANA C & THERESA M	547	23223.9041	374a	72.97	2nd order	13		Y				Y		Y
MANSFIELD, TERRY M & KRISTIN G	555	12282.9008	378	20.14	2nd order	0								
MANSFIELD, TERRY M & KRISTIN G	554	12282.9009	378	137.22	2nd order	0								
MAUER, JARED	560	23261.9029	381	45.91	2nd order	8		Y				Y		
MCKINSTRY, DAVID M & DONNA R	571	23271.9041	389	20.49	2nd order	8		Y				Y		
MCNARY ETAL, ROBERT J "JIM"	573	12286.9007	391	147.9	2nd order	12			Y				Y	Y
MILL, R L	579	02234.9004	395	164.05	2nd order	10			Y			Y	Y	
MOORE, MARGARET	592	22291.9002	399	80.24	2nd order	15					Y			Y
MOORE, MARGARET	597	22282.9012	399a	32.24	2nd order	10					Y			
MOORE, MARGARET	590	22282.9004	399a	86.6	2nd order	15					Y			Y
MOORE, MARGARET	593	22321.9007	399	62.16	2nd order	15					Y			Y
MOORE, MARGARET	589	22294.9005	399	118.18	2nd order	10					Y			

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
NEWBRY, G B & B L	604	23225.9049	406	109.92	2nd order	13		Y				Y		Y
PARKER, JOHN S & VONICE D	617	23274.9018	417b	42.32	2nd order	10		Y	Y					
PENCE ETAL, GARY	628	12075.9006	420	277.93	2nd order	11			Y	Y		Y		
PENCE, R H & M K	631	12053.9018	422a	40.4	2nd order	16				Y	Y	Y		
PHILLIPS, JOHN W	637	22043.9008	425	40.5	2nd order	0								
PHILLIPS, JOHN W	640	22041.9001	425b	42.07	2nd order	28	Y			Y	Y	Y	Y	
POOL LIV TRUST, FJ/POOL LIV TRUST	650	12092.9002	427	31.44	2nd order	0								
QUINN, SUSAN & ROBERT R	667	23273.9042	434	62.89	2nd order	10		Y	Y					
RIPLEY DEVELOPMENT LLC	684	22021.9048	438	20.8	2nd order	0								
RUSSE, DAVID L & RICHARD W	697	23252.9031	445	20.24	2nd order	8		Y				Y		
SHOWALTER CORP	709	02144.9003	452a	157.09	2nd order	10			Y			Y	Y	
SHOWALTER CORP	712	02123.9005	452a	25.23	2nd order	8				Y		Y	Y	
SPANJER LIVING TRUST	720	23155.9002	458a	176.98	2nd order	8		Y				Y		
SPOONER, EUGENE & MARLA A	730	23262.9025	462	166.11	2nd order	13		Y				Y		Y
SPOONER, EUGENE & MARLA A	732	23232.9038	462a	79.95	2nd order	8		Y				Y		
STELZER, DARRELL	737	23355.9003	463b	21.56	2nd order	15	Y	Y						
STRICKLAND, R & S	748	02244.9002	467	80.24	2nd order	17					Y		Y	Y
STRIEFF ETUX, B R	749	02252.9002	468	120.92	2nd order	10						Y	Y	Y
STRIEFF, RAYMOND	755	12185.9015	469e	305.8	2nd order	13				Y		Y	Y	Y
STRIEFF, RAYMOND	752	02235.9005	469e	323.24	2nd order	10			Y			Y	Y	
STRIEFF, RAYMOND	754	23095.9005	469a	307.02	2nd order	11		Y		Y		Y		
STRIEFF, RAYMOND	758	23105.9009	469a	155.25	2nd order	8		Y				Y		
STRIEFF, RAYMOND	759	23045.9034	469a	140.23	2nd order	8		Y				Y		
STRIEFF, RAYMOND	760	02125.9007	469	136.51	2nd order	8				Y		Y	Y	
STRIEFF, RAYMOND	756	23085.9020	469a	290.17	2nd order	13			Y			Y		Y
STRIEFF, RAYMOND	753	12190.9006	469c	313.31	2nd order	15					Y	Y	Y	
T & N HEINEMANN LIVING TRUST	768	23341.9001	472	83.05	2nd order	8		Y				Y		
UNKNOWN	850		483c	128.98	2nd order	10						Y	Y	Y
VISSOTZKY, DAVID A & ANDREA J	795	23235.9039	487	81.86	2nd order	11		Y		Y		Y		
WASH STATE DEPT NATURAL RESC	807	23364.9007	2b	70.67	2nd order	8		Y				Y		
WASH STATE DEPT NATURAL RESC	806	23165.9001	2j	105.04	2nd order	8		Y				Y		

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
WESTERMAN, W H	822	23231.9037	497b	123.93	2nd order	16		Y	Y	Y		Y		
WESTERMAN, W H	819	23234.9005	497b	165.27	2nd order	11		Y		Y		Y		
WESTERN STS OP ENG INST OF TNG TRUST	823	23363.9019	498	60.58	2nd order	8		Y				Y		
WINTERS, STEVEN E & KATHLEEN A	834	23363.9013	505	45.5	2nd order	8		Y				Y		
YOUNG, GORDON O & SHARON L	840	22021.9050	509a	20.45	2nd order	0								
YOUNG, GORDON O & SHARON L	839	22021.9047	509a	25.28	2nd order	0								
THIRD ORDER PRIORITY PARCELS: (262 landowners)														
ABRAMOWITZ FERSZT, MIRIAM	1	22025.9020	203	8.68	3rd order	25	Y	Y			Y			
ADKINS, MICHAEL R & DEBRA I	3	23261.9037	204	5.07	3rd order	5		Y						
ADKINS, MICHAEL R & DEBRA I	2	23261.9037	204a	10.21	3rd order	8		Y				Y		
ADVANTA USA, INC.	6	22222.9007	205a	0.39	3rd order	10	Y							
AG ENTERPRISES SUPPLY, INC	8	13286.9077	206	0.95	3rd order	0								
AG ENTERPRISES SUPPLY, INC	7	13286.9077	206	10.05	3rd order	10	Y							
ALLEMAND, D M & KILGORE	10	22045.9025	207	10.32	3rd order	0								
ALVIS, DARRELL H	12	12184.9012	208	15.34	3rd order	10			Y			Y	Y	
ALVIS, DARRELL H	11	12184.9014	208	36.41	3rd order	7			Y				Y	
AMES, ANNA L	13	13262.9011	209	39.03	3rd order	0								
AMON,T & W/MURPHY	16	23261.9035	210	11.19	3rd order	5		Y						
AMON,T & W/MURPHY	15	23261.9034	210	12.13	3rd order	5		Y						
ANDERSON, BRIAN W	17	23301.9011	211	19.18	3rd order	0								
ANDERSON, C E	26	12165.9002	212c	2.49	3rd order	0								
ANDERSON, C E	25	12084.9005	212	3.61	3rd order	20	Y				Y			
ANDERSON, C E	27	12093.9005	212a	2.46	3rd order	0								
ANDERSON, C E	28	12093.9005	212e	1.27	3rd order	0								
ANDERSON, C E	24	12165.9002	212d	5.11	3rd order	0								
ANDERSON, KATHERINE L	29	13224.9016	213	2.14	3rd order	15	Y	Y						
ANDERSON, ROBERT E & LUANN M	30	13291.9013	214	22.6	3rd order	0								
ANDERSON, T J	32	23023.9059	216	4.81	3rd order	3						Y		
ANDERSON, VICTOR A/ANDERSON	33	13291.9018	217	19.85	3rd order	0								
BARNETT, GEORGE/BOLTE	43	23033.9024	219	6.23	3rd order	3						Y		
BATES, KAREN	48	13286.9039	220	3.17	3rd order	10	Y							

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
BATES, KAREN	47	13286.9039	220	9.5	3rd order	10	Y							
BAUMGARTNER, DAROL	49	13271.9014	221	3.68	3rd order	15	Y	Y						
BEAL, GARY C & FRANCIS J	51	13262.9009	222	36.22	3rd order	0								
BEAL, GARY C & FRANCIS J	50	13262.9010	222	38.66	3rd order	0								
BELL, D R	53	12343.9003	223	9.07	3rd order	5								Y
BELL, D R	52	12344.9009	223	24.96	3rd order	5								Y
BELL, PEYTON A & MARC A	68	12352.9002	224	19.73	3rd order	5								Y
BELL, PEYTON A & MARC A	60	12274.9008	224	129.17	3rd order	7							Y	Y
BELL, PEYTON A & MARC A	69	12243.9009	224c	13.47	3rd order	17		Y			Y		Y	
BELL, PEYTON A & MARC A	70	12355.9001	224	1.46	3rd order	15					Y			Y
BELL, RONALD & ANTOINETTE	71	23265.9024	225	6.02	3rd order	5		Y						
BENSON, ELLEN TRUSTEE	72	23271.9026	226	14.84	3rd order	8		Y				Y		
BETZ, FRANKLIN	73	12184.9007	227	25.07	3rd order	5			Y					
BIRCH, NANCY J/WOODGER	77	12074.9015	228	9.98	3rd order	15			Y		Y			
BIRCH, NANCY J/WOODGER	76	12074.9016	228	10	3rd order	15			Y		Y			
BIRCH, NANCY J/WOODGER	78	12074.9014	228	9.95	3rd order	18			Y		Y	Y		
BIRCH, NANCY J/WOODGER	79	12074.9013	228	9.93	3rd order	18			Y		Y	Y		
BITZ, DEAN W & DEBORAH L	80	13214.9027	229	9.25	3rd order	15	Y	Y						
BLACKLEDGE, GARLYN & LYUBOV	82	13286.9032	230	7.66	3rd order	10	Y							
BLACKLEDGE, GARLYN & LYUBOV	81	13286.9032	230	11.22	3rd order	18	Y	Y		Y				
BLEEKER, CAROLYN	85	12051.9005	231	12.63	3rd order	20		Y		Y	Y		Y	
BRASH, GUY E	87	22151.9022	232b	19.73	3rd order	27	Y	Y			Y		Y	
BRASH, GUY E	90	23343.9010	232a	8.26	3rd order	18	Y	Y				Y		
BRASH, RICK & BRENT	95	23346.9012	233b	1.14	3rd order	18	Y	Y				Y		
BRASH, SHAWN W/SAGERSER	98	22025.9032	234	9.25	3rd order	25	Y	Y			Y			
BRASH, SHAWN W/SAGERSER	99	22025.9029	234	9.15	3rd order	25	Y	Y			Y			
BRASH, SHAWN W/SAGERSER	100	22025.9030	234	8.84	3rd order	25	Y	Y			Y			
BRAY, BOBBY L & ANN R	101	23233.9015	235	2.88	3rd order	8		Y				Y		
BREEDLOVE, JOSEPH & CYNTHIA	102	23294.9010	236	18.83	3rd order	0								
BROOK, RANDY L & APRIL	104	22024.9018	237	8.18	3rd order	25	Y	Y			Y			
BROOK, RANDY L & APRIL	103	22024.9017	237	10.32	3rd order	25	Y	Y			Y			

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
BULAT, A R & L G	105	23281.9010	238	9.9	3rd order	18	Y	Y				Y		
BUOB, ELMER D	107	12230.9001	239a	0.61	3rd order	12					Y		Y	
BURDICK, KELLY R & MICHELLE	109	13214.9026	240	10.8	3rd order	15	Y	Y						
BUSTIN A ADVENTURES, LLC	110	23191.9031	241	3.81	3rd order	10	Y							
C & P PROPERTIES	111	13234.9066	242	10.39	3rd order	0								
CAMP, BERNARD L	112	23033.9025	243	6.94	3rd order	3						Y		
CANWELL, JAMES A	115	12342.9013	245	6.77	3rd order	0								
CCRH, LLC	120	23232.9008	246	1.94	3rd order	8		Y				Y		
CCRH, LLC	119	23232.9027	246	2.19	3rd order	8		Y				Y		
CHARLTON, DERRICK G	121	13275.9031	247	10	3rd order	25	Y	Y			Y			
CITY OF CHENEY	123	23185.0014	4b	82.24	3rd order	3						Y		
CITY OF CHENEY	125	13214.9046	4	0.99	3rd order	10	Y							
CITY OF CHENEY	126	23186.9035	4a	0.99	3rd order	10	Y							
CLAYDEN ETUX, D	128	23174.9004	250	4.91	3rd order	3						Y		
COOLEY LIVING TRUST, JAMES O & CONNIE J	130	23233.9028	251	0.02	3rd order	0								
COOLEY LIVING TRUST, JAMES O & CONNIE J	129	23224.9039	251	9.95	3rd order	8		Y				Y		
CORDER, CRAIG P & JUDITH A	138	12172.9006	252a	11.3	3rd order	10					Y			
CORDER, CRAIG P & JUDITH A	133	12172.9028	252c	33.23	3rd order	0								
CORDER, CRAIG P & JUDITH A	135	12172.9027	252a	18.9	3rd order	10					Y			
CORDER, CRAIG P & JUDITH A	137	12176.9004	252a	12.63	3rd order	0								
CORDER, CRAIG P & JUDITH A	139	12172.9005	252a	11.05	3rd order	0								
CORDER, CRAIG P & JUDITH A	140	12181.9020	252a	10.55	3rd order	0								
CORDER, CRAIG P & JUDITH A	141	12181.9022	252a	9.89	3rd order	3						Y		
CORDER, CRAIG P & JUDITH A	142	12181.9021	252a	9.62	3rd order	0								
CORDER, CRAIG P & JUDITH A	144	12181.9018	252b	7.7	3rd order	5				Y			Y	
CORDER, CRAIG P & JUDITH A	145	12186.9024	252a	6.33	3rd order	5			Y					
CORDER, CRAIG P & JUDITH A	146	12186.9024	252a	5.7	3rd order	5			Y					
CORDER, CRAIG P & JUDITH A	147	12176.9004	252a	4.54	3rd order	0								
CORDER, CRAIG P & JUDITH A	148	12186.9025	252a	2.95	3rd order	0								
CORDER, CRAIG P & JUDITH A	149	12181.9018	252	1.11	3rd order	2							Y	
CORDER, CRAIG P & JUDITH A	133	22042.9021	252c	0	3rd order	0								

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
CORDER, CRAIG P & JUDITH A	143	12186.9025	252a	8	3rd order	5			Y					
CORDER, CRAIG P & JUDITH A	136	12172.9029	252a	12.93	3rd order	0								
CORDILL, NELSON A	166	12293.9009	253c	0.6	3rd order	0								
CORDILL, NELSON A	155	12205.9003	253b	88.94	3rd order	5						Y	Y	
CORDILL, NELSON A	157	12292.9015	253d	33.51	3rd order	0								
CORDILL, NELSON A	158	12205.9003	253d	25.69	3rd order	0								
CORDILL, NELSON A	160	12175.9010	253e	11.66	3rd order	20	Y				Y			
CORDILL, NELSON A	161	12292.9005	253c	7.21	3rd order	0								
CORDILL, NELSON A	162	12293.9017	253c	4.31	3rd order	0								
CORDILL, NELSON A	163	12292.9015	253b	2.48	3rd order	0								
CORDILL, NELSON A	165	12304.9008	253a	1.08	3rd order	0								
CORDILL, NELSON A	150	02251.9001	253	161.34	3rd order	7							Y	Y
CORDILL, NELSON A	164	12204.9006	253f	1.26	3rd order	2							Y	
COWAN, J/FISHER, G	167	23252.9020	254	20.33	3rd order	8		Y				Y		
CREAGER JR, DONALD L & CHRISTINA D	168	23033.9027	255	19.53	3rd order	3						Y		
CROWN FINANCIAL INC.	169	13324.9025	256	7.66	3rd order	15		Y			Y			
CURTIS, BEN F	175	23103.9003	257	2.73	3rd order	3						Y		
CURTIS, BEN F	174	23155.9005	257a	31.89	3rd order	3						Y		
CURTIS, BEN F	173	23104.9007	257	63.8	3rd order	3						Y		
CURTIS, BEN F	172	23103.9003	257a	74.95	3rd order	3						Y		
CURTIS, BEN F	171	23104.9007	257a	85.18	3rd order	3						Y		
CURTIS, BEN F	170	23155.9005	257	239.25	3rd order	3						Y		
CURTIS, CHRIS & MICHAEL/GAMON	176	23105.9001	258	238.1	3rd order	3						Y		
DAHL LIVING TRUST, GARY & JENNIFER	181	12214.9005	259b	0.08	3rd order	0								
DAHL LIVING TRUST, GARY & JENNIFER	180	12214.9005	259a	79.89	3rd order	7			Y				Y	
DARE, L	184	23074.9027	260	36.95	3rd order	3						Y		
DARE, L	183	23074.9030	260	40.03	3rd order	3						Y		
DARE, L	185	23074.9027	260	35.65	3rd order	3						Y		
DARE, L	182	23082.9003	260a	75.72	3rd order	3						Y		
DAVIS, SCOTT P & DONNA	187	23252.9022	261	10.34	3rd order	8		Y				Y		
DAVIS, SCOTT P & DONNA	186	23252.9008	261	33.31	3rd order	8		Y				Y		

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
DELANEY, WESLEY & MARGARET	207	23242.9027	262	9.67	3rd order	0								
DELANEY, WESLEY & MARGARET	197	23242.9024	262	10.27	3rd order	5		Y						
DELANEY, WESLEY & MARGARET	205	23243.9004	262	9.75	3rd order	11		Y		Y		Y		
DELANEY, WESLEY & MARGARET	206	23243.9009	262	9.72	3rd order	5		Y						
DELANEY, WESLEY & MARGARET	204	23242.9026	262	9.85	3rd order	0								
DELANEY, WESLEY & MARGARET	203	23242.9023	262	9.96	3rd order	5		Y						
DELANEY, WESLEY & MARGARET	202	23243.9006	262	10.01	3rd order	8		Y				Y		
DELANEY, WESLEY & MARGARET	200	23242.9028	262	10.18	3rd order	0								
DELANEY, WESLEY & MARGARET	198	23242.9025	262	10.27	3rd order	0								
DELANEY, WESLEY & MARGARET	196	23243.9017	262	10.28	3rd order	5		Y						
DELANEY, WESLEY & MARGARET	195	23242.9018	262	10.28	3rd order	5		Y						
DELANEY, WESLEY & MARGARET	194	23243.9012	262	10.29	3rd order	5		Y						
DELANEY, WESLEY & MARGARET	193	23243.9007	262	10.31	3rd order	8		Y				Y		
DELANEY, WESLEY & MARGARET	192		262	12.01	3rd order	8		Y				Y		
DELANEY, WESLEY & MARGARET	191	23243.9008	262	15.2	3rd order	5		Y						
DELANEY, WESLEY & MARGARET	190	23243.9014	262	15.29	3rd order	5		Y						
DELANEY, WESLEY & MARGARET	188	23245.9015	262	20.45	3rd order	5		Y						
DELANEY, WESLEY & MARGARET	201	23242.9029	262	10.17	3rd order	0								
DELANEY, WESLEY & MARGARET	189	23245.9020	262	20.1	3rd order	5		Y						
DELANEY, WESLEY & MARGARET	216	23243.9016	262	6.76	3rd order	5		Y						
DELANEY, WESLEY & MARGARET	208	23243.9011	262	9.59	3rd order	8		Y		Y				
DELANEY, WESLEY & MARGARET	225	23242.9019	262	0.14	3rd order	5		Y						
DELANEY, WESLEY & MARGARET	224	23242.9030	262	0.15	3rd order	0								
DELANEY, WESLEY & MARGARET	223	23242.9032	262	0.2	3rd order	0								
DELANEY, WESLEY & MARGARET	222	23243.9004	262	0.23	3rd order	8		Y				Y		
DELANEY, WESLEY & MARGARET	221	23243.9010	262	0.24	3rd order	5		Y						
DELANEY, WESLEY & MARGARET	220	23242.9031	262	0.33	3rd order	0								
DELANEY, WESLEY & MARGARET	219	23243.9016	262	2.51	3rd order	5		Y						
DELANEY, WESLEY & MARGARET	217	23243.9013	262	5.12	3rd order	8		Y		Y				
DELANEY, WESLEY & MARGARET	215	23243.9010	262	8.79	3rd order	8		Y		Y				
DELANEY, WESLEY & MARGARET	199	23242.9021	262	10.19	3rd order	5		Y						

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
DELANEY, WESLEY & MARGARET	214	23242.9031	262	8.8	3rd order	0								
DELANEY, WESLEY & MARGARET	226	23243.9004	262	0.07	3rd order	0								
DELANEY, WESLEY & MARGARET	213	23242.9030	262	8.88	3rd order	0								
DELANEY, WESLEY & MARGARET	212	23242.9032	262	9.16	3rd order	0								
DELANEY, WESLEY & MARGARET	211	23242.9019	262	9.45	3rd order	5		Y						
DELANEY, WESLEY & MARGARET	210	23243.9005	262	9.46	3rd order	11		Y		Y		Y		
DELANEY, WESLEY & MARGARET	209	23242.9022	262	9.57	3rd order	5		Y						
DELANEY, WESLEY & MARGARET	218	23243.9013	262	3.87	3rd order	5		Y						
DICKERSON, H A	231	12335.9005	263a	0.99	3rd order	2							Y	
DICKERSON, H A	228	12275.9007	263	170.39	3rd order	7							Y	Y
DICKERSON, H A	227	12335.9005	263	432.87	3rd order	7							Y	Y
DICKERSON, H A	230	12334.9008	263	75.69	3rd order	5						Y	Y	
DICKERSON, H A	229	12284.9004	263	163.36	3rd order	7							Y	Y
DONEL BELSBY FARMING & RANCHING CORP	235	12334.9003	264	13.41	3rd order	3						Y		
DOUGLAS, G H	237	23191.9004	265	2.2	3rd order	10	Y							
DOUGLAS, G H	236	23191.9035	265	6.07	3rd order	10	Y							
DOUGLAS, KELLY P & BRIGITTE L	240	23233.9017	267	0.21	3rd order	5		Y						
DOUGLAS, KELLY P & BRIGITTE L	239	23224.9027	267	10.27	3rd order	8		Y				Y		
DOW TESTAMENTARY TRUST, WALLACE F	241	12054.9012	268	35.93	3rd order	38	Y	Y	Y	Y	Y	Y	Y	
DOW, ALVIN A	250	13281.9025	269e	13.15	3rd order	15	Y	Y						
DOW, ALVIN A	258	13324.9036	269a	10.01	3rd order	0								
DOW, ALVIN A	257	13284.9027	269e	10.01	3rd order	15	Y	Y						
DOW, ALVIN A	266	13336.9022	269b	4.07	3rd order	18		Y		Y	Y			
DOW, ALVIN A	256	13321.9028	269	10.14	3rd order	15		Y			Y			
DOW, ALVIN A	255	13321.9029	269	10.32	3rd order	15		Y			Y			
DOW, ALVIN A	254	13284.9024	269e	10.38	3rd order	25	Y	Y			Y			
DOW, ALVIN A	253	13284.9075	269f	10.94	3rd order	25	Y	Y			Y			
DOW, ALVIN A	251	13284.9025	269e	12.61	3rd order	25	Y	Y			Y			
DOW, ALVIN A	259	13275.9032	269f	9.99	3rd order	25	Y	Y			Y			
DOW, ALVIN A	252	13281.9026	269e	11.52	3rd order	15	Y	Y						
DOW, ALVIN A	268	13336.9022	269b	1.35	3rd order	18		Y		Y	Y			

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
DOW, ALVIN A	271	13333.9023	269c	0.65	3rd order	0								
DOW, ALVIN A	260	13284.9026	269e	9.72	3rd order	25	Y	Y			Y			
DOW, ALVIN A	269	13276.9076	269f	1.26	3rd order	15	Y	Y						
DOW, ALVIN A	267	13336.9019	269b	2.58	3rd order	25	Y	Y			Y			
DOW, ALVIN A	264	13324.9051	269	9.51	3rd order	0								
DOW, ALVIN A	265	13271.9012	269h	9.05	3rd order	15	Y	Y						
DOW, ALVIN A	263	13324.9050	269	9.6	3rd order	0								
DOW, ALVIN A	262	13325.9040	269b	9.65	3rd order	0								
DOW, ALVIN A	261	13324.9037	269a	9.67	3rd order	0								
DOW, ALVIN A	270	13332.9021	269d	0.92	3rd order	15		Y			Y			
DOW, BARRY & JANICE ELAINE	272	13325.9039	270	9.71	3rd order	0								
DOW, LELAND G	273	13226.9075	271	17.58	3rd order	15	Y	Y						
DOW, WALLACE & LUELLA	278	12056.9022	272	1.29	3rd order	25	Y				Y	Y	Y	
DRISCOLL, JOHN F & JULIE A	279	23033.9028	273	19.06	3rd order	3						Y		
DRISCOLL, JOHN F & JULIE A	280	23033.9023	273	10.58	3rd order	3						Y		
EAST CHENEY GRNG	281	22042.9004	274	0.87	3rd order	0								
ELDRIDGE, GEORGE L & HEIDI A	282	23271.9018	275	14.59	3rd order	8		Y				Y		
ELLIOTT, RHONDA M	283	23291.9016	276	16.54	3rd order	15	Y	Y						
EMTMAN, FREDA	284	13252.9004	277d	3.12	3rd order	0								
EMTMAN, FREDA	288	13252.9004	277c	0.02	3rd order	0								
EMTMAN, FREDA	287	13243.9012	277	0.08	3rd order	0								
EMTMAN, FREDA	286	13252.9004	277b	0.22	3rd order	0								
EMTMAN, FREDA	285	13243.9012	277a	1.22	3rd order	0								
EMTMAN, JAMES R & DARLA M	297	23196.9041	278b	8.17	3rd order	10	Y							
EMTMAN, JAMES R & DARLA M	298	23196.9041	278b	3.26	3rd order	10	Y							
EMTMAN, JAMES R & DARLA M	296	23191.9039	278c	12.84	3rd order	13	Y					Y		
EMTMAN, JAMES R & DARLA M	295	23195.9038	278c	9.84	3rd order	13	Y					Y		
EMTMAN, JAMES R & DARLA M	291	13252.9005	278	1.46	3rd order	0								
EMTMAN, JAMES R & DARLA M	290	13252.9005	278a	28.78	3rd order	0								
ENGELSEN LLC	300	22114.9006	280	5.77	3rd order	18	Y	Y				Y		
FARRELL, GARY R	301	13286.9078	281	17.49	3rd order	10	Y							

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
FARRELL, GARY R	302	13286.9078	281	3.83	3rd order	10	Y							
FIRGROVE INV INC	308	23175.9005	283a	4.19	3rd order	3						Y		
FIRGROVE INV INC	307	23084.9007	283	16.29	3rd order	8			Y			Y		
FISK, STEVEN D & JULIE A	309	23271.9024	284	4.33	3rd order	8		Y				Y		
FORD ETAL, DONALD	313	12084.9007	285a	1.48	3rd order	20	Y				Y			
FRANK, ALFRED C & AMY L	314	23354.9034	286	17.41	3rd order	5		Y						
FRANZ, LARRY D	316	12051.9003	288	0.12	3rd order	10					Y			
GERDES, BLAKE & JEAN	318	13286.9034	289	7.09	3rd order	10	Y							
GERDES, BLAKE & JEAN	317	13286.9034	289	7.36	3rd order	15	Y		Y					
GINSBURG, JOHN A & NATASCHA D	326	23224.9051	293a	0.61	3rd order	8		Y				Y		
GINSBURG, JOHN A & NATASCHA D	325	23224.9051	293	8.57	3rd order	8		Y				Y		
GLEAVE, LARRY & ERIN	327	22021.9044	294	19.86	3rd order	25	Y	Y			Y			
GOODSON, FLORIDA M	328	23271.9034	295	9.83	3rd order	8		Y				Y		
GOODSON, FLORIDA M	330	23271.9033	295a	0.16	3rd order	5		Y						
GOODSON, FLORIDA M	329	23271.9033	295	7.27	3rd order	8		Y				Y		
GOODWATER, LEONE C/GOODWATER	331	22025.9008	296	5.62	3rd order	25	Y	Y			Y			
GRAHAM, DONALD C	332	23261.9030	297	15.24	3rd order	8		Y				Y		
GREEN, KELLY	333	23265.9027	299	12.06	3rd order	5		Y						
GREEN, R	336	23263.9018	300a	5.95	3rd order	5		Y						
GREEN, R	335	23263.9018	300	68.04	3rd order	5		Y						
GREEN-VIETZ REV LV TRUST, K J & B L	339	13286.9035	298	7.82	3rd order	15	Y		Y					
GREEN-VIETZ REV LV TRUST, K J & B L	337	13286.9037	298	8.75	3rd order	10	Y							
GREEN-VIETZ REV LV TRUST, K J & B L	338	13286.9036	298	8.28	3rd order	10	Y							
GREEN-VIETZ REV LV TRUST, K J & B L	342	13286.9037	298	4.74	3rd order	10	Y							
GREEN-VIETZ REV LV TRUST, K J & B L	341	13286.9036	298	5.52	3rd order	10	Y							
GREEN-VIETZ REV LV TRUST, K J & B L	340	13286.9035	298	6.31	3rd order	10	Y							
GROGAN FAMILY REV LIVING TRUST	356	22313.9003	302d	2.5	3rd order	8						Y		Y
GROGAN FAMILY REV LIVING TRUST	359	11021.9002	302e	1.17	3rd order	13					Y	Y		
GROGAN FAMILY REV LIVING TRUST	346	12341.9001	302a	165.03	3rd order	5								Y
GROGAN FAMILY REV LIVING TRUST	351	12344.9007	302f	38.24	3rd order	8						Y		Y
GROGAN FAMILY REV LIVING TRUST	353	12341.9001	302f	16.76	3rd order	5								Y

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
GROGAN FAMILY REV LIVING TRUST	355	12344.9008	302a	5.87	3rd order	0								
GROGAN FAMILY REV LIVING TRUST	357	22313.9003	302	1.91	3rd order	3						Y		
GROGAN FAMILY REV LIVING TRUST	358	12344.9007	302a	1.21	3rd order	5								Y
GROGAN FAMILY REV LIVING TRUST	344	12361.9002	302d	28.89	3rd order	8						Y		Y
GROGAN FAMILY REV LIVING TRUST	345	12364.9003	302d	2.94	3rd order	3						Y		
GROGAN FAMILY REV LIVING TRUST	354	12344.9008	302f	8.81	3rd order	5								Y
GROGAN LAND COMPANY LLC	378	22182.9002	303	0.08	3rd order	0								
GROGAN LAND COMPANY LLC	372	22322.9004	303c	40.77	3rd order	0								
GROGAN LAND COMPANY LLC	374	22321.9008	303c	20.34	3rd order	0								
GROGAN LAND COMPANY LLC	377	22325.9002	303b	0.43	3rd order	10					Y			
GROGAN LAND COMPANY LLC	376	12254.9003	303	10.85	3rd order	15					Y	Y	Y	
GROGAN LAND COMPANY LLC	375	22183.9004	303a	15.25	3rd order	0								
GROGAN RLT, WILLIAM J	381	12352.9003	304	18.66	3rd order	8						Y		Y
GRUNEWALD, ROY & SARAH	386	22151.9021	307	9.5	3rd order	27	Y	Y			Y		Y	
HAMEL, RAY O	387	23191.9036	308	14.83	3rd order	10	Y							
HAMPTON, DAVID M	388	23203.9016	309	13.69	3rd order	0								
HAMPTON, JASON& PHYLLIS	389	23291.9011	310	19.97	3rd order	23	Y	Y				Y		Y
HAMPTON, LISA D	390	23203.9018	311	13.26	3rd order	0								
HAMPTON, ROBERT J	395	23203.9017	312a	17.13	3rd order	0								
HANRAHAN, CHARLES R & DAN E	396	23033.9019	313	19.15	3rd order	8		Y				Y		
HANRAHAN, CHARLES R & DAN E	397	23033.9018	313	1.29	3rd order	3						Y		
HARDEE, THOMAS V & TERESA J	399	12056.9023	314	2.57	3rd order	22	Y				Y		Y	
HARRIS, JOHN H	404	12293.9010	316	1	3rd order	0								
HARRIS, JOHN H	403	12292.9004	316	40.24	3rd order	0								
HARRIS, JOHN H	402	12291.9012	316	139.6	3rd order	2							Y	
HARTMAN, WILLIAM AND DIANA	405	13286.9029	317	8.43	3rd order	25	Y	Y			Y			
HARTMAN, WILLIAM AND DIANA	408	13286.9028	317	4.94	3rd order	25	Y	Y			Y			
HARTMAN, WILLIAM AND DIANA	407	13286.9028	317	6.05	3rd order	25	Y	Y			Y			
HARTMAN, WILLIAM AND DIANA	406	13286.9029	317	3.9	3rd order	25	Y	Y			Y			
HELM, ROGER J & LAUREL	411	13291.9003	318a	48.2	3rd order	0								
HELM, ROGER J & LAUREL	409	13292.9007	318a	138.1	3rd order	0								

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
HELMS, JERRY S & CHADYNE M	412	12175.9009	319	10.02	3rd order	0								
HELSING, DAVID M	413	13234.9064	320	9.54	3rd order	0								
HEYER, DARCY	414	12073.9018	321	62.23	3rd order	5						Y	Y	
HIGASHI FAMILY LIMITED PARTNERSHIP	420	23232.9024	324	0.55	3rd order	8		Y				Y		
HIGASHI FAMILY LIMITED PARTNERSHIP	419	23221.9034	324	10.14	3rd order	8		Y				Y		
HIGASHI FAMILY LIMITED PARTNERSHIP	421	23232.9024	324	0.45	3rd order	8		Y				Y		
HIGASHI FAMILY LIMITED PARTNERSHIP	418	23221.9032	324	10.17	3rd order	8		Y				Y		
HILTON, EARL L	422	23281.9014	325	16.23	3rd order	18	Y					Y		Y
HILTON, JERRY L	423	23282.9011	326	16.01	3rd order	21	Y	Y		Y		Y		
HOLBROOK, TERRY V & ROXANNE	426	23263.9030	327	21.3	3rd order	0								
HOOVER, L L & V J	427	13291.9015	328	2.01	3rd order	0								
HUME, D J	428	23145.9013	329	6.94	3rd order	3						Y		
HUMPHREY, CURTIS B	430	23274.9044	330	21	3rd order	8		Y				Y		
HUMPHREY, CURTIS B	429	23274.9045	330	42.48	3rd order	5		Y						
INLAND NORTHWEST LAND TRUST	438	23176.9058	332a	8.3	3rd order	0								
INLAND NORTHWEST LAND TRUST	434	23173.9059	332a	15.26	3rd order	0								
INLAND NORTHWEST LAND TRUST	435	23186.9053	332	14.86	3rd order	0								
INLAND NORTHWEST LAND TRUST	446	23202.9055	332a	0.06	3rd order	0								
INLAND NORTHWEST LAND TRUST	437	23202.9055	332a	10.22	3rd order	0								
INLAND NORTHWEST LAND TRUST	439	23186.9051	332	7.65	3rd order	0								
INLAND NORTHWEST LAND TRUST	440	23186.9052	332	5.59	3rd order	0								
INLAND NORTHWEST LAND TRUST	441	23186.9052	332	4.86	3rd order	0								
INLAND NORTHWEST LAND TRUST	442	23176.9058	332a	3.98	3rd order	0								
INLAND NORTHWEST LAND TRUST	443	23186.9053	332	3.27	3rd order	0								
INLAND NORTHWEST LAND TRUST	444	23186.9051	332	2.21	3rd order	0								
INLAND NORTHWEST LAND TRUST	445	23176.9057	332a	0.25	3rd order	0								
INLAND NORTHWEST LAND TRUST	436	23176.9057	332a	10.73	3rd order	0								
ISABELL, WM P & CYNTHIA	448	13286.9038	333	3.95	3rd order	10	Y							
ISABELL, WM P & CYNTHIA	447	13286.9038	333	9.21	3rd order	10	Y							
JACKSON, MIKE R & CANDYCE L	449	13291.9017	334	5.5	3rd order	0								
JACKSON, PRESTON M & GRACE L	450	23031.9040	335	29.13	3rd order	3						Y		

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
JACKSON, PRESTON M & GRACE L	451	23034.9008	335	147.62	3rd order	3						Y		
JAMES, MILDRED D	453	23224.9036	336	0.09	3rd order	8		Y				Y		
JAMES, MILDRED D	452	23224.9036	336a	4.57	3rd order	8		Y				Y		
JAMISON, GLEN A & BRENDA L	454	13214.9025	337	11.02	3rd order	15	Y	Y						
JANKE, KEITH & HEATHER	455	23275.9046	338	20.43	3rd order	8		Y				Y		
JARMS, RONALD L	457	13322.9012	339	5.03	3rd order	15		Y			Y			
JARMS, RONALD L	456	13322.9014	339	5.07	3rd order	15		Y			Y			
JARMS, W L/ANGELL-SMITH	459	13293.9020	340	10.07	3rd order	15		Y			Y			
JARMS, W L/ANGELL-SMITH	458	13293.9022	340	10.18	3rd order	15		Y			Y			
JERNEGAN, MICHAEL F & NATALIA	460	23252.9014	341	10.54	3rd order	8		Y				Y		
JEWEL INVESTMENT CO LLC	465	22023.9027	342	4.9	3rd order	25	Y	Y			Y			
JEWEL INVESTMENT CO LLC	461	22025.9031	342	8.48	3rd order	25	Y	Y			Y			
JEWEL INVESTMENT CO LLC	462	22023.9025	342	6.83	3rd order	25	Y	Y			Y			
JEWEL INVESTMENT CO LLC	464	22023.9024	342	5.85	3rd order	25	Y	Y			Y			
JEWEL INVESTMENT CO LLC	466	22023.9028	342	4.29	3rd order	25	Y	Y			Y			
JEWEL INVESTMENT CO LLC	463	22023.9026	342	5.92	3rd order	25	Y	Y			Y			
JOHNSON, SALLY A	467	23113.9012	343	1.09	3rd order	3						Y		
JOLLY JACK RANCH, L.L.C.	477	22112.9008	344b	13.61	3rd order	0								
JOLLY JACK RANCH, L.L.C.	474	22044.9016	344b	20.08	3rd order	0								
JOLLY JACK RANCH, L.L.C.	475	22151.9014	344c	15.47	3rd order	25	Y	Y			Y			
JOLLY JACK RANCH, L.L.C.	476	22151.9012	344c	15.35	3rd order	25	Y	Y			Y			
JOLLY JACK RANCH, L.L.C.	480	22151.9008	344c	5.21	3rd order	20	Y				Y			
JOLLY JACK RANCH, L.L.C.	481	22151.9009	344c	5.21	3rd order	20	Y				Y			
JOLLY JACK RANCH, L.L.C.	479	22151.9013	344c	11.4	3rd order	25	Y	Y			Y			
JOLLY JACK RANCH, L.L.C.	482	22151.9010	344c	4.74	3rd order	20	Y				Y			
JOLLY JACK RANCH, L.L.C.	478	22151.9011	344c	12.65	3rd order	25	Y	Y			Y			
KAISER, WESLEY H & LAURA C	487	13271.9027	346	9.64	3rd order	18	Y	Y		Y				
KAISER, WESLEY H & LAURA C	486	13271.9026	346	9.81	3rd order	18	Y	Y		Y				
KAISER, WESLEY H & LAURA C	488	13271.9028	346	8.09	3rd order	18	Y	Y		Y				
KAISER, WESLEY H & LAURA C	489	13271.9028	346a	1.55	3rd order	18	Y	Y		Y				
KAISER, WESLEY H & LAURA C	490	13271.9027	346a	0.17	3rd order	18	Y	Y		Y				

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
KALOUS, ROBERT K & MARILYN M	494	13276.9029	347	4.15	3rd order	15	Y	Y						
KALOUS, ROBERT K & MARILYN M	493	13226.9070	347	0.23	3rd order	15	Y	Y						
KALOUS, ROBERT K & MARILYN M	492	13226.9070	347	4.44	3rd order	15	Y	Y						
KALOUS, ROBERT K & MARILYN M	497	13226.9071	347	0.56	3rd order	15	Y	Y						
KALOUS, ROBERT K & MARILYN M	496	13276.9029	347	0.63	3rd order	15	Y	Y						
KALOUS, ROBERT K & MARILYN M	495	13226.9071	347	4.01	3rd order	15	Y	Y						
KALOUS, ROBERT K & MARILYN M	491	13224.9075	347	4.81	3rd order	15	Y	Y						
KAPLAN FAM REF LIVING TRUST	498	11021.9001	348	12.41	3rd order	15					Y	Y	Y	
KARY, CALVIN T	501	23035.9021	349a	7.86	3rd order	3						Y		
KARY, CALVIN T	500	23035.9022	349a	11.05	3rd order	3						Y		
KARY, CALVIN T	499	23033.9026	349	19.79	3rd order	8		Y				Y		
KARY, CALVIN T & LAURA J	502	23032.9020	350	9	3rd order	3						Y		
KAUTZMAN, DANNY J	503	23273.9043	351	22.29	3rd order	5		Y						
KELLY LIVING TRUST, CECELIA M	505	23222.9003	352	79.5	3rd order	3						Y		
KEPL, TED V	506	22123.9005	353	8.11	3rd order	20	Y	Y				Y	Y	
KINNEY, BRIAN R	507	23223.9047	354	17.04	3rd order	8		Y				Y		
KUDAMATSU, ROBERT & JOYCE	509	13286.9043	356	9.81	3rd order	10	Y							
KUDAMATSU, ROBERT & JOYCE	510	13286.9043	356	0.22	3rd order	0								
KUONEN, ROBERT B & NANCY J	513	23354.9016	357a	0.17	3rd order	5		Y						
LABISH FAMILY LIVING TRUST	528	23163.9003	358d	11.49	3rd order	8		Y				Y		
LABISH FAMILY LIVING TRUST	523	12225.9004	358b	0.17	3rd order	2							Y	
LABISH FAMILY LIVING TRUST	522	13233.9041	358c	4.61	3rd order	0								
LABISH FAMILY LIVING TRUST	520	13234.9072	358c	40.82	3rd order	0								
LABISH FAMILY LIVING TRUST	529	23164.9004	358d	9.94	3rd order	8		Y				Y		
LESLIE/ALICE MILL LIVING TRUST	534	02261.9001	363	80.07	3rd order	2							Y	
LINDELL LAND CO	535	13214.9024	364	11.81	3rd order	15	Y	Y						
LOCKWOOD, ANNE C	536	22024.9019	365	10.85	3rd order	25	Y	Y			Y			
LOVERME, JOEL A & MARLENE S	537	13322.9033	366	10.13	3rd order	15		Y			Y			
LUCAS, JAMES G	538	12301.9014	367	92.24	3rd order	0								
LUNDGRIN, PAUL A & ESPERANZA O	540	23321.9011	368	18.9	3rd order	18	Y	Y				Y		
LUTCHENDORF, R C	541	23294.9009	369	14.78	3rd order	0								

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
MACY, DEL	542	22151.9016	370	9.52	3rd order	27	Y	Y			Y		Y	
MADDUX, GENE G & KELLI J	545	23224.9019	372	0.11	3rd order	5		Y						
MADDUX, GENE G & KELLI J	544	23224.9019	372a	40.25	3rd order	8		Y				Y		
MADSEN, DANA C & TERRY M	546	23223.9040	373	6.19	3rd order	8		Y				Y		
MADSEN, DANA C & THERESA M	548	23211.9004	374	10.13	3rd order	8		Y				Y		
MADSON, DANA C & THERESA M	549	23223.9010	375	9.81	3rd order	8		Y				Y		
MAGER, JOHN & BONNIE	551	13284.9028	376	10.81	3rd order	25	Y	Y			Y			
MAGER, JOHN & BONNIE	550	13272.9077	376a	39.62	3rd order	18	Y	Y		Y				
MALCOLM, JON & INEZ	22	23191.9027	377	25.8	3rd order	10	Y							
MALCOLM, JON & INEZ	22	12084.9005	377	30.15	3rd order	10	Y							
MANSFIELD, TERRY M & KRISTIN G	556	12213.9003	378a	0.12	3rd order	2							Y	
MARTIN, TERRY & PRISCILLA M	558	22021.9037	379	2.37	3rd order	15	Y	Y						
MARTIN, TERRY & PRISCILLA M	557	22021.9037	379a	16.24	3rd order	15	Y	Y						
MATHEWS, DAVID D & LYNN E	559	22044.9024	380	7.64	3rd order	0								
MCCORD, OLIVER & ANNA	561	13236.9070	382	8.7	3rd order	0								
MCCORMICK, R & K	562	22023.9005	383	5.86	3rd order	25	Y	Y			Y			
MCINTIRE, GABRIELE	563	22024.9014	384	5.79	3rd order	25	Y	Y			Y			
MCKINLAY LIVING TRUST, WARREN & ANNA	564	22014.9008	385a	18	3rd order	8		Y				Y		
MCKINLAY, JACK/WILLSON	569	22016.9017	387	6.07	3rd order	0								
MCKINLAY, JACK/WILLSON	568	22016.9017	387	8.27	3rd order	0								
MCMICHAEL, RANDALL L	572	23232.9021	390	38.59	3rd order	8		Y				Y		
MCNARY ETAL, ROBERT J "JIM"	575	12281.9006	391	9.27	3rd order	2							Y	
MCNARY ETAL, ROBERT J "JIM"	574	12286.9007	391	17.16	3rd order	2							Y	
MCTAGGART, MARK A & SANDY L	576	23261.9031	392	10.01	3rd order	5		Y						
MILL, L E & A M	578	02262.9003	394	83.26	3rd order	2							Y	
MILL, R L	580	02265.9002	395	162.46	3rd order	7			Y				Y	
MILLER, BARRY M & TERRIANN	581	13234.9065	396	10.02	3rd order	0								
MILLER, LENNY D & KAREN L	582	23263.9023	397	13.59	3rd order	5		Y						
MONTGOMERY, W P	583	13322.9021	398	4.88	3rd order	15		Y			Y			
MONTGOMERY, W P	584	13322.9015	398	1.14	3rd order	5		Y						
MONTGOMERY, W P	585	13322.9024	398	3.94	3rd order	15		Y			Y			

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
MOORE, MARGARET	595	22324.9006	399	16.04	3rd order	10					Y			
MOORE, MARGARET	594	22281.9007	399a	18.9	3rd order	0								
MOORE, MARGARET	596	22285.9009	399a	5.55	3rd order	10					Y			
MORAVEC, MICHAEL G & MARCI L	598	23224.9037	400	4.69	3rd order	8		Y				Y		
MOREHOUSE, LYLE	599	12291.9013	401	11.31	3rd order	5				Y			Y	
MORRISSEY, MICHAEL J & SALLY L	600	12301.9013	402	40.4	3rd order	0								
MYERS REALTY, INC	601	23351.9030	403	10.4	3rd order	8		Y				Y		
MYERS, W J/EDWARDS	602	23206.9013	404	14.64	3rd order	13	Y					Y		
NETZLEY, TIMOTHY C & BONNIE L	603	13322.9034	405	9.44	3rd order	15		Y			Y			
NEWBRY, G B & B L	605	23222.9048	406	10.05	3rd order	3						Y		
NICKLOUS, MICHAEL W	606	23231.9034	407	10.16	3rd order	3						Y		
NORGAARD, ARNOLD	607	22024.9016	408	12.3	3rd order	25	Y	Y			Y			
OAKES, ROBERT A AND CONNIE L	608	13284.9023	409	12.37	3rd order	25	Y	Y			Y			
ODELL, NANCY L	609	23282.9007	410	15.28	3rd order	18	Y					Y		Y
ODUM, PHILIP L & KAREN	610	23261.9036	411	10.37	3rd order	8		Y				Y		
OIEN, LOYAL J	611	12342.9012	412	86.78	3rd order	7							Y	Y
OLSEN, TRACY J & OLAF E	612	23354.9035	413	18.33	3rd order	8		Y				Y		
PARKER J S ETUX	613	23261.9021	414	19.3	3rd order	8		Y				Y		
PARKER, C L	614	23223.9048	415	23.35	3rd order	11		Y		Y		Y		
PARKER, FRANK (LIVE ESTATE)	615	23023.9073	416	41.21	3rd order	3						Y		
PARKER, JOHN S & VONICE D	619	23291.9015	417a	12.26	3rd order	18	Y	Y				Y		
PARKER, JOHN S & VONICE D	623	23291.9013	417a	11.09	3rd order	18	Y	Y				Y		
PARKER, JOHN S & VONICE D	618	23274.9004	417b	40.09	3rd order	5		Y						
PARKER, JOHN S & VONICE D	620	23291.9014	417a	11.76	3rd order	18	Y	Y				Y		
PARKER, JOHN S & VONICE D	621	23274.9004	417c	0.14	3rd order	5		Y						
PARKER, JOHN S & VONICE D	622	23274.9004	417c	0.13	3rd order	5		Y						
PARKER, JOHN S & VONICE D	616	23191.9034	417	6.45	3rd order	10	Y							
PARKER, JOHN S & VONICE D	624	23274.9003	417c	0.9	3rd order	5		Y						
PARKER, ROBERT J	625	23022.9005	418	0.41	3rd order	0								
PENCE ETAL, R H	630	12082.9003	421	40.88	3rd order	6				Y		Y		
PENCE, R H & M K	632	12061.9009	422	0.17	3rd order	10					Y			

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
PETERSON, MARK A & JOAN M	633	22223.9012	423	30.26	3rd order	0								
PHILLIPS, JOHN W	641	22044.9011	425	17.87	3rd order	0								
PHILLIPS, JOHN W	642	22045.9007	425a	0.21	3rd order	18	Y	Y				Y		
PHILLIPS, JOHN W	638	22042.9022	425	22.86	3rd order	0								
PHILLIPS, JOHN W	643	22041.9003	425	1.77	3rd order	0								
POINDEXTER, CLAY H & MELINDA J	646	12222.9002	426a	0.54	3rd order	17	Y		Y				Y	
PORTER, MARK H & SANDRA D	653	13286.9074	428	0.11	3rd order	25	Y	Y			Y			
PORTER, MARK H & SANDRA D	652	13284.9073	428	9.78	3rd order	25	Y	Y			Y			
PORTER, MARK H & SANDRA D	651	13286.9074	428	10.96	3rd order	25	Y	Y			Y			
POTTER, R B	656	23275.9037	430a	4.11	3rd order	3						Y		
POWER, MYRON D & MARIE A	658	13286.9033	431	6.89	3rd order	13	Y			Y				
POWER, MYRON D & MARIE A	657	13286.9033	431	7.87	3rd order	10	Y							
PRESSWOOD, THOMAS A & GLORIA A	659	23354.9006	432	21.51	3rd order	5		Y						
PROSTER, MARK E. & ANDREA C.	662	23186.9054	433	1.64	3rd order	0								
PROSTER, MARK E. & ANDREA C.	664	23186.9056	433	17.23	3rd order	0								
PROSTER, MARK E. & ANDREA C.	665	23186.9056	433	12.74	3rd order	0								
PROSTER, MARK E. & ANDREA C.	666	23186.9056	433	1.31	3rd order	0								
PROSTER, MARK E. & ANDREA C.	661	23186.9054	433	7.09	3rd order	0								
PROSTER, MARK E. & ANDREA C.	663	23186.9054	433	0.52	3rd order	0								
PROSTER, MARK E. & ANDREA C.	660	23186.9054	433	8.22	3rd order	0								
REILLY, ALLEN W	673	23351.9024	435	10.46	3rd order	5		Y						
REILLY, ALLEN W	679	23351.9044	435	10.25	3rd order	5		Y						
REILLY, ALLEN W	668	23351.9042	435	15.62	3rd order	5		Y						
REILLY, ALLEN W	669	23354.9033	435a	12.69	3rd order	8		Y				Y		
REILLY, ALLEN W	670	23351.9040	435	10.7	3rd order	5		Y						
REILLY, ALLEN W	671	23351.9041	435	10.54	3rd order	5		Y						
REILLY, ALLEN W	672	23351.9043	435	10.49	3rd order	5		Y						
REILLY, ALLEN W	674	23351.9023	435	10.46	3rd order	5		Y						
REILLY, ALLEN W	676	23351.9020	435	10.43	3rd order	5		Y						
REILLY, ALLEN W	675	23351.9019	435	10.43	3rd order	5		Y						
REILLY, ALLEN W	677	23351.9021	435	10.43	3rd order	5		Y						

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
REILLY, ALLEN W	680	23351.9045	435	10.25	3rd order	5		Y						
REILLY, ALLEN W	678	23355.9034	435	10.37	3rd order	8		Y				Y		
RHODES, RAYMOND	681	23252.9016	436	10.27	3rd order	8		Y				Y		
RIETZ, GILMOUR A	683	12043.9010	437	8.78	3rd order	30	Y	Y			Y	Y	Y	
ROCKY PINE RANCH LLC	691	23281.9013	439b	0.55	3rd order	0								
ROCKY PINE RANCH LLC	690	23281.9015	439b	8.16	3rd order	0								
ROCKY PINE RANCH LLC	689	23281.9015	439a	11.48	3rd order	0								
ROGERS, MICHAEL F & DAWN M	692	23231.9033	440	10.55	3rd order	3						Y		
ROYALTIES LMTD	694	22024.9015	442	8.03	3rd order	25	Y	Y			Y			
RULE, M I/RANCOURT	695	22045.9018	443	10.09	3rd order	0								
RUPP SR, HAROLD & MARCELLE	696	13291.9002	444	9.49	3rd order	0								
SANDERSON, RODNEY R & CARLA J	698	23354.9009	446	10.1	3rd order	5		Y						
SCHULTES, FRANZ E & TAMARA A	699	23231.9036	447	10.33	3rd order	3						Y		
SCIBA, DARWIN R & REBECCA L	700	23355.9017	448a	31.18	3rd order	8		Y				Y		
SCIBA, DARWIN R & REBECCA L	703	23354.9032	448	10.37	3rd order	8		Y				Y		
SCIBA, DARWIN R & REBECCA L	702	23355.9035	448a	10.39	3rd order	8		Y				Y		
SCIBA, DARWIN R & REBECCA L	701	23351.9022	448a	10.43	3rd order	8		Y				Y		
SEIPP, HALEY & ROBERT J	705	23274.9038	450	21.05	3rd order	8		Y				Y		
SEUBERT, PATRICK M & ANGIE M	706	13286.9020	451	10.74	3rd order	25	Y	Y			Y			
SEUBERT, PATRICK M & ANGIE M	707	13286.9020	451	1.76	3rd order	25	Y	Y			Y			
SHOWALTER CORP	711	02145.9001	452a	48.15	3rd order	5						Y	Y	
SHOWALTER CORP	710	02145.9001	452a	49.46	3rd order	2							Y	
SHOWALTER CORP	713	12073.9017	452	16.46	3rd order	8				Y		Y	Y	
SHOWALTER, MARGARET E	714	02121.9021	453	10.51	3rd order	5						Y	Y	
SHUSKO, GLEE D	715	13271.9008	454	1.48	3rd order	15	Y	Y						
SMITH, B E	716	23324.9007	455	10.41	3rd order	0								
SMITH, BERT	718	23324.9006	456a	2.29	3rd order	0								
SOOY, AMY JO	719	02233.9003	457	163.85	3rd order	2							Y	
SPANJER LIVING TRUST	724	23164.9005	458a	0.89	3rd order	3						Y		
SPANJER LIVING TRUST	723	23164.9005	458	1.98	3rd order	3						Y		
SPANJER LIVING TRUST	722	23155.9002	458b	14.04	3rd order	3						Y		

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
SPANJER LIVING TRUST	721	23164.9005	458a	34.83	3rd order	3						Y		
SPEAR, STEVEN A & LORNA L	726	23233.9029	459	0.36	3rd order	5		Y						
SPEAR, STEVEN A & LORNA L	725	23224.9017	459	8.93	3rd order	5		Y						
SPOKANE COUNTY	728	23224.9028	3b	0.1	3rd order	0								
SPOKANE COUNTY	727	22282.9011	3a	6.74	3rd order	10					Y			
SPOKANE PRODUCE INC	729	23221.9015	461	19.05	3rd order	8		Y				Y		
SPOONER, EUGENE & MARLA A	731	23262.9025	462b	0.05	3rd order	5		Y						
STELZER, DARRELL	740	22025.9002	463d	1.83	3rd order	0								
STELZER, DARRELL	739	22032.9004	463a	2.88	3rd order	18	Y	Y				Y		
STELZER, DARRELL	738	22025.9002	463c	15.41	3rd order	18	Y	Y				Y		
STELZER, DARRELL	744	22031.9002	463a	0.19	3rd order	18	Y	Y				Y		
STELZER, DARRELL	743	22032.9003	463a	3.82	3rd order	18	Y	Y				Y		
STIMSON, STEVE C & ANGELA M	745	13322.9023	464	4.83	3rd order	15		Y			Y			
STOUGHTON, DONALD A & MARY J	746	22021.9043	465	9.71	3rd order	0								
STRALEY, GEORGE L & JACKIE	747	13322.9011	466	9.91	3rd order	15		Y			Y			
STRIEFF, RAYMOND	765	12185.9015	469d	4.53	3rd order	2							Y	
STRIEFF, RAYMOND	764	02143.9002	469e	13.71	3rd order	2							Y	
STRIEFF, RAYMOND	763	12185.9015	469f	18.27	3rd order	5						Y	Y	
STRIEFF, RAYMOND	762	23054.9065	469b	25.16	3rd order	3						Y		
SWEDBERG, K C	766	23191.9033	470	5.37	3rd order	10	Y							
SYKVAS, CHARLES E/BORELLI	767	23231.9035	471	10.33	3rd order	3						Y		
TEEL DAIRY FARMS INC	771	13286.9042	473	6.65	3rd order	15	Y	Y						
TEEL DAIRY FARMS INC	769	13281.9041	473	5.35	3rd order	15	Y	Y						
TERRY, MARK A & MARLA J	773	23112.9093	474	2.01	3rd order	3						Y		
TERRY, MARK A & MARLA J	772	23112.9094	474	34.47	3rd order	3						Y		
THOMPSON, RODNEY/ENGSTROM	776	22216.9005	475	17.25	3rd order	0								
TITUS, SHIRLEY	779	22023.9012	476	5.95	3rd order	30	Y	Y	Y		Y			
TITUS, SHIRLEY	778	22023.9007	476	6.74	3rd order	25	Y	Y			Y			
TITUS, SHIRLEY	777	22023.9006	476	7.69	3rd order	25	Y	Y			Y			
TOBLER, LEON N & DEBRA L	780	13271.9013	477	10.2	3rd order	15	Y	Y						
TOBLER, MARVIN W & DEBORAH L	781	13271.9025	478	10.16	3rd order	15	Y	Y						

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
TOLER, GREGORY L/LYNN M	782	13275.9033	479	12.96	3rd order	25	Y	Y			Y			
TOWEY, WILLIAM T & KARLYN A	783	12051.9019	480	15.38	3rd order	17		Y			Y		Y	
TUPPER, EDDY ROY & MARIE	784	23252.9023	481	15.73	3rd order	8		Y				Y		
TUTTLE, DONNA K	786	23271.9036	482	10.72	3rd order	8		Y				Y		
TUTTLE, DONNA K	785	23271.9027	482	12.43	3rd order	8		Y				Y		
UNKNOWN	854	23335.9006	483d	0.1	3rd order	0								
UNKNOWN	851	13262.9004	483b	4.22	3rd order	0								
UNKNOWN	853		483	0.17	3rd order	0								
UNKNOWN	852		483a	2.22	3rd order	0								
US DEPARTMENT OF AGRICULTURE	788	22101.9003	1	17.3	3rd order	0								
USA	789	12343.9004	1a	22.92	3rd order	0								
VAN TINE, DOUG K & BONNIE J	793	23263.9029	486	21.26	3rd order	0								
VAN TINE, DOUG K & BONNIE J	794	23263.9017	486a	8.71	3rd order	5		Y						
WADE, E R & M B	796	22042.9021	488	8.09	3rd order	18	Y	Y				Y		
WADE, E R & M B	798	22042.9021	488b	0.61	3rd order	18	Y	Y				Y		
WADE, E R & M B	797	22042.9021	488a	4.38	3rd order	18	Y	Y				Y		
WAGGENER LIVING TRUST	800	13214.9023	489	12.64	3rd order	15	Y	Y						
WAGNER, PENNY JO	801	22151.9007	490	11.85	3rd order	25	Y	Y			Y			
WALLINGFORD JR, R M & A L	802	13286.9076	491	7.38	3rd order	25	Y	Y			Y			
WALLINGFORD JR, R M & A L	803	13286.9076	491	3.08	3rd order	0								
WASH STATE DEPT NATURAL RESC	811	23165.9001	2a	2.96	3rd order	3						Y		
WASH STATE DEPT NATURAL RESC	808	22151.9018	2c	21.33	3rd order	25	Y	Y			Y			
WASH STATE DEPT NATURAL RESC	809	23165.9001	2d	6.46	3rd order	3						Y		
WASH STATE DEPT NATURAL RESC	810	23364.9007	2i	4.22	3rd order	5		Y						
WASH STATE DEPT NATURAL RESC	808	12365.9001	2c	24.82	3rd order	25	Y	Y			Y			
WASH STATE DEPT NATURAL RESC	812	23165.9001	2e	2.3	3rd order	8		Y				Y		
WASHINGTON STATE UNIVERSITY	813	23354.9031	2k	10.38	3rd order	8		Y				Y		
WAYMIRE, ELDA	814	13282.9007	494	2.67	3rd order	10	Y							
WAYMIRE, ELDA	815	13282.9007	494a	0.07	3rd order	10	Y							
WEEKS, DAVID S	816	22041.9014	495	5.01	3rd order	18	Y	Y				Y		
WESSLEN ETUX, J D	818	23252.9019	496	9.97	3rd order	8		Y				Y		

OWNER	MAP KEY	COUNTY NUMBER	TRACT	GIS ACRES	PROTECTION PRIORITY	RESOURCE SUM VALUE	GWAT	WSHED	WETS1	WETS2	STEPPE	FOR	HUNT OPP	INTACT
WESSLEN ETUX, J D	817	23252.9021	496	17.89	3rd order	13		Y	Y			Y		
WESTERMAN, W H	821	23265.9028	497a	9.31	3rd order	5		Y						
WESTERMAN, W H	820	23265.9028	497	13.03	3rd order	0								
WHITNEY, STEWART	824	22025.9011	499	6.24	3rd order	25	Y	Y			Y			
WICHMAN, PHILLIP & KAREN S	826	23354.9004	500	6.93	3rd order	5		Y						
WICHMAN, PHILLIP & KAREN S	827	22021.9039	500	3.87	3rd order	15	Y	Y						
WILSON, KAREN R	830	13332.9020	502	6.09	3rd order	18		Y		Y	Y			
WILSON, KAREN R	831	13332.9020	502a	3.18	3rd order	15		Y			Y			
WILSON, MICHAEL E & LORIE M	832	23252.9012	503	10.32	3rd order	5		Y						
WINKLER, RICHARD H & MARGARET A	833	22025.9010	504	5.82	3rd order	25	Y	Y			Y			
WIPPERT, LARRY C & DIANE M	835	23261.9032	506	10.01	3rd order	5		Y						
WIPPERT, LARRY C & DIANE M	836	23261.9033	506	10.13	3rd order	8		Y				Y		
WOODGER, BLAIR C	837	12072.9005	507	4.13	3rd order	3						Y		
YOUNG, BRADLEY GUY & SANDRA J	234	23343.9013	508	24.66	3rd order	18	Y	Y				Y		
YOUNG, BRADLEY GUY & SANDRA J	234	12343.9005	508	26.27	3rd order	18	Y	Y				Y		
YOUNG, GORDON O & SHARON L	842	22021.9046	509a	19.28	3rd order	0								
YOUNG, GORDON O & SHARON L	841	22021.9049	509	19.94	3rd order	0								
ZABEL, MARIE J	844	23271.9025	511a	2.61	3rd order	8		Y				Y		
ZABEL, MARIE J	845	23271.9035	511	9.84	3rd order	8		Y				Y		
ZACHER LIVING TRUST, HARVEY &	848	12295.9019	512	7.96	3rd order	0								
ZACHER LIVING TRUST, HARVEY &	847	12203.9005	512	40.19	3rd order	2							Y	
ZACHER LIVING TRUST, HARVEY &	846	12295.9018	512	63.71	3rd order	0								
ZIMMERMAN, LINDA	849	22025.9009	513	6.95	3rd order	25	Y	Y			Y			

APPENDIX B: HABITAT MANAGEMENT PLAN SUMMARY

B.1 HABITAT MANAGEMENT PLAN EXECUTIVE SUMMARY

The Turnbull Habitat Management Plan (HMP) was developed prior to the CCP and was signed in 1999 (USDI, 1999). The following appendix summarizes the HMP and presents all of the objectives and strategies written for the HMP.

In recent years, the mission and goals of the refuge have evolved from an emphasis on the production and maintenance of migratory waterfowl to a more holistic ecosystem management approach. The new mission is to restore and maintain ecosystem processes that provide for a natural diversity of flora and fauna native to the wetland, steppe and ponderosa pine communities of Eastern Washington. In order to fulfill this mission, specific goals were developed for each of the major plant communities, water quality and quantity, endangered and threatened species and maintenance of landscape connectivity.

An analysis of the current condition of the refuge ecosystem found that several factors limit the ability of the refuge staff to achieve these goals. These limitations are the outcome of past alterations to habitats and natural disturbance regimes by private landowners prior to refuge acquisition, subsequent refuge management, and increased urbanization of the area surrounding the refuge.

Significant non-point sources of nitrogen and phosphorus are entering the refuge from private lands north and east of the refuge. Refuge wetlands appear to have a greater susceptibility to drought that may be the result of increased usage of the water table for domestic and agricultural uses around the refuge, artificial recharge deficits as a result of extensive management drawdowns, and decreasing water yield from increased forest cover in refuge watersheds.

Past logging, grazing and suppression of fire has created pine stands with tree densities 2 to 4 times the pre-settlement condition. Large trees greater than 24 inches (60 cm) in diameter constitute less than 10% of the stands. Greater than 75% of the refuge ponderosa pine forest exists as closed canopy, multi-storied stands with a similar age and size structure. The forest understory is dominated by decadent snowberry and a dense layer of organic debris that suppresses the growth of native bunchgrasses and forbs. Fuel loading in refuge pine stands is 5 times greater than the average for this forest type. Conditions are ripe for catastrophic loss due to insects, disease, and fire.

The average density of snags in refuge forest stands is less than 1 per acre. Optimum conditions for cavity nesting birds require on the average 3 suitable snags per acre greater than 15 inches (38 centimeters) in diameter. Past logging and suppression of fire has resulted in the loss of mature and old growth stands that produce large diameter snags that persist over long periods of time. Existing stands are overstocked with pole and sapling sized pines that suppress tree growth and root development. Most snags are less than 15 inches (38 centimeters) in diameter and are susceptible to decay and windfall.

Aspen/deciduous shrub habitat important habitat for a large number of refuge neotropical migratory landbird species has been significantly reduced on the refuge by competition from encroaching ponderosa pine and the suppression of aspen and shrub regeneration by past grazing. Aspen and deciduous shrub dominated plant communities have been reduced by 65%. In the past, periodic fire removed encroaching pines and encouraged regeneration of aspen and understory shrubs.

Wet meadows and seasonal wetlands have been invaded by reed canarygrass (*Phalaris arundinacea*), an exotic perennial grass which out competes nearly all native plant species. Gone are the diverse seasonal

wetland habitats dominated by native sedges, rushes, and grasses. Water howellia, a federally threatened aquatic plant species restricted to seasonal wetlands, is at risk of being displaced by reed canarygrass.

Nearly 300 acres of seasonal wetland habitat has been impacted through the creation of over 700 nesting islands. These islands were created from spoil pushed up in the seasonal portion of several large sloughs and smaller potholes. Built too close to shore and each other and in water too shallow to prevent access by predators, these islands have not been used successfully by nesting waterfowl.

Exotic species such as cheatgrass brome (*Bromus tectorum*), Canada thistle (*Cirsium arvense*), dalmatian toadflax (*Linaria dalmatica*), St. Johns wort (*Hypericum perfoliatum*), spotted and diffuse knapweed (*Centaurea diffusa* and *C. maculosa*), and leafy spurge (*Euphorbia esula*) are present in refuge plant communities. Although limited in distribution on the refuge through integrated pest management practices. The potential exists for expansion without continued management effort. Cheatgrass is dominant in many refuge areas, displacing native perennial grass and forb communities.

The refuge occurs on a narrow extension of the Ponderosa Pine Zone into the Columbia Basin. This peninsula of ponderosa pine forest surrounded by intensively developed agricultural land is in danger of being isolated from the rest of the forested zones to the north by urban development around Spokane and the Interstate 90 corridor. Further isolation has resulted from forest practices on private lands surrounding the refuge. Past and current timber management activities on these lands have created either suppressed stands of ponderosa pine vulnerable to catastrophic fire or relatively young even aged stands of trees with little structural diversity.

Both qualitative and quantitative objectives have been established to provide more detailed direction and targets that will need to be met in order to achieve refuge goals. Objectives address limitations to meeting refuge goals identified by the Service, the habitat needs of native wildlife species, and the maintenance of the integrity of the refuge in its ecoregional setting. The habitat needs of wildlife species were addressed using a wildlife guild concept that groups wildlife by their common use of 10 different habitat strata for both breeding and foraging. Because guilds are often large, key management or indicator species were selected for each guild to focus management actions. These species were chosen because of legislative mandate (threatened or endangered), their significance to conserving biodiversity, the critical status of their populations, or the fact that their habitat requirements represent a subset of the membership of their respective guild.

Management strategies have been developed to meet these objectives. These strategies include both manipulative and administrative actions that will be applied over the next 15 to 20 years.

- Manipulative actions will include restoration of fire through prescribed burning, tree removal utilizing a variety of silvicultural methods, noxious weed control, livestock grazing, water management, wetland restoration, and riparian and grassland vegetation restoration.
- Administrative actions will primarily involve increased coordination with other public agencies and private landowners to protect the quantity and quality of water entering the refuge and prevent further refuge isolation resulting from increased urbanization of landscape linkages.

Specifically these actions will involve:

- Silvicultural treatment of approximately 400 acres annually for the next 15 years using a combination of non-commercial and commercial thinning, single tree selection harvest, and group selection harvest to achieve a natural distribution of stand conditions.
- Prescribed burning of between 800 - 1600 acres per year.
- Continuation of integrated weed management using either singly or in combination, cultural, chemical, biological, or mechanical management practices.
- An experimental program to control reed canarygrass in seasonal wetland habitat and restore native plant diversity in cheatgrass dominated steppe and forested habitats.
- A refined water management program to meet objectives for emergent vegetation and open water in 22 managed wetlands.
- Restoring natural contours of 29 altered wetland basins by removing artificial islands and berms.
- Coordination and cooperation with local, county, and state regulatory agencies and private landowners to reduce threats to water quality and quantity.
- Use of available incentive programs to change private land-uses that are impacting the quality and quantity of water entering the refuge.
- Use of fee or easement acquisition from willing sellers when necessary to protect water quality and quantity, water howellia habitat, meadow steppe plant communities and landscape linkages.
- Research would be initiated to answer critical questions about habitat requirements and species biology of water howellia in order to design sound management plans for restoring and maintaining natural occurrences.

Full implementation of this plan will cost approximately $330,000 annually. Primary costs are associated with the need for the equivalent of three full-time personnel for planning, implementing and monitoring forest and prescribed fire management and 1 full time equivalent employee for wetland restoration work. Additional costs are associated with equipment, fuel, native plant materials, research contracts, and outreach.

This plan takes an adaptive management approach. Habitat monitoring will be undertaken to insure that assumptions made in developing strategies are correct. If objectives are not being met then corrections can be made. Monitoring procedures have ben been or will be developed for each breeding and foraging strata and water howellia.

Implementation of this plan over the next 20 years should result in improved water quality and quantity, improved wetland conditions, improved forest health, increased stand diversity and snag densities, reduction in the risk of stand replacing wildfires, restoration of native plant diversity, increased area of aspen riparian habitat and maintenance of landscape linkages.

B.2. HABITAT MANAGEMENT OBJECTIVES AND STRATEGIES

In order to achieve refuge goals and resolve resource challenges, both qualitative and quantitative objectives were established that address the habitat needs of breeding and foraging guilds as well as maintaining the integrity of the refuge in its ecoregional setting. Habitat objectives for guilds are mostly quantitative and were set to restore and maintain specific habitat elements using guild management guidelines. Recognizing that these guidelines represent optimum conditions, refuge objectives were tempered by the natural capacity of the refuge to provide these elements. The overriding theme in the objective setting process is the restoration and maintenance of ecological processes that produce a natural diversity and distribution of habitats. These ecological processes are dynamic resulting in variations in the abundance and distribution of habitat strata both spatially and temporally. Because of this variability, objectives generally cover a range of values. Objectives for achieving goals necessary to maintain the ecological integrity of the refuge in the larger landscape are more qualitative and deal with minimizing the effect of off-refuge activities on refuge resources.

GOAL #1. Provide habitat conditions essential to the conservation of migratory birds and other wildlife within a variety of wetland complexes.

1A. OPEN WATER ACREAGE OBJECTIVE: Manage the 22 refuge wetlands with water control capability at a level that maintains between 500 and 750 acres of permanent open water annually to support the water surface and emergent stratum breeding guild.

Guild Management Guidelines

Water surface breeding guild

- For every 1000 acres of habitat, maintain at least one large wetland, greater than 100 acres, with deep water and beds of dense submerged aquatic plants available from March 15th to August 30th.

Emergent stratum breeding guild

- Permanent wetlands should be maintained at a density of 2 ponds per square mile larger than 50 acres.
- Between 30 and 50% of a permanent wetland basin should be managed as open water in blocks of at least 25 acres in size.
- Open water areas should contain interspersed patches of dense, submerged aquatic plant beds. Submerged aquatic plants provide a substrate for invertebrate production. Aquatic invertebrates are critical to egg production, the maintenance of incubating females and growth and survival of broods.

Strategies

- Maintain water control capability in 22 permanent wetland basins and establish peak operating levels of the 22 managed wetlands to achieve objectives for wetland strata (Table 4 in HMP). Stabilize water levels in all managed wetlands by April 1.
- Develop contour maps of the 22 managed wetland basins. These maps will allow the use of existing wetland vegetation models that account for annual runoff and evapotranspiration to establish operating levels that will achieve wetland strata objectives over the long-term.
- Until contour mapping is completed, peak water levels will be based on existing operating levels (Table 5). Interim adjustments to operating levels will be made if monitoring indicates that objectives for wetland strata are not being met.
- Because the bottom of the control structure is often higher than the lowest point in the basin, a piezometer well is required near the structure of each managed wetland to measure the level of the water table and water use to refine water management and support existing water rights and claims. Piezometer wells are currently in place at Kepple Lake, Upper Turnbull, Lower Turnbull and Long Lake. The topography of these four wetlands will be surveyed and mapped first. Eighteen more piezometer wells will be placed at remaining managed wetlands.

Rationale:

There are 22 wetlands with water control structures where water levels can be established that will meet habitat objectives for a range of values for open water, emergent vegetation and water depths. Meeting these objectives will provide the strata necessary to support wetland breeding and foraging guilds. Water levels can be established using both vegetation simulation models and empirical data. Supplemental water can be used to augment local runoff to reach these water levels. It is important to note that even with supplemental water it will not be possible or desirable to maintain stable quantities or distributions of different vegetation zones and water depths within a wetland basin overtime. Long-term stability of wetlands is often associated with declining productivity in terms of the interspersion of wetland vegetation zones, productivity and composition of submerged aquatic plant communities, and the diversity and abundance of aquatic invertebrates. Use of supplemental water can, however, reduce the extremes of natural cycles and maintain objective levels of wetland strata for longer periods of time.

Peak operating level for each managed wetland basin that will have the greatest probability of meeting objectives for wetland strata can be established using wetland vegetation models. Rules for the model have been empirically derived for prairie pothole wetlands to predict changes in wetland vegetation zones as a result of different hydrologic inputs (van der Valk 1981). The rules predict conversion from one vegetation type to another as a result of different drawdown and flooding scenarios. These rules have been incorporated into spatial simulation models to predict potential effects of global warming on prairie wetlands (Poiani and Johnson 1991). Recently this model with some modifications was applied to a wetland basin on the refuge with good predictive ability (Mahrer 1995).

1B. EMERGENT PLANT STRATA OBJECTIVE: Establish an annual operating level for the 22 managed wetlands that maintains an emergent plant strata that covers between 10% and 30% of the wetland basin to support the emergent and water surface stratum breeding and foraging guilds. Fifty percent of this zone should have a width of greater than 100 feet.

Guild Management Guidelines

Emergent Stratum Breeding and Foraging Guilds

- The ratio of open water areas to emergent plant beds should be near 1:1. At least half of the emergent plant beds should be at least 100 feet in width to provide adequate area for the establishment of territories and security for nesting.
- Stem densities should be greater than 14 stems per square foot in at least 50% of the emergent stands.

Strategies

(see Strategies for Objective 1A)

Rationale

See rationale for Objective 1B

1C. WATER DEPTHS IN EMERGENT PLANT ZONE OBJECTIVE: Manage water annually to maintain water depths of at least 18 inches in the emergent plant zone of managed wetlands from April 1 through July 30 for nesting birds in the emergent stratum breeding guild.

Guild Management Guidelines

Emergent Stratum Breeding Guild

- Water depths in hardstem bulrush stands should not drop below 18 inches (45 cm) from April 1 to July 30.

Strategies

(see Strategies Objective 1A)

Rationale

Maintenance of the specified minimum water depths in managed wetlands during the nesting season is critical to the success of nesting attempts by members of the emergent stratum breeding guild (Low 1945, Lokemoen 1966, Siegfried 1976, and Stoudt 1982). Adequate water depths mainly serve to limit access to the nest by potential predators.

1D. RESTORATION OF NATURAL HYDROLOGY OBJECTIVE: By 2007, restore the natural hydrology of 250 acres of managed wetlands that occur in isolated watersheds and are not downstream from off refuge water sources.

Guild Management Guidelines

Emergent Stratum Breeding Guild

- A diversity of wetland types and sizes are required to meet all wetland associated needs of this guild seasonally and annually.
- Fluctuating water levels seasonally and between years promotes both a temporal and spatial diversity of conditions in emergent stands. Under these conditions, suitable habitat is provided for all guild members over the long-term.

Water Surface and Water Column Feeding Guilds

- Without full water management capability, maintenance of a complex of natural wetlands with dynamic hydrologic cycles will provide the greatest diversity of foraging opportunities during spring and fall migration periods.

Bare Surface Feeding Guild

- A complex of wetlands with different hydrologic regimes, will provide the diversity of habitats required by all waterbird species in a localized area.

Strategies

•	The long-term strategy should be to maximize water retention in these basins. Existing water control structures (McDowell Lake, 30-Acre Lake, and Hale Lakes) can be replaced by a spillway set at a desired maximum level. Drainage ditches can be back-filled and the wetland basin returned to its natural configuration by removal of near shore islands and recontouring.

Rationale

Several previously drained wetlands on the refuge occur at the head of a drainage system and do not receive supplemental water from other wetlands. Because supplemental water is not available to recover from drawdown or maintain water depths over extended periods of time in these wetlands, active water management is not generally feasible. Based on overall depth, wetlands in this category can be separated into two types. The deeper wetland type with greater than 20% permanent open water has little need for a water control structure because drawdowns can result in artificial deficits that may be difficult to overcome in all but the wettest years without supplemental water. The remaining wetlands in this category are more shallow and seasonal in nature and have no permanent open water. This may be the result of either a shallower natural basin or the placement of a water control structure below the elevation of the natural outlet. As a result of the shallowness of these wetlands, they are often dominated by reed canarygrass. Control of reed canarygrass in these managed wetlands can be accomplished in part by raising the elevation of the outlet to allow deeper flooding. This is an option in wetlands such as Palmer Meadow where the maximum elevation of the current outlet is lower than the pre-drainage outlet.

1E. RESTORATION OF NATURAL BASIN TOPOGRAPHY OBJECTIVE: By 2017, restore the natural basin topography and historic wetland function of 29 wetlands that have been manipulated in the past to create deeper wetland habitat and waterfowl nesting islands.

Guild Management Guidelines

Water column breeders

- Natural basin topography should be maintained or restored to a 10:1 slope to provide the necessary shallow, warm water areas needed for maintenance of this guild under a variety of water conditions.

Terrestrial covered surface breeders

- Islands can be excellent predator free breeding habitat for waterfowl members of this guild when they are located in the right environment. Critical features include a distance from shore of at least 160 feet, maintenance of water depths in excess of 50 inches around islands throughout the breeding season, a spacing of at least 60 feet between islands, and no more than two islands per 20 acres of wetland area.

Water column and water surface feeders

- Whenever possible large wetlands with gentle shoreline slopes should be flooded in the winter and spring to a depth that maximizes the amount of shallow flooded shoreline areas. These wetlands should be allowed to drawdown naturally through the spring and summer. These large wetlands have the highest potential for providing a sustained diversity of foraging strata for this guild overtime.

Bare surface feeders (shorebirds)

- Availability of exposed mudflats and an adjacent, shallow wetland zone with less than 25% vegetative cover from mid-June to the end of September is key to the maintenance of this guild during migration.
- Wetlands with a gradual sloping bottom provide a greater diversity of water depths and shoreline edge resulting in greater invertebrate diversity. As food diversity increases so does the diversity of species using different foraging strategies.

Strategies

- There are 29 wetland basins that have been manipulated through ditching, excavation of emergent plant beds and/or construction of nesting islands(Table 6 and Figure 5 of HMP). Primary restoration activities will involve the removal of the 427 islands and berms that do not meet minimum requirements (see terrestrial covered surface guild guidelines, Appendix D of HMP) for secure nesting islands. The material from both islands and berms will be pushed back into the borrow areas and recontoured to the original slope of the wetland basin. Because of the large quantity of work, only 3 small wetlands or a single large managed wetland will be restored per year. To avoid creating artificial recharge deficits, large, managed wetlands should not be drawn down to gain access for restoration work. The larger permanent wetlands may not be accessible until a year or two of below average recharge. The shallower more seasonal wetlands can generally be accessed during the late summer and fall of most years. All manipulated wetlands will be surveyed for the presence of water howellia prior to treatment.

Rationale

From 1968 to 1985, nearly 300 acres of seasonal wetland habitat has been impacted through the creation of over 700 nesting islands and activities to increase the interspersion of open water and emergent vegetation. The islands were created from spoil pushed up in the seasonal portion of several large sloughs and smaller potholes. Built too close to shore and each other and in water too shallow to prevent access by predators, these islands have not been used successfully by nesting waterfowl. Island construction resulted in the direct loss of seasonal wetland habitat by burial and the scrapes often exposed the underlying tephra layer. These areas are in general devoid of a vegetative substrate for egg attachment, predator escapement and aquatic invertebrates, the primary food source. In some wetlands, the entire shoreline area has been recontoured to a more abrupt slope. The potential negative impact to the water column breeding guild is the loss of the gentle shoreline gradient that provides shallow, warmwater breeding sites and foraging areas for hatchlings and older larvae.

1F. REED CANARYGRASS CONTROL OBJECTIVE: By 2000, develop and apply on an experimental basis management strategies to restore and maintain native plant communities of seasonal wetlands and wet meadows dominated by reed canarygrass.

Guild Management Guidelines

Bare surface feeders (shorebirds)

- Availability of exposed mudflats and an adjacent, shallow wetland zone with less than 25% vegetative cover from mid-June to the end of September is key to the maintenance of this guild during migration.

Water column and water surface feeders

- Whenever possible large wetlands with gentle shoreline slopes should be flooded in the winter and spring to a depth that maximizes the amount of shallow flooded shoreline areas. These wetlands should be allowed to drawdown naturally through the spring and summer. These large wetlands have the highest potential for providing a sustained diversity of foraging strata for this guild overtime.

***Howellia* guidelines**

- Evasive exotic species capable of invading water howellia habitat, such as reed canarygrass, may through competition for light and space reduce or eliminate the area of suitable habitat in a wetland basin.

Strategies

- There are 4 wetland basins (Helms Meadow, Schaefer Meadow, Palmer Meadow, and McDowell Meadow that have large enough stands of reed canarygrass to warrant the use of replacement control strategies (HMP Figure 6). Experimental plots will be established in these areas to test various restoration strategies involving the use of deep flooding, prescribed fire, high intensity short duration grazing, haying, herbicides, discing and seeding. Although these sites are not typical water howellia habitat, a survey will be conducted prior to any treatment. Treatments found to be effective will be applied n a larger scale. This site and future experimental treatments will be monitored to determine their success in restoring native plant communities.

Rationale

Wet meadows and seasonal wetlands have been invaded by reed canarygrass (*Phalaris arundinacea*), an exotic perennial grass which out competes nearly all native plant species. Gone are the diverse seasonal wetland habitats dominated by native sedges, rushes, and grasses. Loss of native plant diversity and the heavy accumulation of litter and higher stem density of reed canarygrass areas decreases the biodiversity of the refuge and severely limits use by wetland dependent wildlife. Water howellia, a federally threatened aquatic plant species restricted to seasonal wetlands, is at risk of being displaced by reed canarygrass.

GOAL #2. Protect and restore water quality and quantity sufficient to maintain native wetland flora and fauna.

2A. WATER RIGHTS REVIEW OBJECTIVE: By 1999, review the status of current adjudicated water rights and all claims for water rights and update to coincide with current water management objectives.

Strategies

- Work with the Regional Engineer to review current adjudicated water and all water right claims to assure they coincide with current water management objectives.

Rationale

The Service has claims on all major drainages flowing onto the Refuge but only five water rights have been adjudicated. The majority of the Refuge's water rights are still unadjudicated claims. The State of Washington has no immediate plans to complete the adjudication of claims in this area. It will be likely many decades before the Refuge has a final determination of its water rights. Although the Refuge's claims are valid water rights which allow for the diversion and use of water in the Refuge wetlands, because they are unadjudicated, the State will not regulate other water users to protect the Refuge's water rights. Therefore, the water supply to the refuge may be threatened.

2B. MONITORING OF WETLANDS LEVELS OBJECTIVE: Annually monitor wetland recharge and water losses for the 22 managed wetlands to quantify water usage and the status of local groundwater resources.

Strategies

- Contour maps of the 22 managed wetland basins will be developed through contract surveying or by refuge staff using a geographic positioning system and measurement of water depths relative to the water control structure. Contour maps and water level monitoring will allow calculation of water volumes in individual basins. Because the bottom of the control structure is often higher than the lowest point in the basin, a piezometer well is required near the structure of each managed wetland to measure the level of the water table and water use to support existing water rights and claims. Piezometer wells are currently in place at Kepple Lake, Upper Turnbull, Lower Turnbull and Long Lake. The topography of these four wetlands will be surveyed and mapped first. Eighteen more piezometer wells will be placed at the remaining managed wetlands. adjudicated water and all water right claims to assure they coincide with current water management objectives.

Rationale

Monitoring of groundwater and wetland water levels on the Refuge has clearly demonstrated that wetland water levels are supported through the summer months by inflow from the shallow water table. The greater the number of wells drilled into the local aquifer, the higher the likelihood that subsurface water flows to Refuge wetlands will diminish, ultimately affecting Refuge habitats for waterfowl and other species. Most of the current and future domestic and industrial development in the area is reliant on groundwater withdrawals from the local shallow aquifer, much of which is unregulated. Under State regulations, individual and Group B (2-14 connections) systems pumping less than 5,000 gallons per day are exempt from the standard water permitting procedure. In addition, the city of Cheney has recently added additional deep municipal wells. The number of new wells and the lack of institutional mechanisms to curb groundwater "mining" pose a threat to the shallow aquifers in the area. Use of the aquifer faster than its recharge rate will result in a lowering of the water table. There is indication that drought, coupled with increased domestic well use, has lowered the water table on the Refuge already. With shallower wetlands, we will see increased encroachment of the invasive species, reed canary grass, together with other marsh edge species. This would negatively affect the production of waterfowl and other waterbirds through declining acres of open water and a lack of adequate brood rearing habitat in summer.

2C. WATERSHED YIELD OBJECTIVE: Restore and maintain the natural water yield of refuge watersheds through restoration of open forest conditions and riparian habitats within the annual forest treatment areas.

Strategies

See strategies under Objectives 3A and 3C.

Rationale

The hydrologic regime of many small wetlands have been altered through changes in the density of coniferous forest cover in local water sheds. Reduction of coniferous forest cover and restoration of deciduous riparian vegetation should increase water yields through decreased transpiration and interception of precipitation (Gifford et al. 1984). Coniferous trees transpire for a longer period of the year than either deciduous woody vegetation or grass and forbs. The presence of tree foliage throughout the year in coniferous forest results in the interception of a greater amount of snowfall by the tree canopy. This results in less snow pack and potentially less runoff to wetland basins. It is likely that intercepted snow evaporates more readily than snow on the ground because of the greater surface area exposed to solar radiation and wind (Debyle 1985).

2D. WATERSHED QUALITY COORDINATION OBJECTIVE: By 2000, identify properties adjacent to the refuge that contain large portions of the four major drainage systems that enter the refuge and their watersheds, and coordinate with federal, state, and local agencies to identify and reduce non-point sources of pollution and to protect water quantity.

Strategies

See strategies for objective 2F in CCP.

Rationale

Grazing and mechanical disturbance of soil associated with the use of heavy equipment during habitat improvement work on the refuge can potentially affect water quality through increased erosion and sediment transport to wetlands. Heavy concentrations of livestock can deposit nitrogenous waste into wetlands resulting in eutrophication. Drained wetland basins on private lands are currently used as pasture and hay for livestock. Many of these basins are drained by the four major ditches that enter the refuge. A study of water quality completed on the refuge in 1992 by Eastern Washington University (Whalen et al. 1992) found high concentrations of nitrogen and phosphorus entering the refuge in drainwater from both the Kaegle and Phillips Ditch. The private pastures drained by these two ditches are used as pasture in late summer and fall and during the winter as feedlots. Spring thaw and rain transports the accumulated animal waste into the drainage ditch and onto the refuge. The result is nutrient enrichment of affected wetlands resulting in extensive algal blooms. Algal blooms caused severe oxygen debt and the death of fish and invertebrate species. Dense algal mats in late summer restrict access of young waterfowl to invertebrate and plant food resources.

All homes outside the Cheney city limits are on septic systems. The majority of residential development within a mile of the refuge will be using septic systems. There is a strong possibility these systems could contaminate the shallow aquifer resulting in nutrient enrichment and eutrophication of refuge wetlands.

In 1992, a potential landowner applied for a permit from the county to allow placement of an auto wrecking yard adjacent to Philleo Ditch. During a public hearing, the refuge manager and several private citizens testified to the importance of Stubblefield Lake to wildlife and the inadequacy of the applicant's environmental checklist as required by the State Environmental Protection Act. The hearing officer found the checklist inadequate and denied the permit until the applicant completed a more thorough review. The applicant has not yet reapplied. As the area around the refuge becomes increasingly urbanized there will be other applications of this sort and a real potential for contamination of surface and ground waters entering the refuge.

GOAL #3. Restore refuge forest to a natural distribution of stand structural and successional stages to benefit forest dependent wildlife.

3A. RESTORATION OF PONDEROSA PINE OBJECTIVE: Restore and manage refuge ponderosa pine forest through the annual treatment of a minimum of 400 acres to improve forest health, restore diverse native understory plant communities and maintain natural tree densities and the distribution and diversity of stand conditions necessary to sustain native forest-dependent wildlife (Figure 3 and 4).

Guild Management Guidelines

Tree canopy breeders

- In general, higher breeding densities of individual guild members are associated with greater height to the bottom of the tree canopy and greater volume of individual tree canopies.

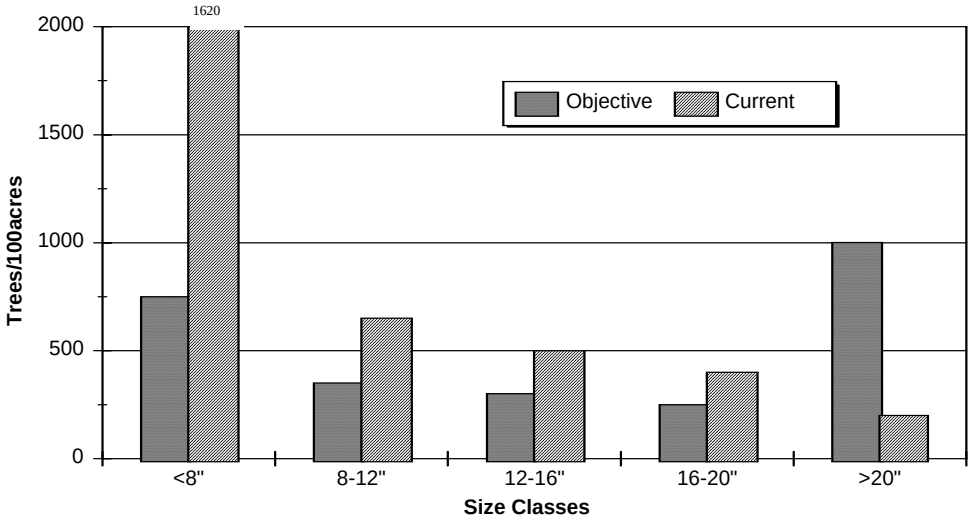

Figure 3 . Comparison of objective and current mean tree densities by size class.

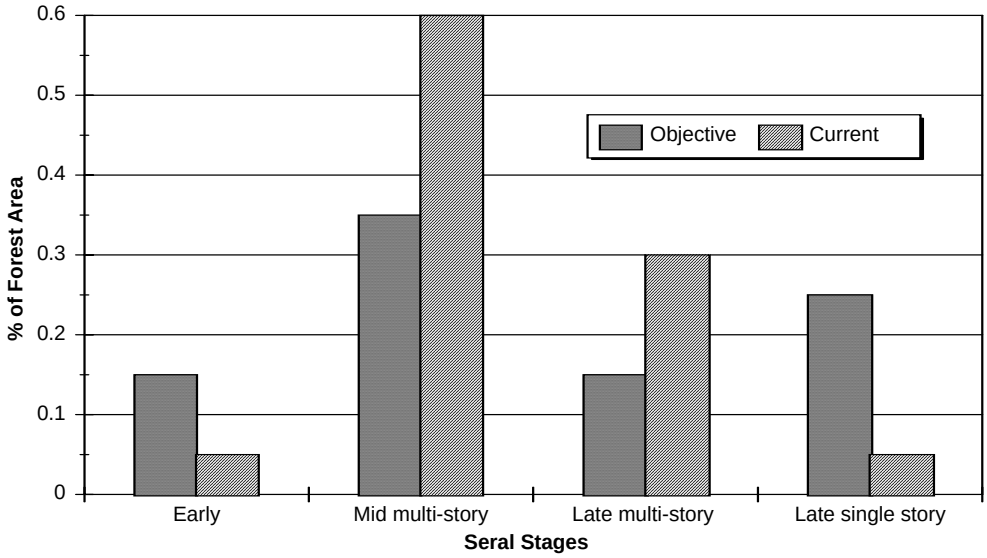

Figure 4. Comparison of objective and current distribution of forest seral stages.

- The majority of the guild membership are found more frequently and in greater abundance in open forest that provide access to open air spaces and surface and shrub strata for foraging.

Cave/Crevice breeders

- The plant community and the structural or successional stage in which these features occur and the proximity of preferred foraging strata may be important determinants of suitability. Management of the refuge for a natural distribution and diversity of plant communities and structural and successional stages should met the needs of all guild members.

Terrestrial sub-surface breeders

- Highest densities of fossorial guild members are found in areas of deep soils with a minimum of rock.
- Successional stage and structure of the overlying plant community and the proximity to water are important determinants of habitat suitability.
- Deep soil habitat with open or early successional plant cover with an abundance of herbaceous forb species is important to both key indicator species, the northern pocket gopher and Columbian ground squirrel.
- Maintenance of the natural distribution and diversity of successional stages and structural classes on these deep soil sites should meet the needs of this guild.

Terrestrial Covered surface feeders

- In general, maintenance of a natural distribution and diversity of plant communities and successional stages will provide the habitats necessary to sustain this guild during migration and wintering periods.

Strategies

- In general, trees greater than 24 inches should be reserved.
- Unless the lack of larger size class prevents meeting tree density objectives, tree stems less than 8 inches in diameter should be cut and removed from the site. If left on site, they should be piled for later burning.
- Commercial harvest should be employed to remove excess trees in intermediate size classes. Single -tree selection and group-selection should be used to create a grouped spatial arrangement of different densities and size classes, including openings for future regeneration.
- All commercial harvest involving the use of heavy equipment should take place in the winter when soils are frozen and snow covered
- Thinning and commercial harvest activities should be followed up with low intensity/high moisture burn to remove a portion of the slash and piles. Another higher intensity/low moisture burn should be completed in the late summer or fall of the following year to complete fuel reductions and understory treatment.
- Treatment units should be burned again at approximately 10 to 25 year intervals to mimic natural fire return intervals (Arno 1988 and Kinateder and Stein 1998).

Rationale:

Based on studies in ponderosa pine communities in the Southwest, presettlement stocking densities of ponderosa pine stands ranged from 19 to 47 trees per acre (Covington and Moore 1994). Trees were often found in relatively even-aged clumps approximately 0.07 acres in size (Cooper 1961, West 1969, White 1985). Although a diversity of different age and tree densities were present in the landscape, the overall aspect of the forest was open and park-like, with predominately large diameter trees in single-storied stands (Quigley and Arbelbide 1996). The bottom of the tree canopy was higher as result of frequent pruning by ground fires. This higher canopy resulted in less needle scorch and needle fall. These higher canopies and more open stands favored many members of the canopy and tree and snag bole breeding and aerial feeding guilds. The presettlement understory consisted of a dense ground cover of bunchgrasses or low shrubs that favored ground breeding and foraging species. Common snowberry and Wood's rose, although common, were probably less abundant and represented by a higher proportion of live stems as a result of frequent low intensity ground fires. Excessive accumulations of needles and other organic debris would have been reduced by these fires promoting the development of cryptogamic soil crusts on bare soils between the low shrubs and bunchgrasses. These understory conditions provided valuable breeding and foraging habitats for members of the terrestrial covered surface breeding and foraging guilds.

Past logging, grazing and suppression of fire has created pine stands with tree densities 2 to 4 times the pre-settlement condition. Large trees greater than 24 inches (60 cm) in diameter constitute less than 10% of the stands. Large portions of the refuge ponderosa pine forest have a similar age and size structure. The forest understory is dominated by decadent snowberry and a dense layer of organic debris that suppresses the growth of native bunchgrasses and forbs. Fuel loading in refuge pine stands is 5 times greater than the average for this forest type. Gone is the open park-like savanna of large ponderosa pine trees with an understory of bunchgrasses and forbs typical of this forest type. Conditions are ripe for catastrophic loss due to insects, disease, and fire.

3B. SNAG RECRUITMENT OBJECTIVE: During annual forest treatments, provide conditions in refuge ponderosa pine and aspen stands that result in recruitment of the density and distribution of snags necessary to sustain 40% of the maximum potential breeding populations of cavity excavating wildlife species (Table 3).

Table 3. Objective and current snag densities (snags/100 acres) in ponderosa pine and aspen stands of Turnbull National Wildlife Refuge.

	Ponderosa Pine		Aspen	
Size Class	Objective	Current	Objective	Current
> 12 inches	309	74	144	1,862

Guild Management Guidelines

Tree bole and Snag breeders

- The larger the tree or snag diameter the better. As a rule, most guild members use snags or trees greater than 15 inches in diameter at breast height.

- Snags are more valuable in clumps than individually.
- Trees with large diameter dead tops are important snag resources because of their height and greater longevity
- Forest stand conditions should provide a density of snags necessary to maintain at least 40% of the maximum breeding population of cavity excavators. A good rule of thumb is a density of approximately 3 hard snag equivalents per acre.

Strategies

- Long-term strategy for meeting objectives for snags and downed woody material requires the restoration and maintenance of forest stand conditions that foster recruitment and retention of large diameter snags (see Strategies Objective 3a). Forest conditions should promote the growth of larger, older trees that are more resistant to decay and less susceptible to crown scorch. These conditions should also deter large scale disturbances that kill large numbers of trees and limit the ability of damaged trees to respond to insect attack.
- Because of the current low numbers of snags in refuge pine stands, meeting snag density objectives in the short-term will require increasing snag recruitment and retention. Snags can be created in association with forest restoration activities through the use of fire, girdling, or blasting.
- An alternative to snag creation is the use of artificial nest boxes until snag objectives are met through forest restoration. Nest boxes also provide an opportunity to monitor the productivity of cavity using species.

Rationale

Since trees near the end of their physiological life were present in many presettlement stands, there were probably a fair number of large dbh snags available within the landscape. These larger snags were more resistant to rot and windfall and probably persisted for decades providing an adequate habitat base for cavity using wildlife requiring more open habitat. Keen (1961) reported average snag densities of 4 snags per acre in ponderosa pine forest in the early part of this century. Densities ranged from 1.1 to 7.9 snags per acre. This range of densities correspond with the recommendations of several researchers studying the needs of cavity using wildlife (Balda 1975, Cunningham et al. 1980, Scott and Oldemeyer 1983, Raphael and White 1984).

The current average density of snags in refuge forest stands is less than 1 per acre. Past logging and suppression of fire has resulted in the loss of mature and old growth stands that produce large diameter snags that persist over long periods of time. Existing stands are overstocked with pole and sapling sized pines that suppress tree growth and root development. Most snags are less than 15 inches (38 centimeters) in diameter and are extremely susceptible to blow down.

3C. ASPEN/RIPARIAN RESTORATION WITHIN PINE CLIMAX STANDS OBJECTIVE:
Within annual forest treatment units, restore the natural diversity of stand conditions and the dominance of aspen and native deciduous shrub species in riparian habitat now dominated by Ponderosa Pine to increase the number and size of habitat patches to support members of the tree canopy and shrub strata breeding and foraging guilds.

Guild Management Guidelines

Shrub breeders and foragers

- Patches of shrub habitat greater than the average reported territory size of shrub nesting passerines (0.83 acres) should be maintained.
- The greater the number of patches, the larger the patch size, and the closer patches are to each other the greater occupancy rate and productivity of guild members.
- Greater volume of shrub foliage in habitat patches provides better security cover by impeding the movement of predators and shielding the nest and/or activities of parents and neonates that can alert a predator.

Tree canopy breeders and foragers

- In general, higher breeding densities of individual guild members are associated with greater height to the bottom of the tree canopy and greater volume of individual tree canopies.
- For guild members that require deciduous tree cover, greater habitat occupancy is found in larger habitat patches in close proximity to other suitable patches in the landscape.

Strategies

- Meeting aspen/shrub riparian objectives will require strategies that can return dominance of aspen and deciduous shrubs to stands where ponderosa pine is climax, regenerate declining, even-aged stands, and restore degraded stream side riparian habitat. The periodic use of prescribed fire can remove advance regeneration of ponderosa pine and kill above ground aspen stems stimulating regeneration through root sprouting.

- Where mature pines are suppressing aspen growth and vigor, commercial harvest or non-commercial thinning can be used to remove trees (see Strategies for Objective 3a). Pine trees greater than 24 inches in diameter at breast height can be killed and left as snag habitat. If these large diameter pines, represent the only old growth pine remaining in an area they should be maintained.

- Restoration of degraded riparian habitats can be accomplished through the use of plantings. An excellent discussion of species and techniques related to plantings are provided by Monsen (1983) and in a symposium proceedings compiled by Clary et al. (1992). This strategy has already been employed on the reach of Pine Creek from Headquarter Pond to Winslow Pool using volunteers from the local Audubon chapter and scout groups. Rooted stock of thin-leafed alder (*Alnus incana*), black cottonwood (*Populus trichocarpa*), aspen, and red-osier dogwood have been used in these plantings. Because many of these areas are currently dominated by reed canarygrass, a planting area of approximately 16 ft^2 was cleared to reduce competition with shrub and tree plantings.

Rationale

Aspen dominated forest stands are a critical resource for species requiring both cavities and deciduous foliage in tree and shrub canopies for breeding and foraging. These aspen and deciduous shrub riparian habitat types have been significantly reduced on the refuge by competition from encroaching ponderosa pine and the suppression of aspen and shrub regeneration by past grazing. Aerial coverage of aspen and deciduous shrub dominated plant communities has been reduced by 65%. Existing stands are dominated

by overmature trees with little regeneration. In the past, periodic fire removed encroaching pines and encouraged regeneration of aspen and understory shrubs.

3D. DOWNED LOGS OBJECTIVE: Annual forest management activities will provide at least 4 downed trees per acre, 15 to 17 inches in diameter at the large end and 20 feet or more in length to support the members of the terrestrial covered surface breeding guild requiring this habitat feature.

Guild Management Guidelines

Terrestrial covered surface breeders

- Several guild members require large dead and down material as cover above the soil surface. At least 4 logs, 15 to 17 inches in diameter at the large end and 20 feet or more in length should be maintained per acre.

Strategies

- Long-term strategy for meeting objectives for snags and downed woody material requires the restoration and maintenance of forest stand conditions that foster recruitment and retention of large diameter snags (see Strategies Objective 3a).

Rationale

Coarse woody debris is an important breeding stratum for several members of the terrestrial covered surface breeding and foraging guilds. Current levels of large woody debris is considerably higher than presettlement conditions as a result of the suppression of fire and higher fall rates associated. Reintroduction of fire during forest restoration strategies will likely reduce the quantity and distribution of this habitat feature.

GOAL # 4. Protect and restore the natural distribution and diversity of grassland and shrub steppe habitats to benefit indigenous wildlife.

4A. LITTER COVER PERCENT OBJECTIVE: Annually, maintain at least 75% of grassland and steppe habitats as nesting cover for resident and migratory birds as indicated by at least 50% ground cover of litter and a visual obstruction measurement greater than 8 inches taken prior to any spring growth.

Guild Management Guidelines

Terrestrial cover surfaced breeders

- For upland nesting waterfowl and other waterbirds, areas of grass and low shrub cover within 200 yards of brood-rearing wetlands is of critical importance.
- A residual vegetation component should be maintained in at least 75% of the wet meadow and grass and low shrub dominated upland plant communities. As a rule, the maintenance of a visual obstruction reading of 10 inches or greater taken prior to initiation of current years growth will provide the best nesting cover. Visual obstruction

is measured by estimating the height a pole is completing hidden from view by an individual 13.4 feet away.

- Litter is an important component of the terrestrial covered surface stratum and should be present but not in excess of 50% ground cover or a depth of 1 inch.

Rationale

Nearly all members of the terrestrial covered surface breeding guild require grass cover and litter. This requirement is particularly true of upland nesting waterfowl with three exceptions. Both the mallard and gadwall have been found in a variety of cover types and frequently use low shrubs and dense forbs that provide adequate concealment (Greenwood et al. 1995). Nest of green winged teal are often found in areas of tree and shrub cover and security cover is often provided by low shrubs and downed logs. Blue-winged teal, cinnamon teal, northern pintail, and northern shoveler nest are found primarily in grass dominated cover (Greenwood et al. 1995). Several species especially the sparrows, also require grass and litter as a ground cover component. Wray and Whitmore (1979) found that successful vesper sparrow nest had a greater percentage of litter cover than unsuccessful nests. In a study of shrub-steppe birds of the Great Basin, Wein and Rotenberry (1981) found that grasshopper sparrows, meadowlarks and savannah sparrows were associated with greater grass and litter cover. The song sparrow, California quail and ruffed grouse utilize grass and litter cover under an overstory of shrubs or trees.

4B. ENCROACHING PINE REMOVAL OBJECTIVE: Restore and maintain the open grassland aspect to at least 50 acres of steppe habitat annually through removal of encroaching ponderosa pine trees.

Rationale

Many of the terrestrial covered surface breeding guild members that breed in the steppe portion of the Channeled Scablands avoid areas of extensive tree cover. Increasing canopy cover can also reduce grass cover a critical component of breeding habitat for members of this guild.

4C. EXOTIC PLANT SPECIES CONTROL OBJECTIVE: Control exotic plant species on between 25 and 50 acres of upland grassland and steppe habitats annually and by 1999 initiate an experimental program to investigate strategies to reduce the dominance of cheatgrass and restore native plant communities.

Strategies

- The primary strategy for controlling the expansion of introduced plant species will be maintenance of vigorous native plant communities. Soil disturbance will be kept to a minimum during habitat and facility management activities. Where soil disturbance does occur, disturbed sites will be replanted with native species.
- The control strategies for 6 herbaceous noxious plant species will include mowing of roadsides, manual pulling, discing and reseeding with native species, release of biological control agents, and use of herbicides (HMP Table 8).
- An experimental program will be initiated to determine the feasibility of using late winter and early spring burning followed by seeding of native plant species to control cheatgrass in steppe and forested habitats.

Rationale

The main limitation to achieving objectives for refuge steppe and grassland areas is the presence of exotic plant species. Exotic species were established in this community during past agricultural practices that involved farming and livestock grazing. These practices introduced the seeds of exotic species and disturbed the soil surface allowing invasion of native plant associations. The primary exotic species in these stands include cheatgrass brome (*Bromus tectorum*), ventanata (*Ventanata dubius*), St. Johns Wort, dalmatian toadflax, diffuse and spotted knapweed, and leafy spurge. Many of the mound areas in refuge steppe habitats are dominated by cheatgrass and ventanata with few remaining native species. Cheatgrass decreases the survival of native perennial seedlings by rapidly exploiting available soil water and nutrients (Harris 1967). Cheatgrass germinates earlier and over a longer period of time and continues root growth during cooler temperatures than native perennial species. The productivity and density of cheatgrass on the mounds and its early senescence also create a thick layer of thatch that further decreases survival of native plant seedlings, reduces the vigor of native forb species, reduces the cover of cryptogamic soil crust and may increase the frequency and intensity of fires (Mack 1981 and Tausch et al. 1994). Increased fire frequency and intensity further modifies steppe plant communities favoring cheatgrass.

4D. IDENTIFICATION OF INTACT GRASSLAND AND STEPPE OBJECTIVE: By 2000, identify areas of intact native upland grasslands and meadow steppe habitat adjacent to the refuge and through cooperation and coordination with private landowners, local, state and federal agencies, and private organizations maintain these lands as native plant communities.

GOAL #5. Maintain the biodiversity of the refuge through support of the conservation of threatened and endangered species in their natural ecosystems

5A. WATER HOWELLIA RESEARCH AND MONITORING OBJECTIVE: By 1999, conduct research and monitoring to answer critical questions about habitat requirements and species biology in order to design sound management plans for restoring and maintaining natural occurrences of water howellia.

Strategies

- Work with the Endangered Species Office and university researchers to develop a research design and acquire funding for this project.

Rationale

The Refuge contains 35 of 170 known occurrences of this species. Water howellia was listed as a threatened species under the Federal Endangered Species Act by the U.S. Fish and Wildlife Service in July 1994. A recovery plan is being drafted for the species. The recovery objective in the draft plan is " ... to provide an adequate level of protection for the species and its habitats so that there will be self-sustaining populations distributed throughout its range." Development and implementation of habitat management plans to sustain water howellia on federal lands is a Priority 1 recovery action.

Little information is available on the historic occurrence of this species on the refuge. Alteration of refuge wetlands through the years may have had a negative impact on this species reducing the amount of suitable habitat. Management or historic land use activities that significantly altered the basin bottom through mechanical excavation, combustion or sedimentation may have displaced the seedbed or caused direct mortality of seeds and jeopardized sub-populations of this species. Alteration of the hydrologic regime of a wetland through drainage or changes in the water yield of watersheds due to increased coniferous forest cover may have reduced the amount of available habitat. The introduction of evasive exotic species capable of invading water howellia habitat, such as reed canarygrass, may have through competition for light and space reduced or eliminated the area of suitable habitat in refuge wetland basins. Changes in water chemistry or temperature as a result of increased sedimentation or nutrient input could have resulted in changes in macrophyte and algal communities that may adversely affected the survival of individual populations through competition for light and space.

Research is needed on the ecology of water howellia, impacts of management actions on howellia and its habitat, and control methods for reed canarygrass. The findings of this research would assist in the development of more specific management plans.

5B. HOWELLIA PRECAUTION OBJECTIVE: Assure that annual management activities adjacent to known occurrences of water howellia do not create habitat conditions that fall outside the range of suitability for this species and may jeopardize its continued existence.

Strategies

- A survey for water howellia will be completed in all historic and potential habitats prior to any management treatment that may alter its habitat. Known occurrences will be avoided or restoration foregone in occupied wetlands.
- Forest restoration activities involving commercial tree harvest and restoration of seasonal wetlands have a potential to increase soil erosion and sedimentation. Mitigative measures would be utilized to minimize the risk to water quality that can impact important wetland values including the threatened plant species, water howellia. All tree harvest activities would take place only during periods of time that soils are resistant to compaction and erosion (dry or frozen). Log skidding will be minimized and landing areas will be dispersed and placed to avoid long skid trails. The butt-end of all felled trees would be lifted off the ground when skidded. Wide wheeled or tracked vehicles would be required to minimize impacts associated with rutting and disturbance of soil cover. Where possible harvester loaders and Feller/bunchers would be utilized to reduce damage from skidding. All disturbed areas including skid trails, landings and temporary access roads would be rehabilitated by replacing topsoil and seeding with native species. Hydro-seeding or a slurry mulch would be utilized in areas where greater than 75% of the ground cover is removed.
- Any tree harvest adjacent to wetlands would require that trees be felled away from the wetland and no tracked vehicle would be allowed within 25 yards of a wetland edge. Use of heavy equipment in wetland habitats for restoration purposes would be conducted when possible when the area is dry to avoid sediment movement throughout the basin. Work would also be restricted to periods when water is static between ponds preventing transport of sediment between wetlands.

Rationale

Management activities in wetlands and uplands that disturb the soil (island removal, tree harvest, log skidding, prescribed fire etc.) have the potential to negatively impact water howellia. Increased sedimentation in wetlands can directly impact howellia by burying the seed bed thereby preventing germination or covering seedlings. Sedimentation can indirectly impact this plant species by altering water chemistry and light penetration that may change the associated plant community and existing

competitive relationships. Use of heavy equipment in wetlands can also directly impact howellia by either displacing the seed bed or causing direct mortality to seedlings.

***5C. REDUCTION OF REED CANARYGRASS COMPETITION OBJECTIVE*:** By 2000, identify and apply on an experimental basis management strategies that may reduce the impact of reed canarygrass on the survival of water howellia.

Strategies

- Work with the Endangered Species Office and university researchers to develop a research design and acquire funding for this project.

Rationale

The introduction of evasive exotic species capable of invading water howellia habitat, such as reed canarygrass, may have through competition for light and space reduced or eliminated the area of suitable habitat in refuge wetland basins.

5D. HOWELLIA EDUCATION OBJECTIVE: By 2001, form partnerships with local, state, and federal agencies, and private organizations and individuals to develop and initiate an educational program concerning conservation of water howellia on private land.

Strategies

- An integral part of the proposed actions to protect water howellia habitat is an outreach and education program that informs the general public of its ecology and current and potential threats to its viability and strategies to minimize these threats. The refuge currently has an outreach and environmental education program directed at school-age children. This program needs to be extended to the community-at-large including refuge neighbors, local government agencies, and private groups and individuals. This can be accomplished by development of outreach media including pamphlets, posters, video programs, community service projects and presentations by refuge staff to local business and service groups. Without an informed public, it will be difficult to accomplish objectives that involve the development of partnerships to minimize the impacts of private land use activities on howellia habitat and the refuge.

Rationale

A large percentage of the meta-population that includes the Turnbull NWR sub-populations occurs on non-federal lands. Because there is no regulatory authority to protect threatened species on these lands, outreach is needed in order to promote voluntary involvement in howellia habitat protection.

5E. HOWELLIA HABITAT PROTECTION OBJECTIVE: By 2001, explore options to protect additional water howellia habitat off refuge.

Rationale

Numerous potential howellia wetlands occur within the landscape surrounding the refuge. Recovery of this species requires that it ‘s current geographic distribution is maintained. This requires not only protection of occurrences on federal lands, but further protection of sub-populations within a larger meta-population.

GOAL #6. Support the maintenance of biologically effective landscape linkages and corridors between the refuge and other intact areas of vegetation zones representative of this ecoregion.

6A. PARTICIPATION IN COUNTY/MUNICIPALITY PLANNING OBJECTIVE: On a continuing basis, provide input into growth management planning of the counties and local municipalities surrounding the refuge to assure the maintenance of lands with natural vegetative cover between the refuge and other large intact natural areas.

Strategies

- Refuge staff will provide input on state, county, and local permits and proposed zoning changes that will affect land use of important areas adjacent to the refuge.
- Work with regulatory agencies to provide input to and improve compliance of land and water protection ordinances.

Rationale

For most of the refuge's existence, surrounding land use has mostly complemented the refuge by maintaining open space, providing a larger habitat base, and serving as critical linkage to other undisturbed habitats. However, in the past twenty years, Spokane County's population has increased by 30%. Accelerated home construction, business developments, and the transportation infrastructure to service this growing population have begun to isolate the refuge from other undisturbed habitat. This development increases the potential for threats such as contamination of air and water, altered or depleted supplies of surface and ground water, loss of connectivity to other suitable or complimentary habitats, and the invasion of exotic plant and animal species that erode the integrity of the refuge. The above strategies will help to minimize the negative impacts of the area's growth.

6B. MAINTENANCE OF NATIVE LAND COVER OBJECTIVE: Through coordination and cooperation with private landowners, local, state, and federal agencies, and private organizations identify opportunities to maintain the native land cover on properties within undeveloped areas contiguous with the refuge that support the goal of maintaining landscape linkages and corridors.

Strategies

- Work with partners to expand the currently limited refuge education and outreach program to include refuge neighbors, local, state, and federal government agencies, private organizations and individuals.
- Coordinate with the above mentioned groups to identify opportunities to maintain native land cover.
- Use cooperative agreements, acquisition of easements and fee-title purchase to protect native land cover within the approved refuge boundary and encourage landowner participation in conservation programs within the stewardship area.

Rationale

For most of the refuge's existence, surrounding land use has mostly complemented the refuge by maintaining open space, providing a larger habitat base, and serving as critical linkage to other undisturbed habitats. However, in the past twenty years, Spokane County's population has increased by 30%. Accelerated home construction, business developments, and the transportation infrastructure to

service this growing population have begun to isolate the refuge from other undisturbed habitat. This development increases the potential for threats such as contamination of air and water, altered or depleted supplies of surface and ground water, loss of connectivity to other suitable or complimentary habitats, and the invasion of exotic plant and animal species that erode the integrity of the refuge. The above strategies will help to minimize the negative impacts of the area's growth.

Literature Cited

Arno, S. F. 1988. Fire ecology and its management implications in ponderosa pine forests. Pages 133-140 *in* Baumgartner, D. M. and J. E. Lotan (eds.) Symposium proceedings Ponderosa pine: the species and its management. Washington State University, Pullman.

Balda, R. P. 1975. The relationships of secondary cavity nesters to snag densities in western coniferous forests. USDA Forest Service Wildlife Habitat Technical Bulletin 1. 37 pp.

Clary, W. R., E. D. McArthur, D. Bedunah, C. L. Wambolt. compilers. 1992. Proceedings-symposium on ecology and management of riparian shrub communities. USDA Forest Service, General Technical Report. INT-GTR-289. Intermountain Research Station, Ogden, Utah, 232 pp.

Cooper, C. F. 1961. Pattern in ponderosa pine forests. Ecology 42:493-499.

Covington, W. W. and M. M. Moore. 1994. Southwestern ponderosa forest structure: changes since Euro-American settlement. Journal of Forestry 92:39-47.

Cunningham, J. B., R. P. Balda and W. S. Gaud. 1980. Selection and use of snags by secondary cavity-nesting birds of the ponderosa pine forest. USDA Forest Service Research Paper RM-222. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, 15 pp.

Debyle, N.V. 1985. Water and watershed. pp 153-167. In: Debyle, N.V. and R. P. Winokur (eds.). Aspen: Ecology and management in the western United States. USDA Forest Service General Technical Report RM-119. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, 283 pp.

Gifford, G. F., W. Humphries, and R. Jaynes. 1984. A preliminary quantification of the impacts of aspen to conifer succession on water yield II. Modeling results. Water Resources Bulletin 20(2):181-186.

Greenwood, R. J., A. B. Sargeant, D. G. Johnson, L. M. Cowardin, and T.L. Schaffer. 1995. Factors associated with duck nest success in the Prairie Pothole Region of Canada. Wildlife Monograph 128. 57pp.

Harris, G. A. 1967. Some competitive relationships between *Agropyron spicatum* and *Bromus tectorum*. Ecological Monograph 37(2):89-111.

Keen. 1961. Cited on P. B-19

Kinateder, D. J. and S. J. Stein. 1998. Fire history at Turnbull National Wildlife Refuge in Eastern Washington. Unpublished report on file at Turnbull National Wildlife Refuge, Cheney, Washington.

Mack, R. N. 1981. Invasion of *Bromus tectorum* L. into western North America: an ecological chronicle. Agro-Ecosystems 7:145-165.

Mahrer, E. A. 1995. Application of a spatial simulation model for pothole wetland vegetation at the Turnbull National Wildlife Refuge. M.S. Thesis, Washington State University, Pullman, 78 pp.

Monsen, S. B. 1983. Plants for revegetation of riparian sites within the Intermountain Region. Pages 83-89 *in*: Monsen, S.B. and N. Shaw, (compilers). Year? Managing Intermountain Rangelands - Improvement of range and wildlife habitats. USDA Forest Service, General Technical Report INT-GTR-157, Intermountain Research Station, Ogden, Utah.

Poiani, K. A. and C. A. Johnston. 1991. Global warming and prairie wetlands: Potential consequences for waterfowl habitat. Bioscience 41(9):611-618.

Quigley, T. M. and S. J. Arbelide.(tech eds.) 1996. An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins. USDA Forest Service, General Technical Report, Pacific Northwest Research Station, Portland, Oregon, 2 Volumes.

Raphael, M. G. and M. White. 1984. Use of snags by cavity-nesting birds in the Sierra Nevada. Wildlife Monograph 86, 66 pp.

Scott, V. E. and J. L. Oldemeyer. 1983. Cavity-nesting bird requirements and response to snag cutting in ponderosa pine. Pgs. 19 - 23 *in*: Davis, J. W., G. G. Goodwin, and R. A. Ockenfels (tech coords.). Snag habitat management: Proceedings of the symposium. USDA Forest Service General Technical Report RM-GTR-99, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, 226 pp.

Tausch, R. J., T. Svejcar, and J. W. Burkhardt. 1994. Patterns of annual grass dominance on Anaho Island: implications for Great Basin vegetation management. pp 120-125 *in*: Monsen, S. B. and S. G. Kitchen (eds.) Proceedings - Ecology and management of annual rangelands. USDA Forest Service General Technical Report INT-GTR-313. Intermountain Research Station, Ogden, Utah. 416 pp.

USDI Fish and Wildlife Service. 1999. Habitat Management Plan, Turnbull National Wildlife Refuge. Cheney, Washington.

van der Valk. 1981. Cited on Pg B-6.

West, N. E. 1969. Tree patterns in central Oregon ponderosa pine forests. The American Midland Naturalist 81(2):584-589.

Whalen, L. E., R. A. Soltero, and L. M. Sexton. 1992. Water quality assessment of selected waters entering and within the Turnbull National Wildlife Refuge. Unpublished report. Project No. 13560-01, Eastern Washington University and U.S. Fish and Wildlife Service, 129 pp.

White, A. S. 1985. Presettlement regeneration patterns in a southwestern ponderosa pine stand. Ecology 66:589-594.

Wiens, J. A. and J. T. Rotenberry. 1981. Habitat associations and community structure of birds in shrub-steppe environments. Ecological Monographs 51(1):21-41.

Wray II, T. and R. C. Whitmore. 1979. Effects of vegetation on nesting success of vesper sparrows. Auk 96:802-805.

APPENDIX C: FIRE MANAGEMENT PLAN SUMMARY

C.1 INTRODUCTION

This appendix is a summary of the Fire Management Plan (FMP) for Turnbull National Wildlife Refuge which was approved in 2001. The summary is intended to give readers an introduction to the FMP and how it relates to the rest of the planning process.

C.2 WILDFIRE RISK: NEED FOR FIRE MANAGEMENT PLAN

Due to the success of local fire agencies in preventing and suppressing wildland fires both on and off the Refuge for many years, extreme levels of live and dead fuels now occupy the forest environment, creating conditions of high probability for a large devastating wildland fire within the near future. One of the greatest threats to the resource integrity of Turnbull NWR is uncontrolled wildland fires. A medium sized wildland fire (5,000 to 10,000 acres) would alter the Refuge environment for decades to come, affecting the wildlife that inhabit the refuge, water quality, aesthetic value to visitors, and economic value to the community. A wildland fire could threaten numerous private residences built on lands immediately adjacent to the Refuge and on lands leased by the USFWS for wildlife easements. Several Refuge buildings, including historic structures, would be threatened by wildfire.

The expansion of the urban interface to the boundaries of the Refuge creates a complex fire environment, which constrains fire management options in both fire suppression and prescribed fire. Currently, there are hundreds of homes in the ponderosa pine forests surrounding the refuge creating contiguous fuels from the refuge through the urban interface. Extreme fire weather in the local fire environment is punctuated by hot, dry winds blowing from the southwest off the Palouse. There is the potential for a fire originating on or burning through the Refuge, attaining extreme size and extreme fire behavior in the process and continuing across Refuge boundaries into residential areas causing significant structural loss and damage. Similarly a fire could originate in the urban interface and spread onto the refuge damaging wildlife habitat and refuge facilities.

As the human population continues to increase around the Refuge boundaries, the potential for human caused fires increases proportionally. The combination of natural ignition potential coupled with the human factors that increase fire risk, including more residential development, traffic, visitors and human activity around the Refuge, creates an extremely high fire potential for the area. Large amounts of dead fuels that have accumulated in the pine forests within and surrounding the refuge also increase the risk.

Department of Interior policy requires that all Refuges with vegetation capable of sustaining fire, develop a fire management plan that details wildland fire suppression policies, the use of prescribed fire for attaining resource management objectives and fire program operational procedures. The Fire Management Plan is an extension of the Refuge Habitat Management Plan. It describes in detail fire management programs, activities and methods that will be undertaken by the U.S. Fish & Wildlife Service in meeting the wildland fire suppression objectives and fire management strategies which utilize prescribed fire to attain the habitat management goals established for Turnbull NWR. The plan also assesses the potential environmental effects of the proposed fire management program in relation to Refuge resources, the local environment as well as impacts to the public, adjacent landowners and surrounding communities. Consideration of these issues is required by the mandates of the *National Environmental Policy Act of 1972 (NEPA)* and other applicable federal laws and regulations.

C.3 FIRE PROGRAM PURPOSE AND CAPABILITY

The purpose of the wildland fire suppression program at Turnbull NWR is to provide the equipment and personnel necessary to suppress wildland fires that occur within or near the Refuges boundaries that threaten life, property and Refuge resources. It is also the intention of the USFWS to provide cooperative wildland fire suppression assistance to local, state and other federal firefighting agencies in the suppression of wildland fires when requested through the provisions of various mutual-aid agreements, cooperative agreements, and as mandated by federal law.

Current suppression capability on the Refuge consists of a 500 gallon 4 wheel drive quick attack engine (ICS type V), a 900 gallon extended operations engine (ICS type IV), a 300 gallon engine unit (ICS type VI) and a 3000 gallon water tender (ICS type II). All initial attack engines are "Class A" foam equipped to increase effectiveness in all aspects of fire operations. The Refuge also maintains a 20 person fire cache consisting of hand tools, chainsaws, personal protective equipment, field pack meals and first aid supplies. Various equipment such as porta-tanks and a "Mark III" porta-pump support fire suppression and prescribed fire activities

C.4 PLAN DECISIONS

It is the intention of the U.S. Fish & Wildlife Service to continue to suppress all wildland fires occurring within Turnbull NWR, including natural lightning ignitions. Prescribed fire will be utilized under controlled conditions and defined weather variables to mimic the natural role of fire in sustaining ecosystem functions, improve habitat conditions for wildlife and reduce hazardous accumulations of dead fuels for fire prevention.

The FMP needs to be viewed side by side with the Habitat Management Plan, completed in 1999, which describes specific actions and techniques that will be undertaken by the U.S. Fish & Wildlife Service to manage the various habitat types found within the Refuge. Since wildland fire played an essential role in the evolution of the ponderosa pine/bunchgrass ecosystem, prescribed fire is one of many techniques for manipulating vegetation within the Refuge to meet habitat management objectives.

The specific objectives of the wildland fire management program are to:

1. Protect human life and property both within and adjacent to Refuge areas.
2. Perpetuate, restore, replace or replicate natural processes where appropriate.
3. Protect natural and cultural resources from unacceptable impacts due to fire and fire management activities.
4. Promote an interagency approach to managing fires on an ecosystem basis.
5. Develop and implement a process to ensure the collection, analysis and application of high quality fire management information needed for sound management decisions.
6. Employ strategies to suppress all wildland fires, which minimize costs and resource damage, consistent with values at risk.
7. Prevent unplanned human-caused ignitions.
8. Restore and rehabilitate facilities lost in or damaged by fire or suppression activities.
9. Minimize and mitigate human-induced impacts to resources or natural processes.
10. Promote public understanding of fire management programs and objectives.
11. Conduct fire activities in a manner consistent with applicable laws, policies and regulations.
12. Organize and maintain a fire management capability which consistently applies the highest standards of professional and technical expertise.
13. Encourage research to advance understanding of fire behavior, effects, and ecology.
14. Integrate fire management with all other aspects of Refuge management.

Refuge fire crews, engines and qualified incident management personnel are national resources and will be fully utilized to respond to requests for assistance from other agencies. The Interagency Fire Agreement (No. 83-SIE) provides the basis for cooperation between the agencies of the Departments of the Interior and Agriculture on all aspects of wildland fire management and to facilitate the cooperative use of fire related resources during national or regional non-fire emergencies.

As part of the Refuge wildland fire pre-suppression program staff will identify areas of hazardous accumulations of woodland and range fuels and attempt to reduce wildland fire potential and effect by using various means of fuel reduction including; manual fuel reduction by crews, mechanical fuel reduction with Refuge equipment and hazard fuel reduction prescribed burns. The U.S. Fish & Wildlife Service will also participate and provide fire prevention activities and awareness programs within and around the Refuge in cooperation with other local and State fire agencies.

In addition to the interagency agreements between federal firefighting agencies, Turnbull NWR has entered into specific mutual aid agreements with local and state fire suppression agencies. These agreements are with Spokane County Fire District #3 and the State of Washington Department of Natural Resources.

The basic concept of these agreements is that no single agency has the suppression capability to control large and devastating wildland fires within local area and that it is more cost effective to enlist the support of other agencies within the region. These agreements are generally executed without exchange of funds between the agencies, with the understanding that unusual amounts or types of resources, (such as air tankers) or in extended attack situations will require some reimbursement. The agreements specify that each agency involved will retain autonomy in the command of it's individual resources through the implementation of the "Unified Command System" in which agency representatives of each agency involved in the suppression effort will be included within the command organization of the incident.

The existence of the wildland/urban interface surrounding the Refuge presents significant constraints on the use of prescribed fire in relation to potential liabilities resulting from escaped fires. An escaped fire resulting from a Refuge habitat management prescribed fire that burns into private property will cause severe constraints to be placed upon the use of prescribed fire by the FWS. Due to the importance of using prescribed fire in the management of the Refuge, extreme caution should be used when implementing prescribed fires. The USFWS must maintain a significant initial attack capability of engines, crews, dozers and water tenders to deal with this risk. Cooperative agreements and/or funding is required to provide for remuneration to local fire agencies to assist Refuge staff in the implementation of the prescribed fire program. The values at risk from an escaped prescribed fire are too great to allow escapes to occur into areas surrounding the Refuge. This constraint will continue to increase the urban interface continues to develop adjacent to the Refuge. Communication is necessary with local agencies about the magnitude of the wildland fire problem on and around the Refuge.

C.5 FIRE ECOLOGY

Fire is a natural phenomenon and has played a critical role in the ecosystem dynamics of natural communities represented within Turnbull National Wildlife Refuge (NWR). Before the advent of current wildland fire suppression capabilities, naturally caused fires burned thousands of acres of upland and wetland vegetation in eastern Washington each year. Prior to the advent of significant fire suppression capabilities in the early third of this century, fires within the local region area were ignited primarily by lightning and possibly aboriginal burning practices. Lightning is frequent in eastern Washington during summer and fall. Lightning activity coincides with fuel moisture conditions conducive to natural ignitions, causing fires of significant size.

Natural disturbance is one of the primary progenitors in the maintenance and succession of natural vegetation communities. Fire is one of the most significant and frequent mechanisms for natural disturbance in the forest and range vegetation communities in western North America (Ahlgren & Ahlgren 1960). Extensive research has been conducted into the role of natural fire in the development and extent of the ponderosa pine/bunchgrass vegetation type, which predominates the upland communities of Turnbull NWR. Weaver (1955) and Kinateder (1998) studied fire scarred ponderosa pine stump sections in eastern Washington and found an average fire frequency of one fire every 8 years between the middle 1700's to the early 1900's. The frequency of fire in ponderosa pine communities is a function of the climatic conditions found within the habitats occupied by the species. Ponderosa pine generally prefers drier site soil conditions and requires full sunlight for successful reproduction without the competition of overstory canopy. Aboriginal ponderosa pine forests were described as forests consisting of large trees of even-age classes widely spaced apart, giving the appearance of a well managed park. Tree reproduction in these primal forests was in small even-aged groups growing in open clearings. These forest openings were generated by a variety of processes including windfall, insect attacks or mortality from old age. The accumulations of dead material within these areas of tree mortality created conditions conducive to intense fires which produced forest openings suitable for regeneration of the shade intolerant ponderosa pine seedlings (Biswell 1963, Weaver 1955).

The short fire return interval in ponderosa pine forests kept levels of dead material from accumulating to amounts in which the subsequent fire would be of sufficient intensity to cause mortality to the mature trees which are protected by a thick layer of bark. These frequent low intensity fires also kept shade-tolerant trees and shrubs out of the forest understory, which insured the perpetuation of the ponderosa pine forest type. Fire caused openings in the forest provided excellent regeneration sites for ponderosa pine seedlings; exposure to full sunlight, good penetration of the forest canopy of the available moisture, and high levels of available nutrients through pyrolytic decomposition of dead forest biomass.

As the ponderosa pine regeneration reached the sapling stage, heavy drops of pine needles (a characteristic of ponderosa pine which makes this community inherently more flammable) would accumulate to a degree sufficient to support a low intensity fire, which would serve to thin the stand of young trees. The surviving trees, growing with less competition, would subsequently become more vigorous and more resistant to future fires. Trees reaching maturity would thus be those with the best adaptive traits to survive fire and through time genetic selection favored ponderosa pine with characteristics that made them even more resistant to fire.

Natural fires occurring within the Channeled Scabland ecosystem that comprises Turnbull NWR probably ranged in size from small single tree fires to fires that burned thousands of acres over a period of several weeks to months, under the right conditions of fuel moisture and wind. These larger fires, which occurred less frequently than the more common low intensity lightning caused fire, burned not only the upland ponderosa pine communities, but the adjacent wetland communities as well. In very dry years, these fires had the capability to burn into the marsh basins, removing the dead biomass (peat) that accumulated in the marsh bottoms and in the process, deepen the wetland basin.

This same pre-historic scenario of frequent small fires, and infrequent large fires served to maintain other vegetation communities that are found within Turnbull NWR, including the annual grasslands, perennial grasslands, shrub, and riparian communities. The riparian communities probably burned with less frequency (40 to 80 year intervals) and intensity due to the moisture content of the vegetation present. Long fire return intervals of large intense wildland fires probably played the most important role in the renewal of riparian communities due to the time periods required for sufficient fuel buildup and drought conditions sufficient to allow fire to carry through the usually moist riparian vegetation.

APPENDIX D: SPECIES LISTS

The following lists show species confirmed or expected on the Refuge or the Study Area. Status codes are defined at the end of the Appendix.

ANIMAL LIST

CLASS	ORDER	Common Name	Genus	species	STATUS
ACTINOP-TERYGII		eastern brook trout	Salvelinus	fontinalis	EX, extirpated
		rainbow trout	Onchorynchus	mykiss	EX
		kokanee	Onchorynchus	nerka	EX
		cutthroat trout	Onchorynchus	clarki	EX*
		largemouth bass	Micropterus	salmoides	EX
		smallmouth	Micropterus	dolomieu	EX*
		pumpkinseed	Lepomis	gibbosus	EX
		black crappie	Pomoxis	nigromaculatus	EX*
		speckled dace	Rhinichtys	osculus	
		redside shiner	Richardsonius	balteatus	
		tench	Tinca	tinca	EX
		Yellow perch	Perca	flavescens	EX*
		brook stickleback	Culaea	inconstans	EX
		brown bullhead	Ictalurus	nebulosus	EX
AMPHIBIA		blotched tiger salamander	Ambystoma	tigrinum	SM
		East. long-toed salamander	Ambystoma	macrodactylum	
		Pacific chorus frog	Hyla	regilla	
		Columbian spotted frog	Rana	lutriventris	SC
		Great Basin spadefoot toad	Bufo	woodhousii	
REPTILIA		rubber boa	Charina	bottae	
		west. yellow-bellied racer	Coluber	constrictor	
		valley garter snake	Thamphis	eyrtopsis	
		wandering garter snake	Thamphis	elegans	
		Great Basin gopher snake	Pituophis	melaleucus	
		N. Pacific rattlesnake	Sistrurus	catenatus	
		Western painted turtle	Chrysemys	pictabelli	EX
AVES	ANSERIFORMES	mallard	Anas	platyrhynchos	NAWCA
		northern pintail	Anas	acuta	NAWCA
		green-winged teal	Anas	crecca	
		cinnamon teal	Anas	cyptera	
		blue-winged teal	Anas	discors	
		northern shoveler	Anas	clypeata	
		gadwall	Anas	strepera	
		American wigeon	Anas	americana	
		ruddy duck	Oxyura	jamaicensis	
		canvasback	Aythya	valisineria	NAWCA
		lesser scaup	Aythya	affinis	NAWCA
		redhead	Aythya	americana	NAWCA
		ring-necked duck	Aythya	collaris	NAWCA
		wood duck	Aix	sponsa	NAWCA
		bufflehead	Bucephela	albeola	

CLASS	ORDER	Common Name	Genus	species	STATUS
		Barrow's goldeneye	Bucephala	islandica	
		common goldeneye	Bucephala	clangula	
		white-winged scoter	Melanitta	fusca	
		hooded merganser	Lophodytes	cucullatus	
		red-breasted merganser	Mergus	serrator	
		common merganser	Mergus	merganser	
		snow goose	Chen	caerulescens	
		Canada goose	Branta	canadensis	
		great white-fronted goose	Anser	albifrons	
		trumpeter swan	Cygnus	buccinator	
		tundra swan	Cygnus	columbianus	
	APODIFORMES	Vaux's swift	Chaetura	vauxi	SC,PIF
		black-chinned hummingbird	Archilochus	alexandri	
		calliope hummingbird	Stellula	calliope	
		rufous hummingbird	Selasphorus	rufus	
	CAPRIMULGIFORMES	common nighthawk	Chordeiles	minor	
	CHARADRIIFORMES	killdeer	Charadrius	vociferus	
		lesser golden plover	Pluvialis	fulua	
		semi-palmated plover	Charadrius	seimipalmatus	
		black-bellied plover	Pluvialis	squatarola	
		black tern	Chlidonias	niger	R1,SM
		ring-billed gull	Larus	delawararensis	
		Franklin's gull	Larus	pipixcan	
		Forster's tern	Sterna	forsteri	SM
		California gull	Larus	californicus	
		Bonaparte's gull	Larus	philadelphia	
		American avocet	Recurvirostra	americana	
		black-necked stilt	Himantopus	mexicanus	SM
		Wilson's phalarope	Phalaropus	tricolor	
		northern phalarope	Phalaropus	lobatus	
		spotted sandpiper	Actitis	macularia	
		common snipe	Gallinago	gallinago	
		semi-palmated sandpiper	Calidris	pusilla	
		red-necked phalarope	Phalaropus	lobatus	
		least sandpiper	Calidris	minutilla	
		long-billed curlew	Numenius	americanus	SM
		pectoral sandpiper	Calidris	melatos	
		western sandpiper	Calidris	mauri	
		lesser yellowlegs	Tringa	flavipes	
		dunlin	Calidris	alpina	
		marbled godwit	Limosa	fedoa	
		greater yellowlegs	Tringa	melanoleuca	
		long-billed dowitcher	Limdromus	scolopaceus	
		solitary sandpiper	Tringa	solitaria	
		sanderling	Calidris	alba	
		Baird's sandpiper	Calidris	bairdii	
	CICONIIFORMES	great blue heron	Ardea	herodias	SM
		American bittern	Botaurus	lentiginosus	R1
		great egret	Ardea	alba	SM
	COLUMBIFORMES	mourning dove	Zenaida	macroura	

CLASS	ORDER	Common Name	Genus	species	STATUS
	CORACIIFORMES	belted kingfisher	Ceryle	alcyon	
	FALCONIFORMES	red-tailed hawk	Buteo	jamaicensis	
		northern harrier	Circus	cyaneus	
		ferrugius hawk	Buteo	regalis	R1,ST
		sharp-shinned hawk	Accipiter	striatus	
		northern goshawk	Accipiter	gentilis	SC
		golden eagle	Aquila	chrysaetos	SC
		rough-legged hawk	Buteo	lagopus	
		Swainson's hawk	Buteo	swainsoni	SC
		Cooper's hawk	Accipiter	cooperii	
		bald eagle	Haliaeetus	leucocephalus	FT, ST
		turkey vulture	Cathartes	aura	SM
		American kestrel	Falco	sparverius	
		peregrine falcon	Falco	peregrinus	FE,SE
		merlin	Falco	columbarius	SM
		prairie falcon	Falco	mexicanus	SM
		osprey	Pandion	haliaetus	SM
	GALLIFORMES	ruffed grouse	Bonasa	umbellus	
		ring-necked pheasant	Phasianus	colchicus	EX
		gray partridge	Perdix	perdix	EX
		California quail	Callipepla	californica	
		sharp-tailed grouse	Tympanuchus	phasianellus	SC
	GAVIIFORMES	common loon	Gavia	immer	
	GRUIFORMES	sandhill crane	Grus	canadensis	SE
		sora	Porzana	carolina	
		American coot	Fulica	americana	
		Virginia rail	Rallus	limicola	
	PASSERIFORMES	horned lark	Eremophila	alpestris	
		cedar waxwing	Bombycilla	cedrorum	
		Bohemian waxwing	Bombycilla	garrulus	
		black-headed grosbeak	Pheucticus	melanocephalus	
		lazuli bunting	Passerina	amoena	
		brown creeper	Certhia	americana	
		black-billed magpie	Pica	pica	
		common raven	Corvus	corax	
		American crow	Corvus	brachyrhyncos	
		Steller's jay	Cyanocitta	stelleri	
		Clark's nutcracker	Nurifraga	columbiana	
		song sparrow	Melospiza	melodia	
		grasshopper sparrow	Ammodramus	savannarum	PIF, R1,SM
		spotted towhee	Pipilo	maculatus	
		vesper sparrow	Pooecetes	gramineus	SM
		lark sparrow	Chandestes	grammacus	R1
		dark-eyed junco	Junco	hyemalis	
		chipping sparrow	Spizella	passerina	PIF
		savannah sparrow	Passerculus	sandwichensis	
		Lincoln's sparrow	Melospiza	lincolnii	
		American tree sparrow	Spizella	arborea	
		fox sparrow	Passerella	iliaca	

CLASS	ORDER	Common Name	Genus	species	STATUS
		white-crowned sparrow	Zotrichia	leucophrys	
		white-throated sparrow	Zotrichia	albicollis	
		Cassin's finch	Carpodacus	cassinii	
		American goldfinch	Carduelis	tristis	
		pine siskin	Carduelis	pinus	
		house finch	Carpodacus	mexicanus	
		red crossbill	Loxia	curvirostra	
		common redpoll	Carduelis	flammea	
		rosy finch	Leucosticte	atrata	
		pine grosbeak	Pinicola	enucleator	
		evening grosbeak	Coccothraustes	vespertinus	
		violet-green swallow	Tachycineta	thalassina	
		barn swallow	Hirundo	rustica	
		cliff swallow	Petrochelidon	pyrrhota	
		bank swallow	Riparia	riparia	
		tree swallow	Tachycineta	bicolor	
		n. rough-winged swallow	Stelgidopteryx	serripennis	
		red-winged blackbird	Agelaius	phoeniceus	
		brown-headed cowbird	Molothrus	aeneus	
		Brewer's blackbird	Euphagus	cyanocephalus	
		yellow-headed blackbird	Xanthocephalus	xanthocephalus	R1
		northern oriole	Icterus	bullockii	
		western meadowlark	Sturnella	neglecta	
		loggerhead shrike	Lanius	ludovicianus	R1,SC
		northern shrike	Lanius	excubitor	
		northern mockingbird	Mimus	polyglottos	
		gray catbird	Dumetella	carolinensis	
		water pipit	Anthus	rubescens	
		veery	Catharus	fuscescens	
		American robin	Turdus	migratorius	
		western bluebird	Sialia	mexicana	
		Townsend's solitaire	Myadestes	townsendi	
		mountain bluebird	Sialia	currucoides	
		hermit thrush	Catharus	guttatus	
		varied thrush	Ixoreus	naevius	
		Swainson's thrush	Catharus	bicknelli	
		black-capped chickadee	Poecile	atricapillus	
		mountain chickadee	Poecile	gambeli	
		yellow warbler	Dendroica	petechia	
		common yellowthroat	Geothlypis	trichas	
		Nashville warbler	Vermivora	ruficapilla	
		orange-crowned warbler	Vermivora	celata	
		Townsend's warbler	Dendroica	townsendi	
		American redstart	Setophaga	ruticilla	
		Wilson's warbler	Wilsonia	pusilla	
		yellow-rumped warbler	Dendroica	coronata	
		MacGillivray's warbler	Oporornis	tolmiei	
		yellow-breasted chat	Icteria	virens	
		house sparrow	Passer	domesticus	EX
		ruby-crowned kinglet	Regulus	calendula	
		golden-crowned kinglet	Regulus	satrapa	
		white-breasted nuthatch	Sitta	carolinensis	
		red-breasted nuthatch	Sitta	canadensis	
		pygmy nuthatch	Sitta	pygmaea	
		European starling	Sturnus	vulgaris	EX

CLASS	ORDER	Common Name	Genus	species	STATUS
		Western tanager	Piranga	ludoviciana	
		rock wren	Salpinctes	obsoletus	
		marsh wren	Cistothorus	palustris	
		Bewick’s wren	Thyromanes	bewickii	R1
		house wren	Troglodytes	aedon	
		winter wren	Troglodytes	troglodytes	
		canyon wren	Catherpes	mexicanus	
		Say's phoebe	Sayornis	saya	
		western wood-pewee	Nocontopus	sordidulus	
		eastern kingbird	Tyrannus	tyrannus	PIF
		western kingbird	Tyrannus	verticalis	
		willow flycatcher	Empidonax	traillii	SS
		western flycatcher	Empidonax	occidentalis	
		dusky's flycatcher	Empidonax	olberholseri	
		Hammond's flycatcher	Empidonax	hammondii	
		olive-sided flycatcher	Contopus	cooperii	R1
		warbling vireo	Vireo	gilvus	
		solitary vireo	Vireo	solitarius	
		red-eyed vireo	Vireo	olivaceus	
	PICIFORMES	downy woodpecker	Picoides	pubescens	
		northern flicker	Colaptes	auratus	
		hairy woodpecker	Picoides	villosus	
		red-naped sapsucker	Sphyrapicus	nuchalis	
		yellow-bellied sapsucker	Sphyrapicus	varius	
		Lewis' woodpecker	Melanerpes	lewis	R1,SC
	PODICIPEDIFORMES	pied-billed grebe	Podilymbus	podiceps	
		eared grebe	Podiceps	nigricollis	
		horned grebe	Podiceps	auritus	SM
		western grebe	Aechmorphorus	occidentalis	SM
		red-necked grebe	Podiceps	grisegena	SM
	SIGIFORMES	northern pygmy owl	Glaucidium	gma	
		short-eared owl	Asio	flammeus	R1
		long-eared owl	Asio	otus	
		great horned owl	Bubo	virginianus	
		northern saw-whet owl	Aefolius	acadicus	
		western screech owl	Otus	Kennicotti	
		common barn owl	Tyto	alba	
MAMMAL	ARTIODACTYLA	Rocky Mountain elk	Cervus	canadensis	
		white-tailed deer	Odocoileus	virginianus	
		mule deer	Odocoileus	hemionus	
		moose	Alces	alces	
	CARNIVORA	coyote	Canis	lepophagus	
		bobcat	Felis	rufus	
		striped skunk	Mephitis	mephitis	
		river otter	Lutra	canadensis	
		long-tailed weasel	Mustela	frenata	
		mink	Mustela	vison	
		badger	Taxidea	taxus	
		raccoon	Procyon	lotor	
		black bear	Ursus	americanus	

CLASS	ORDER	Common Name	Genus	species	STATUS
	CHIROPTERA	little brown myotis	Myotis	lucifugus	
		Yuma myotis	Myotis	yumanensis	
		California myotis	Myotis	californicus	
		long-eared myotis	Myotis	evotis	SM
		big brown bat	Eptesicus	fuscus	
		fringed myotis	Myotis	thysanodes	SM
		small-footed myotis	Myotis	ciliolabrum	SM
		Silver-haired bat	Lasionycteris	noctivagans	
		pallid bat	Antrozous	pallidus	SM
		hoary bat	Lasiurus	cinereus	
		Townsend's big-eared bat	Plecotus	townsendii	SC
		long-legged myotis	Myotis	volans	SM
	INSECTIVORA	vagrant shrew	Sorex	vagrans	
	LAGOMORPHA	mountain cottontail	Sylvilagus	nuttallii	
	RODENTIA	beaver	Castor	canadensis	
		bushytail woodrat	Neotoma	cinera	
		meadow vole	Microtus	pennsylvanicus	
		Montana vole	Microtus	montanus	
		muskrat	Ondatra	zibethicus	
		deer mouse	Peromyscus	maniculatus	
		porcupine	Erethizon	dorsatum	
		northern pocket gopher	Thomomys	talpoides	
		Great Basin pocket mouse	Perognathus	parvus	
		yellow-bellied marmot	Marmota	flaviventris	
		Columbian ground squirrel	Citellus	columbianus	
		red squirrel	Tamiasciurus	hudsonicus	
		yellow pine chipmunk	Eutamias	amoenus	
		rthern flying squirrel	Glaucomys	sabrinus	
		western jumping mouse	Zapus	princeps	

PLANT LIST

Common Family	Family	Common Name	Genus	Species	Status
Water plantain	Alismataceae	American Water plantain	Alisma	plantago-aquatica	
		Arumleaf Arrowhead	Sagittaria	cuneata	
		Broadleaf Arrowhead	Sagittaria	latifolia	
Amaranth	Amaranthaceae	White Pigweed	Amaranth	albus	
		Redroot Amaranth	Amaranth	retroflexsus	
Sumac	Anacardiaceae	Poison ivy	Rhus	radicans	
Dogbane	Apocynaceae	Spreading dogbane	Apocynum	androsaemifolium	
Milkweed	Asclepiadaceae	Showy Milkweed	Asclepias	speciosa	
Barberry	Berberidaceae	Creeping Oregon Grape	Berberis	repens	
		Shining Oregon Grape	Berberis	aquifolium	
		European Barberry	Berberis	vulgaris	EX
Birch	Betulaceae	Mountain Alder	Alnus	incana	
		Red Birch	Betula	occidentalis	
		Paper Birch	Betula	papyrifera	
Borage	Boraginaceae	Fiddleneck	Amsinckia	lycopsoides	
		Small-flowered Fiddleneck	Amsinckia	menziesii	
		Madwort	Asperugo	procumbens	
		Torrey's Cryptantha	Cryptantha	torreyana	
		Western Hound's Tongue	Cynoglossum	spp.	
		Corn Gromwell	Lithospermum	ruderale	
		Western Gromwell	Lithospermum	arvense	
		Long-flowered Bluebells	Mertensia	longiflora	
		Blue scorpion-grass	Myosotis	micrantha	
		Popcorn Flower	Plagiobothrys	scouleri	
		Slender-branch Plagiobothrys	Plagiobothrys	leptocladus	
Harebell	Campanulaceae	Scotch Bluebells	Campanula	rotundifolia	
		Gray Howellia	Howellia	aquatilis	FT
		Showy Downingia	Downingia	elegans	
Honeysuckle	Caprifoliaceae	Blue Elderberry	Sambucus	cerulea	
		Snowberry	Symphoricarpos	albus	
Pink	Caryophyllaceae	Blunt-leaf Sandwort	Arenaria	lateriflora	
		Bigleaf Sandwort	Arenaria	macrophylla	
		Jagged Chickweed	Holosteum	umbellatum	
		Wild Pink	Silene	spp.	
		Spalding’s silene	Silene	spladingii	FT
		Long stalk Starwort	Stellaria	longipes	
		Shining chickweed	Stellaria	nitens	
		Nodding chickweed	Stellaria	nutans	
Hornwort	Ceratophyllaceae	Coontail	Ceratophyllum	demersum	
Goosefoot	Chenopodiaceae	Wedgescale Orache	Atriplex	truncata	
		White Goosefoot	Chenopodium	album	
Aster	Compositae	Yarrow	Achillea	millefolium	
		False-dandelion	Agoseris	glauca	
		Low Pussytoes	Antennaria	dimorpha	
		Woodrush Pussytoes	Antennaria	luzuloides	
		Rosy Pussytoes	Antennaria	microphylla	
		Orange Arnica	Arnica	fulgens	
		Prairie Sagebrush	Artemesia	ludoviciana	
		Scab Sagebrush	Artemesia	rigida	
		Three-tip sage	Artemesia	tripartita	

		Aster	Aster	spp.	
		Arrowleaf Balsamroot	Balsamorhiza	sagittata	
		Bachelor's Button	Centaurea	cyanus	
		Russian thistle	Centaurea	repens	
		Knapweed	Centaurea	spp	
		Chicory	Cichorium	intybus	
		Canada thistle	Cirsium	arvense	EX
		Palouse Thistle	Cirsium	brevifolium	
		Bull thistle	Cirsium	vulgare	EX
		Horseweed	Conyza	canadensis	
		Dwarf mountain fleabane	Erigeron	compositus	
		Gaillardia	Gaillardia	aristata	
		Slender Cudweed	Gnaphalium	microcephalum	
		Gumweed	Grindelia	spp.	
		Hounds-tongue Hawkweed	Hieracium	cynoglossoides	
		Hawkweed	Hieracium	spp.	
		Blue Lettuce	Lactuca	pulchella	
		Prickly Lettuce	Lactuca	serriola	
		Little Tarweed	Madia	exigua	
		Cluster Tarweed	Madia	glomerata	
		Slender Tarweed	Madia	gracilis	
		Small Head Tarweed	Madia	minima	
		Pineapple Weed	Matricaria	matricarioides	
		Alkali-marsh Butterweed	Senecio	hydrophilis	
		Western Groundsel	Senecio	integerrimus	
		Canada Goldenrod	Solidago	canadensis	
		Goldenrod	Solidago	Spp.	
		Common Tansy	Tanacetum	vulgare	
		Common Dandelion	Taraxacum	officinale	
		Yellow Salsify	Tragopogon	dubius	
		Mule's Ears	Wyethia	amplexicaulis	
Morning-glory	Convolvulaceae	Field Morning-glory	Convolvulus	arvensis	EX
Dogwood	Cornaceae	Red-osier Dogwood	Cornus	stolonifera	
Stonecrop	Crassulaceae	Wormleaf Stonecrop	Sedum	stenpetalum	
Mustard	Cruciferae	Common Wall Cress	Arabidopsis	thaliana	
		Sicklepod Rockcress	Arabis	sparsiflora	
		American Wintercress	Barbarea	orthocerus	
		Falseflax	Camelina	sativa	
		Shepard's Purse	Capsella	bursa-pastoris	
		Little Western Bittercress	Cardamine	oligosperma	
		Blue Mustard	Chorispora	tenella	
		Western Tansymustard	Descurainia	pinnata	
		Flixweed	Descurainia	sophia	
		Spring Whitlow-grass	Draba	verna	
		Scalepod	Idahoa	scapigera	
		Common Pepperweed	Lepidium	densiflorum	
		Clasping Pepperweed	Lepidium	perfoliatum	
		Western Yellowcress	Rorippa	curvisiliqua	
		Hispid Yellowcress	Rorripa	islandica	
		Water-cress	Rorripa	nasturtium - aquaticum	EX
		Tumblemustard	Sisymbrium	altissimun	EX
		Field Pennycress	Thlapsi	arvense	EX
Dodder	Cuscutaceae	Dodder	Cuscuta	sp.	
Sedge	Cyperaceae	Inflated Sedge	Carex	vesicaria	
		Thread-leaved Sedge	Carex	fififolia	
		Spike Rush	Eleocharis	spp.	
		Hardstem Bullrush	Scirpus	acutis	
		American Great Bullrush	Scirpus	vallidus	
Teasel	Dipsacaceae	Teasel	Dipsacus	sylvestris	EX

Oleaster	Elaeagnaceae	Russian Olive	Elaeagnus	angustifolia	EX
Horsetail	Equisetaceae	Horsetail	Equisetum	arvense	
		Common Scouring-Rush	Equisetum	hyemale	
		Smooth Scouring-Rush	Equisetum	laevigatum	
Heath	Ericaceae	Bearberry, Kinikinik	Arctostaphylos	uva-ursi	
		Prince's Pine	Chimaphila	umbellata	
		Pinedrops	Pterospora	andromedea	
		Wintergreen	Pyrola	spp.	
		Dwarf Huckleberry	Vaccinium	caespitosum	
Spurge	Euphorbiaceae	Thyme-leaf Spurge	Euphorbia	serpyllifolia	
Gentain	Gentianaceae	White-stemmed Frasera	Frasera	albicaulis	
		Gentian	Gentiana	spp.	
Geranium	Geraniaceae	Stork's Bill	Erodium	cicutarium	EX
		Bicknell's Geranium	Geranium	bicknellii	
		Sticky Geranium	Geranium	viscosissimum	
Grass	Gramineae	Interrupted Apera	Agrostis	interrupta	EX
		Crested Wheatgrass	Agropyron	cristatum	EX
		Bearded Wheatgrass	Agropyron	caninum	
		Slender Wheatgrass	Agropyron	trachycaulum	
		Quack Grass	Agropyron	repens	EX
		Blue-Bunch Wheatgrass	Agropyron	spicatum	
		Wheatgrass	Agropyron	spp.	
		Meadow Foxtail	Alopecurus	pratensis	EX
		Oatgrass	Arrhenatherum	spp.	EX
		Rattlesnake Grass	Bromus	brizaeformis	EX
		Hairy Brome	Bromus	commutatus	EX
		Smooth Brome	Bromus	inermis	EX
		Japanese Brome	Bromus	japonicus	EX
		Soft Cheat	Bromus	mollis	EX
		Cheat Grass	Bromus	tectorum	EX
		Pine Grass	Calamagrostis	rubescens	
		Reedgrass	Calamagrostis	spp.	
		Orchard Grass	Dactylis	glomerata	EX
		Oatgrass	Danthonia	spp	EX
		Tufted Hairgrass	Deschampsia	caespitosa	
		Annual Hairgrass	Deschampsia	danthonoides	
		Giant Wildrye	Elymus	cinereus	
		Idaho Fescue	Festuca	idahoensis	
		Fescue	Festuca	spp.	
		Northern Mannagrass	Glyceria	borealis	
		Foxtail Barley	Hordeum	jubatum	
		Prairie Junegrass	Koeleria	cristata	
		Cutgrass	Leersia	oryzoides	
		English Ryegrass	Lolium	perenne	EX
		Common witchgrass	Panicum	capillare	EX
		Reed canarygrass	Phalaris	arundinaceae	EX
		Common Timothy	Phleum	pratense	EX
		Big bluegrass	Poa	ampla New-juncifolia	EX
		Canada Bluegrass	Poa	compressa	
		Thurber's Needlegrass	Stipa	thurberiana	
		Bottlebrush Squirreltail	Sitanion	hystrix	
Grass	Gramineae	Sandberg's Bluegrass	Poa	sandbergii	
		Kentucky Bluegrass	Poa	pratensis	EX
		Fowl Bluegrass	Poa	palustris	EX
		Bulbous Bluegrass	Poa	bulbosa	EX
		Ventanata	Ventanata	dubia	EX
Gooseberry	Grossulariaceae	Golden Currant	Ribes	aureum	
		Squaw Currant	Ribes	cereum	
		White-stem Gooseberry	Ribes	inerme	

		Gooseberry	Ribes	spp.	
Water-Milfoil	Haloragaceae	Spiked Water-Milfoil	Myriophyllum	spicatum	
		American Milfoil	Myriophyllum	exalbescens	
Hydrangea	Hippuridaceae	Mare's Tail	Hippuris	vulgaris	
Hydrangea	Hydrangeaceae	Syringa	Philadelphus	lewisii	
Frog's-Bit	Hydrocharitaceae	Rocky Mountain Waterweed	Elodea	canadensis	
		American Wild Celery	Vallisneria	americana	
		California Hesperochiron	Hesperochiron	californicus	
		Ballhead Waterleaf	Hydrophyllum	capitatum	
		Silverleaf Phacelia	Phacelia	hastata	
		Threadleaf Phacelia	Phacelia	linearis	
St. John's Wort	Hypericaceae	Common St. John's Wort	Hypericum	perforatum	EX
Iris	Iridaceae	Western Blue Flag	Iris	missouriensis	
		Grass Widow	Sisyrinchium	inflatum	
		Blue-eyed Grass	Sisyrinchium	angustifolium	
Rush	Juncaceae	Baltic Rush	Juncus	balticus	
		Rush	Juncus	spp.	
		Field Woodrush	Luzula	campestris	
Mint	Labiatae	Common Dead Nettle	Lamium	amplexicaule	
		Red Dead Nettle	Lamium	purpureum	
		Horehound	Marrubium	vulgare	EX
		Corn Mint	Mentha	arvensis	
		Catnip	Nepeta	cataria	EX
		Self-heal	Prunella	vulgaris	
		Wood-sage	Teucrium	canadensis	SS
		Blue-curls	Trichostema	oblongum	
Pea	Leguminosae	Purple Milk Vetch	Astragalus	agrestis	
		Milk Vetch	Astragalus	spp.	
		Sweet-pea	Lathyrus	spp.	EX
		Deer vetch	Lotus	spp.	
		Velvet Lupine	Lupinus	leucophyllus	
		Bigleaf Lupine	Lupinus	polyphyllus	
		Silky Lupine	Lupinus	sericeus	
		Black Medic	Medicago	lupilina	EX
		Alfalfa	Medicago	sativa	EX
		White Sweet Clover	Melilotus	alba	EX
		Yellow Sweet Clover	Melilotus	officinalis	EX
		Clover	Trifolium	sp	
		American Vetch	Vicia	americana	
		Vetch	Vicia	sp.	
Bladderwort	Lentibulariaceae	Common Bladderwort	Utricularia	vulgaris	
Duckweed	Lemnaceae	Star Duckweed	Lemna	trisulca	
		Water Lentil	Lemna	minor	
Lily	Liliaceae	Hooker Onion	Allium	acuminatum	
		Geyer's Onion	Allium	geyeri	
		Douglas’ onion	Allium	columbiana	
		Asparagus	Asparagus	officinalis	EX
		Douglas' Brodiaea	Brodiaea	douglasii	
		Common Camas	Camassia	quamash	
		Wartberry Fairy-bell	Disporum	trachycarpum	
		Yellow Bell	Fritillaria	pudica	
		Western Solomon Plume	Smilacina	racemosa	
		Starry Solomon Plume	Smilacina	stellata	
		Death Camas	Zigadenus	venenosus	

Meadow Foam	Limnanthaceae	False-mermaid	Floerkea	prosperpinacoides	
Flax	Linaceae	Blue Garden Flax	Linum	perenne	EX
Mallow	Malvaceae	Dwarf Mallow	Malva	neglecta	
		Oregon checker-mallow	Sidalcea	oregana	
Water Lily	Nymphaceae	Yellow Pond Lily	Nuphar	polysepalum	
Olive	Oleaceae	Common Lilac	Syringa	vulgaris	
Evening Primrose	Onagraceae	Elkhorn Clarkia	Clarkia	puchella	
		Fireweed	Epilobium	angustifolium	
		Autumn Willow-herb	Epilobium	paniculatum	
Orchid	Orchidaceae	Fairy-slipper	Calypso	bulbosa	
		Coral Root	Corallorhiza	sp.	
		Yellow Lady's slipper	Cypripedium	calceolus	SE
			Cypripedium	montanum	
		Hooded Ladies' Tresses	Spiranthes	romanzoffiana	
Broomrape	Orobanchaceae	Naked Broomrape	Orobanche	uniflora	
		Clustered Broomrape	Orobanche	fasciculata	
Pine	Pinaceae	Ponderosa Pine	Pinus	ponderosa	
		Douglas Fir	Pseudotsuga	menziesii	
Phlox	Polemoniaceae	Large Flowered Collomia	Collomia	grandiflora	
		Pink Microsteris	Microsteris	gracilis	
		Needle-leaf Navarretia	Navarretia	intertexta	
		Clumped Caespitosa	Phlox	caespitosa	
		Showy phlox	Phlox	speciosa	
		Little bells Polemonium	Polemonium	micranthum	
Plantain	Plantaginaceae	English Plantain	Plantago	lanceolata	EX
		Indian-wheat	Plantago	patagonica	
Buckwheat	Polygonaceae	Northern Buckwheat	Eriogonum	compositum	
		Wyeth Buckwheat	Eriogonum	heracleoides	
		Snow Buckwheat	Eriogonum	niveum	
		Doorweed	Polygonum	aviculare	
		Sulfur Buckwheat	Eriogonum	umbellatum	
		Water Smartweed	Polygonum	coccineum	
		Palouse Knotweed	Polygonum	majus	
		Spotted Thumbweed	Polygonum	periscaria	
		White-margined Knotweed	Polygonum	polygaloides	
		Knotweed	Polygonum	spp.	
		Red Sorrel	Rumex	acetosella	EX
		Curly Dock	Rumex	crispus	EX
		Seaside Dock	Rumex	maritimus	EX
Common Fern	Polypodiaceae	Brittle Bladder-Fern	Cystoptris	fragilis	
		Bracken Fern	Pteridium	aquilinum	
		Woodsia	Woodsia	oregana	
Purslane	Portulaceae	Bitterroot	Lewisia	rediviva	
		Dwarf Montia	Montia	dichotoma	
		Narrow-leaved montia	Montia	linearis	
		Miners Lettuce	Montia	perfoliata	
		Common Purslane	Portulaca	oleracea	
Primrose	Primulaceae	Slimpod Shooting Star	Dodecatheon	conjugans	
		Few-flowered shooting star	Dodecatheon	pulchellum	
		Fringed Loosestrife	Lysimachia	ciliata	
Pondweed	Potamogetonaceae	Ribbon-leaf Pondweed	Potamogeton	epihydrus	
		Sago Pondweed	Potamogeton	pectinatus	

		Richardson's Pondweed	Potamogeton	richardsonii	
		Flat-Stemmed Pondweed	Potamogeton	zosteriformes	
		Broad-leaved Pondweed	Potamogeton	nutans	
Buttercup	Ranunculaceae	Upland Larkspur	Delphinium	nutallianum	
		Least Mouse-tail	Myosurus	minimus	EX
		White water Buttercup	Ranunculus	aquatilis	
		Yellow water Buttercup	Ranunculus	flabellaris	
		Creeping Buttercup	Ranunculus	flammula	
		Sagebrush Buttercup	Ranunculus	glaberrimus	
		Blister Buttercup	Ranunculus	sceleratus	EX
		Horn-seed Buttercup	Ranunculus	testiculatus	EX
Rose	Rosaceae	Serviceberry	Amelanchier	alnifolia	
		Black Hawthorn	Crataegus	douglasii	
		Wood's Strawberry	Fragaria	vesca	
		Large-leaved Avens	Geum	macrophyllum	EX
		Old man's Whiskers	Geum	triflorum	
		Oceanspray	Holodiscus	discolor	
		Nine bark	Physocarpus	malvaceus	
		Common Silverweed	Potentilla	anserina	EX
		Sticky Cinquefoil	Potentilla	glandulosa	
		Cinquefoil	Potentilla	sp.	
		Serviceberry	Amelanchier	alnifolia	
		Chokecherry	Prunus	virginiana	
		Apple	Pyrus	malus	EX
		Apple	Pyrus	spp.	EX
		Wood's Rose	Rosa	woodsii	
		Annual Burnet	Sanguisorba	occidentalis	EX
		Pyramid Spirea	Spirea	pyramidata	
Madder	Rubiaceae	Goose Grass	Galium	aparine	
		Northern Bedstraw	Galium	boreal	
		Small Bedstraw	Galium	trifidum	
Willow	Salicaceae	Quaking Aspen	Populus	tremuloides	
		Black Cottonwood	Populus	trichocarpa	
Saxifrage	Saxifragraceae	Roundleaf Alumroot	Heuchera	cylindrica	
		Bulbiferous Fringecup	Lithophragma	bulbifera	
		Small flower Fringecup	Lithophragma	parviflora	
		Swamp Saxifrage	Saxifraga	integrifolia	
Figwort	Scrophulariaceae	Red Besseya	Besseya	rubra	
		Paintbrush	Castilleja	lutescens	
		Small-flowered Blue-eyed Mary	Collinsia	parviflora	
		Dalmatian Toadflax	Linaria	dalmatica	EX
		Butter and Eggs	Lineria	vulgaris	EX
		Thin leaved Owl Clover	Orthocarpus	tenuifolius	
		Hot-Rock Penstemon	Penstemon	deustus	
		Common Mullein	Verbascum	thlapsus	
		Common Speedwell	Veronica	arvensis	
		Purslane Speedwell	Veronica	peregrina	EX
		Skullcup Speedwell	Veronica	scutellata	
Selaginella	Selaginellaceae	Compact Selagenella	Selagenella	densa	
Nightshade	Solanaceae	Climbing Nightshade	Solanum	duleamara	
Bur-reed	Sparganiaceae	Bur-reed	Sparganium	eurycarpum	
Cattail	Typhaceae	Common cattail	Typha	latifolia	
Parsley	Umbelliferae	Western water Hemlock	Cicuta	douglasii	
		Cow Parsnip	Heracleum	lanatum	
		Swale Desert-parsely	Lomatium	ambignum	

		Fern-leaved Lomatium	Lomatium	dissectum
		Couer d'Alene Lomatium	Lomatium	farinosum
		Geyer's Lomatium	Lomatium	geyeri
		Gorman's Lomatium	Lomatium	gormanii
		Large Fruit Lomatium	Lomatium	macrocarpum
		Nine Leaf Lomatium	Lomatium	triternatum
		Blunt-Fruit Sweet-Root	Osmorhiza	depauperata
Nettle	Urticaceae	Stinging Nettle	Urtica	dioica
Valerian	Valerianaceae	long-horn Plectritis	Plectriris	macrocera
		Tobacco Root	Valeriana	edulis
Verbena	Verbenaceae	Bracted Verbena	Verbena	bracteata
Violet	Violaceae	Hook Violet	Viola	adunca

Status codes for both plants and animals

*species found only in the study area

SM	State Monitor Species	EX	Exotic-no Federal protection	NAWCA- North American Waterfowl	
SC	State Candidate for listing	SS	Federal Sensitive	Conservation Act priority waterfowl	
ST	State Threatened	FT	Federal Threatened	PIF - Partners in Flight priority species	
SE	State Endangered	R1	FWS Region 1 Species of Mgmt Concern with ratings $\geq$9		

APPENDIX E: COMPATIBILITY DETERMINATIONS

INTRODUCTION

This set of compatibility determinations (CDs) evaluates uses as projected to occur under the CCP.

Chapter 4 of the Draft CCP/EA (US FWS 2005) also contained analysis of the impacts of public uses to wildlife and habitats. That portion of the Draft CCP/EA is intended to be incorporated through reference into this set of CDs.

Uses that occur on the Columbia Plateau Trail (CPT) are not evaluated in these CDs. The CPT is managed by the Washington State Parks and Recreation Commission; the Refuge maintains a Cooperative Agreement with the State of Washington which allows for responses from the Service on issues related to law enforcement, weed management, and fire. Recreational uses that are allowed on the CPT (mostly bicycling, hiking, and equestrian activity) are outside the bounds of Service authority.

USES EVALUATED AT THIS TIME

The following section includes full CDs for all Refuge uses that are required to be evaluated at this time. According to Service policy, compatibility determinations will be completed with all newly proposed uses under a Comprehensive Conservation Plan. Existing wildlife-dependent recreational uses must also be re-evaluated 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 re-evaluated 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 unless the existing CDs are more than ten years old. However, the Service planning policy recommends preparing CDs for all individual uses, specific use programs, or groups of related uses associated with the proposed action. Given this, and the potential that some recently evaluated uses could occur in the expanded area, we chose in this document to revise some recently prepared CDs. Accordingly, the following CDs are included:

	Use	Reason CD prepared	Year Due for Re-Evaluation
E.1	Wildlife Observation and Photography	Existing wildlife dependent rec use	2021
E.2	Environmental Education and Interpretation	Existing wildlife dependent rec use	2021
E.3	Waterfowl Hunting	Proposed wildlife dependent rec use	2021
E.4	Elk Hunting	Proposed wildlife dependent rec use	2021
E.5	Bicycling, Jogging, and Cross-Country Skiing	Local conditions have changed	2016
E.6	Research	Existing CD ten years old	2016
E.7	Agricultural Practices	To evaluate potential use in expanded area	2016
E.8	Commercial Tree Harvest	To evaluate potential use in expanded area	2016
E.9	Firewood Collecting	Existing CD ten years old	2016

COMPATIBILITY - LEGAL AND HISTORICAL CONTEXT

Compatibility is a tool Refuge managers use to ensure that recreational and other uses do not interfere with wildlife conservation - the primary focus of Refuges. Compatibility is not new to the Refuge System and dates back to 1918, as a concept. As policy, it has been used since 1962. The Refuge Recreation Act of 1962 (Recreation Act) directed the Secretary of Interior to allow only those public uses of Refuge lands that were "compatible with the primary purposes for which the area was established."

Legally, Refuges are closed to all public uses until officially opened through a compatibility determination. Regulations require that adequate funds be available for administration and protection of Refuges before opening them to any public uses. However, wildlife-dependent recreational uses (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) are to receive enhanced consideration and cannot be rejected simply for lack of funding resources unless the Refuge has made a concerted effort to seek out funds from all potential partners. Once found compatible, wildlife-dependent recreational uses are deemed the priority public uses at the Refuge. If a proposed use is found not compatible, the Refuge manager is legally precluded from approving it. Economic uses that are conducted by or authorized by the Refuge also require compatibility determinations.

Under compatibility policy, uses are defined as recreational or economic/commercial or management use of the Refuge by the public or a non-Refuge System entity. Uses generally providing an economic return (even if conducted for the purposes of habitat management) are also subject to compatibility determinations. The Service does not prepare compatibility determinations for uses when the Service does not have jurisdiction over the use. Such examples might include: property rights vested in others; legally binding agreements exist; treaty rights by tribes etc. In addition, aircraft over flights, emergency actions, some activities on navigable waters, and activities by other Federal agencies on "overlay Refuges" are exempt from the compatibility review process.

New compatibility regulations, required by the National Wildlife Refuge System Improvement Act of 1997 (NWRSIA), were adopted by the Service in October, 2000 (http://refuges.fws.gov/policymakers/nwrpolicies.html). The regulations require that a use must be compatible with both the mission of the System and the purposes of the individual Refuge. This standard helps to ensure consistency in application across the Refuge System. The Act also requires that compatibility determinations be written and that the public have an opportunity to comment on most use evaluations.

The System mission emphasizes that the needs of fish, wildlife, and plants must be of primary consideration. NWRSIA 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 NWRSIA as ". . . a finding, determination, or decision that is consistent with principles of sound fish and wildlife management and administration, available science and resources . . ." Compatibility for priority wildlife-dependent uses may depend on the level or extent of a use.

Court interpretations of the compatibility standard have found that compatibility is a biological standard and cannot be used to balance or weigh economic, political, or recreational interests against the primary purpose of the Refuge (Defenders of Wildlife v. Andrus [Ruby Lake Refuge I]).

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 Turnbull NWR are based on the professional judgment of Refuge and planning personnel including observations of Refuge uses and reviews of appropriate scientific literature.

LITERATURE CITED

Defenders of Wildlife v. Andrus (Ruby Lake Refuge I). 11 Envtl. Rptr. Cases 2098 (D.D.C. 1978), p. 873.

House of Representatives Report 105-106 (on NWRSIA) - http://refuges.fws.gov/policyMakers/mandates/HR1420/part1.html

New compatibility regulations, adopted by the Service in October, 2000: (http://refuges.fws.gov/policymakers/nwrpolicies.html).

U.S. Fish and Wildlife Service. 2005. Environmental Assessment for the Draft Refuge Comprehensive Conservation Plan, Turnbull National Wildlife Refuge.

E.1 WILDLIFE OBSERVATION AND PHOTOGRAPHY COMPATIBILITY DETERMINATION

Use: Wildlife Observation, Wildlife Photography

Refuge Name: Turnbull National Wildlife Refuge, Spokane County, Washington

Establishing and Acquisition Authorities:
- Executive Order 7681, dated July 30, 1937
- Migratory Bird Conservation Act [16 U.S.C. 715-715d, 715e, 715f-715r]
- Refuge Recreation Act as amended (16 U.S.C. 460k-460k-4)
- Fish and Wildlife Act of 1956, as amended [16 U.S.C. 742a-742j, not including 742l]

Refuge Purpose(s):
- "*... as a refuge and breeding ground for migratory birds and other wildlife...*" (Executive Order 7681, dated July 30, 1937)
- "*... 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).
- "*... for the development, advancement, management, conservation, and protection of fish and wildlife resources* ... "(16 U.S.C. 742f(a)(4) ... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ... 16 U.S.C. 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System Mission: The mission of the National Wildlife Refuge System is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee])

Description of Use: Wildlife observation and wildlife photography are wildlife-dependent, non-consumptive uses with similar elements and so are considered together in this compatibility determination. Under the CCP (US FWS 2006), the majority of wildlife observation and photography activities at the Refuge will occur within the Public Use Area and along the Columbia Plateau Trail. Some observation will occur along the Cheney-Plaza Highway, Cheney Spangle Highway and Mullinix Road as visitors pass by the Refuge. Visitors may engage in wildlife observation while walking trails or driving the auto tour route, or occasionally, while cross-country skiing or biking on the Refuge. (Jogging, bicycling and cross-country skiing as specific uses on their own are treated separately in another CD.) This Compatibility Determination assesses effects from persons engaged in wildlife observation or photography while on foot or in a vehicle. At the current time, visitors are allowed to roam off-trail anywhere within the Public Use Area.

Existing facilities that are involved in these uses include: the auto tour route, all pedestrian trails on the Refuge, photo blinds, the entry fee station, and public restrooms. The auto tour route is 5.3 miles of

graveled surface that runs through the heart of the Public Use Area. The auto tour route includes numerous pull-outs, parking areas with associated foot trails, and an accessible boardwalk with interpretive signs. Currently there are 7.75 miles of trails within the Public Use Area. In addition, visitors can access a 4.75-mile stretch of the Columbia Plateau Trail (CPT) that transects the Refuge near its western boundary (however, as explained in the Introduction above, uses occurring on the CPT are not analyzed in this CD due to lack of Service authority over that land).

New facilities under the CCP include the development of an additional 3.75 miles of pedestrian trails in the Public Use Area (the Public Use Area itself will also be enlarged). In addition, the Refuge will seek to develop four pullouts with developed viewpoints and interpretation on local county roads as described in Chapter 2 of the CCP. The CCP also includes development of additional photo/observation blinds at East Blackhorse Lake, Kepple Peninsula and along the CPT at Long Lake, and an elevated platform to be built at Stubblefield Lake. Visitors coming to view and photograph wildlife will also benefit from the substantial investment made in interpretive materials (signs), facilities and programs that are explored more fully under the Environmental Education / Interpretation CD.

Of the visitors arriving at the Refuge, more engage in wildlife observation and/or photography than any other use. In 2003, wildlife observation and photography visitation to the Refuge from non-student groups was approximately 20,000. Under the CCP, visitation numbers for these two uses are expected to rise, reaching approximately 30,000 by 2018. Visitation estimates are explained more fully in Chapter 4 of the Draft CCP/EA (US FWS 2005). Approximately 20% of those coming to observe wildlife carry cameras, and intend to photograph wildlife and wildlands. The most heavily used areas include trails and access points to Winslow Pool, Pine Lake, Blackhorse Lake, and Kepple Lake. The majority of use occurs on spring and summer weekends during the daytime.

Visitors are allowed to bring dogs but they must be kept leashed.

See Chapter 2 of the CCP (USFWS 2006) for a detailed description of the use. Also see Map 3 in Chapter 2 of the CCP for locations and facilities of the use. See Chapter 3 of the same document for a detailed description of the use at the current time.

This use is defined as a wildlife-dependent recreational use under the Improvement Act. See Implementation section (Appendix F of the CCP) to determine priority of projects associated with these uses as funding becomes available.

Use Within the Expansion Area: Chapter 2 of the CCP identifies areas in which the Service would seek to acquire land from willing sellers outside the current approved boundary (Refuge expansion area). Except for the Columbia Plateau Trail, which reaches beyond the Refuge to the northeast and to the southwest, there are no developed public wildlife observation, interpretation, or photography facilities or sites located within the Refuge expansion areas. Compatible wildlife observation and photography could be allowed in the future expansion area in designated localities. Since we do not presently know which landowners may or may not be willing sellers, we are not able to address specific uses in specific locations at this time. If lands are acquired, trails, pullouts, and signs supporting wildlife observation activities may be established, if determined compatible.

Availability of Resources: The following funds will be required to run a program as designed under the CCP. The projected need represents an increase of approximately 300% in recurring expenses compared to current funding for this program. For the one-time expenses, all available sources will be investigated.

Activity or Project	One Time Expense	Recurring Expense
Design and construction of three photography blinds and elevated viewing platform	30,000	
Pedestrian trail development and accessibility improvements	154,000	
Development of pulloffs and viewpoints on county highways	250,000	
Screening and signing	5.000	
Maintenance of Public Use Facilities		50,000
Program Operation, Monitoring, and Law Enforcement		55,000
Totals	**439,000**	**105,000**

Offsetting revenues:
Annual Entrance fee receipts $8,000
In kind services of volunteers $50,000

Existing Refuge resources are not adequate to properly and safely administer the use as envisioned under the CCP. To implement the use, the Refuge will pursue partnerships with appropriate cooperators and/or volunteers. Additional funds and in-kind services will be needed, especially to construct new facilities and upgrade facilities to Americans with Disabilities Act (ADA) standards.

Anticipated Impacts of the Use(s):

Wildlife Observation:

Physical and habitat alteration: The impact of these activities depends upon the size of the group(s), the season of use, the location within the Public Use Area, and the duration of the activity. The construction and maintenance of visitor use facilities (i.e. trails, observation points, photography blinds) would have some effect on soils, vegetation and possibly hydrology in specific areas. This could potentially increase erosion and cause localized soil compaction (Liddle 1975); reduced seed emergence (Cole and Landres 1995); alteration of vegetative structure and composition; and sediment loading (Cole and Marion 1988).

Human disturbance - general: The presence of people observing or photographing wildlife will also cause some impact to wildlife. Numerous studies have confirmed that people on foot can cause a variety of disturbance reactions in wildlife, including flushing or displacement (Erwin 1989; Fraser et al. 1985; Freddy 1986), heart rate increases (MacArthur et al. 1982), altered foraging patterns (Burger and Gochfeld, 1991), and even, in some cases, diminished reproductive success (Boyle and Samson 1985). These studies and others have shown that the severity of the effects depends upon the distance to the disturbance and its duration, frequency, predictability, and visibility to wildlife (Knight and Cole 1991). The variables found to have the greatest influence on wildlife behavior are a) the distance from the animal to the disturbance and b) the duration of the disturbance. Animals show greater flight response to humans moving unpredictably than to humans following a distinct path (Gabrielsen and Smith 1995).
Short term and immediate responses to disturbance are fairly simple to document. A question that has received less research attention is whether these short term responses, which generally require increased energetic expenditures on the part of the individual, ultimately diminish an individual or population's capacity to survive and breed successfully (fitness). Energetic demands of responding to disturbance events were measured by Belanger and Bedard (1989). In Quebec, they found that if disturbance was severe enough to cause geese to fly and not resume feeding upon alighting, hourly energy expenditure increased by 3.4%; hourly metabolized energy intake decreased by 2.9 to 19.4%. A 32% increase in nighttime feeding was required to restore the energy losses incurred.

Wildlife are frequently more sensitive to disturbance from people on foot than in vehicles (Skagen 1980; Grubb and King 1991; MacArthur et al.1982).

Disturbance from Dogs: Dogs also elicit a greater response from wildlife than pedestrians alone (MacArthur et al. 1982; Hoopes 1993). In the case of birds, the presence of dogs may flush incubating birds from nests (Yalden and Yalden 1990), disrupt breeding displays (Baydack 1986), disrupt foraging activity in shorebirds (Hoopes 1993), and disturb roosting activity in ducks (Keller 1991). Many of these authors indicated that dogs with people, dogs on-leash, or loose dogs provoked the most pronounced disturbance reactions from their study animals.

Despite thousands of years of domestication, dogs still maintain instincts to hunt and chase. Given the appropriate stimulus, those instincts can be triggered. Dogs that are unleashed or not under the control of their owners may disturb or potentially threaten the lives of some wildlife. In effect, off-leash, dogs increase the radius of human recreational influence or disturbance beyond what it would be in the absence of a dog. Dog-walkers will be required to maintain control of their animal while on the Refuge, thereby reducing the potential and severity of these impacts to wildlife.

The role of dogs in wildlife diseases is poorly understood. However, dogs host endo- and ectoparasites and can contract diseases from, or transmit diseases to, wild animals. In addition, dog waste is known to transmit diseases that may threaten the health of some wildlife and other domesticated animals. Domestic dogs can potentially introduce various diseases and transport parasites into wildlife habitats (Sime 1999).

Effect of disturbance intensity: Some researchers have attempted to correlate disturbance events in wildlife to the intensity, proximity, or loudness of human disturbance. Burger (1986), studying shorebirds on an eastern coastal Refuge, found that the level of disturbance in the shorebirds increased (fewer remained, more flew) as the total number of disturbances and the number of children, joggers, people walking, dogs, aircraft, and boats increased, and the duration of the disturbance and distance from the disturbance decreased.

Effect of human proximity: Other researchers have looked at the question of proximity. At what distance do humans on foot elicit a disturbance response? From an examination of the available studies, it appears that the distance varies dramatically from species to species. Burger and Gochfeld (1991) found that sanderlings foraged less during the day and more during the night as the number of people within 100 m increased. Elk in Yellowstone National Park were disturbed when people were at average distances of 573 m (Cassirer, 1990). These elk temporarily left the drainage and their home range core areas and moved to higher elevations, steeper slopes, and closer to forested areas. Average return time to the drainage was 2 days. Erwin [1989] studied colonial wading and seabirds in Virginia and North Carolina. Mixed colonies of common terns-black skimmers responded at the greatest distances, with respective means of 142 and 130m; mixed wading bird species were more reluctant to flush (30-50 m average). There were few statistically significant relationships between flushing distance and colony size. Similarly, there were few differences between responses during incubation compared to post-hatching periods.

An analysis of over 4,000 human activity events near bald eagle nests in Central Arizona (Grubb and King 1991) found distance to disturbance to be the most important classifier of bald eagle response, followed in decreasing order of discriminatory value by duration of disturbance, visibility, number of units per event, position relative to affected eagle, and sound.

Breeding bald eagles in north-central Minnesota (Fraser et al. 1985) flushed at an average distance of 476 m at the approach of a pedestrian. A multiple regression model including number of previous disturbances, date and time of day explained 82% of the variability in flush distance and predicted a maximum flush distance at the first disturbance of 503 m (SE=131). Skagen (1980), also studying bald eagles in northwest Washington, found a statistically significant decrease in the proportion of eagles feeding when human activity was present within 200 m of the feeding area in the previous 30 minutes. A statistically significant between-season variation occurred in the use of feeding areas relative to human presence, which correlated with food availability. Eagles appeared more tolerant of human activity in the season of low food availability.

In a review of several studies of the reaction of waterfowl and other wetland birds to people on foot, distances greater than 100 meters in general did not result in a behavioral response (DeLong 2002).

Effects on migrant birds versus resident birds: Klein (1989) studied the effect of visitation on migrant and resident waterbirds at Ding Darling National Wildlife Refuge, finding that resident birds were less sensitive to human disturbance than migrants. Migrant ducks were particularly sensitive when they first arrived on site in the fall. They usually remained more than 80 m from [a visitor footpath on a dike], even at very low visitor-levels. Herons, egrets, brown pelicans, and anhingas were most likely to habituate to humans, thus exposing them to direct disturbance as they fed on or near the dike. Shorebirds showed intermediate sensitivity. Strauss (1990) observed piping plover chicks spent less time feeding (50% versus 91%) and spent more time running (33% versus 2%), fighting with other chicks (4% versus 0.1%), and standing alert (9% versus 0.1%) when pedestrians or moving vehicles were closer than 100 m than when they were undisturbed. In addition plover chicks spent less time out on the feeding flats (8% versus 97%) and more time up in the grass (66% versus 0.1%) during periods of human disturbance.

Wildlife Photography: Wildlife photography is likely more disturbing, per instance, than wildlife observation. Klein (1993) observed at Ding Darling NWR, that of all the non-consumptive uses, photographers were the most likely to attempt close contact with birds, and that even slow approach by photographers disrupted waterbirds.

Dwyer and Tanner (1992) noted that wildlife habituate best to disturbance that is somewhat predictable or "background". Investigating 111 nests of sandhill cranes in Florida, Dwyer and Tanner found that nesting cranes seemed to habituate to certain forms of human disturbance and nested within 400 m of highways, railroads, and mines; cranes also were tolerant of helicopter flyovers. Even so, investigator visits to nests and development-induced alterations of surface water drainage were implicated in 24% of the nest failures.

Summary: Effect at Turnbull: Both Refuge visitation and the number of facilities devoted to wildlife observation and photography are projected to increase under the CCP (viewpoints, observation blinds, and trail miles). Given this, future disturbance effects are likely to be somewhat higher than present. Most studies cited above have demonstrated immediate, rather than long term, responses to disturbance. Long term responses are inherently more difficult and expensive to determine. Given that wildlife observation and activity is not typically a loud or intense kind of activity, the area of habitat within a known distance of human activity centers (Public Use Area, trails, EE sites, and viewpoints) is considered a reasonable indicator to evaluate the disturbance effects of public uses on Refuge wildlife. This analysis is presented within Chapter 4, Section 4.1 of the Draft CCP/ EA (US FWS 2005). According to this analysis, the maximum percent of total habitat by category expected to be affected by public use activities under the CCP is: pine forest: 2.6%; aspen: 4.1%; steppe: 13.5%; and wetlands 11.4%.

Anecdotally, Turnbull NWR staff members have noted that most of the Refuge elk sightings occur outside the Public Use Area, indicating the elk are disturbed by the human presence there and avoid human contact by staying in the more secluded portions of the Refuge. This is likely to change once hunting is initiated on the Refuge; elk will be more likely to avoid the higher risk hunting areas and to move into the Public Use Area and other no-hunting zones on and off the Refuge.

Wildlife observation and photography may impact threatened and endangered species, including Spalding's silene and bald eagle. Impact to the silene populations are expected to be minimal. Disturbance impacts to the bald eagle would be expected to increase, but could be reduced to a certain extent through the design of public use facilities. See Section 4.1.7 of the Draft CCP/EA (US FWS 2005) for further discussion of the effects of this use on threatened and endangered species.

Impacts from wildlife observation / photography, and the modes of transport used by visitors engaged in these activities, can be contained most effectively, mitigating the overall effect on Refuge wildlife, by ensuring that visitors remain on trails and within the areas designated for public use. This strategy (containing visitor use to trails) will be implemented under the CCP. Enforcement will be required to ensure that visitors follow the new on-trail-only rule. The Refuge is aware that some visitors already disregard signs along the Columbia Plateau Trail requiring visitors to stay on the trail. These visitors leave the trail and make unauthorized routes to get closer to the lakes and wetlands nearby. Such events create greater disturbance to wildlife than that expected to occur from use of the trails themselves. It also contributes to direct damage of some habitat.

Public education that informs photographers of ethical and least intrusive methods will be available under all alternatives and could reduce some impacts. Three new photo blinds will be built under the CCP. The purpose of these photo blinds is to provide a site where photographers can get close-up photographs without disturbing wildlife. Placement of these additional blinds would likely reduce disturbance from wildlife photographers.

Although disturbance to wildlife from these activities will be higher than at present, we anticipate that the overall effect to the Refuge wildlife will still be minimal, being mostly dealt with at the outset by being contained within trails and other public facilities only within the Public Use Area and on the Columbia Plateau Trail.

Anticipated Impacts of the Use within the Expansion Area: If and when the Refuge acquires land within the expansion area, there could be opportunities for compatible wildlife observation and/or wildlife photography. Due to the similarity of species and habitats with current Refuge owned lands, this use would be anticipated to have impacts similar to those described for current Refuge owned lands. If the Refuge manager determines that those opportunities would substantially change the conditions under which this use was found compatible, or that there is new, substantive information regarding the effects of the use, this CD would need to be re-evaluated.

Public Review and Comment: Public review and comments were solicited in conjunction with release of the Draft CCP/EA (US FWS 2005) in order to comply with the National Environmental Policy Act and with Service policy. Appendix L of the CCP (US FWS 2006) contains a summary of the comments and Service Responses.

Determination :

____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

User Stipulations:
- Visitors will be required to stay on trails and designated roadways throughout the year.
- Use is restricted to daylight hours only.
- Pets must be kept leashed at all times.

Administrative stipulations:
- Allowing the use as described in the CCP is contingent upon finding the full funding to properly manage and administer the use. However, if funds are short for construction of facilities associated with this use, that should not be construed as invalidating the compatibility of the use overall.
- At least 50% of the Refuge will be managed as wildlife sanctuary free from routine human disturbance.
- Where feasible native trees and shrubs will be planted to create screening along trails and at observation points to reduce disturbance.
- Elevated observation platforms, accessible trails, and boardwalks will be designed to help reduce negative visitor impacts to soils, vegetation and hydrology.
- Regulations will be available to the public through a Refuge brochure.
- Directional, informational and interpretive signs will be posted and maintained to help keep visitors on trails and help educate the public on minimizing wildlife and habitat disturbance.
- Monitor human use levels by activity and evaluate impacts of increased human uses on Refuge.

Justification: Wildlife observation and photography are two of the six wildlife-dependent recreational uses of the National Wildlife Refuge System as stated in the National Wildlife Refuge System Improvement Act of 1997. By limiting these activities to a small percentage of the Refuge and by usually providing wildlife sanctuary from human disturbance in other areas of the Refuge, these programs will not interfere with the Refuge achieving its purposes of providing *sanctuary* and a *breeding ground for migratory birds and other wildlife*. These uses contribute to the purpose of *wildlife-oriented recreational development*. Although there are impacts from these activities, the wildlife observation, interpretation, and photography programs complement the Refuge purpose, vision and goals and the NWRS Mission.

Mandatory Re-Evaluation Date (provide month and year for "allowed" uses only):

_2021_Mandatory 15-year Re-Evaluation Date (for priority public uses)
_____ Mandatory 10-year Re-Evaluation Date (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

___ 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

Literature Cited:

Baydack, R. K. 1986. Sharp-tailed grouse response to lek disturbance in the Carberry Sand Hills of Manitoba. Colorado State University, Fort Collins, Colorado.

Belanger, L. and Bedard, J. 1989. Energetic cost of man-induced disturbance to staging snow geese. J. Wildl. Management. 54: 36-41.

Boyle, S.A. and Samson, F.B. 1985. Effects of nonconsumptive recreation on wildlife: a review. Wildl. Soc. Bull. 13: 110-116.

Burger, J. 1986. The effect of human activity on shorebirds in two coastal bays in northeastern United States. Environ. Conserv. 13:123-130.

Burger, J. and Gochfeld, M. 1991. Human activity influence and diurnal and nocturnal foraging of sanderlings (*Calidris alba*). Condor 93: 259-265.

Cassirer, E. F. 1990. Responses of elk to disturbance by cross-country skiers in northern Yellowstone National Park. M.S. Thesis, University of Idaho, Moscow.

Cole, D.N. and J. L Marion. 1988. Recreation impacts in some riparian forests of the eastern United States. Env. Mange. 12:99-107.

Cole, D. N. and P. B. Landres. 1995. Indirect effects of recreation on wildlife. Pages 183-201 in R.L. Knight and K. J. Gutzwiller,ed. Wildlife and Recreationists: coexistence through management and research Island Press, Washington, D.C. 372pp.

DeLong, A. K. 2002. Managing visitor use and disturbance of waterbirds – a literature review of impacts and mitigation measures – prepared for Stillwater National Wildlife Refuge. Appendix L (114pp.) *in* Stillwater National Wildlife Refuge Complex final environmental impact statement for the comprehensive conservation plan and boundary revision (Vol. II). Dept. of the Interior, U.S. Fish and Wildlife Service, Region 1, Portland, OR.

Dwyer, N.C. and G.W Tanner. 1992. Nesting success in Florida sandhill cranes. Wilson Bulletin 104: 22-31.

Erwin, R. M. 1989. Responses to human intruders by birds nesting in colonies: Experimental results and management guidelines. Colon. Waterbirds 12:104-108.

Fraser, James D., L. D. Frenzel, and John E. Mathisen. 1985. The impact of human activities on breeding bald eagles in north-central Minnesota.. J. Wildl. Manage. 49:585-592.

Freddy, D. J. 1986. Responses of adult mule deer to human harasment during winter. Pages 286 *in* Comer, R. D., Baumann, T. G., Davis, P., Monarch, J. W., Todd, J., VanGytenbeek, S., Wills, D., and Woodling, J., eds. Proceedings II. Issues and technology in the management of impacted western wildlife: proceedings of a national symposium. Thorne Ecol. Inst., Boulder, Colorado.

Gabrielson, G. W. and E. N. Smith. 1995. Physiological responses of wildlife to disturbance. Pages 95-107 in R. L. Knight and K. J. Gutzwiller, ed. Wildlife and Recreationists: coexistence through management and research. Island Press, Washington, D. C. 372pp.

Grubb, T. G. and King, R. M. 1991. Assessing human disturbance of breeding bald eagles with classification tree models. J. Wildl. Manage. 55:500-511.

Hoopes, E.M. 1993. Relationship between human recreation and piping plover foraging ecology and chick survival [M.S. Thesis]. Amherst, MA: University of Massachusetts; 1993xii+106.

Keller, V. 1991. Effects of human disturbance on eider ducklings Somateria mollissima in an estuarine habitat in Scotland. Biological Conservation 58:213-228.

Klein, M.L. 1993. Waterbird behavioral responses to human disturbances. Wildl. Soc. Bull. 21:31-39.

Klein, M. L. 1989. Effects of high levels of human visitation on foraging waterbirds at J. N. "Ding" Darling National Wildlife Refuge. Final research report. Cooperative Fish and Wildlife Research Unit, Univ. of Florida, Gainesville.

Knight, R. L. and D. N. Cole. 1991. Effects of recreational activity on wildlife in wildlands, inTransactions of the North American Wildlife and Natural Resources Conference. 56:238-247.

Liddle, M.J. 1975. A selective review of the ecological effects on human trampling on natural ecosystems. Biol. Conserv. 7:17-36.

MacArthur, R. A., Geist, V., and Johnston, R. H. 1982. Cardiac and behavioral responses of mountain sheep to human disturbance. J. Wildl. Manage. 46:351-358.

Sime, C. A. 1999. Domestic Dogs in Wildlife Habitats. Pp. 8.1-8.17 *in* G. Joslin and H. Youmans, coordinators. Effects of recreation on Rocky Mountain wildlife: A Review for Montana. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society. 307pp.

Skagen, S. S. 1980. Behavioral responses of wintering bald eagles to human activity on the Skagit River, Washington. Pages 231-241 in Knight, R. L., Allen, G. T., Stalmaster, M. V., and Servheen, C. W., eds. 1980. Proceedings of the Washington bald eagle symposium; Seattle, Washington.

Strauss, E. G. 1990. Reproductive success, life history patterns, and behavioral variation in a population of piping plovers subjected to human disturbances. Ph.D. Dissertation, Tufts Univ., Medford, Massachusetts.

U.S. Fish and Wildlife Service. 2005. Environmental Assessment for the Draft Refuge Comprehensive Conservation Plan, Turnbull National Wildlife Refuge.

U.S. Fish and Wildlife Service. 2006. Comprehensive Conservation Plan for Turnbull National Wildlife Refuge.

Yalden, P. E., and D. Yalden. 1990. Recreational disturbance of breeding golden plovers (Pluvialis apricarius). Biological Conservation 51:243-262.

Signatures:

Nancy Flury — 3/9/07
Prepared by — Date

Nancy Flury — 3/9/07
Refuge Manager/Project Leader Approval — Date

Concurrence

Linda Watters — 3/21/07
Refuge Supervisor — Date

Carolyn A. Robben — 3/22/07
Regional Chief, National Wildlife Refuge System — Date

E.2 ENVIRONMENTAL EDUCATION AND INTERPRETATION COMPATIBILITY DETERMINATION

Use: Environmental Education and Interpretation

Refuge Name: Turnbull National Wildlife Refuge, Spokane County, near Cheney, Washington

Establishing and Acquisition Authorities:
- Executive Order 7681, dated July 30, 1937
- Migratory Bird Conservation Act [16 U.S.C. 715-715d, 715e, 715f-715r]
- Refuge Recreation Act as amended (16 U.S.C. 460k-460k-4)
- Fish and Wildlife Act of 1956, as amended [16 U.S.C. 742a-742j, not including 742l]

Refuge Purpose(s):
- "*... as a Refuge and breeding ground for migratory birds and other wildlife...*" (Executive Order 7681, dated July 30, 1937)
- "*... 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).
- "*... for the development, advancement, management, conservation, and protection of fish and wildlife resources* ... "(16 U.S.C. 742f(a)(4) ... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ... 16 U.S.C. ¤¤ 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System Mission: The mission of the National Wildlife Refuge System is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee])

Description of Use: Environmental Education (EE) consists of educational activities conducted by Refuge staff, volunteers, partners and teachers. EE themes pertain to the Refuge, the NWRS, wildlife and their habitats and the human environment. The EE program goal is to foster an understanding of and appreciation for resource management, to broaden understanding of the human impacts on wildlife habitats, and to encourage active participation in resource protection. Between 3,000 and 8,000 students are currently served each year by the Refuge's EE program.

Interpretation occurs in less formal activities (i.e. infrequently scheduled tours or casual talks) conducted by Refuge staff or volunteers. Interpretive material is also available to visitors through exhibits (mostly found in the EE classroom), signs and brochures. Environmental education currently occurs within the 2,200-acre Public Use Area at four outdoor designated sites and in the EE classroom. Under the CCP, the Refuge will improve each of these sites as well as expand the EE classroom. Each EE site will eventually consist of a shelter, vault toilet, parking facilities for bus and car, and an activities trail.

With a full time environmental education staff person, seasonal help, and volunteers, the Refuge could host approximately 10,000 students per year. The students will be engaged in education activities using curricula approved and/or designed by Refuge staff and reviewed by teachers. EE use of the Refuge will be most intensive during spring (mid April - mid June) and fall (mid September - mid November).

Interpretive materials are not widely available now on the Refuge, with the exception of signs and/or markers on three interpretive trails. The Columbia Plateau Trail Interpretive panels will be developed following plans laid out in the Refuge's Interpretive Prospectus (under development) and as described in Chapter 2 of the CCP. Panels will be established at various pullouts, trails, and observation points within the Public Use Area and at four county highway pullouts. The Friends of Turnbull NWR are developing an interpretive brochure for the Kepple Peninsula trail that interprets various features, habitats and wildlife that can be observed along the trail. Seasonal public use staff will also be available for some guided tours/hikes within the Public Use Area. These guided interpretive activities will most likely occur in summer when heavier public use occurs and be provided to such requesting groups as Boy Scouts, Girl Scouts, senior citizen groups, etc. An interpretation exhibit area will be designed in concert with new office space to be constructed sometime over the next fifteen years. Chapter 2 of the CCP provides additional details regarding the EE and interpretation programs. Also see Map 3 in Chapter 2 of the CCP for locations and facilities of the use under the CCP.

Environmental education and interpretation are both defined as wildlife-dependent recreational uses under the Improvement Act. See Implementation section (Appendix F of the CCP) to determine priority of projects associated with these uses as funding becomes available.

Use Within the Expansion Area: Chapter 2 of the CCP identifies areas in which the Service would seek to acquire land from willing sellers outside of the current approved boundary. There are no developed public environmental education centers or sites within the expansion area. Since land acquisition within an expanded boundary is an unknown quantity, the Service is unable to address specific environmental education uses in specific locations at this time. Due to transportation and field site logistics (all classes now make a visit to the EE classroom as part of their learning experience) it is unlikely that environmental education activities would be expanded onto lands outside the existing Public Use Area and the Eastern Washington University Turnbull Lab for Ecological Studies.

Availability of Resources: The following funds will be required to run a program as designed under the CCP. The projected need represents an increase of approximately 65% in recurring expenses compared to current funding for this program. For the one-time expenses, all available sources will be investigated.

Activity	One Time Expense	Recurring Expense
Construct and outfit EE classroom addition	$430,000	
Operate & maintain classroom		$12,500
Staff classroom		$71,000
Install and maintain EE shelters (3)	$51,000	$1,000
Design and construction of office with visitor contact area:	$1,500,000	
Operate and maintain office/visitor contact area		$35,000
Interpretive exhibits and outfitting for visitor contact area	$300,000	$2,000
Interpretive panels and structures	$96,000	$500
Harden EE sites, construct piers, and plant screening vegetation	$5,000	$500
Totals	**$2,382,000**	**$122,500**

Offsetting revenues: Currently Friends of Turnbull NWR are donating approximately $6,000 annually to support Environmental Education facilitator stipends. They are attempting to build an endowment fund that could eventually contribute to annual support for a full-time Environmental Education Coordinator as well as up to two Environmental Education facilitators. There are also annual in-kind services donations equal to 5,200 volunteer hours and valued at $80,000. These are expected to continue in the future at approximately this level or higher.

Existing Refuge resources are not adequate to properly and safely administer the use as envisioned under the CCP. To implement the use, the Refuge will pursue partnerships with appropriate cooperators and/or volunteers. Additional funds and in-kind services will be needed.

Anticipated Impacts of the Use(s): Impacts from environmental education activities at Turnbull NWR occur mostly in the area of Pine Creek, where school groups concentrate to conduct pond and stream studies. Impacts observed include: trampling of vegetation, disturbance to nesting birds, and disturbance to feeding or resting birds or other wildlife in the proximate vicinity. An unpublished study (Jose 1997) examined the effect of EE site activities at the Refuge's Blackhorse Lake. The study was designed to compare waterfowl presence and behavior patterns between the times when EE activities were occurring and when EE classes were not on-site. The study results indicated that fewer waterfowl were present in the study area when EE classes were on site as compared to the control times. The study also found more short flights undertaken by birds when EE classes were on site. Redheads displayed the highest number of flight responses, followed by mallards. Ruddy ducks almost never flew but had the highest increase in directional swimming away from the EE classes. The study author recommended that sites heavily used by smaller bodied birds, such as ruddy ducks, buffleheads, and teals, not be used as EE sites.

Effects from the EE program are thus similar in type to effects from wildlife observation and photography activities (see Wildlife Observation and Photography CD). In addition to wildlife disturbance, EE activity will result in some trampling of vegetation. With the growth of the environmental education program, future effects can be expected to be higher than present. Although public uses, including environmental education, do have a certain detrimental impact on Refuge habitats and wildlife, the effect is mostly reduced at the outset by being contained within the Public Use Area, and within this area, to the four designated field study sites. Currently, approximately 85% of the existing Refuge is off-limits to year-round public use. After implementation of the CCP, about a third of the total Refuge will be open seasonally to elk hunting and about 20% of the Refuge will be open to year round public use. About fifty percent of the Refuge will remain closed to public use.

This use may impact threatened and endangered species, including Spalding's silene and bald eagle. Impact to the silene populations are expected to be minimal. Disturbance impacts to the bald eagle would be expected to increase, but could be reduced to a certain extent through the design of public use facilities. See Section 4.1.7 of the Draft CCP/EA for further discussion of the effects of this use on threatened and endangered species.

Anticipated Impacts of the Use within the Expansion Area: At this time, no impacts within the expansion area are anticipated, since the environmental education and interpretation program would not occur outside of the current Public Use Area.

Public Review and Comment: Public review and comments were solicited in conjunction with release of the Draft CCP/EA (US FWS 2005) in order to comply with the National Environmental Policy Act and with Service policy. Appendix L of the CCP (US FWS 2006) contains a summary of the comments and Service Responses.

Determination:

____ Use is Not Compatible
_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

User Stipulations:

- Advance reservations required for groups participating in environmental education activities.
- All groups will be instructed in trail etiquette and ways to reduce wildlife and habitat disturbance during their welcome session.
- Students/visitors will be required to stay on trails within the Environmental Education Study Sites.
- Wetland/pond activities are limited to designated sites within the four Environmental Education Study sites.
- Groups will provide their own drinking water and carry out all their own garbage.
- Students and teachers will be encouraged to participate in stewardship activities including habitat restoration or monitoring.

Administrative stipulations:

- Allowing the use as described in the CCP is contingent upon finding the full funding to properly manage and administer the use However, if funds are short for construction of facilities associated with this use, that should not be construed as invalidating the compatibility of the use overall.
- The Refuge will conduct yearly workshops to "teach the teachers" trail etiquette, minimizing wildlife disturbance, and how to facilitate their own field trips.
- An effort will be made to spread out use by large groups while reservations are made, reducing disturbance to wildlife and overcrowding of Refuge facilities during times of peak demand.
- A maximum of 70 students will conduct EE activities per study site per day and no more than 35 students shall be at a study site at one time.
- Only three of the four study sites will be used on any one day; the fourth site will be rested.
- No single study site will be used more than four days/week.
- The classroom can be used up to seven days/week for activities; during both the daytime and evening, pending staff resources.
- The EE classroom and at least one study site will be accessible to all visiting public, including disabled citizens.
- Signs, pamphlets, and verbal instructions from Refuge staff and volunteers will promote appropriate use of trails, boardwalks, and platforms to minimize wildlife and habitat disturbance.
- Periodic monitoring and evaluation of sites and programs will be conducted to assess if objectives (see Chapter 2 of the CCP) are being met and the resource is not being unacceptably degraded.
- At least 50% of the Refuge will be managed as wildlife sanctuary where human disturbance is infrequent.
- Where feasible, native trees and shrubs will be planted to create screening along trails and at observation points to reduce disturbance.
- EE sites will be hardened and piers constructed to facilitate aquatic studies and to help reduce negative visitor impacts to soils, vegetation and hydrology.
- Regulations will be available to the public through a Refuge brochure.
- Directional, informational and interpretive signs will be posted and maintained to help keep visitors on trails and help educate the public on minimizing wildlife and habitat disturbance.
- Any new construction related to the EE program shall ensure that facilities are sited either 328 feet from wetlands, or out of view of any wetland wildlife.

Justification: Environmental education and interpretation contribute to the mission of the National Wildlife Refuge System by providing wildlife-oriented educational and recreational benefits to Americans. Environmental education and interpretation are two of the six wildlife-dependent recreational uses of the National Wildlife Refuge System as stated in the National Wildlife Refuge System Improvement Act of 1997. By limiting the numbers of students/groups as well as always providing sanctuary from human disturbance in other areas of the Refuge, these programs will not interfere with the Refuge achieving its purposes of providing *sanctuary* and a *breeding ground for migratory birds and other wildlife* and they contribute to the purpose of *wildlife-oriented recreational development.* Environmental Education and interpretation are also an important part of the Turnbull NWR vision and goals.

Mandatory Re-Evaluation Date (provide month and year for "allowed" uses only):

_2021_ Mandatory 15-year Re-Evaluation Date (for priority public uses)
_____ Mandatory 10-year Re-Evaluation Date (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

___ 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

Literature Cited:

Jose, J. 1997. Evaluation of the Effect of Environmental Education Classes on Waterfowl Behavior. Unpublished report. Biology 454 class, Eastern Washington University, Cheney, Washington.

U.S. Fish and Wildlife Service. 2005. Environmental Assessment for the Draft Refuge Comprehensive Conservation Plan, Turnbull National Wildlife Refuge.

U.S. Fish and Wildlife Service. 2006. Comprehensive Conservation Plan for Turnbull National Wildlife Refuge.

Signatures:

Prepared by _____ Date 3/9/07

Refuge Manager/Project Leader Approval _____ Date 3/9/07

Concurrence

Refuge Supervisor _____ Date 3/21/07

Regional Chief, National Wildlife Refuge System _____ Date 3/22/07

E.3 WATERFOWL HUNTING COMPATIBILITY DETERMINATION

Use: Waterfowl Hunting

Refuge Name: Turnbull National Wildlife Refuge, Spokane County, near Cheney, Washington

Establishing and Acquisition Authorities:
- Executive Order 7681, dated July 30, 1937
- Migratory Bird Conservation Act [16 U.S.C. 715-715d, 715e, 715f-715r]
- Refuge Recreation Act as amended (16 U.S.C. 460k-460k-4)
- Fish and Wildlife Act of 1956, as amended [16 U.S.C. 742a-742j, not including 742l]

Refuge Purposes:
- "*... as a Refuge and breeding ground for migratory birds and other wildlife...*" (Executive Order 7681, dated July 30, 1937)
- "*... 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).
- "*... for the development, advancement, management, conservation, and protection of fish and wildlife resources ...*"(16 U.S.C. 742f(a)(4) "*... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ...*" 16 U.S.C. 742f (b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System Mission: The mission of the National Wildlife Refuge System is "...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee])

Description of Use: Turnbull NWR lands currently are not open to waterfowl hunting. Under the CCP and after preparation and approval of a Hunt Plan, the US Fish & Wildlife Service will implement an annual 2-day youth waterfowl hunt in late September within the boundaries of Turnbull NWR. Youth waterfowl hunting will be open on approximately 140 acres of wetlands and associated shoreline each year. The designated waterfowl hunting area is the north side of Upper Turnbull Slough. Hunting areas will be posted with signs. Hunting will be allowed consistent with annual State hunting regulations. Hunter numbers will be limited to two with an adult supervisor per spaced hunting site. Youths must be accompanied by an adult. By spacing hunters at least 300 yards apart, we estimate there will be sites available for six to eight hunting blinds across Upper Turnbull Slough. Under this scenario, the Refuge could accommodate approximately 6-16 youth hunters per day. No construction of permanent facilities will be made except for spaced numbered posts noting designated hunting blind. Dogs will be allowed for retrieval; however they must be under control of the hunter at all times. Should an additional 300+ acres of restored wetland be added to the Refuge through acquisition or conservation easement in the identified Stewardship Area, the U.S. Fish and Wildlife Service would consider expanding the waterfowl hunt on the existing Refuge into the regular state waterfowl season. Under this scenario, we envision the Refuge accommodating approximately 24-36 hunters per day. The waterfowl season will last 3 weeks to

3 months depending upon the season/freeze up. See description of the use in Chapter 2 of the CCP (US FWS 2006). Also see Map 3 in Chapter 2 of the CCP for locations and facilities of the use.

This use is defined as a wildlife-dependent recreational use under the Improvement Act. See Implementation section (Appendix F of the CCP) to determine priority of projects associated with these uses as funding becomes available.

Use Within the Expansion Area: Waterfowl hunting currently occurs within some portions of the Refuge expansion area. Philleo Lake is one area within the expansion that currently receives waterfowl hunting from a private duck club. There are no public lands that support waterfowl hunting within the expansion area at this time.

Compatible waterfowl hunting could be allowed in the future expansion area in designated localities if large enough blocks are added. Since we do not presently know which landowners may be willing sellers and which may not, we are not able to address future hunting use in specific locations at this time. However, if Philleo Lake is acquired, waterfowl hunting could be permitted at this area, under similar program management and stipulation features as waterfowl hunts permitted on the Refuge.

Availability of Resources: The following funds will be required to run a program as designed under the CCP. Currently, no funds are being expended on this program, so the funds below represent all new funding needs. For the one-time expenses, all available sources will be investigated.

Activity	One Time Expense	Recurring Expense
Development and Administration of Hunt Plan and associated documentation	$10,000	$500
Placement and maintenance of signs	$1,000	$500
Law Enforcement Staffing	0	$1,200
Biological staff to monitor hunt program	0	$1,200
Totals	**$11,000**	**$3,400**

Offsetting revenues:
Hunt permit fees $240-$480 (@$10/hunter per day)

Anticipated Impacts of the Use(s): The direct effect of hunting on waterfowl is mortality, wounding, and disturbance.

Effect on distribution and use of habitat: Belanger and Bedard (1995) concluded that disturbance caused by hunting can modify the distribution and use of various habitats by birds (Owens 1977; White-Robinson, 1982; Madsen 1985). In Denmark, Madsen (1995) experimentally tested disturbance effects of hunting by the establishment of two experimental reserves where hunting activity was manipulated such that sanctuary areas were created in different parts of the study area in different hunting seasons. In both areas, waterbird numbers increased, most strongly in hunted species (3-40 fold increase), with highest densities found in sanctuary areas, irrespective of where these sanctuaries were sited. At Sacramento National Wildlife Refuge, in California, researchers found statistically significant differences in the densities of northern pintails among hunting units, units adjacent to hunting units, units adjacent to auto tour route, and units isolated from disturbance (Wolder 1993). Prior to the opening of hunting season, pintail used units in proportion to their availability, indicating no preference to particular areas. During

the hunting season, 50-60% of the pintails on the Refuge were located on the isolated units that contained 26-28% of the Refuge wetlands, suggesting a strong waterfowl preference for areas of little human activity. Units along the auto tour route and adjacent to hunting units maintained pintails at similar proportions to their availability. Three to sixteen percent of the pintails on the Refuge were located on hunted units (36-40% of the available habitat) during non-hunt days (4 days per week) and almost entirely absent on days when hunting was taking place, indicating an avoidance of the hunted areas.

Belanger and Bedard (1989) studied the effect of disturbances to staging greater snow geese in a Quebec bird sanctuary over 471 hours of observation. They found that the level of disturbance (defined as any event causing all or part of the goose flock to take flight) that prevailed on a given day in fall influenced goose use of the sanctuary on the following day. When disturbance exceeded two events per hour, it produced a 50% drop in the mean number of geese present in the sanctuary the next day.

Effects on energetics and survival: Hunting limits access of waterfowl to food resources and may modify migration timing. Madsen (1988 as cited by Dalgren and Korschgen 1992) suggested that hunting on the coastal wetlands of Denmark modified waterfowl movements and caused birds to leave the area prematurely. However, Kahl (1991) suggested that lack of adequate access to food may decrease survival of canvasbacks by causing birds to remain on a staging site longer and forage under suboptimal conditions, or by causing birds to migrate in shorter flights with more frequent stops.

Disturbance due to hunting has caused waterfowl to cease feeding or resting activities, thus decreasing energy intake and increasing energy expenditure. At Chincoteage NWR, Morton et al. (1989a) found that wintering black ducks experienced reduced energy intake while doubling energy expenditure by increasing the time spent in locomotion in response to disturbance. Belanger and Bedard (1995) in a quantitative analysis, estimated that neither the response to disturbance by flying away and promptly returning to the foraging site to resume feeding, nor the response of flying away (leaving the foraging site for a roosting site - thus interrupting feeding) allowed snow geese to balance their daytime energy budget. At high disturbance rates (>2/hour - these included hunting and transport related disturbance), Belanger and Bedard estimated that an increase in night feeding as a behavioral compensation mechanism could not counterbalance energy lost during the day. Likewise, geese could not compensate for a loss in feeding time by increasing their daily foraging behavior to maximize food intake during undisturbed periods. Belanger and Bedard suggested mitigation with spatial or temporal buffer zones.

Considerations for design of hunt units: Fox and Madsen (1997) found that mobile hunting activity close to roosting and or feeding areas is more disturbing than hunting from fixed points or where birds are shot moving between such areas. For sanctuary areas, they recommended areas with regular shape, maximum practicable size, and with a diameter of three times the escape flight distance (at a minimum) of the most sensitive species present. Flock size also affects flush distance, larger flocks tending to react at a greater distance. Based on estimated flight distances from boats, Kahl (1991) recommended that sanctuaries should be at least 1.5-2.0 km square and encompass as much of a feeding area as feasible.

This use may impact threatened and endangered species, including Spalding's silene and bald eagle. Impact to the silene populations are expected to be minimal. Disturbance impacts to the bald eagle would be expected to increase, but could be reduced to a certain extent through the design of public use facilities. See Section 4.1.7 of the Draft CCP/EA (US FWS 2005) for further discussion of the effects of this use on threatened and endangered species.

Impacts to other wildlife-dependent recreational uses: 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 will be separated spatially

from the Public Use Area and the Columbia Plateau Trail. See Map 3 in Chapter 2 of the CCP (US FWS 2006) for public use locations and facilities.

Summary and application to Turnbull NWR: The studies cited above display the variety and scale of negative impacts to waterfowl from hunting. In full consideration of these studies, a youth waterfowl hunting program at Turnbull, were it to be implemented as envisioned under the CCP, is not expected to have a major effect on Refuge waterfowl populations. The most likely effect would be a shift in waterfowl populations away from hunted areas to non-hunted areas on the Refuge. Total fall wetland habitat available to waterfowl at the present time is estimated at 800 acres. Under the CCP, approximately 17.5% of the existing fall Refuge wetland base will be open to waterfowl hunting. Hunters will be limited to 25 shells per day per hunter, with non-toxic shot permitted only.

By its very nature, waterfowl hunting has very few if any positive effects on waterfowl and other birds while the activity is occurring, but it is well recognized that this activity has given many people a deeper appreciation of wildlife and a better understanding of the importance of conserving their habitat, which has ultimately contributed to the Refuge System mission. At Turnbull NWR, efforts will be made to ensure that hunting impacts will be minimal, by restricting the hunt to a two day youth, and requiring hunting from a limited number of fixed spaced hunting sites.

Anticipated Impacts of the Use within the Expansion Area: A block of lands would have to be acquired, sufficient in size to support a quality hunt program and sanctuary area, before a hunt program could be initiated. Staffing would also have to increase to adequately manage and enforce the hunt program. Preliminary stipulations that would have to be met before a waterfowl hunting program could be implemented in the expansion area include:

1) There is no significant indirect, direct, or cumulative threat anticipated to human health or safety;
2) There is no significant indirect, direct, or cumulative threat anticipated to natural or cultural resources;
3) The use is consistent with management of existing Turnbull NWR lands and would contribute to achieving Refuge goals;
4) The newly acquired lands represent a meaningful unit within which to manage the activity; and
5) There are no significant anticipated conflicts with other wildlife-dependent recreational uses.

If and when the US Fish & Wildlife Service acquires land within the expansion area, there could be opportunities for compatible waterfowl hunting. Due to the similarity of species and habitats with current Refuge owned lands, this use would be anticipated to have impacts similar to those described for current Refuge owned lands. If the Refuge manager determines that those opportunities would substantially change the conditions under which this use was found compatible, or that there is new, substantive information regarding the effects of the use, this CD would need to be re-evaluated.

Public Review and Comment: Public review and comments were solicited in conjunction with release of the Draft CCP/EA (US FWS 2005) in order to comply with the National Environmental Policy Act and with Service policy. Appendix L of the CCP (US FWS 2006) contains a summary of the comments and Service Responses. Public review of a step down Hunt Plan (see Stipulations) as required under Service policy will be conducted before opening the Refuge to hunting.

Determination:

____ Use is Not Compatible

__X__ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility:

User stipulations:
- Hunters must obey all state and federal hunting regulations.
- Daily limit of 25 shells per hunter, non-toxic shot only.
- Hunting permitted from stationary posted spaced hunting sites only.
- Hunting limited to the early fall two day Youth Waterfowl Hunting season.
- Hunting dogs will be under hunter control at all times.
- Before expanding the waterfowl hunt to the regular state hunting season, an additional 300+ acres of wetlands shall be restored in the Stewardship area surrounding the Refuge.

Administrative stipulations:
- Allowing the use as described is contingent upon finding the full funding to properly manage and administer the use.
- Prior to opening of a hunt, a complete Hunting Plan package (Hunting Plan, NEPA documentation, state concurrence, Section 7 ESA consultation, and Federal register regulations) will be completed as required under Refuge System policy. Hunting will not be allowed until regulations allowing hunting have been published in the Federal Register.
- The U.S. Fish & Wildlife Service will install 6-8 stationary blinds spaced at least 300 yards apart to minimize crowding.
- Hunt areas will be well separated from other public use areas of the Refuge.
- Hunt areas and no hunting zones will be well posted.
- Refuge staff will issue hunt permits, conduct law enforcement, maintain hunting facilities, and monitor wildlife impacts.

Justification: Waterfowl hunting at Turnbull NWR as described in this CD contributes to the mission of the National Wildlife Refuge System by providing a wildlife-oriented recreational benefit to Americans. By limiting the numbers of hunters and days of hunting as well as always providing sanctuary from human disturbance in other areas of the Refuge, this waterfowl hunting program will not interfere with the Refuge achieving its purposes of providing *sanctuary* and a *breeding ground for migratory birds.* The use contributes to the purpose of *wildlife-oriented recreational development*. Hunting is also one of the six wildlife-dependent recreational uses of the National Wildlife Refuge System as stated in the National Wildlife Refuge System Improvement Act of 1997.

Mandatory Re-Evaluation Date (provide month and year for "allowed" uses only):

__2021__ Mandatory 15-year Re-Evaluation Date (for priority public uses)
_____ Mandatory 10-year Re-Evaluation Date (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

___ 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

Literature Cited:

Belanger, L. and Bedard, J. 1989. Responses of staging greater snow geese to human disturbance. J. Wildl. Management 53:713-719.

Belanger, L. and J. Bedard. 1995. Hunting and waterfowl. Pages 243-256 *in* R.L. Knight and K.J. Gutzwiller, ed. Wildlife and Recreationists: coexistence through management and research. Island Press, Washington, D.C., 372 pp.

Dahlgren, R.B. and C.E. Korschgen. 1992. Human disturbances of waterfowl: an annotated bibliography. Resource Publ. 188. U.S. Fish and Wildlife Service, Washington, D.C., 62 pp.

Fox, A.D. and J. Madsen. 1997. Behavioral and distributional effects of hunting disturbance on waterbirds in Europe: implications for Refuge design. J. Appl. Ecol. 34:1-13.

Kahl, R. 1991. Boating disturbance of canvasbacks during migration at Lake Poygan, Wisconsin. Wild. Soc. Bull. 19:242-248.

Madsen, J. 1995. Impacts of disturbance on migratory waterfowl. Ibis 137:S67-S74.

Madsen, J. 1988. Autumn feeding ecology of herbivorous wildfowl in the Danish Wadden Sea, and impact of food supplies and shooting on movements. Danish Review of Game Biology 13:1-32.

Madsen, J. 1985. Impact of disturbance on field utilization of pink-footed geese in West Jutland, Denmark. Biol. Conserv. 33:53-63.

Morton J. M., A.C. Fowler and R.L. Kirkpatrick. 1989. Time and energy budgets of American black ducks in winter. J. Wildl. Manage. 53(2):401-410.

Owens, N. W. 1977. Responses of wintering brant geese to human disturbance. Wildfowl 28:5-14.

White-Robinson, R. 1982. Inland and saltmarsh feeding of wintering brent geese in Essex. Wildfowl 33:113-118.

Wolder, M. 1993. Disturbance of wintering northern pintails at Sacramento National Wildlife Refuge, California. M.S. Thesis, Humboldt Stat Univ., Arcata, California, 62 pp.

U.S. Fish and Wildlife Service. 2005. Environmental Assessment for the Draft Refuge Comprehensive Conservation Plan, Turnbull National Wildlife Refuge.

U.S. Fish and Wildlife Service. 2006. Comprehensive Conservation Plan for Turnbull National Wildlife Refuge.

Signatures:

Prepared by _____ Date 3/9/07

Refuge Manager/Project Leader Approval _____ Date 3/9/07

Concurrence

Refuge Supervisor _____ Date 3/21/07

Regional Chief, National Wildlife Refuge System _____ Date 3/22/07

E.4 ELK HUNTING COMPATIBILITY DETERMINATION

Use: Elk Hunting

Refuge Name: Turnbull National Wildlife Refuge, Spokane County, near Cheney,Washington

Establishing and Acquisition Authorities:
- Executive Order 7681, dated July 30, 1937
- Migratory Bird Conservation Act [16 U.S.C. 715-715d, 715e, 715f-715r]
- Refuge Recreation Act as amended (16 U.S.C. 460k-460k-4)
- Fish and Wildlife Act of 1956, as amended [16 U.S.C. 742a-742j, not including 742l]

Refuge Purpose(s):
- "*... as a Refuge and breeding ground for migratory birds and other wildlife...*" (Executive Order 7681, dated July 30, 1937)
- "*... 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).
- "*... for the development, advancement, management, conservation, and protection of fish and wildlife resources* ... "(16 U.S.C. 742f(a)(4) ... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ... 16 U.S.C. 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System Mission: The mission of the National Wildlife Refuge System is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee])

Description of Use: No hunting occurs on the Refuge at the current time. Elk hunting will be implemented under the CCP to respond to issues related to elk management, especially: a) heavy browsing of young aspen and other deciduous shrubs and trees on the Refuge; b) neighbor complaints of elk damage to hay, fences and other property items; and c) to facilitate hunting as a wildlife-dependent recreational use as specified under the Improvement Act.

Under the CCP, elk hunting will occur each year, but the number of permits issued and length and number of seasons will vary depending on aspen monitoring results conducted each year. Elk hunting will occur outside the Public Use Area in special safe hunting areas designated by the Refuge Manager. Areas tentatively identified include the west side of the Refuge below the Turnbull Slough, and the east side of the Refuge north of the Public Use Area and east of the Turnbull Pines Research Natural Area. Hunting areas will be specified in a hunt plan. The hunt program will permit vehicles at parking facilities accessing these hunt areas. Hunters will access hunting areas by foot. Key facilities involved include parking areas at two to three hunter access points. Special needs for disabled hunters will be accommodated upon request.

Under the CCP, approximately 6-10 elk hunt permits may be issued for each of the hunt seasons proposed in any particular year (example: 6-10 permits for an archery season plus 6-10 permits for a youth rifle hunt). The actual number of permits will be determined after consultation with Washington Fish & Wildlife Department and based on wildlife and habitat monitoring results. All hunting will occur in the months of September, October, November, and/or December during legal hunting hours. No overnight camping will be permitted. See Chapter 2 of the CCP (US FWS 2006) for a detailed description of the use under the CCP. Also see Map 3 in Chapter 2 of the CCP for locations and facilities of the use.

This use is defined as a wildlife-dependent recreational use under the Improvement Act. See Implementation section (Appendix F of the CCP) to determine priority of projects associated with these uses as funding becomes available.

Use Within the Expansion Area: Chapter 2 of the CCP identifies areas in which the Service will seek to acquire land from willing sellers outside of the current approved acquisition boundary [Refuge expansion area]. Elk hunting currently occurs within the Refuge expansion areas. Compatible elk hunting could be allowed in the future expansion area in designated localities if large enough land blocks are added. Since we do not presently know which landowners may be willing sellers and which may not, we are not able to address future hunting use in specific locations at this time.

Availability of Resources: The following funds will be required to run a program as designed under the CCP. Currently, no funds are being expended on this program, so the funds below represent all new funding needs. For the one-time expenses, all available sources will be investigated.

Activity	One Time Expense	Recurring Expense
Development and administration of Hunt Plan and associated documentation	$20,000	$2,500
Development and maintenance of hunter parking	$48,000	$2,000
Placement and maintenance of signs	$1,000	$ 500
Law enforcement staffing	0	$10,000
Biological staff for monitoring effects	0	$ 5,000
Totals	**$69,000**	**$20,000**

Offsetting revenues: (recurring)
Hunt permit fees $ 3,000

Existing Refuge resources are not adequate to properly and safely administer the use as envisioned under the CCP. To implement the use, the Refuge will pursue partnerships with appropriate cooperators and/or volunteers. Additional funds and in-kind services will be needed, especially to assist in costs of administering and patrolling the hunt.

Anticipated Impacts of the Use(s):

Impacts to Wildlife and Habitats: Direct mortality to elk associated with the hunt would of course occur. Some wounding would occur as well. In all cases, the Refuge would seek to minimize needless elk mortality while providing a quality hunt experience and obtaining habitat objectives.

Foot travel associated with elk hunting could potentially result in trampling of vegetation. Since elk hunting would involve small numbers of hunters, and take place during the time of the year most understory plants are dormant, this activity would likely have little direct impact on any native plant species.

The activity of hunters pursuing elk on the Refuge could also disturb some wildlife species. These potential impacts are described more fully in the Refuge's 2006 Wildlife Observation CD (USFWS 2006). Hunters walking in close proximity to wetlands and associated gun fire can result in behavioral responses by waterfowl and other wetland birds. Any portions of the Refuge that may be open to elk hunting would include wetlands. Waterfowl use, however, occurs only on the permanent and semi permanent wetlands of the Refuge through mid-November when freeze-up usually occurs and waterfowl move to rivers and larger, deeper lakes off-Refuge. This short period of overlap between the elk hunting season and the period of peak fall waterfowl concentrations coupled with a small number of hunters and a hunting season tied into habitat damage, would likely result in only minimal impacts to waterfowl.

This use may impact threatened and endangered species, including Spalding's silene and bald eagle. Impact to the silene populations are expected to be minimal. Short-term disturbance impacts to the bald eagle would be expected to increase inside the hunt units. Some short-term effects to bald eagle use within the hunt units would also be expected. Wintering populations of bald eagles have shown susceptibility to disturbance resulting in disrupted foraging behavior and changes in social dynamics between other species in the avian scavenger guild (Skagen 1991) and avoidance of areas with high disturbance (Stalmaster and Newman 1978). Stalmaster and Newman (1978) also found that recreational activities occurring within 250 meters of roosting and foraging areas resulted in changes in distribution patterns by displacement to areas of lower human activity. With regards to hunting, Stalmaster and Newman (1978) found that gunshots were the only noises that elicited overt escape behavior by eagles in their study. Edwards (1969) also found that gunshots could be used to flush eagles from their roost (cited in Stalmaster and Newman 1978). Hunt units would likely incorporate portions of large permanent wetlands utilized by bald eagles for foraging, potentially placing hunters within 250 meters of this habitat.

Elk hunting can also have indirect impacts to habitat by reducing populations or redistributing elk thereby changing densities of elk in a given area. Under very high densities, elk can damage habitats through overgrazing and trampling resulting in the loss of preferred forage species, soil damage, increased erosion and spread of less palatable exotic species on disturbed areas. Generally elk populations (unless extremely large) do not impact the ponderosa pine and steppe communities found on the Refuge because of the low preference for pine and the resistance of most grasses and forbs to moderate grazing pressure. The only impacts to pine forest that have been observed on the Refuge to date have been in the tall shrub phase of the Ponderosa pine/snowberry association. In these areas high use of blue elderberry, serviceberry, chokecherry and spiraea has occurred impacting growth form and reproduction. Elk use and preference for aspen and other deciduous browse is, however, well documented (Debyle 1985). Under high elk densities and limited habitat, elk browsing during winter can have a negative impact on the regeneration of aspen and other deciduous trees and shrubs. Elk browse the tips of new shoots below 2.5 meters and also eat the bark of mature aspen. When browsing intensity is high enough to remove the majority of the current years' growth, aspen develops a shrub form or the new sprouts are killed. Without recruitment of an adequate density of well formed aspen stems, mature trees that die will not be replaced and the stand will decline.

It is important to note that redistributing elk from areas of high density to areas providing relatively greater security without reductions in population size will only transfer impacts. If hunting is applied on an annual basis in the same units, elk may alter use patterns and begin using the remaining no-hunting zones to a greater degree. These no-hunting zones would be private parcels and portions of the Refuge

set aside for other public uses. The main no-hunting zone on the Refuge would be the Public Use Area. This portion of the Refuge has historically received low elk use as a result of the relatively greater level of human disturbance. Since disturbance associated with hunting has a greater influence on elk behavior than other public uses (Skovlin 1982), elk will likely begin to habituate to the level of human disturbance in the no shooting areas (Ward 1973). Increased density of elk in these areas may increase the intensity of grazing and browsing resulting in habitat damage.

Impacts to other wildlife-dependent recreational uses: 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 would be separated spatially from the Public Use Area and the Columbia Plateau Trail. See Map 3 for public uses and facilities.

Elk hunting could have a positive effect on wildlife observation/photography quality. Hunt areas would be located outside the boundaries of the Public Use Area and buffered from the Columbia Plateau Trail and County roadways. Although uncertain, wildlife observation/photography opportunities could be increased as a variety of animals move away from the hunted zones toward no hunting zones, including the Public Use Area. The ultimate outcome for the visitor is that higher numbers of animals may be visible, but the aesthetic value of the experience may be diminished somewhat by the occasional sound of shots.

Anticipated Impacts of the Use within the Expansion Area: A block of lands would have to be acquired, sufficient in size to support a quality hunt program and sanctuary area, before a hunt program could be initiated. Staffing would also have to increase to adequately manage and enforce the hunt program. Preliminary stipulations that would have to be met before an elk hunting program could be implemented in the expansion area include:

1) There is no significant indirect, direct, or cumulative threat anticipated to human health or safety;
2) There is no significant indirect, direct, or cumulative threat anticipated to natural or cultural resources;
3) The use is consistent with management of existing Turnbull NWR lands and would contribute to achieving Refuge goals;
4) The newly acquired lands represent a meaningful unit within which to manage the activity; and
5) There are no significant anticipated conflicts with other wildlife-dependent recreational uses.

If and when the Refuge acquires land within the expansion area, there could be opportunities for compatible elk hunting. Due to the similarity of species and habitats with current Refuge owned lands, this use would be anticipated to have impacts similar to those described for current Refuge owned lands. If the Refuge manager determines that those opportunities would substantially change the conditions under which this use was found compatible, or that there is new, substantive information regarding the effects of the use, this CD would need to be re-evaluated.

Public Review and Comment: Public review and comments were solicited in conjunction with release of the Draft CCP/EA (US FWS 2005) in order to comply with the National Environmental Policy Act and with Service policy. Appendix L of the CCP (US FWS 2006) contains a summary of the comments and Service Responses. Public and state review will also be solicited during preparation of the step-down Hunting Plan subsequent to approval of the CCP.

Determination :

____ Use is Not Compatible

_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

User stipulations:
- Hunters must obey all state and federal hunting regulations.
- Hunting permitted from within designated hunting areas only.
- Access will be walk-in only except upon special request to reasonably accommodate disability.

Administrative stipulations:
- Allowing the use as described in The CCP is contingent upon finding the full funding to properly manage and administer the use. However, if funds are short for construction of facilities associated with this use, that should not be construed as invalidating the compatibility of the use overall.
- Prior to opening of a hunt, a complete Hunting Plan package (Sport Hunting Plan, NEPA documentation, state concurrence, Section 7 ESA consultation regulations, and Federal Register regulations) will be completed as required under Refuge System policy. Hunting will not be allowed until regulations allowing hunting have been published in the Federal Register.
- Hunt units will be well posted and separated from other public use areas of the Refuge including the main Public Use Area, Columbia Plateau Trail, Turnbull Laboratory for Ecological Studies, and County roads to assure public safety.
- The Refuge will vary hunt units to reduce impacts to non-target wildlife by providing spatial and /or temporal sanctuary from disturbance associated with elk hunting.
- To the extent possible, the Refuge will vary hunt units spatially and/or temporally to also minimize habituation by elk and their concentration in no shooting zones.
- Approximately 6-10 elk hunt permits may be issued for each of the hunt types (i.e. archery hunt, rifle hunt) proposed in any particular year. The actual number of permits will be determined after consultation with Washington Fish & Wildlife Department and based on wildlife and habitat monitoring results.

Justification: Elk hunting at Turnbull NWR as described in this CD contributes to the mission of the National Wildlife Refuge System by conserving aspen stands through elk management. Elk browsing of aspen is a known concern on the Refuge. Elk hunting will reduce and redistribute elk densities which can decrease browsing intensity on aspen sprouts enough to allow escapement and height growth putting them beyond the reach of elk. Disturbance concerns can be incorporated into the design of the hunt area, mitigating these impacts to a certain extent. Elk hunting also contributes to the mission by providing a wildlife-oriented recreational benefit to Americans. By limiting the numbers of hunters and days of hunting as well as always providing sanctuary from human disturbance in other areas of the Refuge, an elk hunting program will not interfere with the Refuge achieving its purposes of providing *sanctuary* and a *breeding ground for migratory birds and other wildlife*. The use also contributes to the purposes of *wildlife-oriented recreational development* and *the protection of natural resources*. Hunting is also one of the six wildlife-dependent recreational uses of the National Wildlife Refuge System as stated in the National Wildlife Refuge System Improvement Act of 1997.

Mandatory Re-Evaluation Date (provide month and year for "allowed" uses only):

__2021__Mandatory 15-year Re-Evaluation Date (for priority public uses)
_____Mandatory 10-year Re-Evaluation Date (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

___ 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

Literature Cited:

Debyle, N.V. 1985. Water and watershed. pp 153-167. In: Debyle, N.V. and R. P. Winokur (eds.). Aspen: Ecology and management in the western United States. USDA Forest Service General Technical Report RM-119. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, 283 pp.

Skagen, S.K., R.L. Knight, and G.H. Orians. 1991. Human disturbance of an avian scavenging guild. Ecological Applic. 1:215-225.

Skovlin, J.M. 1982. Habitat requirements and evaluations. *In* Elk of North America -- Ecology and Management, eds. J.W. Thomas and D.E. Toweill, pp 369-413. Wildlife Management Institute, Stackpole Books, Harrisburg, PA.

Stalmaster, M.V. and J.R. Newman. 1978. Behavioral responses of wintering bald eagles to human activity. J. Wildl. Manage. 42:506-513.

Edwards, C.C. 1969. Winter behavior and population dynamics of American eagles in western Utah. Ph.D. Thesis. Brigham Young Univ., Provo. 157pp.

Ward, A.L. 1973. Elk behavior in relation to multiple uses on the Medicine Bow National Forest. Proc. West. Assoc. State Game and Fish Comm. 53:125-141.

U.S. Fish and Wildlife Service. 2005. Environmental Assessment for the Draft Refuge Comprehensive Conservation Plan, Turnbull National Wildlife Refuge.

U.S. Fish and Wildlife Service. 2006. Comprehensive Conservation Plan for Turnbull National Wildlife Refuge.

Signatures:

Nancy J Curry — 3/9/07
Prepared by — Date

Nancy J Curry — 3/9/07
Refuge Manager/Project Leader Approval — Date

Concurrence

Linda Walters — 3/21/07
Refuge Supervisor — Date

Carolyn A. Bohan — 3/22/07
Regional Chief, National Wildlife Refuge System — Date

E.5 BICYCLING, JOGGING AND CROSS-COUNTRY SKIING COMPATIBILITY DETERMINATION

Use: Bicycling, jogging and cross country skiing

Refuge Name: Turnbull National Wildlife Refuge, Spokane County, Washington, near Cheney

Establishing and Acquisition Authorities:
- Executive Order 7681, dated July 30, 1937
- Migratory Bird Conservation Act [16 U.S.C. 715-715d, 715e, 715f-715r]
- Refuge Recreation Act as amended (16 U.S.C. 460k-460k-4)
- Fish and Wildlife Act of 1956, as amended [16 U.S.C. 742a-742j, not including 742l]

Refuge Purpose(s):
- "*... as a Refuge and breeding ground for migratory birds and other wildlife...*" (Executive Order 7681, dated July 30, 1937)
- "*... 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).
- "*... for the development, advancement, management, conservation, and protection of fish and wildlife resources* ... "(16 U.S.C. 742f(a)(4) ... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ... 16 U.S.C. 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System Mission: The mission of the National Wildlife Refuge System is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee])

Description of Use: By one estimate, obtained through a survey of about 500 visitors, approximately twelve percent of visitors to Turnbull NWR bicycle while on the Refuge (EDAW, 1999). Others estimate that the number is smaller - around 1,000 visitors per year. Other visitors, likely fewer, jog (run), or cross country ski while at the Refuge. While biking, jogging, or skiing, these visitors may frequently view wildlife while at the Refuge. However, these activities are treated separately in this CD since impacts are of a different nature and bicycling, jogging, running, and skiing do not automatically support the six wildlife-dependent priority uses.

Most of the bicycling is observed March-October, seven days a week during daylight hours. Use currently occurs on the Auto Tour Route within the 2,200-acre Public Use Area. Some use occurs now on the closed road which accesses Stubblefield Lake, though this use is not considered legal. There are no current designated facilities for biking, jogging, or skiing.

Under the CCP, a new 2.6-mile bicycle trail will be constructed that will run from the entrance road to the Public Use Area along Cheney Plaza Highway utilizing remnants of the old highway bed and fire guards along the Refuge boundary. This bike trail will link to the Columbia Plateau Trail (CPT). Hikers and skiers will be allowed on the new bike route. Under the CCP, bicycles will be allowed only on the new bike trail, the auto tour route, and the CPT.

Special events and training will not be permitted on the Refuge. The Refuge will limit the number of individuals in any biking group to five.

Cross country skiing is a pastime only observed at Turnbull NWR during those winters when there is sufficient snow upon which to ski (~ 3 out of 10 years). The skiing occurs November-February when there is suitable snow cover. Skiers utilize the entrance road, auto tour route and also in the past have skied off trail within the Public Use Area. They can also use the Columbia Plateau Trail and will have access to the bicycle trail linking the CPT to the Public Use Area. There are no plans for providing groomed ski trails.

Jogging occurs occasionally at the present time on Refuge trails and roads. Group training will not be permitted on the Refuge.

See Chapter 2 of the CCP (US FWS 2006) for a description of the uses under the CCP. Also see Map 3 in Chapter 2 of the CCP for locations and facilities of the use. See Chapter 3 of the same document for a description of the uses at the current time.

These uses are not defined as wildlife-dependent recreational uses under the Improvement Act. See Implementation section (Appendix F of the CCP) to determine priority of projects associated with these uses as funding becomes available.

Use Within the Expansion Area: Bicycling, skiing, and jogging take place within the expansion area along the CPT and along public roads. Future use in the expansion area would not likely increase were the Refuge to acquire additional lands.

Availability of Resources: The following funds will be required to run a program as designed under the CCP. All available sources will be investigated.

Activity or Project	One Time Expense	Recurring Expense
Bike Trail development (Refuge portion)	600,000	
Staff costs		2,500
Equipment and Maintenance		250
Materials and supplies		575
Screening and signing	8,000	
Law enforcement		3,000
Total	**$608,000**	**$6,375**

Offsetting revenues: None

Existing Refuge resources are not adequate to properly and safely administer the use as envisioned under the CCP. To implement the use, the Refuge will pursue partnerships with appropriate cooperators and/or volunteers. Additional funds and in-kind services will be needed, especially to assist with bicycle trail construction.

Anticipated Impacts of the Use(s): See the Refuge's 2006 Wildlife Observation and Photography CD (US FWS 2006) for a summary of scientific findings on impacts to wildlife from human activity associated with wildlands recreation.

Wildlife Response to Jogging: Rapid movement by joggers is more disturbing to wildlife than slower moving hikers (Bennett and Zuelke 1999). However, joggers tend to spend less time in a particular area than pedestrians and are less likely to directly approach or otherwise disturb wildlife. The effects of human disturbance are reduced by restricting human activity to an established trail. Animals show greater flight response to humans moving unpredictably than to humans following a distinct path (Gabrielsen and Smith 1995).

Wildlife Response to Bicycling: Rapid movement directly toward wildlife frightens them, while movement away from or at an oblique angle to the animal is less disturbing (Knight and Cole 1995). Knight and Cole (1991) suggest that sound may elicit a much milder response from wildlife if animals are visually buffered from the disturbance.

Under the CCP, the new bike trail's course along the old Cheney-Plaza Highway would put individuals on foot and bicycle near several wetlands including the Overpass Pond, East Tritt Lake and Reeves Lake. Similarly, outside the Public Use Area, the Columbia Plateau Trail crosses 4.75 miles of the Refuge where individuals on foot, bicycle and horseback pass within 30 meters and in full view of 56 acres of several important wetlands (Overpass Ponds, Wetland, Long Lake, and Ballinger Lakes). Several of the areas adjacent to the CPT provide important waterfowl migration habitat in the spring and fall. Depending on the level of use and compliance to regulations restricting off-trail use, some impact to wildlife would be expected.

Use of both the CPT and the new Refuge bike trail would be expected to increase over the next fifteen years. Although biking has the potential to cause flushing of birds from these important breeding and foraging habitats, bicycling on the Refuge trails and on the CPT is not anticipated to cause large disturbances to wildlife as long as riders do not directly approach wetlands or areas where wildlife congregate, and riders stay predictably on the designated bike trails. This will allow wildlife to habituate to the use.

In addition, group size will be limited by prohibiting special events and training within the Refuge's portion of the trail. Under the CCP, the Refuge will implement regulations restricting walking, hiking, jogging, and skiing to trails only to minimize wildlife disturbance. Enforcement of these provisions should minimize negative effects, especially disturbance effects, to wildlife and habitats.

Wildlife Response to Cross-Country Skiing:

In two different studies of winter recreation impacts to wildlife in Yellowstone National Park, Aune (1981) and Cassirer (1990) found that, except for coyotes, all wildlife species observed (mostly big game) reacted more quickly to an approaching skier than to a snowmobile, and the flight distance was generally greater from skiers. Bison were found to respond dramatically to skiers who were off established trails. All wildlife species studied, including bison, were wary of people on foot. Aune (1981) also observed that in Yellowstone National Park, elk were less likely to flee from snowmobiles or skiers late in the

winter than they were earlier in the season. He suggested that this was likely due in part to habituation by elk to snowmobile traffic and in part to decreased vigor of elk later in the season combined with the increasing difficulty of flight through deep, crusted snow. Proximity of escape cover that breaks the line of sight between elk and the disturbance may reduce flight distances and consequently the amount of energy used in flight. Moving automobiles and trail bikes had little effect on elk resting in timber at distances of only 0.13 miles (Lyon and Ward 1982).

Ferguson and Keith (1982) researched the influence of crosscountry ski trail development and skiing on elk and moose distribution in Elk Island National Park in Alberta, Canada. They found no indication that overwinter distribution of elk was altered by cross-country skiing activity. However, it did appear that elk moved away from ski trails, particularly those that were heavily used, during the ski season.

Aune (1981) also reported that snowmobile activity in YNP resulted in average elk flight distances of 33.8 m, compared to average flight distances of 53.5 m in response to skiers. In another study, elk began to move when skiers approached to within 15 m in an area heavily used by humans year-round, and within 400 m in an area where human activity is much lower (Cassirer et al. 1992). Elk in YNP fled more frequently and over greater distances from skiers off established trails than from skiers on established trails (Aune 1981).

Rudd and Irwin (1985) investigated the movements of moose in response to cross-country skiing and found that the average distance 19 moose moved away from people on snowshoes or skis was 16.6 yards, and the average distance at which moose were displaced was 80.7 yards.

Overall Impact at Turnbull NWR: The studies cited above show that these activities can and do disturb wildlife. However we anticipate the impacts will be small, given the relatively low numbers of users. Containing these uses to designated trails and/or roads should prevent most of the worst of the potential impacts and allow wildlife in the area to habituate to the use.

This use may impact threatened and endangered species, including Spalding's silene and bald eagle. Impact to the silene populations are expected to be minimal. Disturbance impacts to the bald eagle would be expected to increase, but could be reduced to a certain extent through the design of public use facilities. See Section 4.1.7 of the Draft CCP/EA for further discussion of the effects of these uses on threatened and endangered species.

Anticipated Impacts of the Use within the Expansion Area: If and when the Refuge acquires land within the expansion area, there could be opportunities for biking, jogging, and cross-country skiing. Due to the similarity of species and habitats with current Refuge owned lands, this use would be anticipated to have impacts similar to those described for current Refuge owned lands. If the Refuge manager determines that those opportunities would substantially change the conditions under which this use was found compatible, or that there is new, substantive information regarding the effects of the use, this CD would need to be re-evaluated.

Public Review and Comment: Public review and comments were solicited in conjunction with release of the Draft CCP/EA (US FWS 2005) in order to comply with the National Environmental Policy Act and with Service policy. Appendix L of the CCP (US FWS 2006) contains a summary of the comments and Service Responses.

Determination:

____ Use is Not Compatible

_X_ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility:

User Stipulations:
- Joggers, bicyclists, and skiers are required to stay on trails and designated roadways year- around.
- Bicyclists and cross country skiers can only go on the Auto Tour Route, Columbia Plateau Trail, the connecting bike trail and entrance road. All other trails will be pedestrian only.
- Use is restricted to daylight hours only.
- Groups will be limited to five people or less.

Administrative stipulations
- Allowing the use as described in CCP is contingent upon finding the full funding to properly manage and administer the use. However, if funds are short for construction of facilities associated with this use, that should not be construed as invalidating the compatibility of the use overall.
- At least 50% of the Refuge will be managed as wildlife sanctuary where human disturbance is infrequent.
- Where feasible native trees and shrubs will be planted to create screening along the new bike trails to reduce disturbance.
- Regulations will be available to the public through a Refuge brochure.
- Directional, informational and interpretive signs will be posted and maintained to help keep visitors on trails and help educate the public on minimizing wildlife and habitat disturbance.

Justification: Biking, jogging, and cross-country skiing do not directly contribute to the mission of the National Wildlife Refuge System or to the wildlife purposes of the Turnbull NWR. They are merely ways visitors access the Refuge. We believe some biking, jogging, and cross-country skiing visitors come with the expectation of wildlife observation which is one of the six wildlife-dependent recreational uses of the National Wildlife Refuge System as stated in the National Wildlife Refuge System Improvement Act of 1997. Though these activities can cause disturbance, we believe that by limiting these activities to a small percentage of the Refuge and by always providing wildlife sanctuary from human disturbance in other areas of the Refuge, these activities will not interfere with the Refuge achieving its purposes of providing *sanctuary* and a *breeding ground for migratory birds and other wildlife*.

Mandatory Re-Evaluation Date (provide month and year for "allowed" uses only):

___ Mandatory 15-year Re-Evaluation Date (for priority public uses)
2016 Mandatory 10-year Re-Evaluation Date (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

___ 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

Literature Cited:

Aune, K. E. 1981. Impacts of winter recreationists on wildlife in a portion of Yellowstone National Park, Wyoming. Thesis, Montana State University, Bozeman, Montana, USA.

Bennett, K. A. and E. Zuelke. 1999. The effects of recreation on birds: a literature review. Delaware Natural Heritage Program, Smyrna, DE 19977

Cassirer, E. F. 1990. Responses of elk to disturbance by cross-country skiers in northern Yellowstone National Park. M.S. Thesis, University of Idaho, Moscow.

Cassirer, E. F., D. J. Freddy, and E. D. Ables. 1992. Elk responses to disturbance by cross-country skiers in Yellowstone National Park. Wildlife Society Bulletin 20:375-381.

EDAW, 1999. Draft Friends of Turnbull NWR Visitor Survey Results. Prepared for Turnbull NWR. Cheney, Washington.

Gabrielson , G. W. and E. N. Smith. 1995. Physiological responses of wildlife to disturbance. Pages 95-107 in R. L. Knight and K. J. Gutzwiller, ed. Wildlife and Recreationists: coexistence through management and research. Island Press, Washington, D. C. 372pp.

Ferguson, M. A. D., and L. B. Keith. 1982. Influence of Nordic skiing on distribution of moose and elk in Elk Island National Park, Alberta. Canadian Field Naturalist 96:69–78.

Hoopes, E.M. 1993. Relationships between human recreation and piping plover foraging ecology and chick survival. Thesis, University of Massachusetts, Amherst, Massachusetts.

Knight, R. L. and D. N. Cole. 1991. Effects of recreational activity on wildlife in wildlands *in* Transactions of the North American Wildlife and Natural Resources Conference. 56:238-247.

Knight, R. L. and D. N. Cole. 1995. Wildlife responses to recreationists. Pages 71-79 in R. L. Knight and K. J. Gutzwiller, ed. Wildlife and Recreationists: coexistence through management and research. Island Press, Washington, D. C. 372pp.

Lyon, J., and A. L. Ward. 1982. Elk and land management. Pages 443–478 *in* J. W. Thomas and D. E. Toweill, editors. Elk of North America: ecology and management. Stackpole Books, Harrisburg, Pennsylvania, USA.

Rudd, L. T., and L. L. Irwin. 1985. Wintering moose vs. oil/gas activity in western Wyoming. Alces 21:279–298.

U.S. Fish and Wildlife Service. 2005. Environmental Assessment for the Draft Refuge Comprehensive Conservation Plan, Turnbull National Wildlife Refuge.

U.S. Fish and Wildlife Service. 2006. Comprehensive Conservation Plan for Turnbull National Wildlife Refuge.

Signatures:

Nancy Flury — 3/9/07
Prepared by — Date

Nancy Flury — 3/9/07
Refuge Manager/Project Leader Approval — Date

Concurrence

Linda Walters — 3/21/07
Refuge Supervisor — Date

Carolyn Q. Bohn — 3/22/07
Regional Chief, National Wildlife Refuge System — Date

E.6 RESEARCH AND MONITORING COMPATIBILITY DETERMINATION

Use: Research and Monitoring including the Operation of the Turnbull Laboratory for Ecological Studies

Refuge Name: Turnbull National Wildlife Refuge (NWR), Spokane County, Cheney Washington

Establishing and Acquisition Authorities:
- Executive Order 7681, dated July 30, 1937
- Migratory Bird Conservation Act [16 U.S.C. 715-715d, 715e, 715f-715r]
- Refuge Recreation Act as amended (16 U.S.C. 460k-460k-4)
- Fish and Wildlife Act of 1956, as amended [16 U.S.C. 742a-742j, not including 742l]

Other Applicable Authorities:
- Intergovernmental Cooperative Agreement between the Bureau of Sport Fisheries and Wildlife and Eastern Washington State College for the establishment and operation of an environmental research facility on Turnbull NWR, dated June 1973.
- Intergovernmental Cooperative Agreement between the US Fish and Wildlife Service (USFWS) and Eastern Washington University for the operation and maintenance of an environmental research facility on Turnbull NWR, dated October, 1988.
- Memorandum of Understanding between the US Fish and Wildlife Service and Eastern Washington University for the purpose of conducting environmental and biotic studies at the Turnbull Laboratory for Ecological Studies, dated July 2004.
- Delegated State Rental Agreement between State of Washington, Department of Ecology and U.S. Fish and Wildlife Service, Turnbull National Wildlife Refuge for lease of a site on Turnbull NWR for ambient air condition monitoring station, dated October 2003.

Refuge Purpose(s):
- "*... as a Refuge and breeding ground for migratory birds and other wildlife...*" (Executive Order 7681, dated July 30, 1937)
- "*... 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).
- "*... for the development, advancement, management, conservation, and protection of fish and wildlife resources* ... "(16 U.S.C. 742f(a)(4) ... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ... 16 U.S.C. 742f(b)(1) (Fish and Wildlife Act of 1956)

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." (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee])

Description of Use: The Refuge Manager issues up to six Special Use Permits (SUP) per year for approved research projects on Turnbull Refuge. This is the number of permits the staff can currently handle in one year. This limit also helps restrict research-related wildlife and habitat disturbance and also minimizes researcher competition for space and project interference. Resource management oriented research is given priority, but other compatible research is permitted. Research activities include collection of specimens, measuring, observation, monitoring, photography, live trapping, data analysis, and report writing. Research is conducted by students and professors from local universities and colleges (such as Eastern Washington University and Washington State University). Additional permits will be considered on a case by case basis.

Data on air quality and weather is also collected by Federal, State and County agencies through stationary monitoring equipment. Air quality monitoring stations are located on the Refuge and operated by the Washington Department of Ecology and Spokane County Air Pollution Control Agency (SCAPCA). The County monitoring station is used as a control for the County's air quality monitoring system. A national climate station is being proposed for installation on the Refuge. This is one of 100 stations being located across the United States to measure long term climatic conditions.

Both air quality monitoring stations are located at the same site, near the Refuge headquarters at the site of the old well pump house just south of Pine Creek and Headquarters Pond. The SCAPCA station sits on the existing cement pad from the old well pump house. A single SCAPCA employee visits the station frequently (sometimes as often as once a day during periods of poor air quality) to ready the monitors and change filters. They approach the site either on foot or by vehicle on an existing dirt access road. Electrical consumption is minimal and has been provided to the County by the Refuge in the past. WA Department of Ecology monitors their site electronically. The State has been paying a nominal fee to the Refuge for electrical consumption. The proposed locations for the National Oceanic and Atmospheric Association (NOAA) national climate station are the current location of the station's weather (RAWS) station near the maintenance shop or near the Refuge bunkhouse.

Research occurs year-round throughout the 15,656 acres of the Refuge, in and around wetlands and streams, springs, and in all upland habitats. The activity occurs mostly during the period March through October, on weekdays, and during daylight hours. Research may occasionally occur on weekends and rarely at night. Monitoring stations will be operated year-around.

In addition to the research above, Eastern Washington University (University) will continue to operate an environmental research facility known as the Turnbull Laboratory for Ecological Studies (TLES) and conduct research in an area of approximately 50 acres near this facility in the northern portion of the Refuge along the Cheney-Plaza Road at T23N, R41E, S1/2 Section 25 and T22N, R42E, E1/2E1/2 Section 5. University research activities are subject to the terms of the cooperative agreement between the University and the Service which was first entered into in 1973, renewed in 1988, and again in 2004 as a memorandum of understanding (MOU). (See Other Applicable Authorities, above) In particular, under the MOU, "The facility is for the purpose of conducting environmental and biotic studies that will assist the Service in accomplishing the objectives for which the Refuge was established." This facility provides the opportunity for environmental studies and research on-site within a National Wildlife Refuge. Because of the existence of this facility and the cooperative agreement, the designated research site adjacent to TLES receives the most concentrated amount of research activities on the Refuge. In operating the facility and using Refuge lands the University is required to comply with all Federal and State laws applicable to Turnbull NWR.

Pending future funding, the university has proposed to put an addition on the existing laboratory doubling the square feet in order to add additional classroom and laboratory space.

This use is not defined as a wildlife-dependent recreational use under the Improvement Act. See Map 2 in Chapter 1 of the Draft CCP/EA for locations of the TLES facility.

Availability of Resources: The following funds will be required to run a program as designed under the CCP. The projected need is equivalent to the existing recurring expenses for this program.

One time expenses: none

Recurring expenses for research activities:

Staffing: Salaries (Refuge Biologist, Refuge Manager)	$8,000/year
Administrative oversight of monitoring station agreements	$ 250/year
TOTAL RECURRING EXPENSES:	$8,250/year

Offsetting revenues: WA Dept of Ecology reimburses the Refuge $250/year for electricity used in their monitoring station. With renewal of the Spokane County agreement the County will also be required to reimburse the USFWS for any electrical consumption associated with their station. The same will go for the NOAA national climate station.

Existing Refuge resources are adequate to properly and safely administer the use as envisioned under the CCP. However, grants may be sought with the assistance of the Friends of Turnbull NWR to assist the University in providing research funds for graduate students.

Anticipated Impacts of the Use(s): Disturbance to breeding, resting and feeding wildlife and their habitats may occur through frequent contact with researchers performing data collection and monitoring activities. Results of disturbance could include the abandonment of nest and young resulting from frequent visitation to nest or breeding sites. In addition, trapping and marking of wildlife for habitat and population studies may result in injury and mortality; study of food habits, parasitism or disease may require the sacrifice of animals; and measurement of habitat characteristics or experimental manipulation of habitats may result in the alteration or destruction of wildlife habitat.

The TLES facility is an earth-shelter facility that blends well with the environment at the site and reduces the negative visual impacts of development at the site. Current impacts from the operation and maintenance of the facility and the research studies occurring on the site involve disturbance both to habitats and wildlife populations. With the anticipated level of activity occurring at the site over the next ten years, these impacts are determined to be insignificant at this time.

Should the USFWS allow the University to add on to the existing structure there will be direct impacts to habitats at the building site, displacing vegetation and animal life. This compatibility determination will be reviewed and amended as appropriate should the University request permission to add on to the laboratory facility.

Anticipated Impacts of the Use within the Expansion Area: If and when the Service acquires land within the expansion area, there could be opportunities for compatible research. Due to the similarity of species and habitats with current Refuge owned lands, this use would be anticipated to have impacts similar to those described for current Refuge owned lands. If the Refuge Manager determines that those opportunities would substantially change the conditions under which this use was found compatible, or

that there is new, substantive information regarding the effects of the use, this Compatibility Determination would need to be re-evaluated. The acreage covered under the MOU with the University would not be extended into the expansion area. There are no plans to relocate or locate any monitoring stations from their present or proposed locations.

Public Review and Comment: Public review and comments were solicited in conjunction with release of the Draft CCP/EA (US FWS 2005) in order to comply with the National Environmental Policy Act and with Service policy. Appendix L of the CCP (US FWS 2006) contains a summary of the comments and Service Responses.

Determination :

_____ Use is Not Compatible

__X__ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility:

User Stipulations:

- All researchers will be required to submit a detailed research proposal for review and recommendation by the Refuge biologist and approval by the Refuge Manager. The biologist will provide the required proposal format to researchers.
- Researchers will be required to submit progress and final reports, as well as hard and electronic copies of all publications resulting from on-Refuge research.
- Special use permit conditions must be adhered to or the research and/or monitoring will be suspended.
- Under the terms of the Memorandum of Understanding between Eastern Washington University and the Service: a) the Service has the right to restrict the University from engaging in any projects when the Service determines that it is in its best interest to do so, b) Use of the lands upon which the laboratory is located and all use of the premises outside the building are coordinated with and subject to the approval of the Refuge Manager and will be compatible with Refuge purposes and the mission of the National Wildlife Refuge System. c) The Service may terminate the MOU for failure of the University to comply with any or all of the terms or conditions of the cooperative agreement. Eastern Washington University is responsible for all maintenance and operational costs of running the laboratory facility.
- Any new construction or changes to the TLES facility will require Refuge Manager approval, an agreement amendment, review of this compatibility determination and must be in accordance with State and Federal laws, regulations and policy.
- Agencies and entities operating stationary monitoring stations requiring utilities (air quality, weather) will cover maintenance and operating costs including utilities for their station.
- All samples and specimens collected from the Refuge are Refuge property. Once the research project is complete or terminated, researchers shall check with Refuge to ascertain whether staff prefers samples and specimens turned over to Refuge offices. Service personnel shall be provided access to the samples and specimens at any time at no cost (unless arrangements are made to the contrary).

Administrative Stipulations:

- The Refuge Biologist will review all research proposals and identify any conditions of the research permits that eliminate or minimize negative impacts to any one area, species or habitat of the Refuge. The Refuge Biologist will make a recommendation to the Refuge Manager on whether the research should occur, based on weighing of benefits and impacts.

- Research requiring the collection of animals will only be authorized after careful consideration by the Refuge Biologist and Refuge Manager as to the importance of Refuge populations to the conservation of the species, the possible adverse impacts to the Refuge populations, and the humaneness of the collection methodology. State and federal collection permits are required.
- Consultation will be conducted for any research activities that may possibly have an impact on threatened or endangered species.
- The Refuge Manger will issue no more than six special use permits annually for research outside the TLES research site. Additional permits may be considered depending upon staff workload and cumulative impacts of existing research projects on wildlife and habitats and on each other. The permit holder will list the names of each person assisting on the research project and provide description and license number of vehicles that will be used.
- Semiannual reviews (April and October) will be conducted of the TLES Memorandum of Understanding, facility operations, and on-going research.
- Refuge staff will monitor research projects to ensure that on-going research is not causing any habitat damage or impacting any animal populations.
- Refuge staff will monitor operation and maintenance of the laboratory to ensure that the building and utilities attached to the TLES facility are not causing any further impacts to the site.
- Additional site specific and research specific terms and conditions will be included in all SUPs.

Justification: Research contributes to the NWRS mission and Turnbull NWR purposes by providing scientific data that expands biological knowledge of the Refuge. Research can assist the Service in making Refuge management decisions. Research is also an important part of the Refuge Vision and Goals and contributes to a quality environmental education program on the Refuge. The stipulations provided herein, and the terms and conditions that will be included on each SUP, will ensure that all research remains compatible. The operation of the air quality monitoring stations does not interfere with the management of the Refuge. The USFWS will benefit from any knowledge gained by the State and County on air quality issues. The USFWS would like to maintain a working partnership with the Department of Ecology and Spokane County Air Pollution Control Agency in all aspects of Refuge management. The proposed NOAA national climate station will also provide information beneficial to the Refuge and the NWRS.

Mandatory Re-Evaluation Date (provide month and year for "allowed" uses only):

_____Mandatory 15-year Re-Evaluation Date (for priority public uses)
__2016_Mandatory 10-year Re-Evaluation Date (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision:

_____Categorical Exclusion without Environmental Action Statement (for special use permits)
____ Categorical Exclusion and Environmental Action Statement
__X_Environmental Assessment and Finding of No Significant Impact
(The Turnbull Laboratory for Ecological Services was also discussed in an Environmental Assessment for the operation of Turnbull NWR dated August 1973).
____Environmental Impact Statement and Record of Decision

Signatures:

Prepared by _____ Date 3/9/07

Refuge Manager/Project Leader Approval — Date 3/9/07

Concurrence

Refuge Supervisor — Date 3/21/07

Regional Chief, National Wildlife Refuge System — Date 3/23/07

E.7 AGRICULTURAL PRACTICES COMPATIBILITY DETERMINATION

Use: Grazing, Mowing and Haying

Refuge Name: Turnbull National Wildlife Refuge (NWR)

Establishing and Acquisition Authorities:
- Executive Order 7681, dated July 30, 1937
- Migratory Bird Conservation Act [16 U.S.C. 715-715d, 715e, 715f-715r]
- Refuge Recreation Act as amended [16 U.S.C. 460k-460k-4]
- Fish and Wildlife Act of 1956, as amended [16 U.S.C. 742a-742j, not including 742l]

Refuge Purpose(s):
- "...as a Refuge and breeding ground for migratory birds and other wildlife." (Executive Order 7681, dated July 30, 1937)
- "...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 (Refuge Recreation Act).
- "...for the development, advancement, management, conservation, and protection of fish and wildlife resources..." (16 U.S.C. 742f(a)(4)...for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude...16 U.S.C. 742f(b)(1) (Fish and Wildlife Act of 1956)

National Wildlife Refuge System Mission: "To preserve a national network of lands and waters for the conservation and management of the fish, wildlife, and plants of the United States for the benefit of present and future generations." (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee])

Description of Use: As identified in the Turnbull NWR Habitat Management Plan (USDI, 1999) there is a need to control exotic plant species in both the seasonal wetland habitat as well as upland habitat sites. Suggested management tools include high intensity short duration grazing, mowing, and haying, as well as other restoration strategies, such as deep flooding, prescribed fire, herbicides, disking and seeding. The primary objective of using grazing, mowing, and haying is to manage vegetation to maintain or increase its value to wildlife at minimal cost to the government.

The U.S. Fish and Wildlife Service (USFWS) will permit livestock (cattle) operators to graze in selected wetland basins as needed to control reed canarygrass. The livestock could be used on approximately 200 acres of the Refuge annually to remove annual growth of this exotic species as part of a program to increase native plant diversity in Refuge wet meadow habitat. Although grazing was used in the past as an economic use in all upland and wetland habitats on this Refuge and was found incompatible, the use of cattle grazing as a management practice only to control reed canarygrass is a new application. Stressing reed canarygrass with high intensity short duration grazing is one tool to be used to improve habitat for native wetland plant species by reducing competition for light, space and nutrients. Grazing is expected to reduce and eliminate the accumulation of a heavy litter layer that can cover or shade out native plant species from germinating and growing.

The number of Animal Unit Months (AUM's) will be determined after experimentation and will be dependent upon the number of acres in the annual prescription. The permittee may be required to construct fencing using materials furnished by the Service. The permittee will be expected to maintain fences, gates adjoining their permit areas during the period their permit is in effect. All necessary fence maintenance materials will be furnished by the Service (6 RM 9 and 9 RM 3). Temporary electric fencing will be used throughout this experimental grazing program. Once it is determined whether it is a feasible tool for reed canarygrass control, consideration may be given to permanent fencing.

The USFWS will employ mowing and haying on approximately 300 acres of the Refuge. Haying and mowing will be used to remove annual growth of exotic species such as reed canarygrass, Canada thistle, tansy and knapweed. It also may be used to reduce flashy fuels in an effort to reduce wildfire hazards along roadsides, trails and dikes and around facilities. Mowing and haying from mid-June through July will be used as needed on appropriate areas in conjunction with other integrated pest management tools. Haying may be conducted by cooperators, contractors, or by Refuge staff. A cooperator managed haying program will complement other reed canarygrass control efforts at minimal cost to the USFWS. It is not expected that more than two or three cooperators or permittees will be necessary to meet targeted acres.

The use of these agricultural practices will be closely monitored on an initial 17 acres of grazing on Helm marsh and 33 acres of haying on Helm Marsh and Stubblefield Lake to determine their impacts and success before implementation on a larger scale (200-300 acres). Success will be measured as the control of further spread and/or reduction of the exotic plant species. These actions support Turnbull NWR Habitat Management Plan Objective 1F: "By 2000, develop and apply, on an experimental basis, management strategies to restore and maintain native plant communities of seasonal wetlands and wet meadows dominated by reed canarygrass" (USDI, 1999). Also see Rule (2004).

These uses are not defined as wildlife-dependent recreational uses under the Improvement Act. See Implementation section (Appendix F of the CCP – US FWS 2006) to determine priority of projects associated with these uses as funding becomes available.

Use Within the Expansion Area: Any new land acquired will be assessed for weed and hazardous fuel problems and the appropriate management tool applied to abate the problem. Based on the success of the pilot program on existing Refuge lands the Refuge manager may propose to allow grazing, haying or mowing to enhance resource management.

Availability of Resources: The following funds will be required to run a program as designed under the CCP. Currently, there is zero funding for this program. For the one-time expenses, all available sources will be investigated.

One time expenses:	Staff-conducted	Cooperator-conducted
Planning	$1,500	
Purchase of electric fencing materials	$1,500	
TOTAL ONE TIME EXPENSES	$3,000	
Recurring expenses:		
Implementation and monitoring	$3,000	
Annual tractor maintenance	$ 500	
Diesel fuel	$ 500	
Maintenance Worker WG-8 Salary	$1,800	
Permit compliance	$ 0	$ 300
TOTAL RECURRING EXPENSES:	$5,800	$ 300

Offsetting revenues: Grazing permittees will be charged fair market value for forage consumed. Haying permittees will be charged fair market value for hay.

Anticipated Impacts of the Use: Because of the limited nature of this use (short term, small acres) it is not anticipated that these activities will have major adverse effects on native Refuge flora or fauna or other Refuge uses. Livestock excrement may increase the nutrient level of the area being grazed and could increase the levels of nitrogen, and phosphorus in the wetland basin after spring run-off. Accumulations of these nutrients over time can have an impact on water quality (Whalen, S.G. 1990). There will be short-term disturbance to wildlife caused by the presence of people, and livestock or haying machinery. Cover will be removed as livestock graze or haying is implemented. Nesting by some late ground nesting birds may be disrupted. Agricultural implements and livestock will cause some disturbance to soils and plants.

There is a potential for introduction of invasive plant species from private equipment used in haying. However, it is anticipated that removal of exotic grasses and weeds before they go to seed will reduce the spread of exotics.

These management actions to control reed canarygrass would result in improving native plant diversity in wet meadow plant communities. There are 100 species of native plants that should occur in habitats susceptible to invasion by reed canarygrass. Survey work on the Refuge has shown that plant species diversity of invaded stands has been reduced to 11 species on the average with some stands having three species or less. Every wetland basin on the Refuge and in the surrounding area has at this time been invaded by reed canarygrass (Rule, 2004).

A native plant of interest while managing reed canarygrass is *Howellia aquatilis*, a species federally listed as threatened. Monitoring of reed canarygrass control methods such as grazing will allow the Refuge to determine if the strategy is improving conditions for howellia and other native wetland plants. Fire danger will be decreased in mowed and grazed areas. Early spring browse, when flooded, as a result of these treatments will provide a food source for Canada geese and wigeon.

This compatibility determination is based on the findings and recommendations of Habitat Management Plan/Environmental Assessment (USDI, 1999a).

Anticipated Impacts of the Use within the Expansion Area: If and when the Refuge acquires land within the expansion area, there could be opportunities for compatible haying or grazing. Due to the similarity of species and habitats with current Refuge owned lands, this use would be anticipated to have impacts similar to those described for current Refuge owned lands. If the Refuge manager determines that those opportunities would substantially change the conditions under which this use was found compatible, or that there is new, substantive information regarding the effects of the use, this Compatibility Determination would need to be re-evaluated.

Public Review and Comment: Public review and comments were solicited in conjunction with release of the Draft CCP/EA (US FWS 2005) in order to comply with the National Environmental Policy Act and with Service policy. Appendix L of the CCP (US FWS 2006) contains a summary of the comments and Service Responses.

Determination (check one)

____ Use is Not Compatible

_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
User stipulations:

- Only high intensity short duration grazing will be permitted.
- All grazing activities will be restricted to designated areas for the periods prescribed.
- Permittee must own the livestock.
- Permittee will install and remove the temporary electric fence around the unit.
- Grazing will occur in May-June when reed canarygrass is most palatable and livestock water is available.
- Cooperator's tractors and farming implements as well as Refuge equipment will be washed prior to moving onto the Refuge and also be cleaned of all mud, dirt and plant parts between sites within the Refuge to reduce the likelihood of moving noxious weed seeds.
- Refuge farm equipment will be washed at the shop equipment wash stall
- All haying and mowing activities will be restricted to designated areas.
- Haying and mowing activities will start after July 1 each year and be completed by November 1.

Administrative stipulations:

- A Special Use Permit (SUP) will be issued to all cooperators associated with grazing, haying, and mowing activities and will require that the above stipulations be met.
- Permits shall be issued annually.
- Each unit necessitating grazing treatment shall be grazed for no less than two years.
- Permits will be issued through sale by lottery (USFWS 6RM 9.10B).
- AUM's and hay prices will be set annually based on fair market value.
- Cattle stocking rate will be high enough to achieve at least 80% utilization of reed canarygrass within two weeks.
- Counts of livestock will be made at entrance and exit to ensure compliance.
- Harvested hay may remain on the Refuge no longer than necessary to allow sufficient drying for weighing and long-term storage (no longer than 30 days following the end of the haying season).
- A representative sample of the hay bales will be weighted and a bale count received by the Refuge manager prior to all harvested hay being removed.
- Areas will be monitored to ensure treatments are improving habitat conditions and to ensure grazing and haying are the appropriate management strategies for a particular site.
- Refuge staff will monitor cooperator activities to ensure that special conditions required under the SUP and/or Cooperative Land Management Agreement are met.

Justification: These uses, as described in this Compatibility Determination, contribute to fulfilling the mission of the National Wildlife Refuge System and to the purposes of Turnbull NWR by managing wet meadows and seasonal wetland plant communities to conserve native plants, including the threatened water howellia, and their associated wildlife species. Grazing may be an effective strategy to help control the very aggressive exotic reed canarygrass and, when used in combination with other integrated pest management tools (chemical treatment, disking, prescribed fire, flooding, mowing and shading), can assist the Refuge in achieving its Vision and Goals. An experimental program of controlled livestock grazing was proposed under the Habitat Management Plan that will be closely monitored to determine its impacts and success before implementation on a larger scale. There are ten units identified on the Refuge that will receive either singly or in combination one of the reed canarygrass treatments listed above. Treatments will be assigned based on logistical considerations; accessibility for equipment and perspective livestock permittees, and existing infrastructure (fences, water level control, livestock water, etc.).

Mandatory Re-Evaluation Date (provide month and year for "allowed" uses only):

_____ Mandatory 15-year Re-evaluation date (for priority public uses)
_2016_ Mandatory 10-year Re-evaluation date (for all uses other than priority 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

Literature Cited:

Rule, Mike. 2004. The Adaptive Management Plan for the Control of Reed Canarygrass on Turnbull NWR.

USDI Fish and Wildlife Service. 1999. Turnbull National Wildlife Refuge Habitat Management Plan, December 1999. Cheney, Washington.

USDI Fish and Wildlife Service. 1999a. Environmental Assessment, Turnbull National Wildlife Refuge Habitat Management Plan, August 1999. Cheney, Washington.

U.S. Fish and Wildlife Service. 2005. Environmental Assessment for the Draft Refuge Comprehensive Conservation Plan, Turnbull National Wildlife Refuge.

U.S. Fish and Wildlife Service. 2006. Comprehensive Conservation Plan for Turnbull National Wildlife Refuge.

Signatures:

_____ 3/9/07
Prepared by Date

_____ 3/9/07
Refuge Manager/Project Leader Approval Date

Concurrence

_____ 3/21/07
Refuge Supervisor Date

_____ 3/22/07
Regional Chief, National Wildlife Refuge System Date

E.8 COMMERCIAL TIMBER HARVEST COMPATIBILITY DETERMINATION

Use: Commercial Timber Harvest

Refuge Name: Turnbull National Wildlife Refuge, Spokane County, Washington

Establishing and Acquisition Authorities:
- Executive Order 7681, dated July 30, 1937
- Migratory Bird Conservation Act [16 U.S.C. 715-715d, 715e, 715f-715r]
- Refuge Recreation Act as amended (16 U.S.C. 460k-460k-4)
- Fish and Wildlife Act of 1956, as amended [16 U.S.C. 742a-742j, not including 742l]

Refuge Purpose(s):
- "*... as a Refuge and breeding ground for migratory birds and other wildlife...*" (Executive Order 7681, dated July 30, 1937)
- "*... 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).
- "*... for the development, advancement, management, conservation, and protection of fish and wildlife resources* ..." (16 U.S.C. 742f(a)(4) ... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ... 16 U.S.C. ¤¤ 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System Mission: The mission of the National Wildlife Refuge System is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee])

Description of Use: This use is further defined and analyzed in the Habitat Management Plan's Environmental Assessment (USDI 1999). Under the Habitat Management Plan (HMP), the Refuge determined to use commercial tree harvest as a forest restoration technique to achieve HMP habitat goals (similar or identical to the goals listed in Chapter 1 of the CCP) in ponderosa pine forest and aspen riparian woodlands. The Refuge has been utilizing this tool as prescribed under the HMP since 1999 on approximately 400 acres/year. Continuing into the future, approximately 400 acres could be treated annually (more if additional lands acquired and in need of forest restoration) and harvested utilizing the following generic prescription.
- Cutting of trees 8 inch diameter at breast height (d.b.h.) or less could be completed on a minimum of 200 acres annually. Average densities in this size class range from 64-305 trees per acre with maximum densities above 1000 trees/acre. Stems will be removed for the small wood market, fuel wood, and piled or broadcast for later burning.
- Single tree selection harvest could be conducted on 400 acres of ponderosa pine forests annually to remove up to 60 percent of the trees between 8 - 24 inch d.b.h. This amounts to a removal on the

average of between 5- 40 trees per acre > 8" d.b.h. The largest number of stems to be removed is actually in the <8" d.b.h size classes which can amount to from 50 – 2,000 trees/acre.

- Group selection cuts less than .25 acres in size could be completed on approximately 5% of annual treatment areas to create forest openings for regeneration where they currently do not occur.
- In mixed stands of pine and aspen, up to 100% of the ponderosa pine less than 24 inches in diameter could be removed from annual forest treatment area (approximately 35 acres annually). Regeneration of aspen will be stimulated by burning or mechanical methods.

Commercial timber harvest with the use of heavy equipment will occur in most cases on frozen ground with a cover of snow. Other periods may be considered based upon equipment being used and moisture level in soils. Forest units will be cruised and marked by Refuge staff prior to bid proposals going out to potential permittees. Awards will be determined through competitive bidding. The successful bidder will be issued a Special Use Permit with conditions attached.

This use is not defined as a wildlife-dependent recreational use under the Improvement Act. See Implementation section (Appendix F of the CCP) to determine priority of projects associated with these uses as funding becomes available.

Use Within the Expansion Area: Chapter 2 of the CCP (US FWS 2006) identifies areas in which the Service would seek to acquire land from willing sellers outside of the current approved boundary [Refuge expansion area]. Were the Refuge to acquire some of these lands, timber harvest may be allowed in the future expansion area in designated localities dependent upon the condition of the forests. Since we do not presently know which landowners may be willing sellers and which may not, we are not able to address specific uses in specific locations at this time.

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.

One time expenses (each sale site):

Graveling haul road:	$50,000
Re-seeding skid trails and landing sites:	$30,000
Pre and Post Monitoring:	$ 5,000
TOTAL ONE TIME EXPENSES PER SALE SITE:	$85,000*

(Note: Each sale site includes an estimate of rehabilitation work needed and prospective purchasers need to submit bid to pay for this work. Refuge does not anticipate the need for recurring road maintenance or reseeding after contract closes).

Recurring expenses:

Administration of permit and contract inspection:	$ 2,500
Cruising and marking timber sale:	$10,000
TOTAL RECURRING EXPENSES:	$12,500

Offsetting revenues: Revenues from sale of timber (approximately 500 thousand board feet (mbf) annually), pulpwood, and hogfuel: $100,000. Revenues received by the Refuge are submitted to the US Treasury. The Refuge benefit would be in any funds coming back to the Station to administer the permits.

The permittee either pays directly or reimburses Service for costs of rehabilitation and monitoring on each sale site.

In kind services (students from Student Conservation Corps natural resources program assisting with cruising) $2,500 .

Anticipated Impacts of the Use(s): The following is a brief description of potential impacts. A more detailed impact analysis of this use is contained in the Turnbull NWR Habitat Management Plan/Environmental Assessment (USDI 1999a). The potential negative impacts of commercial tree harvest include ground disturbance from the use of heavy equipment and disturbance to wildlife from tree harvest 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. It is expected that between 50-100 acres of the Refuge will be subject to potentially ground disturbing activities annually for the next 15 years. If mineral soils are exposed there is a high probability that these sites will be invaded by exotic plant species such as ventanata (*Ventanata dubius*), cheat grass (*Bromus tectorum*), Canada thistle (*Cirsium arvense*), common mullein (*Verbascum thlaspus*) and dalmation toadflax (*Linaria dalmatica*) unless the disturbed sites are rehabilitated.

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 including the threatened plant species water howellia (*Howellia aquatilis*).

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 landbirds (songbirds, grouse, owls, and hawks), white-tailed deer (*Odocoileus virginianus*), Rocky mountain elk (*Cervus elaphus*), and coyotes (*Canis latrans*) are expected to avoid areas of high activity. These species will readily move into these sites after the disturbance is removed. This level of activity is expected to occur on less than 5% of the Refuge at any given time. Foliage roosting bats such as the hoary bat (*Lasiurus cinereus*) and the silver-haired bat (*Lasionycteris noctivagans*) may be dislodged from roost trees if tree harvest occurs during the summer months. Tree harvest activities occurring during the nesting season can directly impact both ground and foliage nesting birds.

Cavity nesting birds may be impacted if snags or dead top trees are removed. Because the use of mechanized fellers is required, operations can occur near large snags without violating Occupational Safety and Hazard Administration rules. No snags will to be cut if they measure 8" d.b.h or larger. This use may impact threatened and endangered species, including Spalding's silene and bald eagle. Impact to the silene populations are expected to be minimal. Disturbance impacts to the bald eagle would occur but would be of a temporary nature. See the Turnbull NWR Habitat Management Plan/Environmental Assessment (USDI, 1999) for further discussion of the effects of this use on threatened and endangered species.

Anticipated Impacts of the Use within the Expansion Area: If and when the Refuge acquires land within the expansion area, there could be opportunities for compatible forestry operations. Due to the similarity of species and habitats with current Refuge owned lands, this use would be anticipated to have impacts similar to those described for current Refuge owned lands. If the Refuge manager determines that those opportunities would substantially change the conditions under which this use was found compatible, or that there is new, substantive information regarding the effects of the use, this CD would need to be re-evaluated.

Public Review and Comment: Public review and comments were solicited in conjunction with release of the Draft CCP/EA (US FWS 2005) in order to comply with the National Environmental Policy Act and

with Service policy. Appendix L of the CCP (US FWS 2006) contains a summary of the comments and Service Responses.

Determination:

____ Use is Not Compatible

__X__Use is Compatible with Following Stipulations

User Stipulations:
Equipment:
- Unless approved in writing in advance by 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 in the Refuge.

Ground disturbance, roads and landings:
- Harvesting and heavy equipment use will be limited to periods of time when soils are either frozen or soil moisture is just enough to cushion the ground but not be either soggy nor powder dry. Manager will make the determination whether 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 within the unit.
- Existing road access will be improved as specified in the SUP, if necessary for specified harvest and haul equipment so that road surface degradation can be avoided.
- Landings will be of the minimum size required and shall not encompass more than 5 acres of the unit.
- Service will comply with current policies and procedures related to cultural resource protection and perform mitigation required through 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. 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 (snag/dead top trees $\geq$8 inches d.b.h. 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 fallen away from the wetland and cabled outside the buffer before skidding.
- Heavy equipment will not be used on large exposed rock outcrops.
- All open steppe areas except those identified as potential landing sites will be avoided during skidding operations to minimize disturbance to shallow soil areas.
- 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 shall result in permit suspension.

Rehabilitation:

- All soil surfaces disturbed by harvest operations shall be restored to their natural surface contours and re-seeded with native seed mixes upon completion of harvest operations.
- Rehabilitation of disturbed areas by replacement of topsoil and re-seeding with native species will be required of all timber operators.

Administrative Stipulations:

- The Refuge 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 units to assure stipulations are adhered to, expected benefits are realized, and negative impacts fall within the range anticipated.

Justification: The use of commercial tree harvesting contributes to the System mission and the purposes of Turnbull NWR by helping to restore the Refuge's ponderosa pine forests to historical conditions of widely spaced, large diameter trees and by reducing the encroachment of pine trees into aspen riparian areas. It also supports the National Fire Plan in reducing hazardous fuel loads on federal lands. As detailed in the HMP, the Refuge's forests are in poor condition due to past logging, grazing and fire suppression. Current conditions are ripe 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, firewood cutting, and prescribed fire is needed to address today's current forest conditions, air quality and human safety concerns, and resource protection needs.

Commercial tree harvesting may also contribute to the mission of the NWRS and purposes of the Refuge by improving wetland habitat conditions for the threatened plant species water howellia. The hydrologic regimes of many small wetlands that are habitat for water howellia have been altered through changes in the density of coniferous forest cover in local watersheds. Reduction of coniferous forest cover and restoration of deciduous riparian vegetation should increase water yields through decreased transpiration and interception of precipitation (Gifford et al. 1984). Restoration of riparian deciduous vegetation and increasing water yield in Refuge watersheds will increase the amount of available *Howellia* habitat by restoring the natural hydrology of Refuge wetlands.

Mandatory Re-Evaluation Date

_____Mandatory 15-year Re-Evaluation Date (for priority public uses)
_2016_Mandatory 10-year Re-Evaluation Date (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

_____ 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

Literature Cited:

Gifford, G.F., W. Humphries, and R. Jaynes. 1984. A preliminary quantification of the impacts of aspen to conifer succession on water yield. II. Modeling results. Water Resources Bulletin 20 (2):181-186.

USDI Fish and Wildlife Service 1999. Habitat Management Plan, Turnbull National Wildlife Refuge. Cheney, Washington.

USDI Fish and Wildlife Service. 1999a. Environmental Assessment for the Habitat Management Plan, Turnbull National Wildlife Refuge. Cheney, Washington.

U.S. Fish and Wildlife Service. 2005. Environmental Assessment for the Draft Refuge Comprehensive Conservation Plan, Turnbull National Wildlife Refuge.

U.S. Fish and Wildlife Service. 2006. Comprehensive Conservation Plan for Turnbull National Wildlife Refuge.

Signatures:

Prepared by — Date 3/9/07

Refuge Manager/Project Leader Approval — Date 3/9/07

Concurrence

Refuge Supervisor — Date 3/21/07

Regional Chief, National Wildlife Refuge System — Date 3/22/07

E.9 FIREWOOD COLLECTING COMPATIBILITY DETERMINATION

Use: Firewood Collecting

Refuge Name: Turnbull National Wildlife Refuge, Spokane County, Washington

Establishing and Acquisition Authorities:
- Executive Order 7681, dated July 30, 1937
- Migratory Bird Conservation Act [16 U.S.C. 715-715d, 715e, 715f-715r]
- Refuge Recreation Act as amended (16 U.S.C. 460k-460k-4)
- Fish and Wildlife Act of 1956, as amended [16 U.S.C. 742a-742j, not including 742l]

Refuge Purpose(s):
- "*... as a Refuge and breeding ground for migratory birds and other wildlife...*" (Executive Order 7681, dated July 30, 1937)
- "*... 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).
- "*... for the development, advancement, management, conservation, and protection of fish and wildlife resources* ... "(16 U.S.C. 742f(a)(4) ... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ... 16 U.S.C. 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System Mission: The mission of the National Wildlife Refuge System is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee])

Description of Use: The use involves public firewood salvage following Refuge forest management practices. The purpose of providing firewood to the public is to assist the Refuge in cleaning up non-commercially thinned ponderosa pine slash prior to running a prescribed fire through the stand. Removal of downed trees will reduce the fire intensity and improve the efficiency of the prescribed burn. Densely stocked ponderosa pine stands and heavy fuel loading within the Refuge creates a fire hazard. Forest management practices implemented under the Habitat Management Plan (USDI 1999) prescribe removal of excess fuels to re-establish historical pine densities that existed prior to the suppression of wildfire in this region.

Special Use Permits will be issued by the Refuge Manager within active forest management units where non-commercial thinning practices have been employed. Firewood permits for a minimum of two and a maximum of four cords of wood will be issued to the general public to salvage downed wood from Refuge thinning practices. Permits will be issued for specific project sites within one year of a thinning practice. Permittees will be assigned a specific period in which to collect the wood. Permittees will be allowed to drive their vehicles to the salvage site and cut up downed trees (with chainsaws or hand saws)

and remove the slash from the site. Only recently cut small diameter trees, the vast majority under 8" in diameter, will be allowed for firewood collection.

The firewood shall be used for personal use or charity and cannot be sold for profit. Firewood permits will usually be issued August through December. Permittees are allowed a minimum of two and a maximum of four cords at an administrative fee of $10/cord. Fees will be adjusted as administrative costs increase.

This use is not defined as a wildlife-dependent recreational use under the Improvement Act.

Use Within the Expansion Area: Chapter 2 of the CCP (US FWS 2006) identifies areas in which the Service would seek to acquire land from willing sellers outside of the current approved boundary [Refuge expansion area]. Some of these lands probably provide firewood collection, however there are no public firewood sites known at this time.

Availability of Resources:

One time expenses:	N/A
Recurring expenses:	
Administration & compliance inspection of Permits:	$1,000
TOTAL RECURRING EXPENSES:	$1,000
Offsetting revenues: (permit fees)	$ 600

Anticipated Impacts of the Use(s): Some wildlife disturbance would occur as a result of people accessing forested stands to collect firewood. Most of the environmental impacts will be incurred during the actual thinning operation and not the salvage of firewood. Firewood salvage by the general public will however cause temporary disturbance to wildlife in the area. Firewood collectors generally use chain saws, which will cause high decibel localized noise. See the discussion of anticipated impacts in the commercial timber harvest compatibility determination for expected kinds of disturbance impacts caused by chainsaw noise, especially temporary wildlife movement away from the cutting area.

Use will be seasonal, usually August-December. There may be some impact from any illegal off-road vehicle travel. With the use of chainsaws there is the chance of a spark causing a fire. Uncontrolled fire in any of the Refuge habitats can have catastrophic impacts. Therefore precautions will be taken to reduce any chance of fire in the firewood salvage areas (see stipulations).

Loss of large woody debris to the ecosystem is not anticipated to affect fish and wildlife habitats. Only small diameter material will be allowed for collection. Streams are rare at Turnbull. Wildlife species utilizing large wood generally prefer larger material than that which will be removed.

This use may impact threatened and endangered species, including Spalding's silene and bald eagle. Impact to the silene populations are expected to be minimal. Disturbance impacts to the bald eagle would be occur but would be of a temporary nature. See the Turnbull NWR Habitat Management Plan/Environmental Assessment (USDI 1999a) for further discussion of the effects of this use on threatened and endangered species.

Anticipated Impacts of the Use within the Expansion Area: If and when the Refuge acquires land within the expansion area, there could be opportunities for compatible firewood collecting. Due to the

similarity of species and habitats with current Refuge owned lands, this use would be anticipated to have impacts similar to those described for current Refuge owned lands. If the Refuge manager determines that those opportunities would substantially change the conditions under which this use was found compatible, or that there is new, substantive information regarding the effects of the use, this CD would need to be re-evaluated.

Public Review and Comment: Public review and comments were solicited in conjunction with release of the Draft CCP/EA (US FWS 2005) in order to comply with the National Environmental Policy Act and with Service policy. Appendix L of the CCP (US FWS 2006) contains a summary of the comments and Service Responses.

Determination :

____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

User stipulations:
- Firewood collecting will only occur under a Special Use Permit and in areas designated by the permit.
- Only downed trees and branches may be taken, size not to exceed 8" diameter. Standing trees, live or dead, will not be cut.
- There will be no off-road vehicle travel allowed.
- Chainsaws must have spark arresters and users must have a fire extinguisher available.
- No cutting will be allowed on high or extreme fire danger days. Firewood collectors are responsible for contacting Refuge Manager to determine the fire danger rating during each visit.

Administrative stipulations:
- Firewood collecting is to be used only to support Refuge forest management practices in the support of Refuge purposes, goals, or objectives and not for economic purposes.
- There will be an administrative fee charged for the SUP.
- Compliance inspections will be undertaken by the Service from time to time.

Justification: Firewood collecting contributes to the mission of the NWRS and the purposes of Turnbull NWR by reducing high-intensity fire danger that might damage habitats and kill wildlife. This use complements forest thinning and prescribed fire projects by removing slash. It is a tool to reduce hazardous fuel loading in forest management units as well as insect and disease or blow down areas of Refuge forests. It also results in less smoke being generated during prescribed burning activities and there is a community benefit to allowing public to collect firewood.

Mandatory Re-Evaluation Date (provide month and year for “allowed” uses only):

_____ Mandatory 15-year Re-Evaluation Date (for priority public uses)
__2016_ Mandatory 10-year Re-Evaluation Date (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

___ Categorical Exclusion without Environmental Action Statement
___ Categorical Exclusion and Environmental Action Statement

___ Categorical Exclusion and Environmental Action Statement
_X_ Environmental Assessment and Finding of No Significant Impact (USDA 1999a)
___ Environmental Impact Statement and Record of Decision

Literature Cited:

USDI Fish and Wildlife Service. 1999. Habitat Management Plan, Turnbull National Wildlife Refuge. Cheney, Washington.

USDI Fish and Wildlife Service. 1999a. Environmental Assessment for the Habitat Management Plan, Turnbull National Wildlife Refuge. Cheney, Washington.

U.S. Fish and Wildlife Service. 2005. Environmental Assessment for the Draft Refuge Comprehensive Conservation Plan, Turnbull National Wildlife Refuge.

U.S. Fish and Wildlife Service. 2006. Comprehensive Conservation Plan for Turnbull National Wildlife Refuge.

Signatures:

Nancy Flury — 3/9/07
Prepared by — Date

Nancy Flury — 3/9/07
Refuge Manager/Project Leader Approval — Date

Concurrence

Linda Watters — 3/21/07
Refuge Supervisor — Date

Carolyn L. Bohn — 3/22/07
Regional Chief, National Wildlife Refuge System — Date

APPENDIX F: IMPLEMENTATION

I. OVERVIEW

Implementation of the CCP will require increased funding, which will be sought from a variety of sources. This plan will depend on 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.

Many of the infrastructure and facility projects will be eligible for funding through construction or Transportation Equity Act (TEA-21) funds (i.e. Refuge Roads).

The Comprehensive Conservation Plan proposes several projects to be implemented over the next 15 years. All of these projects are included in the Refuge Management Information System (RONS-Refuge Operational Needs System or MMS- Maintenance Management System) which are used to request funding from Congress. Currently, a large backlog of maintenance needs exists on the Refuge. In 2002 the MMS backlog for Turnbull NWR was $5,850,000. An attempt at reducing this backlog needs to be addressed and is included here in the analysis of funding needs. The Refuge Operational Needs System (RONS) documents proposed new projects to implement the CCP to meet Refuge goals and objectives and legal mandates.

Annual revenue sharing payments to Spokane County will continue. If the Refuge expands through the purchase of inholdings (privately owned lands within the current approved boundary) or through an expanded refuge boundary, additional in lieu of tax payments will be made to the county. See Draft CCP/EA Chapter 4, section 4.3 for a summary of the economic effects (US FWS 2005). Total revenue sharing payments made to Spokane County in 2001 and 2002 were $52,107, and $53,185 respectively.

Revenues to the county will also increase in accord with any economic uses occurring on the Refuge, such as commercial thinning projects. Currently, commercially thinning 500 thousand board feet (mbf) of timber generates federal revenues of approximately $90,000-$120,000. Saw timber value at this time averages about $450/mbf. Permittees' costs run about $120-$130/mbf and rehabilitation costs currently run about $400/acre. The Refuge expects commercial thinning activity to last until 2008 or 2009.

Monitoring activities will be conducted on a percentage of all new and existing projects and activities to document wildlife populations and changes across time, habitat conditions and responses to management practices. Actual monitoring and evaluation procedures will be detailed in step-down management plans.

II. COSTS TO IMPLEMENT CCP

The following sections detail both one time and recurring costs for various projects. One time costs reflect the initial costs associated with a project, such as the purchase of equipment, contracting services, construction, purchase of land, etc. Recurring costs reflect the future operational and maintenance costs associated with the project.

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 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, grants, TEA3 funding, etc. Some projects also might require Fire Funds, land acquisition funds, or other special appropriations or grants.

Projects listed below in Table F-1 show one time costs, such as those associated with building and facility needs such as offices, public use facilities, road improvements, and new signs. One time costs are also associated with habitat restoration and protection projects such as specific forestry and wetland projects, research and land acquisition. New research projects, because of their short term nature, are considered one time projects, and include costs of contracting services or hiring a temporary for the short term project. Some project costs are displayed as ranges since there are many factors that will influence the number of acres managed per year, put under some kind of conservation agreement or purchased. Table F-1 below provides estimates of one time costs under the CCP. The table is divided into four parts (A, B, C, and D).

Table F-1, Part A. *One Time Costs (in thousands) for Research and Monitoring*

Project -Research & Monitoring	**Priority**	**Unit Cost**	**Total Cost**	**Potential Fund Source**
Prescribed Fire monitoring (equipment support)	H	$33K	$40	9263; RONS 98001R
Water quality monitoring (equipment support)	H	$5K	$40	RONS 00001R; Contaminants
Expand wildlife and habitat monitoring program (equipment support)	M	$22K	$44	RONS 97004R; 02006R, 00005R
Wetland Contour Mapping	M	$9K	$234	RONS 98004R; 00011R
Hydrology study of Stubblefield Lake	H	$110K	$110	RONS 00006R
Research (several needs including rail, redhead & tern nesting ecology, pest plant, overflight impacts, howellia, elk movements, invasive fish species)	H	$20K/ project	$40	RONS 98002R; 02010R; 02012R; 97005R; 02011R 02013R; 03010R; 03008R/grants
All Research and Monitoring Projects Subtotal (thousands)			**508**	
High Priority Research and Monitoring Only (thousands)			**230**	

Table F-1, Part B. *One Time Costs (in thousands) for Facilities*

Project - Facilities	**Priority**	**Unit Cost**	**Total Cost**	**Fund Source**
EE Classroom Addition w/ furnishings	M	$275/sf	1200 SF $430	1262 Deferred Maint. RONS 00003R
Office with visitor contact area & furnishings	H	$290/SF	$1,500 4500 sf	00006M; Construction RONS 00003R
Fire Facilities (office, crew room, fire cache and engine storage)	H	$150/SF	2000SF $300	Fire; 9251
EE Shelters	L	$20K ea	$60	RONS 03004R; In Kind Services
New Trails	M	$20K/mi	3.5 mi $70	Grants, RONS 03005R or TEA 3

Project - Facilities	Priority	Unit Cost	Total Cost	Fund Source
Bicycle Trails	M	$218K/mi	2.75mi 600	RONS 02002R Grants or TEA 3
Observation/Photo Blinds	H	$10K ea	$20	Grants; RONS 03006R
Interpretive Signs	H	$5K ea	$96	Grants; RONS 00008R; 00010R
Parking (Hunter Access) Construction	M	$16K ea	$48	Grants; RONS 03007R
Pullouts (County Hwys) with Observation Platforms	L	$62.5K ea	$250	RONS 02003R; Refuge Roads/ TEA 3
Refuge Video Production	L	$43K	$43	RONS 02005R
Public Use Support (includes costs associated with hunt plan, public safety, maintenance, and operations)	H	$40K	$40	RONS 02004R; 02001R; 00012R; 00007R; 97003R
All Facilities Subtotal (in thousands)			**$3,527**	
High Priority Facilities Subtotal (thousands)			**$1,956**	

Table F-1, Part C. *One Time Costs (in thousands) for Habitat Management.*
(The following projects include the assumption that some acres will be treated several times over the course of the 15 year CCP time frame.)

Project - Habitat	Priority	Unit Cost	Total Cost	Fund Source
Forest Management on Refuge over 15 years	H	$190/ac	8850 ac $1,681	9263; 9264; RONS 98008R
Wetland Restoration on- Refuge over 15 years	H	$200/ac	2725 ac $545	NAWCA; 97006R
Pest Plant Management over 15 years)	H	$250/ac	3,750 ac $937	RONS 00009R, 02007R, 98002R; Special Funds
Prescribed Fire over 15 years	H	$60/ac	17,100 ac $1026	9263 Project
Meadow Steppe Restoration	M	$40K	$80	RONS 03009R
Riparian Management.	H	$250/ acre	96 ac $24	RONS 02008R; NAWCA/ WRP; In Kind Services
Install Pieziometer Wells to monitor water rights	H	$5K/ea	$130	RONS 97007R
All Habitat Projects Subtotal (in thousands)			**4,423**	
High Priority Habitat only Subtotal (in thousands)			**4,343**	

Table F-1, Part D. *One Time Costs (in thousands) for Land Acquisition*

Land Acquisition (estimated available acres w/in 15 years)	H	$2K/ac	6800 ac $13,600	Land and Water Conservation Fund/ Migratory Bird Conservation Commission funds

A. 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 three years. Operational costs use base funding in Service fund codes 1260, 9251 and 9263.

Table F-2 displays projected operating costs under the CCP. The CCP reflects increased funding needs for proposed increases in public uses and facilities, new land acquisitions, increased habitat restoration and conservation activities, and new monitoring needs. This table includes such things as salary, operational expenditures such as travel, training, supplies, utilities and annual maintenance costs.
Table F-2 includes costs for permanent and seasonal staff needed year after year. It does not include staff costs associated with special projects; these are summarized in Table F-1.

Table F-2 is also related to the Refuge Comprehensive Accomplishment Report. The table includes funds that would be spent in fund codes 1121, 1261, 1262, 9251, 9263, and 6860. The table does not project costs other than operational (for example, costs of contracts for hazardous fuel or wildland urban interface projects are not included, though staff time administering these contracts is included).

Table F-2. *Operational (Recurring) Costs*

Project	Action	Resources Needed	Alt 3
1.a Surveys & Censuses	All methods of enumerating fish and wildlife populations, vegetative habitats, analysis, interpretation and reporting.	1260 - Biologist & Bio Techs and volunteers ½ Volunteer Coordinator	$125K
1.b Studies & Investigations	Research projects for managing fish and wildlife populations and habitats	1260 - Biologist & cooperators	$50K
2.a Wetland Restoration	The conversion of altered or degraded on-refuge wetland habitats, including riparian zones back to their original condition	1260, special project funds ½ Maintenance Worker	$52K
2.b Upland Restoration	The conversion of altered or degraded on-refuge upland habitats back to their original condition by such actions as replanting native species	1260 & special project funds	$6K
3.a Water Level Management	The manipulation of water bodies to affect vegetation and/or create desired wildlife conditions	1260	$28K
3.c Graze/ Mow/Hay	The management of grasslands and other habitats for the benefit of wildlife by any combination of grazing, mowing, and haying.	1260	$12K
3.e Forest Management	All mechanical forestry practices other than tree planting that are designed to alter forested habitat composition or succession to benefit wildlife. Selected thinning by staff or contractors.	1261,9251, 9263 & special project funds ½ FMO, ½ Eng Boss, 1/2 PS FF, ½ (3) Temp FF, 1/2 Crew leader & ½ (5) crew	$250K
3.f Fire Management	Prescribed burning and wildfire preparedness activities. Follow-up monitoring and reporting.	1261,9251, 9263 ½ FMO, Eng Boss, 1 PS FF, 3 Temp FF, 1 Crew lder, 5 crew, special project funds	$265

Project	Action	Resources Needed	Alt 3
3.h Invasive Plant Management	The eradication, reduction, or control of invasive or exotic plants. Includes monitoring.	1260, special project funds	$18K
4.a Bird Banding	Marking and banding of birds	1260, volunteers	$24K
4.d Nest Structures	The installation and maintenance of artificial nesting structures	1260, volunteers	$4K
4.e Native Pest Animal/Predator Control	The eradication, reduction or control of invasive or exotic animals (fish)	1260, volunteers	$2K
5.a Interagency Coordination	Interaction with other Federal, State and local governments to share information, resolve problems, develop cooperative efforts, and manage species & habitats	1260/9251	$36K
5.b Tribal Coordination	Activities associated with the development of cooperative agreements, MOU's annual funding agreements and similar cooperation/coordination/ communication efforts with tribes.	1260	$2K
5.c Private Land Activities	Efforts to assist private land owners with habitat improvement and wildlife issues. (Initiate Stewardship Mgt.)	1121,9264	$50K
6.a Law Enforcement	Public Safety, Resource Protection, Hunt Program	1260, ½ Refuge Officer (LE)	$55K
6.b Permits & Economic Use Management	Explaining, issuing, and monitoring special use permits	1260, 9263	$30K
6.c Contaminant Investigation	Investigation, studies, and monitoring. Baseline monitoring of air and water quality	1260, contaminant funding	$10K
6.e Water Rights Management	Activities associated with compliance with state and federal laws to protect and achieve adequate supplies of water. Reading, maintaining and installing measurement devices and gauging stations, preparing water mgt. Plans, also monitoring off-refuge water uses.	1260	$14K
6.f Cultural Resource Management	Supporting the study and protection of significant prehistoric and historic sites. Evaluation of cultural resources and management of museum property.	1260, 9251	$28K
6.g Land Acquisition Support	Staff participation in land acquisition activities, including development of acquisition proposals and appraisals, meetings, inventories and surveys.	1260	$50K
7.a Visitor Services	Providing access, facilities, and programs for refuge visitors. Planning, construction, operation and maintenance of visitor facilities such as roads, trails, signs. Interpretation, environmental education, hunting and other recreation.	1260, EE Specialist, ½ Volunteer Coordinator, ½ maintenance worker, temp Park Ranger (EE), ½ LE officer	$400K
7.b Outreach	Off-site education about Service activities thru pre-sentations, exhibits, news releases, radio/TV spots.	1260	$50
TOTALS	**Subtotal Annual Operational Costs (in thousands)**		**$1,561**
	Operational Costs over 15 years (in thousands)		$23,415

C. MAINTENANCE COSTS

The maintenance need over the next fifteen years (funds needed to repair or replace buildings, equipment and facilities) is summarized in Table F-3.

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.

Projected maintenance costs include the maintenance "backlog" - maintenance needs that have come due but are as yet unfunded - and also chart the increased maintenance need associated with new facilities and additional acquisitions.

D. STAFFING

Staff is needed to conserve and enhance the quality and diversity of indigenous wildlife habitats on the Turnbull NWR. With the proper staffing to implement this plan, habitat management practices can be implemented and monitoring of flora and fauna responses to management can be applied, which will allow us to apply adaptive management strategies so crucial for long term success in meeting the mission, goals and objectives of the Refuge.

Staff will interact with the public for education purposes and to provide for public safety. Maintenance staff will maintain facilities and equipment. Training of staff and coordination among staff, volunteers and partners will ensure the mission and guiding principles of the National Wildlife Refuge System endure.

The following proposed full development level staffing plan would achieve optimum refuge outputs within this planning period (15 years). The rate at which this station achieves its full potential to fulfill the objectives and strategies contained in the plan is totally dependent upon receiving adequate funding and staffing.

Table F-4 below shows the staffing levels needed to fully implement the CCP, and associated staffing costs. **Note that these costs are already included (project by project) in the recurring costs.** The table simply provides a picture of how the staff structure would look and provides an indication of what percent of the total recurring costs would be allocated towards staff.

Table F-3. *Maintenance Costs*

Maintenance Need	Action	Resources	Total Cost
Buildings	Maintain offices, EE classroom, maintenance. shop, storage buildings, restrooms, vault toilets, well houses, EE shelters, residences	1262, Maintenance Backlog	$1,500K
Facilities	Maintain roads, trails, signs, fencing, gates, wells, water control structures, and public use facilities	1262	$3,000K
Equipment	Maintain heavy Equip., vehicles, other equipment, office equipment	1262	$1,850K
Totals	**Buildings, Facilities & Equipment**	**1262**	**6,350K**

Table F-4. *Annual costs, including salary and benefits, associated w/ Staff Needs*

Staff - Refuge Operations		Staff position	Ann. Salary	Staffing Cost per year
Refuge Manager	PFT	GS-0485-12/13	$80,000	$80,000
Deputy Refuge Manager	PFT	GS-0485-11/12	$75,000	$75,000
Wildlife Biologist	PFT	GS-0486-11/12	$75,000	$75,000
Wildlife Biologist	PFT	GS-0486-7/9/11	$70,000	$70,000
Administrative Officer	PFT	GS-0341-09	$55,000	$55,000
Eng. Equipment Operator	PFT	WG-5716-10	$60,000	$60,000
Maintenance Worker	PFT	WG-4749-08	$50,000	$100,000
Superv. Park Ranger/Volunteer Coordinator	PFT	GS-025-09	$55,000	$55,000
Maintenance Worker	Temp (0.5)	WG-4749-06	$16,000	$16,000
Park Ranger (EE)	Temp (0.5)	GS-025-5/7	$16,000	$16,000
Biological Tech	Temp (0.5)	GS-0404-5/7	$16,000	$32,000
Refuge Operations Specialist	PFT	GS-0485-9/11	$70,000	$70,000
Purchasing Agent	PFT	GS-1105-5/7	$35,000	$35,000
Park Ranger/Refuge Officer (LE)	PFT	GS-025 -5/7/9	$48,000	$48,000
Environmental Educ. Specialist	PFT	GS-1001-7/9	$55,000	$55,000
Information & Education Specialist	Term	GS-1001-5/7	$35,000	$35,000
Totals			**$811,000**	**$877,003**

Staff - Fire Program		Staff position	Annual Salary	Staffing Cost per year
Fire Mgt. Officer	PFT	GS-0401-9/11	$70,000	$70,000
Supv. Forest Tech/Rx Fire Crew Leader	PFT	GS-0462-08	$55,000	$55,000
Lead Forest Tech/Rx Fire Crew Asst. Leader	PS (.85)	GS-0462-06	$40,000	$40,000
Supv. Forest Tech/Engine Boss (Fire)	PS (0.7)	GS-0462-08	$40,000	$40,000
Forest Tech/Firefighter	PS (0.7)	GS-0462-05	$26,000	$52,000
Forest Tech/Rx Fire Crew	PS (.85)	GS-0462-05	$30,000	$150,000
Forest Tech/Firefighter	Temp (0.5)	GS-0462-05	$13,700	$27,400
Forest Tech/Firefighter	Temp (0.33)	GS-0462-04	$8080	$8080
Forest Tech/Firefighter	Temp (0.33)	GS-0462-03	$7200	$7200
Totals			**$289,980**	**$449,683**

PFT: Permanent Full Time
PS: Permanent Seasonal
Temp: Temporary position
Term: Term position
GS: General Schedule Federal Employees
WG: Wage Grade Scale

E. PARTNERSHIP OPPORTUNITIES

The Refuge's location next to a large metropolitan area facilitates many opportunities for partnerships with other agencies, interest groups and schools. Coordinated partnership efforts will focus on habitat restoration, land protection, environmental education, fish and wildlife monitoring, outreach, and quality wildlife-dependent recreation. Current and past partners include local schools, and non-profit groups (such as The Audubon Society, Friends of Turnbull NWR, Inland Northwest Wildlife Council, Eastern Washington University, Washington State Parks and Recreation Commission, The Nature Conservancy, Spokane County Fire District 3 and many others). Future partners will include these groups as well as state and tribal agencies. Partnerships like these will increase our effectiveness, knowledge, and community support, as well as reduce Refuge operating costs.

In order for the Service to be effective in the Stewardship area around the Refuge we will strive to exchange information and provide technical assistance to neighboring landowners to promote protection of valuable wildlife habitat on neighboring properties. Volunteers will continue to assist with various Refuge programs, as detailed in Chapter 3 of the CCP, Section 3.11.

F. BUDGET SUMMARY

Table F-5 summarizes the data from the above tables and displays the overall **annual** funding need for Turnbull National Wildlife Refuge to implement the CCP in full.

Table F-5. *Summary of Refuge Annual Funding Need*

Budget Category	Cost
One Time expenditures - all projects (total costs over 15 years)	
Research and Monitoring	508,000
Facilities	3,527,000
Habitat Management	4,423,000
Land Acquisition	13,600,000
A. Subtotal One Time Expenditures - all	**22,058,000**
One time expenditures - high priority projects only (total costs over 15 years)	
Research and Monitoring	230,000
Facilities	1,956,000
Habitat Management	4,343,000
Land Acquisition	13,600,000
B. Subtotal One Time Expenditure high priority projects only	**20,129,000**
C. Recurring Costs - all projects / salaries	**23,415,000**
D. Maintenance Need (total over 15 years)	**6,350,000**
Total Annual Budgetary Need: High priority projects only = (B +C +D) / 15	**$ 3,326,267**
Total Annual Budgetary Need: All projects = (A +C +D) / 15	**$ 3,454,867**

Literature Cited

U.S. Fish and Wildlife Service. 2006. Comprehensive Conservation Plan for Turnbull National Wildlife Refuge.

APPENDIX G: STATEMENT OF COMPLIANCE

Comprehensive Conservation Plan
Turnbull National Wildlife Refuge,
Spokane County, Washington

The following executive orders and legislative acts have been reviewed as they apply to implementation of the Comprehensive Conservation Plan (CCP) for Turnbull National Wildlife Refuge, Spokane County, Washington.

- **National Environmental Policy Act (1969)**. The planning process has been conducted in accordance with National Environmental Policy Act Implementing Procedures, Department of Interior and Service procedures, and has been performed in coordination with the affected public. The requirements of the National Environmental Policy Act (42 U.S.C. §4321 et seq.) and its implementing regulations in 40 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 CCP management objectives and alternatives into the NEPA document and process. The Draft CCP and EA were released for a 45-day public comment period in June 2005. The affected public was notified of the availability of these documents through a Federal Register notice, news releases to local newspapers, the Service's refuge planning website, and a planning update. Copies of the Draft CCP/EA and/or planning updates were distributed to an extensive mailing list. In addition, the Service provided overviews of the Draft CCP/EA and received comments at two public open houses. The CCP was revised based on public comment received on the draft documents. Service responses to comments are contained in Appendix L of the CCP.

- **National Historic Preservation Act (1966)**. The management of archaeological and cultural resources of the Refuge will comply with the regulations of Section 106 of the National Historic Preservation Act. Four historic properties listed on the National Register of Historic Places and at least 60 other historic properties potentially eligible for listing on the National Register of Historic Places have been identified on Turnbull Refuge. No historic properties are known to be affected by the proposed action based on the criteria of an effect or adverse effect as an undertaking defined in 36CFR800.9 and Service Manual 614FW2, however, determining whether a particular action has a potential to affect cultural resources is an ongoing process that occurs as step-down and site-specific project plans are developed. Should historic properties be identified or acquired in the future, the Service will comply with the National Historic Preservation Act if any management actions have the potential to affect any these properties.

- **Endangered Species Act.** 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 Act requires consultation before initiating projects which affect or may affect endangered species; consultation on specific projects was completed on August 25, 2006. Under the consultation, the Ecological Services Office determined that the proposed action under the CCP is not likely to adversely effect any of the listed species found within the project area (water howellia, Ute ladies'-tresses, Spalding's silene, bald eagle or any of the species of concern.

- **National Wildlife Administration Act of 1966, as amended by The National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd-668ee).** The National Wildlife Refuge System Improvement Act (Public Law 105-57, Improvement Act) requires the Service to develop and implement a comprehensive conservation plan for each refuge. The CCP identifies and describes Refuge purposes; Refuge visions 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 Act.

  Compatibility determinations have been prepared for the following uses: waterfowl hunting, elk hunting, environmental education and interpretation; wildlife observation and photography; jogging, bicycling and cross-country skiing; research, agricultural practices, commercial tree harvest, and firewood collecting. All of these uses were found to be compatible with Refuge purposes and the System mission with stipulations specified in each of the compatibility determinations.

- **Wilderness Act.** The Service has evaluated the suitability of the Refuge for wilderness designation (Appendix H) and has found there are no areas that are suitable for wilderness designation.

- **Executive Order 11988. Floodplain Management.** Under this order Federal agencies "shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains." The CCP is consistent with Executive Order 11988 because CCP implementation would protect floodplains from adverse impacts as a result of modification or destruction.

- **Executive Order 11990. Protection of Wetlands.** The CCP is consistent with Executive Order 11990 because CCP implementation would potentially enhance and restore wetland resources on the refuge.

- **Executive Order 12372. Intergovernmental Review.** Coordination and consultation with affected Tribal, local and State governments, other Federal agencies, and local landowners has been completed through personal contact by Service Planners, Refuge staff, and Refuge Supervisors.

- **Executive Order 12898. Federal Actions to Address Environmental Justice in Minority and Low-Income Populations.** All Federal actions must address and identify, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations, low-income populations, and Indian Tribes in the United States. The CCP was evaluated and no adverse human health or environmental effects were identified for minority or low-income populations, Indian Tribes, or anyone else.

- **Executive Order 13186. Responsibilities of Federal Agencies to Protect Migratory Birds.** This Order directs 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 Fish and Wildlife Service's list of Birds of Conservation (Management) 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 (PIF) into agency planning. The effects of all alternatives to Refuge habitats used by migratory birds were assessed within the CCP and EA.

signed by Ben Harrison	March 30, 2007
Chief, Branch of Refuge Planning	Date

APPENDIX H: WILDERNESS REVIEW

H.1 INTRODUCTION

H.1.1. POLICY AND DIRECTION

U.S. Fish and Wildlife Service policy (Sec 602, also Sec 610 of Refuge Manual) requires wilderness reviews to be completed as part of the Comprehensive Conservation Planning process. When a Refuge is in the process of acquisition planning, (adding to an existing refuge), a preliminary inventory of wilderness resources of the proposed unit(s) is also required to be completed.

A wilderness review is the process we use to determine whether or not we should recommend NWRS lands and waters to Congress for wilderness designation. The wilderness review process consists of three phases: inventory, study, and recommendation. The inventory is a broad look at the Refuge and acquisition lands to identify lands and waters that meet the minimum criteria for wilderness. All areas meeting the criteria are classified as wilderness study areas (WSAs). If WSAs are identified, the review moves on to the study phase.

During the study phase, WSAs are further analyzed for all values (ecological, recreational, cultural), resources (wildlife, water, vegetation, minerals, soils), and uses (management and public) within the Wilderness Study Area. The findings of the study determine whether or not the WSAs merit recommendation from the Service to the Secretary for inclusion in the Wilderness System.

If it is determined during the inventory that no areas qualify as WSAs or if we conclude from the study that we should not recommend any areas as wilderness, we prepare a brief report that documents the unsuitability of the lands and waters for wilderness study or recommendation. The report is submitted to the Director of the Fish and Wildlife Service.

B. Previous Wilderness Review at Turnbull

In 1973, a wilderness study review was conducted for the Turnbull NWR, which at that time measured 17, 171 acres (including leased areas). The study was completed with substantial public involvement (the mailing list numbered in the hundreds with officials and individuals represented in most of the fifty states) and a public hearing were conducted to review the results of the study. The study recommended that no portion of the Refuge be then recommended for wilderness designation.

H.2 WILDERNESS INVENTORY

H.2.1 CRITERIA FOR LANDS TO BE IDENTIFIED AS FOR POTENTIAL INCLUSION IN THE NATIONAL WILDERNESS PRESERVATION SYSTEM

The Wilderness Act of 1964 (Public Law 88-577; Section 2(c)) 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 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..."

Criteria for identifying areas as wilderness are described further on in Section 2(c) of the Act, and are elaborated upon in draft Service wilderness management policy. As quoted from the draft Service policy, the area must:

a. Be affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable.
b. Have outstanding opportunities for solitude or a primitive and unconfined type of recreation.
c. Have at least 5,000 contiguous acres (2,000 ha) or be sufficient in size as to make practicable its preservation and use in an unimpaired condition, or we could restore the wilderness character through appropriate management, at the time of review.
d. Not substantially exhibit the effects of logging, farming, grazing, or other extensive development or alteration of the landscape, or we could restore the wilderness character through appropriate management, at the time of review.
e. Be a roadless island.

H.2.2 LANDS CONSIDERED UNDER THIS WILDERNESS REVIEW

All Refuge-owned lands within the Turnbull NWR current approved boundary were considered during the inventory of wilderness areas. In addition, we also considered all lands within the Study Area - an area of some 45,000 additional acres surrounding the Refuge that was studied for additional land protection measures. Refuge expansion. This is consistent with current policy.

H2.3 STATUS, CONDITION, AND USE OF LANDS CONSIDERED

Habitats and Biological Resources

Chapter 3 of the CCP provides a detailed description of the key habitats and biota found on the Refuge. In general, there are four major habitat types: coniferous forest, aspen/riparian forest, grassland steppe, and wetlands. The juxtaposition of these four types in close proximity creates conditions for exceptional biodiversity on the Refuge.

Although detailed surveys of habitats and biota have not been completed for lands located within the Study Area, an analysis of aerial photos, U.S. Geological Survey maps, and National Wetland Inventory data provide compelling evidence that the habitats and their condition are similar to those found on the Refuge. We believe that many of the same species found at the Refuge inhabit the Study Area.

Land Management Practices

History*:* The Channeled Scablands ecosystem was inhabited by the Spokan people. The area is thought to have had largely transient, seasonal use for hunting and plant processing (see Cultural Resources section in Chapter 3 for more detail). European-American settlement began in the 1870s; and approximately 60 homesteads were established on the area that the Refuge now occupies. The early settlement years were a period of dramatic modifications in the Channeled Scablands ecosystem, including the area now designated as Refuge. Early settlers exploited the forests, logging the majority of the native large ponderosa pine. Upland soils were rocky, thin, and generally unsuitable for agriculture, so early settlers determined to utilize the bottomlands for farming. To facilitate these efforts, an extensive ditch drainage network was dug throughout the area, and the majority of the area's lakes and wetlands

were drained by the 1930s. Early settlers tried to grow hay and grain in the bottomland soils, but met with recurring problems. The drained bottomlands proved less hospitable for agriculture than settlers had hoped, and they generally abandoned cropping in favor of hay production and grazing on the former wetlands. Grazing also occurred on the adjacent uplands.

Other changes accompanied these settlement-induced modifications. Fire, a key natural disturbance, was for the most part suppressed. Exotic species were introduced both intentionally and accidentally.

It was not until 1937 that the Refuge was established as a wildlife Refuge and much of the current Refuge remained in private land ownership for many subsequent years until monies were available to acquire the land.

Current and historical practices in Study Area: The stage for a more industrial, extractive type of human development was set over a hundred years ago, and extractive management still drives most private land use within the study area. Though the Study Area possesses a rural, natural feel and appearance compared to an urbanized area, it is rife with evidence of human-induced changes to the natural ecosystem and landscape. These changes are a direct result of land management practices and settlement. Where forested stands exist, they show the effects of long-ago logging primarily by the size and spacing of the regenerated forest. Few large old trees are left. In some parts of the Study Area, logging of second growth timber has taken place as well.

The grassland/steppe areas are managed primarily as cattle ranches. Livestock grazing on the local steppe vegetation spurs a number of vegetative and soil changes that are evident within the Study Area. Undisturbed steppe areas are characterized by a cryptogramic soil crust comprised of numerous moss and lichen species. These small inconspicuous crust-associated species are thought to play a critical role in nutrient cycling, germination, and survival of native plant species. Unfortunately this crust is very fragile and susceptible to loss through trampling, frequent fire, and excessive accumulation of litter. Grazing has caused soil disturbance, degradation of these crusts and initiated conditions ripe for the introduction and establishment of non-native grasses and forbs. In addition, fences dissect portions of the study area.

Former wetlands have not been restored, and for the most part, spring snowmelt and precipitation runs off through the regional drainage system, rather than remaining in the wetland basins. Of the approximately 8,028 acres of wetlands within the Study Area, 60 percent are drained annually. The drained wetlands continue to serve as summer foraging areas for cattle.

Historical practices on the Refuge: After Refuge establishment in 1937 by Executive Order, the primary focus of habitat management was waterfowl. Early managers focused on restoring wetlands that had been drained and grew grain crops for migratory waterfowl. In later years, management emphasis moved from restoration to enhancement, the goal always being to produce or maintain as many waterfowl as possible. Enhancement involved creating additional semi-permanent wetland habitat for breeding diving ducks, especially redheads. Spoil removed when deepening the marshes was used to create numerous nesting islands for upland nesting ducks. Habitat manipulation for redheads involved deepening seasonal and temporary marshes and increasing the interspersion of open water to emergent vegetation with heavy equipment. Although the Refuge wetlands now present a largely natural appearance, the largest are in fact highly managed with the use of water control structures. In addition, the domination of reed canarygrass in the meadows is not natural, but few recognize this type of disturbance.

The uplands were also a focus of management, but here the management emphasis was more focused on direct human benefit. Until fairly recently, the Refuge itself was managed for a variety of extractive uses, including grazing, haying, trapping, and timber extraction, continuing the pattern of extraction and

development initiated by the early settlers. Some of these practices were directed at improving wildlife habitat but others were undertaken primarily for maintaining goodwill with the local community and provision of economic benefits.

After the Refuge was established in 1937, grazing was stopped for a five-year rest period. In 1943, grazing was again permitted, but it was controlled. Subsequently, grazing was retired from the public use portion of the Refuge, including both the Stubblefield Lake grazing unit and the auto tour route area, adjacent to the headquarters area. Available records indicate that the amount of forage removed ranged from 611 to 4,098 AUMs each season. In 1993, grazing as an economic use was deemed incompatible with the purposes of the Refuge and discontinued as a program on the Refuge. Consequent to developing a habitat management plan, prescription grazing as a specific management tool was determined compatible. The effects of overgrazing prior to Refuge establishment, is still reflected by the presence of cheatgrass which invaded the overgrazed uplands.

Haying by local farmers and ranchers was continued after the Refuge was established. Over 300 tons of hay were removed annually from 8 units, totaling 250 acres throughout the Refuge. Most hay was cut on the wet canary grass meadows, with some harvest of alfalfa in conjunction with the food plot rotations. All operations were conducted under terms of a Refuge permit. Haying was gradually discontinued in later years and most of the older hay units were turned over to cattle for grazing. By 1972, less than 50 tons of hay was harvested from one 30-acre wet meadow, and two alfalfa plots totaling 40 acres.

After time, the Public Use Area was defined. This 2,200-acre area serves as the primary locus for visitor access to the Refuge. The rest of the Refuge (with the exception of the section of the Columbia Plateau Trail that traverses the Refuge) is officially closed to visitor use, although occasional supervised tours are allowed. The Refuge has maintained the greater portion of its lands closed in order to protect wildlife from disturbance and to protect habitats from recreation-induced modification.

Existing Developments

Roads/Railways: Map 2 (see Chapter 1) shows the distribution of roads and railway beds on the Refuge and within the Study Area. One rail bed (recently converted into the cross-state Columbia Plateau Trail) crosses the Refuge and the Cheney-Plaza County Highway blacktopped highway bisects the Refuge from north to south. Two more railroads and a 4-lane "expressway" are nearby. The blacktopped Mullinix Road and Cheney-Spangle Highway form portions of the west and east Refuge boundary. The Refuge currently contains approximately 56 miles of dirt roads, 7 miles of gravel roads, and 5.8 miles of the black-topped Cheney-Plaza County Highway within its interior. This roading level translates into an average density of 1.9 miles/mile^2 dirt or gravel roads over the 20,640 acres within the approved boundary.

Eighty-five percent of the current Refuge is within one mile of a main, publicly accessible blacktopped road. Only about 200 acres are more than 1.5 miles from a main road. The largest unroaded area within the Refuge measures 2061 acres, next largest is 1,498 acres and next largest is 1325 acres.

Roads criss-cross the Study Area at varying densities. Road densities are highest in the northeast section of the Study Area, where the lots are smallest and a higher density of houses is found.

Drainage Network, Dikes, and Water Control Structures: As part of the Channeled Scablands ecosystem, Turnbull NWR occupies a portion of the landscape rich in natural wetlands, lakes and potholes. As previously discussed, these features were not uniformly valued by early settlers. They attempted to drain the lakes and marshes in order to provide some land suitable for agricultural development, the dry, rocky

uplands proving too difficult to farm. Early settlers formed a drainage district, constructing numerous ditches which connected the previously separate lakes and wetlands, and between 1910 and 1912, all of the lakes on the area now encompassed by the Refuge (except Stubblefield Lake) were drained. Most of the large lakes and wetlands located within the Study Area were also drained at this time.

In 1937, the Turnbull National Wildlife Refuge was established and restoration of the natural wetland habitats was begun. This was accomplished by building dikes and water control structures at lake outlets. There are now 17 low dikes varying from 40-800 feet in width across the Refuge. There are also 22 water control structures used to manage water depth and distribution amongst the now connected wetlands and lakes. There are few known water control structures within the Study Area. The wetlands there generally continue to be drained annually through the ditch network.

Drains and ditches for four separate drainage networks traverse the network. The four main networks, or subwatersheds are Company, Philleo, Kaegle, and Phillips. Map 7 (see Chapter 3) shows the location of ditches and the outlines of the four main drainage "watersheds" or networks that extend from the surrounding area into the Refuge.

Some of the drainage ditches along with ditch plugs and low dikes installed for restoration have grown over through the years, blending well into the natural landscape. Others have not. Five lakes in the Pine Creek Drainage are entirely man-made. Old C.C.C. water control structures and dams are quite obvious since most are along the main routes of travel.

Fire trails, fire breaks*:* The interior road network serves as the backbone of fire breaks, as well as providing quick and efficient access for fire suppression activities. At one time, the Refuge maintained a peripheral fire break (surrounding the Refuge), but this has not been maintained in fifteen years. The road network within the Study Area also serves as the main fire break there.

Buildings, other developments: On the Refuge, existing facilities have been developed over a long period beginning in the late 1930s. The Refuge headquarters covers approximately 30 acres adjacent to Pine Creek. Buildings at headquarters include two residences, office, shop-service building, two equipment and supply storage pole barns, two vehicle storage buildings, comfort station, environmental education classroom, and well house. Other public use facilities, all in the area adjacent to headquarters, include a five-mile, unpaved public auto trail, a wheelchair accessible boardwalk, and a small picnic area. In the 1970s, a laboratory owned and maintained by Eastern Washington University was constructed on Refuge lands. Other buildings on the Refuge include those a residence on the former Helms tract (property purchased by the Refuge in 1987) and a house, garage, barn and equipment shed located on the former Goodwin tract.

Within the Study Area, houses are scattered unevenly about. The northeast portion of the Study Area has the highest density of homes, barns, wells, and other structures.

Current and Future Management of Refuge Lands and Expansion Area under the CCP

On the Refuge, habitat management was reviewed in depth between 1994-1999, culminating in the publication of two plans, a Habitat Management Plan (HMP) and a Fire Management Plan (FMP). The CCP incorporates these plans (as written) for the Refuge and would extend similar management philosophies, objectives, and practices to any future acquired lands. Under the vision, goals and objectives articulated in the 1999 Habitat Management Plan and the 2000 Fire Management Plan, numerous active management practices will be undertaken over the next fifteen years. These management practices include, but are not limited to:

- Continued use of water control structures at 22 Refuge lakes to regulate water depth and acreage for managing wetland habitats for waterfowl, wading birds, and other wetland-dependent fauna
- Removal of 427 artificial islands and berms that do not serve as secure nesting islands. This work will be accomplished with heavy equipment at the rate of three small wetlands or 1 large wetland per year.
- Backfill and recontouring of unnecessary drainage ditches
- Potential compaction of wetland basin at Stubblefield Lake to remedy water retention problems.
- Experimental treatments at four large wetland basins. to eliminate reed canary grass, including deep flooding, prescribed fire, high intensity short duration grazing, herbicides, discing and seeding.
- Silvicultural treatments involving cutting of trees less than 8 inches DBH on at least 100 acres annually. In addition, single tree selection harvest will occur on 400 acres/year for removal of 60% of the trees between 8-24 inches. Mechanized harvesting is envisioned for much of the work, topography, access, and soil types proving suitable.
- Removal of the large wood to market and removal of small wood for market and/or to piles for burning.
- Complete removal of ponderosa pine from aspen stands
- Planting of native trees and shrubs in selected riparian areas.
- Prescribed burning, in forested areas with the intent of reducing fuel hazard, in aspen areas with the intent of regenerating decadent aspen, and in selected experimental plots in steppe habitats with the intent of increasing vigor of native perennial grasses and suppressing cheatgrass seed production.
- Noxious weed control, involving roadside mowing, manual pulling, discing and reseeding, release of biological control agents, and use of herbicides.

As apparent from the list above, the management activities to be undertaken will, as a group, involve a great deal of mechanized and in some cases, heavy equipment, over a substantial period of time into the future. In addition, chemical substances will be actively used for certain kinds of management (fire ignitions, some weed treatment) throughout the Refuge. Although no place on the Refuge is very far from a road, typical efficiencies that were assumed throughout the development of both the Habitat Management Plan and the Fire Management Plan included use of vehicles and maintenance of a network of management access roads.

H.3 CONCLUSIONS

H.3.1 AREAS MEETING THE "FORCES OF NATURE" CRITERION.

Which portions of the Refuge or the Study Area are "affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable"?

As described above, changes wrought by man are noticeable and pervasive throughout the Refuge and Study Area. The signs of these changes include the past changes in forest structure and ongoing management of the forest areas, the existence of a widespread road network, the existence of numerous dikes, ditches and water control structures, the regular presences of houses, barns, wells, and other structures, and weedy dominance of cheatgrass and reed canary grass in many of the grassland and marsh habitats. Even the areas of the Refuge most "natural" in appearance are closely managed for desired forest stocking levels, water distribution and to protect against unwanted forest fire.

In conclusion, there are no areas within the Refuge or Study Area that meet this criterion.

H.3.2 AREAS MEETING THE "OUTSTANDING OPPORTUNITIES FOR SOLITUDE" CRITERION

Which portions of the Refuge or the Study area "have outstanding opportunities for solitude or a primitive and unconfined type of recreation"?

As discussed above, most of the Refuge and the Study area is in close proximity to a main road, and permitted public use on the Refuge is confined to the 2,200 acre Public Use area and the Columbia Plateau Trail. The topography, being generally flat, permits long sight distances in unforested areas of the Refuge and the sounds of trains from the nearby railbeds, airplanes, and auto traffic from the three county roads flanking and crossing the Refuge permeate many parts of the Refuge. In addition, with the proximity of Spokane International Airport, Geyer Field, and Fairchild Air Force Base, air traffic over the Refuge and Study Area is extensive. Rarely passes an hour without sight or sound of commercial or military overflights. Cattle can also be heard near the perimeters of the Refuge.

While solitude could be found on certain days and in certain places within the Refuge, it would be a stretch to classify the solitude as "outstanding" or the recreational experience as "primitive and unconfined." Too many human established boundaries and noises limit the potential for a "primitive and unconfined" recreational experience.

There are no areas within the existing boundary of the Refuge or within the Study Area that can be said to meet the criterion. The only way to change this would be a) to eliminate public county roads; and/or b) to dramatically expand the size of the area permitted for public access. Option (a) is infeasible and impractical at this time and option (b) would have potential to undermine the Refuge's ability to meet its purpose.

H.3.4 AREAS MEETING THE 5000-ACRE SIZE OR "SUFFICIENT" SIZE CRITERION

Which portions of the Refuge or the Study Area "have at least 5,000 contiguous acres (2,000 ha) or be sufficient in size as to make practicable its preservation and use in an unimpaired condition, or we could restore the wilderness character through appropriate management, at the time of review?"

Refuge owned lands total 15,859 acres at this time. Under the CCP, the Refuge will expand its boundary and likely acquire further lands from willing sellers. However, until the lands within the expanded area are acquired from willing sellers, they will remain under private ownership and control. Hence, they are considered separately from current Refuge-owned lands in this analysis. The largest area free from roads on the current Refuge totals 2,061 acres. The largest areas free from roads within the Study Area totals 2,650 acres (northwest corner) and another patch in the southwest corner measures 2169 (SW corner) acres. Other roadless patches are smaller.

There are no areas on the Refuge measuring at least 5000 contiguous acres that are not crossed by roads. It is possible to eradicate many of these roads, since they are Refuge owned, native surface, and maintained for management access only. However, doing so would compromise the ability of the Refuge to meet its objectives stated under the Habitat Management Plan and Fire Management Plan. The roads are a critical part of the fire break system. Wildfire containment is an important objective of the Fire Management Plan. Prescribed fire is a critical tool to be used in restoration of the forest landscape on the Refuge and is consistent with national policy encouraging reintroduction of fire in highly fire-dependent ecosystems. Without the native surface road network, the ability of the Refuge to safely and successfully utilize prescribed fire and to fight wildfire would be jeopardized.

Within the Study Area, the potential roadless areas are larger, but none meet the 5000-acre size criterion. Jurisdiction over road management within the Study Area is currently a mix of county and private. These jurisdictional issues would make the elimination of roads within the Study Area more problematic. In addition, all lands acquired in the Study Area would require a certain amount of restoration work, which could extend over many years. This restoration work is similar to the kinds of restoration that will occur on the Refuge over the next fifteen years - i.e. forest thinning, wetlands restoration, fire treatments, etc.

Whether scattered 2,000 acre parcels are "sufficient in size" to preserve or restore a wilderness character within this landscape is a judgment call. At this time, we do not believe that they would represent high quality additions to the wilderness system, based on the configuration of these parcels, the surrounding land uses and the restoration needs that will be ongoing over at least fifteen years.

Finally, acquisition of parcels within the Study Area will occur in a fashion that is not completely under Service control. Given this, it is premature at this time to endorse wilderness designation on any part of the Study Area.

H.3.4 AREAS MEETING THE "WILDERNESS CHARACTER" CRITERION

Which portions of the Refuge or the Study Area do "not substantially exhibit the effects of logging, farming, grazing, or other extensive development or alteration of the landscape, or we could restore the wilderness character through appropriate management, at the time of review?"

As discussed above, most of the areas within the Study Area clearly exhibit the effects of logging, farming, grazing, and settlement. These practices have been ongoing since settlement began and continue today.

On the Refuge, where grazing and farming have been phased out, and most early homesteads removed or lost to time, the signs of human development are not necessarily substantial to the untrained eye. Restoration has been a key goal of Refuge management practice since establishment and will continue to be an integral component of Refuge management. However, restoration under the Habitat Management and Fire Management Plans is not geared towards "wilderness character" *per se*, but rather toward achieving the purposes of the Refuge. As discussed in Chapter 1 of the CCP, the purposes emphasize refugia and breeding grounds for migratory birds, incidental fish and wildlife recreation, protection and management of fish and wildlife and other natural resources, and conservation of endangered and threatened species.

A key question becomes, then, can the Refuge effectively achieve these purposes without the use of permanent structures, mechanized tools and motorized access? Ironically, restoration often involves the very tools (water management, tree cutting) that created an altered landscape in the first place. A reasoned answer is that uplands habitat and fire management could probably be achieved, but it would be severely compromised in efficiency and cost without the ability to use mechanized tools and motorized access. Moreover, risks of uncontrolled fire would be higher. In this area, where the wildland/urban interface is quite evident, to risk wildfire would be imprudent, to say the least.

The network of wetland habitats is particularly dependent on maintenance of water control structures and the associated drainage network. Loss of the ability to use permanent artificial structures would essentially destroy the wetlands complex, and these habitats are critical to migratory birds. Water control structures could be removed and replaced with permanent dikes or plugs but the ability to control flooding or move water would be lost. Moreover, the Refuge could not single-handedly eradicate the drainage network that criss-crosses the Refuge, because upstream property owners will continue to drain

their wetlands to keep the bottomlands clear for summer cattle grazing. Were the Refuge to fill all of the drainage ditches and replace control structures along the networks with permanent plugs, the runoff from property owners upstream would literally have no place to go and would wreak havoc on the landscape, spilling over onto uplands and causing untold erosion.

Given this, achieving the purposes of the Refuge is generally incompatible with restoring it to wilderness character.

H.3.5 AREAS MEETING THE "ROADLESS ISLAND" CRITERION.

Which portions of the Refuge or the Study Area are "roadless islands?"

A variety of natural islands, man-made islands, ephemeral islands and islands exist in Refuge impoundments. Only one, a rocky island in Kepple Lake, can be considered a bona-fide natural and permanent island of any significance. It is less than a half acre in size. All other "natural" islands are little more than small rocks jutting above the water or small patches of emergent vegetation which exist as islands only during a particular phase of manipulated water levels. Most of the other "islands" on the Refuge are of artificial origin and are slated for removal under the objectives and strategies outlined in the Habitat Management Plan.

While the rocky island in Kepple Lake is undeveloped and roadless, it is not of sufficient size or significance to merit wilderness classification on its own.

There are no known islands in the Study Area.

H.3.6 SUMMARY

There are no locations on the Refuge or in the Study Area that meet all of the above criteria for wilderness designation, or even most of the criteria. Some areas could perhaps be judged to passably meet the "sufficient size" or "wilderness character" criteria, but no areas stand out as exceptionally suited to wilderness designation.

Moreover, given the area's history of landscape modification, restoration needs, and the Refuge's continuing links to the regional drainage network, restoration of the area's "wilderness character" is not clearly compatible with achievement of the Refuge's purposes.

It is therefore concluded that there are no areas on Turnbull National Wildlife Refuge or within the Study Area are that can be recommended as suitable for further consideration as wilderness.

APPENDIX I: REFERENCES

CHAPTER 1

Altman, B. and A. Holmes. 2000. Conservation strategy for landbirds in the Columbia Plateau of Eastern Oregon and Washington. Version 1.0. Oregon-Washington Partners in Flight, 97 pp.

Cassidy, K.M., C.E. Grue, M.R. Smith, and K.M. Dvornich, eds. 1997a. Washington State Gap Analysis - Final Report. Washington Cooperative Fish and Wildlife Research Unit, University of Washington, Seattle, Volumes 1-5.

Cassidy, K.M., M.R. Smith, C.E. Grue, and R.E. Johnson. 1997b. The role of Washington State's National Wildlife Refuges in conserving the State's biodiversity. Washington Cooperative Fish and Wildlife Research Unit, University of Washington, Seattle, 86 pp.

EDAW. 1999. Draft Friends of Turnbull NWR Visitor Survey Results. Prepared for Turnbull NWR. Cheney, Washington.

IAC. 1995. Washington Outdoors: Assessment and Policy Plan (1995-2001). An Element of Washington's Statewide Comprehensive Outdoor Recreation Planning (SCORP) Program. Tumwater, Washington.

IAC. 2002a. An Assessment of Outdoor Recreation in Washington State, A State comprehensive Outdoor Recreation Planning (SCORP) Document 2002-2007.

Intermountain West Joint Venture. 1998. Channeled Scablands Focus Area Implementation Plan, Final Draft. Washington State Steering Committee.

Ivey, G.L. and C.P. Herziger. January, 2003. Draft Intermountain West Waterbird Conservation Plan.

Meyers, Woody. 1998. Compilation of 1997 elk survey and population estimates. Unpublished report, Washington Department of Fish and Wildlife, 5pp.

Quigley, T.M, RW Haynes, and RT Graham, tech. eds. 1996. Integrated scientific assessment for ecosystem management in the interior Columbia Basin and portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-382. USDA, Forest Service, Pacific Northwest Research Station, Portland, Oregon, 303 pp.

Shelly, J.S. and J. Gamon. 1996. Howellia aquatilis (water howellia) Recovery Plan. unpublished draft recovery plan for the U.S. Fish and Wildlife Service. vi, +52pp.

Soper, C. 1999. Columbia Plateau Ecoregional Plan. Unpublished draft. The Nature Conservancy. Seattle, Washington.

Spokane County, 2001. Spokane County Comprehensive Plan. Public Works Department, Division of Planning. Spokane County, Spokane, Washington.

Stevenson, Matthew R. 1998. Protecting biodiversity: Applying GAP analysis in Spokane County, Washington. M.S. Thesis, Department of Urban Planning, University of Washington, Seattle.

University of Washington. 1998. Wildlife corridors and landscape linkages: An approach to biodiversity planning for Spokane County, Washington. 508 Interdisciplinary Studio Class, Department of Urban Design and Planning, University of Washington, Seattle.

U.S. Congress. 1997. Public Law 105-57 (Oct. 9, 1997): National Wildlife Refuge System Improvement Act of 1997. Washington D.C.

U.S. Federal Register. 2001. (Jan 16, 2001) Draft National Wildlife Refuge System Goals.

US Fish and Wildlife Service. 2002. Birds of conservation concern 2002. Division of Migratory Bird Management, Arlington, Virginia. 99 pp [Online version available at http://migratorybirds.fws.gov/reports/bcc2002.pdf]

USDI Fish and Wildlife Service. 2001. Fire Management Plan, Turnbull National Wildlife Refuge. Cheney, Washington.

USDI Fish and Wildlife Service. 1999. Habitat Management Plan, Turnbull National Wildlife Refuge. Cheney, Washington.

Wisdom M. J., R. S. Holthausen, B. C. Wales, C. D. Hargis, V. A. Saab, D. C. Lee, W. J. Hann, T. D. Rich, M. M. Rowland, W. J. Murphy, and M. R. Eames. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia Basin: Broad-scale trends and management implications. PNW GTR-485, USDA Forest Service, Pacific Northwest Research Station, Portland, Oregon, Volumes 1-3.

CHAPTER 2

Albrecht, Nathan. 2003. Effects of ungulate herbivory on aspen (Populus tremuloides) on Turnbull National Wildlife Refuge, Washington, USA. M.S. Thesis. Eastern Washington University, Cheney.

Bates, P.C., C.R. Blinn, and A.A. Alm. 1991. Regenerating quaking aspen: management recommendations. 1991. University of Minnesota Extension Publication FO-05637, St. Paul Minnestoa. http://www.extension.umn.edu/distribution/naturalresources/DD5637.html

Campbell, Jr., R.B. and D.L. Bartos. 2001. Aspen ecosystems: Objectives for sustaining biodiversity. Pp 299-307. In: Shepperd, W. D., D. Binkley, D. L. Bartos, T. J. Stohlgren, and L. G. Eskew (compilers). 2001. Sustaining aspen in western landscapes: symposium proceedings. Proceedings RMRS-P-18 Rocky Mountain Research Station, U.S. Department of Agriculture, Forest Service, Fort Collins, Colorado. 460pp

Cassidy, K.M., C.E. Grue, M.R. Smith, and K.M. Dvornich, eds. 1997a. Washington State Gap Analysis - Final Report. Washington Cooperative Fish and Wildlife Research Unit, University of Washington, Seattle, Volumes 1-5.

Debyle, N.V. 1985. Water and watershed. pp 153-167. In: Debyle, N.V. and R.P. Winokur (eds.). Aspen: Ecology and management in the western United States. USDA Forest Service General Technical Report RM-119. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, 283 pp.

Hann, Wendel J; J.L. Jones, M.G. Karl, [and others]. 1997. Landscape dynamics of the basin. Pages 337-1055 *in* Quigley, Thomas M. and S.J. Arbelbide (tech. eds.). An assessment of ecosystem components in the interior Columbia Basin and portions of the Klamath and Great Basins. PNW-GTR-405, USDA, Forest Service, Pacific Northwest Research Station, Portland, Oregon, Volume 2.

Noss, R.F., E.T. LaRoe III, and J.M. Scott. 1995 Endangered ecosystems of the United States: A preliminary assessment of loss and degradation. Biological Report 28, USDI National Biological Service, 58pp.

Altman, R. 2000. Conservation Strategy for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington. Oregon-Washington Partners-in-Flight.

Shelly, J.S. and J. Gamon. 1996. Howellia aquatilis (water howellia) Recovery Plan. unpublished draft recovery plan for the U.S. Fish and Wildlife Service. vi, +52pp.

USDI Fish and Wildlife Service. 1999. Habitat Management Plan, Turnbull National Wildlife Refuge. Cheney, Washington.

USDI Fish and Wildlife Service. 2001. Fire Management Plan, Turnbull National Wildlife Refuge. Cheney, Washington.

USDI Fish and Wildlife Service. 2002. Writing Refuge Management Goals and Objectives: A Handbook (Draft).

CHAPTER 3

Allen, J.E., M. Burns, S.C. Sargeant. 1986. Cataclysms on the Columbia: A Layman's Guide to the Features Produced by the Catastrophic Bretz Floods in the Pacific Northwest. Timber Press Portland, Oregon.

Andelman, S.J. and A. Stock. 1994. Management, Research and Monitoring Priorities for the Conservation of Neotropical Migratory Landbirds that Breed in Oregon. Washington Natural Heritage Program. Washington Department of Natural Resources. Olympia, Washington.

Baker, V.R. 1978. Quaternary Geology of the Channeled Scablands and adjacent areas. *In*:The Channeled Scablands--A geomorphology of the Columbia Basin, Washington V.R. BAker and D. Nummerdal, eds.) pp 17-33 NASA Planetary Geology Program, Washington D.C.

Bernard, R.J. 1947. History of the Turnbull National Wildlife Refuge, Cheney, Washington. M. A. Thesis, University of California.

Bjork, C.R. 1997. Vernal Pools of the Columbia Plateau: Eastern Washington. Unpublished report for The Nature Conservancy, Seattle, Washington. 29pp +appendices.

Cassidy, K.M., C.E. Grue, M.R. Smith, and K.M. Dvornich, eds. 1997a. Washington State Gap Analysis - Final Report. Washington Cooperative Fish and Wildlife Research Unit, University of Washington, Seattle, Volumes 1-5.

Cheney Free Press. 1987. (June 4, 1987). Public Shoots Down Hunting in Turnbull Wildlife Refuge Again. Vol. 91-No.4, Cheney, Washington.

Daubenmire, R. 1952. Forest vegetation of northern Idaho and adjacent Washington, and its bearing on concepts of vegetation classification. Ecological Monographs 22:301-330.

Daubenmire, R. 1970. Steppe vegetation of Washington. Washington Agricultural Experiment Station Pullman, Washington. Technical Bulletin 62. 131 pp.

Donaldson, N.C. and L. D. Giese. 1968. Soil survey of Spokane County, Washington. USDA Soil Conservation Service and Washington Agriculture Experiment Station, 143 pp.

EDAW. 2000. Turnbull National Wildlife Refuge Public Scoping Survey Results. Prepared for Turnbull NWR. Cheney, Washington.

EDAW. 1999. Draft Friends of Turnbull NWR Visitor Survey Results. Prepared for Turnbull NWR. Cheney, Washington.

Everett, Charles and J. Dedrick. 2000. Region Recreation Supply and Demand in the Turnbull National Wildlife Refuge Area. EDAW, Inc. Seattle, Washington

Franklin Jerry F., Frederick C. Hall, C.T. Dryness, and Chris Maser. 1972. Federal Research Natural Areas in Oregon and Washington: A Guidebook for Scientists and Educators. Pacific Northwest Forest and Range Experiment Station. 498 pp. Portland, Oregon.

Franklin, J.F. 1993. Preserving biodiversity: Species ecosystems, of landscapes? Ecological Applications 3:202-205.

Franklin, J.F. and C.T. Dyrness. 1973. The natural vegetation of Oregon and Washington. Oregon State University Press, Corvallis.

Fraser, William. 1999. Washington State Parks and Recreation Commission. December 10, 1999 Personal Communication with Jason Dedrick, EDAW, Inc., Seattle, Washington.

Gamon, J. 1990. Report on the status of endangered, threatened and sensitive plants within Turnbull National Wildlife Refuge. Unpublished report for U.S. Fish and Wildlife Service by Washington Natural Heritage Program. September 1990. 13pp

Grue, C,, K. Cassidy, M. Smith, K. Dvornich, J. Cassady, and S. Fregien. 1995. Ecoregional refuge analysis for Little Pend Oreille NWR, Turnbull NWR, and Nisqually NWR: A preliminary report. Washington State Gap Analysis Project, 29 pp.

Hann, Wendel J; J. L. Jones, M. G. Karl, [and others]. 1997. Landscape dynamics of the basin. Pages 337-1055 *in* Quigley, Thomas M. and S. J. Arbelbide (tech. eds.). An assessment of ecosystem components in the interior Columbia Basin and portions of the Klamath and Great Basins. PNW-GTR-405, USDA, Forest Service, Pacific Northwest Research Station, Portland, Oregon, Volume 2.

Heath, R.C. 1998. Basic ground-water hydrology. USDI, Geological Services, Water Supply Paper 2,220. 86pp.

Holstine, Craig, J. Galm, and R. Bruce. 1992. A Study of Cultural Resources on Turnbull National Wildlife Refuge, Spokane County, Washington. Eastern Washington University, Reports in Archeology and History 100-71. Archaeological and Historical Services, 145 pp.

IAC (State of Washington, Interagency Committee for Outdoor Recreation). 1990. Washington Outdoors: Assessment and Policy Plan (1990-1995). An Element of Washington's Statewide Comprehensive Outdoor Recreation Planning (SCORP) Program. Tumwater, Washington.

IAC. 1995. Washington Outdoors: Assessment and Policy Plan (1995-2001). An Element of Washington's Statewide Comprehensive Outdoor Recreation Planning (SCORP) Program. Tumwater, Washington.

IAC. 2002a. An Assessment of Outdoor Recreation in Washington State, A State comprehensive Outdoor Recreation Planning (SCORP) Document 2002-2007.

IAC. 2002b. Estimates of Future Participation in Outdoor Recreation in Washington State.

Levin, S.A. 1981. The problem of pattern and space in ecology. Ecology 73:1942-1968.

Luzier, J.E. and R.J. Burt. 1974. Hydrology of basalt aquifers and depletion of groundwater in east central Washington. Washington Department of Ecology Water Supply Bulletin 33, 53pp.

Lyons, Kevin J. 1993. The 1990 Test Excavations at the Upper Pine Lake Site (45SP284), Spokane County, Washington. Short Report 288, Archaeological and Historical Services, Eastern Washington University, Cheney.

Noss, R.F., E.T. LaRoe III, and J.M. Scott. 1995. Endangered ecosystems of the United States: A preliminary assessment of loss and degradation. Biological Report 28, USDI National Biological Service, 58pp.

Noss, R.F. 1990. Indicators for monitoring biodiversity: A hierarchical approach. Conservation Biology 4:355-364.

OFM (Office of Financial Management). 1999. Washington State Population Estimates. Olympia, Washington.

Rabe, F.W. 1997. Invertebrate communities of selected vernal pools in eastern Washington. Unpublished report for The Nature Conservancy, Seattle, Washington. 21pp + appendices.

Roland, J.L. 2000. Hydrologic factors controlling seasonal lake-level decline in Stubblefield Lake, Spokane Washington. Masters Thesis. Washington State University, Pullman, Washington. 42pp +appendices.

Shelly, J.S. and J. Gamon. 1996. Howellia aquatilis (water howellia) Recovery Plan. unpublished draft recovery plan for the U.S. Fish and Wildlife Service. vi, +52pp.

Soper, C. 1999. Columbia Plateau Ecoregional Plan. Unpublished draft. The Nature Conservancy. Seattle, Washington.

Spokane County. 2002. Spokane County Comprehensive Plan. Public Works Department, Division of Planning. Spokane County, Spokane, Washington.

University of Washington. 1998. Wildlife corridors and landscape linkages: An approach to biodiversity planning for Spokane County, Washington. 508 Interdisciplinary Studio Class, Department of Urban Design and Planning, University of Washington, Seattle.

USDI Fish and Wildlife Service. 1966. Master Plan, Turnbull National Wildlife Refuge. Cheney, Washington.

USDI Fish and Wildlife Service. 1999. Habitat Management Plan, Turnbull National Wildlife Refuge. Cheney, Washington.

Vaccaro, J.J. 1999. Summary of the Columbia plateau regional aquifer system analysis. Regional Aquifer-System Analysis -- Columbia Plateau. USGS Professional Paper 1413-A.

Valentine, N. 2000. Turnbull National Wildlife Refuge CCP/LAP Cultural Resource Record Search. Unpublished report on file at USFWS Region 1 Cultural Resources Team, Sherwood, Oregon.

Winter, T.C., J. H. Harvey, O. L. Franke, W. M. Alley. 1998. Ground water and surface water a single resource. USGS Circular 1139. 79 pp.

Wisdom M. J., R. S. Holthausen, B. C. Wales, C. D. Hargis, V. A. Saab, D. C. Lee, W. J. Hann, T. D. Rich, M. M. Rowland, W. J. Murphy, and M. R. Eames. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia Basin: Broad-scale trends and management implications. PNW GTR-485, USDA Forest Service, Pacific Northwest Research Station, Portland, Oregon, Volumes 1-3.

Zender, Steve, and Jerry Hickman. 2001. Washington State Elk Herd Plan, Selkirk Elk Herd. Washington Department of Fish and Wildlife. Olympia, Washington.

INTERNET SITES

Chapter 1

Applying Washington GAP http://depts.washington.edu/rsal/GAP/spokane_brochure/index.html

Digest of Federal Resource Laws of Interest to the U.S. Fish and Wildlife Service http://laws.fws.gov

U.S. Fish and Wildlife Service, National Wildlife Refuge System policies http://refuges.fws.gov/policymakers/nwrpolicies.html.

Chapter 3

Access Board information: http://www.access-board.gov/

Spokane County. Information on rural population. http://www.spokanecounty.org/BP/Census/2000/2000cntysum.asp)

U.S. Census 2000. Information on percent of Americans with disabilities: http://www.census.gov/Press-Release/www/2002/cb02ff11.html

U.S. Census 2000. Information on population. (http://quickfacts.census.gov/qfd/states/53/53063.html)

U.S. Census 2000. Information on population growth. http://factfinder.census.gov/servlet/GCTTable?_bm=y&-geo_id=04000US53&-_box_head_nbr=GCT-PH1&-ds_name=DEC_2000_SF1_U&-format=ST-7)

U.S. Census 2000. Business facts. http://quickfacts.census.gov/qfd/states/53/53063.html)

U.S. Geological Survey circular http://water.usgs.gov/pubs/circ/circ1139/#pdf

U.S. National Resource Conservation Service: http://www.nrcs.usda.gov/programs/

U.S. Fish and Wildlife Private Stewardship Grants program: http://endangered.fws.gov/grants/private_stewardship

APPENDIX J: GLOSSARY

Abbreviations

Act	National Wildlife Refuge System Improvement Act of 1997 (also Improvement Act or NWRSIA)
ADA	Americans with Disabilities Act
AHPA	Archaeological and Historic Preservation Act
ARPA	Archaeological Resources Protection Act
BLM	Bureau of Land Management
CCP	Comprehensive Conservation Plan
CFR	Code of Federal Regulations
CPI	Conservation Priority Index
CSFA	Channeled Scablands Focus Area
EA	Environmental Assessment
EE	Environmental Education
ERU	Ecological Reporting Unit
EWU	Eastern Washington University
FMP	Fire Management Plan
FWS	U.S. Fish and Wildlife Service (also, Service, USFWS)
GAP	Gap Analysis Program
GIS	Geographic Information System
HMP	Habitat Management Plan
IAC	Interagency Committee for Outdoor Recreation (Washington State)
ICBEMP	Interior Columbia Basin Ecosystem Management Project
Improvement Act	National Wildlife Refuge System Improvement Act of 1997(also Act, NWRSIA)
INLT	Inland Northwest Land Trust
MMS	Maintenance Management System
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
N	Nitrogen
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
NWRSIA	National Wildlife Refuge System Improvement Act of 1997
P	Phosphorus
PIF	Partners in Flight
PILT	Payment in lieu of taxes
R1	Region 1 of the FWS (WA, OR, CA, HI, NV, ID)
Refuge	Turnbull National Wildlife Refuge
RNA	Research Natural Area
RONS	Refuge Operating Needs System
SCORP	Statewide Comprehensive Outdoor Recreation Plan
Service	U.S. Fish and Wildlife Service (also FWS, USFWS)
TES	Threatened and Endangered Species
TLES	Turnbull Laboratory for Ecological Studies
TNC	The Nature Conservancy
TPL	Trust for Public Land
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington State Department of Fish and Wildlife
WPA	Works Projects Administration
WSPRC	Washington State Parks and Recreation Commission

Glossary

Adaptive Management. Refers to a process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in management plan. Analysis of results help managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.

Adjudication of Water Rights. An adjudication is an administrative or judicial determination of all rights to use water in a particular stream system or watershed to establish the priority, point of diversion, place and nature of use, and the quantity of water used among the various claimants. These stream or watershed adjudications can be initiated by a water user (including the United States) or by the State. The United States may be joined in an adjudication if the requirements of the McCarran Amendment are met. (water rights sec 403 from refuge manual)

Alluvium. Sediment transported and deposited in a delta or riverbed by flowing water.

Alternative. Alternatives are different means of accomplishing refuge purposes and goals and contributing to the System mission (draft Service Manual 602 FW 1.5). The no action alternative is current refuge management while the action alternatives are all other alternatives.

Approved Acquisition Boundary. A National Wildlife Refuge boundary approved by the National or Regional Fish and Wildlife Service Director for potential acquisition of lands by the Service. (R1 Landowner guide, USFWS Division of Refuge Planning)

Archeology. The scientific study of material evidence remaining from past human life and culture (Webster's II).

Basalt. A dark dense volcanic rock (Webster's II).

Biological Diversity(also Biodiversity). The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur (USFWS Manual 052 FW 1. 12B). The System's focus is on indigenous species, biotic communities, and ecological processes.

Biological Integrity. Biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities. (NWRS Biological integrity policy)

Bisquit and Swale Steppe. A mosaic of exposed, fractured basalt, small mounds of deeper soils and swales comprised of shallow lithosols found in the uplands of the flood tracts of the Channeled Scablands. (Turnbull CCP / EA, Chapter 3, Section 3.1)

Categorical Exclusion. A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a Federal agency pursuant to the National Environmental Policy Act (40 CFR 1508.4).

Channeled Scablands. A diverse complex of lakes, sloughs and ponds formed by the scouring of catastrophic floods through wind deposited soils and subsequent deposition of glacial outwash sediments plus volcanic ash on portions of the Columbia Plateau. (Turnbull CCP/EA, Chapter 3, Section 3.1)

Columbia Basin. The region drained by the Columbia River system.

Columbia Plateau. An approximately 80,000 square mile depression in the earth's crust caused by the immense weight of over 200 lava flows piling up in the broad valleys of the Columbia River Basin between 6 and 16 million years ago. (Turnbull CCP/EA, Chapter 3, Section 3.1)

Compatible Use. A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the Mission of the System or the purposes of the refuge (Service Manual 603 FW 3.6). A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.

Comprehensive Conservation Plan. A document that describes the desired future conditions of the refuge, and provides long-range guidance and management direction for the refuge manager to accomplish the purposes of the refuge, contribute to the mission of the System, and to meet other relevant mandates (Service Manual 602 FW 1.5).

Consumer surplus. Consumer surplus represents the amount an individual would be willing to pay for a good or service over and above the asking price. Individuals are often able to enjoy recreational activities at a price that is less than the amount they would be willing to pay. Thus, the consumer surplus measure captures the added benefit consumers gain beyond that reflected in the dollar value of goods and services purchased in the process of participating in these activities (Laughland and Caudill, 1999).

Contaminants. or Environmental contaminants - Chemicals present at levels greater than those naturally occurring in the environment resulting form anthropogenic or natural processes that potentially result in changes to biota at any ecological level. (USGS, assessing EC threats to lands managed by USFWS) Pollutants that degrade other resources upon contact or mixing. (Adapted from Webster's II)

Cooperative Agreement. This is a simple habitat protection action, and no property rights are acquired. An agreement is usually long term but can be modified by either party. They are most effective in establishing multiple use management of land. An example would be a wildlife agreement on a Corps reservoir.

Cover Type. The present vegetation of an area.

Cultural Resources. The physical remains, objects, historic records, and traditional lifeways that connect us to our nation's past. (USFWS, Considering Cultural Resources)

Cultural Resource Inventory. A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 CFR 60.4 (Service Manual 614 FW 1.7).

Deciduous. Describes trees and shrubs which shed all of their leaves each year.

Disturbance. Significant alteration of habitat structure or composition. May be natural (e.g., fire) or human-caused events (e.g., aircraft overflights).

Ecosystem. A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.

Ecosystem Management. Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely.

Environmental Assessment. A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).

Edaphic. Resulting from or influenced by the soil rather than the climate. (yourdictionary.com)

Endangered Species (Federal). A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range.

Endangered Species (State). A plant or animal species in danger of becoming extinct or extirpated in Washington within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.

Environmental Education Facility. A building with one or more classrooms and environmental education materials to accommodate groups of students.

Environmental Education Field Sites. Outdoor locations where groups of students receive hands-on environmental education.

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. (NWRS Biological integrity policy)

Enhancement. Improvement, especially for the benefit of habitats and/or species.

Expanded Refuge boundary. Proposed new Approved Refuge Boundary for potential land acquisition.

Finding of No Significant Impact (FONSI). A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a Federal action will have no significant effect on the human environment and for which an environmental impact statement, therefore, will not be prepared (40 CFR 1508.13).

GAP analysis. Analysis done to identify and map elements of biodiversity that are not adequately represented in the nation's network of reserves. It provides an overview of the distribution and conservation status of several components of biodiversity, with an emphasis on vegetation and terrestrial vertebrates. (Cassidy et al.1997)

Goal. Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (Draft Service Manual 620 FW 1.5).

Guild. Or wildlife guild - an aggregation of species that tend to utilize resources for both feeding and reproduction in a similar manner. (Turnbull NWR Habitat Management Plan)

Habitat. Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.

Habitat Connectivity (Also Landscape Connectivity). The arrangement of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors of appropriate vegetation. The opposite of fragmentation. (Turnbull NWR Habitat Management Plan)

Habitat Management Plan. A plan that guides refuge activities related to the maintenance, restoration, and enhancement of habitats for the benefit of wildlife, fish, and plant populations.

Habitat Restoration. Management emphasis designed to move ecosystems to desired conditions and processes, and/or to healthy ecosystems.

Headquarters. An administrative center. (Webster's II)

Historic Conditions. Composition, structure, and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to substantial human related changes to the landscape. (NWRS Biological integrity policy)

Hydrologic influence. Having an effect on water quality and quantity. In this document much of the study area was selected for its hydrologic influence on the Refuge's wetlands.

Hydrology. A science dealing with the properties, distribution, and circulation of water on and below the earth's surface and in the atmosphere. (yourdictionary.com)

IMPLAN. (MicroIMPLAN - Impact Analysis for Planning) An economic analysis tool designed by the U.S. Forest Service and owned and maintained by the Minnesota IMPLAN group. IMPLAN is used by many state and federal planning agencies to evaluate the economic impact of policy choices.

Indicator. Something that serves as a sign or symptom. (Webster's II)

Inholdings. Refers to lands within an Approved Refuge Boundary for a refuge, that are not owned by the Fish and Wildlife Service. These can be private lands or lands owned by city, county, state, or other federal agencies.

Interpretation. A teaching technique that combines factual information with stimulating explanation. (yourdictionary.com) Frequently used to help people understand natural and cultural resources.

Interpretive Trail. A trail with informative signs, numbered posts that refer to information in a brochure, or where guided talks are conducted for the purpose of providing factual information and stimulating explanations of what visitors see, hear, feel, or otherwise experience while on the trail.

Issue. Any unsettled matter that requires a management decision (e.g., a Service initiative, opportunity, resource management problem, a threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition) (Draft Service Manual 602FW 1.5).

Land Protection. The acquisition of fee-title, easement, or lease of a given land parcel to protect important natural resource values on the land from incompatible land uses.

Landform. A natural feature of a land surface (yourdictionary.com)

Landscape linkages. Landscape features linking areas of similar habitat. Plants and smaller animals are able to use landscape linkages to move between larger landscape blocks over a period of generations. (Turnbull Habitat Management Plan)

Limnology. The scientific study of bodies of freshwater such as lakes. (yourdictionary.com)

Lithic Debris Scatter. Flakes and fragments of cryptocrystalline silica, or sometimes basalt and obsidian, indicating the manufacture of projectile points, scattered about a site that probably represents a temporary Native American campsite. (adapted from Holstine et. al.)

Lithosols. A shallow soil without zonation and consisting of imperfectly weathered rock fragments. ((Turnbull Habitat Management Plan)

Loess. Soils that are the result of wind deposition. (Turnbull Habitat Management Plan)

Maintenance. The upkeep of constructed facilities, structure and capitalized equipment necessary to realize the originally anticipated useful life of a fixed asset. Maintenance includes preventative maintenance; cyclic maintenance; repairs; replacement of parts, components, or items of equipment, periodic condition assessment; periodic inspections, adjustment, lubrication and cleaning (non-janitorial) of equipment; painting, resurfacing, rehabilitation; special safety inspections; and other actions to assure continuing service and to prevent breakdown.

Maintenance Management System (MMS). A national database of refuge maintenance needs and deficiencies. It serves as a management tool for prioritizing, planning, and budgeting purposes. (RMIS descriptions)

Migration. The seasonal movement from one area to another and back.

Migratory birds. Those species of birds listed under 10.13 of 50 CFR chapter 1. USFWS, DOI. (11/23/2001 draft policy).

Mission Statement. Succinct statement of a unit's purpose and reason for being.

Monitoring. The process of collecting information to track changes of selected parameters over time.

National Environmental Policy Act of 1969. Requires all Federal agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision making (from 40 CFR 1500).

Native. With respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem. (NWRS Biological integrity policy)

National Register of Historic Places. The Nation's master inventory of known historic properties administered by the National Park Service. Includes buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archeological, or cultural significance at the national, state, and local levels. (USFWS, Considering Cultural Resources)

National Wildlife Refuge. A designated area of land, water, or an interest in land or water within the System.

National Wildlife Refuge System. Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction; all lands, waters, and interests therein administered by the Secretary as wildlife refuges; areas for the protection and conservation of fish and wildlife that are threatened with extinction; wildlife ranges; games ranges; wildlife management areas; or waterfowl production areas.

National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). A federal law that amended and updated the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668).

Non-attainment areas. A geographic area that is not in compliance with the National Ambient Air Quality Standards for a particular pollutant. (Turnbull Habitat Management Plan)

Non-consumptive recreation. Recreational activities that do not involve harvest, removal or consumption of fish, wildlife or other natural resources.

Noxious Weed. A plant species designated by Federal or State law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or non-native, new, or not common to the United States, according to the Federal Noxious Weed Act (PL 93-639), a noxious weed is one that causes disease or had adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health.

Nutrient Loading. The presence of nutrients such as nitrogen and phosphorus in waterways which cause algal blooms and oxygen depletion with potentially lethal effects on fish and other wildlife species.

Objective. An objective is a concise target statement of what will be achieved, how much will be achieved, when and where it will be achieved, and who is responsible for the work. Objectives are derived from goals and provide the basis for determining management strategies. Objectives should be attainable and time-specific and should be stated quantitatively to the extent possible. If objectives cannot be stated quantitatively, they may be stated qualitatively (Draft Service Manual 602 FW *1.5).*

Operations. Activities related to the normal performance of the functions for which a facility or item of equipment is intended to be used. Costs such as utilities (electricity, water, sewage) fuel, janitorial services, window cleaning, rodent & pest control, upkeep of grounds, vehicle rentals, waste management, and personnel costs for operating staff are generally included within the scope of operations.

Outreach. The process of providing information to the public on a specific issue through the use of the media, printed materials, and presentations. (Turnbull Habitat Management Plan)

Pacific Flyway. One of several major north-south travel corridors for migratory birds. The Pacific Flyway is west of the Rocky Mountains.

Palouse (Prairie) Steppe. Open grassland habitat found on both the rolling palouse hills and the bisquit and swale landform of the Channeled Scablands.

Payment in Lieu of Taxes (PILT). See Revenue Sharing.

Piezometer Well. A hollow tube placed in the ground that allows measurement of the height of the water table. Often times fitted with an automated depth recorder.

Planning Team. The primary U.S. Fish and Wildlife staff and others who played a key role in developing and writing the CCP

Plant Association. A classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community.

Plant Community. An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community (e.g., ponderosa pine).

Playa Lake. (Referring to Stubblefield lake). A level area at the bottom of a desert basin that is at times covered with water. (Webster's II)

Prairie Potholes. Permanent and seasonal wetlands formed by glacial activities of the last ice age (12-15,000 years ago). The prairie pothole region is a large area that extends from south central Canada into the north central United States.

Preferred Alternative. This is the alternative determined [by the decision maker] to best achieve the Refuge purpose, vision, and goals; contributes to the Refuge System mission, addresses the significant issues; and is consistent with principles of sound fish and wildlife management.

Priority Public Uses. Hunting, fishing, wildlife observation and photography, environmental education and interpretation were identified by the National Wildlife Refuge system Improvement Act of 1997 as the six priority public uses of the National Wildlife Refuge System.

Priority Species. Fish and wildlife species that the Washington Department of Fish and Wildlife believe require protective measures and/or management guidelines to ensure their perpetuation. Priority species include the following: (1) State-listed and candidate species; (2) species or groups of animals susceptible to significant population declines within a specific area or statewide by virtue of their inclination to aggregate (e.g., seabird colonies); and (3) species of recreation, commercial, and/or tribal importance.

Public. Individuals, organizations, and groups; officials of Federal, State, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the planning team. It includes those who may or may not have indicated an interest in Service issues and those who may be affected by Service decisions.

Public Use Area. A designated area within the Turnbull NWR which is open to the public year-round. All trails and facilities with the exception of those associated with Columbia Plateau trail are within the public use area.

Pyrolitic. Heat induced, as in changes caused by a fire.

Raptor. A category of carnivorous birds, most of which have heavy, sharp beaks, strong talons, and take live prey (e.g., peregrine falcon, bald eagle).

Refuge Operating Needs System (RONS). A national database of unfunded refuge operating needs required to meet and/or implement station goals, objectives, management plans, and legal mandates. It is used as a planning, budgeting, and communication tool describing funding and staffing needs of the Refuge System. (RMIS descriptions)

Refuge Purpose(s). The purpose(s) specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, a refuge unit, or refuge subunit (Draft Service Manual 602 EW 1.5).

Refuge Vicinity. This is an area that was not specifically outlined, but generally extends outside the refuge for approximately 5-7 miles in each direction. (CCP/EA, Chapter 1)

Research Natural Area. A federal land designation that establishes areas with predominantly natural conditions and processes for research and educational purposes.

Restoration. The act of bringing back to a former or original condition. (Webster's II)

Revenue Sharing. Service payments (government lands are exempt from taxation) made to counties in which national wildlife refuges reside. These payments may be used by the counties for any governmental purpose such as, but not limited to, roads and schools. (USFWS Revenue sharing pamphlet).

Riparian. Refers to an area or habitat that is transitional from terrestrial to aquatic ecosystems; including streams, lakes wet areas, and adjacent plant communities and their associated soils which have free water at or near the surface; an area whose components are directly or indirectly attributed to the influence of water; of or relating to a river; specifically applied to ecology, "riparian" describes the land immediately adjoining and directly influenced by streams. For example, riparian vegetation includes any and all plant life growing on the land adjoining a stream and directly influenced by the stream.

Seral. Of or relating to an ecological sere; a seral stage. (yourdictionary.com)

Site index. Refers to the ability of a particular site to grow trees. A high site index indicates that trees will grow faster and become larger than an area with a low site index.

Songbirds (Also Passerines). A category of birds that are medium to small, perching landbirds. Most are territorial singers and migratory.

Step-down Management Plans. Step-down management plans provide the details necessary to implement management strategies identified in the Comprehensive Conservation Plan (Draft Service Manual 602 FW 1.5).

Steppe. Arid land dominated by shrubs and grasses where soil and moisture limit the growth of trees. (Turnbull Habitat Management Plan)

Stewardship Area. Each of the Alternatives in this CCP/EA has a delineated area where the Service will develop partnerships, provide information, and otherwise encourage private landowners to participate in land and water conservation practices.

Strategy. A specific action, tool, or technique or combination of actions, tools, and techniques used to meet unit objectives (Service Manual 602 FW 1.5).

Stratum. A horizontal layer, as one of a number of layers of rock of the same kind. (Webster's II)

Study Area. The area reviewed in detail for wildlife, habitat, and public use potential. For purposes of this Draft CCP/EA the Study Area includes the lands within the currently Approved Refuge Boundary and adjacent lands that were studied or analyzed in terms of hydrology, habitat quality, recreation, and land use. See Chapter 1, section 1.4 for more details.

Subwatershed. A division within a larger watershed, drained by a stream and its tributaries.

Threatened Species (Federal). Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

Threatened Species (State). A plant or animal species likely to become endangered in Washington within the near future if factors contributing to population decline or habitat degradation or loss continue.

Threshold. The lowest level or intensity at which a stimulus is perceptible or can produce an effect. (Webster's II) This term is sometimes used in connection with monitoring the effects of public uses on natural resources.

Vegetation Type (Also Habitat Type, Forest Cover Type). A land classification system based upon the concept of distinct plant associations.

Viewpoint. A designated point that provides an opportunity to see wildlife or habitats of interest. The point may or may not be "supported" with an interpretive sign. Usually the viewpoint is supported by a pullout or a parking area. (CCP Team definition, 9/10/02)

Visitor Center. A building and staff which provide visitors with interpretation, education, and general information about the natural and cultural resources of the refuge and the local area.

Visitor Contact Point or Center. A kiosk or other location where visitors may go to learn about refuge resources, facilities, trails etc.

Vision Statement. A concise statement of the desired future condition of the planning unit, based primarily upon the System mission, specific refuge purposes, and other relevant mandates (Service Manual 602 FW 1.5).

Watershed. The region or area drained by a river system or other body of water. (Webster's II) See also subwatershed.

Wetlands. Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water at some time during the growing season of each year. (Service Manual 660 FW 2) **Permanent wetland -** a wetland basin or portion of a basin that is covered with water throughout the year in all years except extreme drought. Typically the basin bottom is vegetated with submerged aquatic plant species including milfoil, coontail, and pondweeds. **Semi-permanent wetland -** a wetland basin or portion of a basin where surface water persists throughout the growing season of most years. Typical vegetation is composed of cattails and bulrushes. **Seasonal wetland -** a wetland basin or portion of a basin where surface water is present in the early part of the growing season but is absent by the end of the season in most years. Typically vegetated with sedges, rushes, spikerushes or burreed. (Turnbull Habitat Management Plan)

Wildlife-dependent recreation. Hunting, fishing, wildlife observation and photography, environmental education and interpretation. These are also referred to as the priority public uses of the National Wildlife Refuge System.

APPENDIX K: PUBLIC INVOLVEMENT

Public involvement was sought throughout the development of the CCP, starting in the summer of 1999. Public involvement strategies emphasized face-to-face meetings with key agencies, tribes with ancient links to the area, federally elected officials, and Refuge neighbors. The refuge also held open houses, conducted a planning workshop, sent newsletters, conducted surveys, and gave presentations at community organizations to inform the public, invite discussion and solicit feedback.

A mailing list of approximately 1,200 persons and organizations is maintained at the Refuge and was used to distribute planning updates and public meeting announcements. Below is a brief summary of the events, meetings, and outreach tools that were used in our public involvement efforts.

Meetings with Congressional Representatives and/or their Aides:

- February 2, 2000. Met with Congressional aides to Senator Gorton, Senator Murray
- April 24, 2000. Met with Congressman George Nethercutt.
- April 4, 2001. Met with Judy Olsen and Steve Taylor, aides to Senator Murray and Congressman Nethercutt.
- November 1, 2001. Met with Judy Olsen, aide to Senator Murray.
- November 13, 2001. Met with Robert Thoms, aide to Senator Cantwell.
- December 13, 2001. Met with Steve Taylor, aide to Congressman George Nethercutt.
- January 25, 2006. Met with David Condon, aide to Congresswoman Cathy McMorris.
- February 2, 2006. Met with Judy Olsen, aide to Senator Murray.

Meetings with Tribal Officials

- April 14, 2000. Met with Spokane Tribe Natural Resources staff.
- March, April, 2000 - solicited meetings w/Coeur d'Alene and Colville Tribes, both declined.
- March, April, 2000 - solicited meetings w/Kalispel Tribe but no response.
- October, November 2001 - solicited meetings w/Coeur d'Alene and Spokane Tribes but no responses.

Meetings with Local Elected Officials

- November 5, 2001. Met with Phil Harris, Spokane County Commissioner District 3.
- October, November 2001 - solicited meeting w/Mayor Amy Sooy, Mayor of Cheney, but no response.
- November 21, 2001. Met with John Roskelley, Spokane County Commissioner
- December 5, 2001. Met with Kate McCaslin, Spokane County Commissioner
- February 1, 2006. Met with Mark Richards, Spokane County Commissioner
- February 13, 2006. Met with Todd Mielke, Spokane County Commissioner
- February 22, 2006. Met with Phil Harris, Spokane County Commissioner.
- February 23, 2006. Met with Allan Gainer, Mayor of Cheney.

Meetings with Refuge Neighbors

- January 22, 2002. Cheney. Meeting with neighbors to Northeast of Refuge (4 attendees)
- January 24, 2002. Cheney. Meeting with neighbors to northwest of Refuge
- February 5, 2002. Cheney. Meeting with neighbors to east of Refuge
- February 11, 2002. Fire Station. Meeting with neighbors to west side of Refuge
- February 19, 2002. Cheney. Meeting with neighbors to southeast of refuge
- February 26, 2002. Cheney. Meeting with neighbors to south of Refuge.
- April 2, 2002. Individual meeting with refuge neighbors Don, Mark, and Dana Bell.
- February 6, 2003. Tour of Refuge and meeting with Cow Creek ranchers.

Meetings with Community Organizations

- November 18, 1999. Meeting with Inland Northwest Land Trust
- February 7, 2000. Met with Friends of Turnbull to discuss upcoming CCP.
- October 29, 2001. Met with Eastern Washington University/Turnbull Laboratory for Ecological Studies Directors.
- March 5, 2002. Presentation to Inland Northwest Wildlife Council.
- Fall, 2001. Presentation to Spokane Chapter of The Audubon Society
- ___ Presentation to Kiwanis Club.
- ___. Meeting with Intermountain West Joint Venture Channeled Scabland Focus Group
- March 5, 2002. Presentation to Inland Northwest Land Trust
- Monthly, 2002. Met with West Plains Chamber of Commerce
- April 16, 2002. Met with Cheney Rotary Club.

Public Open Houses/Workshops

- Feb 29, 2000. Cheney High School. Open House to solicit input at outset of CCP (approximately 50 attendees).
- March 1, 2000. Spokane Falls Community College. Open House to solicit input at outset of CCP (approximately 40 attendees).
- December 1-2, 2001. Turnbull NWR Headquarters. Open house to celebrate remodeled EE classroom, highlight Refuge programs and CCP
- May 12, 2001. Open house to celebrate International Migratory Bird Day. Included CCP display.
- June 22, 2002. Turnbull NWR Headquarters. Workshop to solicit feedback on seven preliminary alternatives (approximately 35 attendees).
- July 12, 2005. Spokane Falls Community College. Open House to solicit input at release of Draft CCP/EA (approximately 3 attendees).
- July 13, 2005. Cheney High School. Open House to solicit input at release of Draft CCP/EA (approximately 75 attendees).

Agency Meetings

- April 5, 2000. Meeting with Washington Department of Ecology staff.
- May 3, 2000. Met with Spokane County Division of Long Range Planning staff.
- May 23, 2000. Met with Washington Department of Fish and Wildlife Staff
- September 2000. Met with Washington Department of Fish and Wildlife staff.
- Spring or summer, 2000. Spokane County Department of Long-Range Planning
- March 21, 2001. Washington Parks and Recreation Commission.
- March 22, 2001. Met with Washington Department of Fish and Wildlife.
- May 8, 2002. Met with Natural Resource Conservation Service.
- October 3, 2002. Met with Bureau of Land Management.
- November 19, 2002. Met with Washington State Parks and Recreation Commission.
- September 9, 2004. Met with Washington Department of Fish and Wildlife staff.
- September 29, 2005. Met with Washington Dept. of Fish and Wildlife staff.
- July 26, 2006, Met with City of Cheney Planning Dept.

Planning Updates

- January, 2000. Planning Update #1 sent to ~ 800 persons/organizations /officials (86 responses received back).
- November, 2000. Planning Update #2 sent to ~850 persons/organizations/officials.
- December, 2001. Planning Update #3 sent to ~875 persons/organizations/officials.

- May, 2002. Planning Update #4 sent to ~900 persons/organizations/officials (28 responses received back)
- June, 2005. Planning Update #5 sent to ~1,200 persons/organizations/officials (~100 responses and one petition received back).

Other Tools

- Summer, 1999. Friends of Turnbull conducted visitor surveys to 531 persons at nine different locations near Turnbull NWR.
- September, 2001. Booth at Spokane Interstate Fair.
- March 19, 2002. Participated in Interagency Committee workshop for recreation facilities grants.
- September, 2002. Booth at Spokane Interstate Fair.

Press Coverage:

- March 10, 2000. Interview w/ KBPX
- February 24, 2000. Cheney Free Press article.
- February 24, 2000. Inlander article.
- February 27, 2000. Spokesman Review article
- June, 2002. Cheney Free Press article.
- September, 2002. Spokesman Review article.
- July, 2005. Cheney Free Press article.
- July 2, 2005. Spokesman-Review article.

Federal Register Notices:

- March 2, 2000. Federal Register published *Notice of Intent to Prepare a Draft Comprehensive Conservation Plan and Associated Environmental Assessment; and Notice of Public Meetings.*
- June 30, 2005. Federal Register published *Notice of Availability of the Draft Comprehensive Conservation Plan and Environmental Assessment for the Turnbull National Wildlife Refuge, and Notice of Public Meetings.*

APPENDIX L. PUBLIC COMMENTS ON THE DRAFT CCP/EA

The Refuge received nearly 100 written communications in response to the Draft CCP/EA. Sixteen letters, 24 emails, and 54 forms (provided in the Planning Update that announced the release of the Draft CCP/EA) were received. In addition a petition was received, signed by numerous individuals (some of whom also submitted comments separately).

Comments are summarized in this appendix and arranged by topic, and are sometimes grouped, where several individuals submitted similar comments. Bold type indicates the comment, which is often quoted directly but sometimes paraphrased. The code following the comment (EM8 for example) indicates the identifier that was assigned to each letter, email, or form, see page L-32 for an index. The Service response is in italics. Topics addressed and page numbers where the comments and responses start can be found as listed in Table L-1.

Table L-1. Where to Find Specific Comments and Service Responses

Topic	Page
Overall Support for Alternatives	2
Habitat Management	2
Non-Consumptive Public Use Program	5
Environmental Education	5
Hiking	6
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Wildlife Viewing, Photography, and Interpretation	7
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Public Use Area Size	9
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OVERALL SUPPORT FOR ALTERNATIVES

If a commenter indicated support for a particular alternative overall, it was tallied. The results of the overall support are summarized in the following table.

Table L-2. Distribution of public comment specifying support for a particular alternative

Alternative	Number of letters, emails or comment forms received indicating support for this Alternative overall
Alt 1	26
Alt. 2	5
Alt. 3	35
Alt. 4	10
Alt. 3 or Alt. 4	1
Alt. 1, modified	petition

HABITAT MANAGEMENT

Several comments were received addressing habitat management issues. The CCP adopts the 1999 approved Habitat Management Plan which addresses the habitat management direction being implemented on the Refuge today. See the Habitat Management Plan and Fire Management Plan Summaries in Appendix B and C for more details.

Support restoration to increase number of ponds and sloughs for migratory waterfowl. Need to determine why number of greater Canadian geese using the Refuge for resting and nesting continues to decline. (EM8)

RESPONSE: Wetland restoration support comment noted. Numbers of Canada Geese nesting on the Refuge has always been highly variable and correlated with wet and dry climate cycles. The trend over the past 15 years, however, has been increasing. Through most of the 1970's and 80's Refuge Canada goose breeding populations did not exceed 50 pairs annually. In the early 90's annual goose pair numbers showed a slight increase and averaged 55. Over the past 5 years this average has more than doubled to 117 pairs.

Service burns wrong time of yr, kills too many trees, does not clean up afterwards. (F23)

RESPONSE: The historic natural burning period for ponderosa pine is during late summer and early fall. Burning during this time coincides with the onset of plant dormancy and the low point in fuel moistures assuring that much of the fuel accumulation is reduced. The Refuge recognizes that nearly a century of fire suppression in this area has allowed for the unnatural accumulation of woody debris and litter. This high fuel loading can result in conditions supporting catastrophic wildfires threatening resources and facilities on the Refuge and adjacent property. This high fuel loading can also result in extensive tree damage if the first round of prescribed burning is conducted during the natural burning period. The Refuge has burned during this time period with a mixture of results, some of which were unacceptable. The current forest

restoration strategy adopted by the Refuge includes thinning to remove dense thickets of young pine and to open the forest canopy, piling and burning of slash in winter, spring under-burning to remove a portion of the fuel accumulation, and finally a fall under-burn to achieve near natural conditions. These steps could take several years to complete, thus the unfinished appearance in any one unit. Once the unit is finished with the above restoration strategy it will look "cleaned up" and blend with the natural landscape. Units restored using these techniques are well within the natural range of conditions for the Ponderosa Pine Forest Type given the age distribution of trees in refuge forest stands. Subsequent burning in the fall on a 10-15 year rotation should maintain healthy forest for native plants and wildlife.

What funds and/or assistance is available for private landowners for fire prevention, forest stewardship, maintaining and improving wildlife habitat, preserving wetlands and protecting groundwater resources? (EM11)

RESPONSE: These funds vary annually with Congressional appropriations. In recent years there have been funds made available to the public living in the wildland urban interface to reduce wildfire hazards around their homes. Neighbors close to the Refuge can receive some funding from the Refuge annually for this purpose. Those further away can apply for grants through the U.S. Forest Service. These grants are available for reducing hazardous fuels around home sites and in forested areas within the wildland urban interface. Several Refuge neighbors have benefited from these grants in the past three years. Other programs are available from the Natural Resources Conservation Service for programs such as the Wetland Reserve Program (WRP) and the Conservation Reserve Program (CRP). The WRP is a voluntary program offering landowners the opportunity to protect, restore and enhance wetlands on their property. The CRP program provides technical and financial assistance to eligible farmers and ranchers to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner. The U.S. Fish and Wildlife Service, through its Partners For Fish and Wildlife program, provides technical and financial assistance to private landowners to voluntarily restore wetlands and other habitat on their land. Another program is the U.S. Department of the Interior's Cooperative Conservation Initiative (CCI) which allocates matching funds for resource conservation projects implemented by partnerships of private citizens and public agencies. There are also federal tax laws that provide incentives to landowners who protect their land from development through conservation easements. The Intermountain West Joint Venture also offers opportunities through partnerships in North American Wetlands Conservation Act (NAWCA) grants to protect restore and enhance habitats.

Refuge has too many weeds. (F23, F29, L16) Landowner's property NE of Refuge takes all wind blown weed seed. (PM7) Noxious weeds on Refuge blow over to property owner's lands and the County fines them. (F19)

RESPONSE: The U.S. Fish & Wildlife Service recognizes that noxious weeds are a serious problem and the Refuge staff works each year to control the spread of these species. Refuge staff members use an integrated pest management approach. Weeds are controlled through chemical applications, release of biological control agents, mechanical pulling and mowing. Exotic plants that we attempt to control are Canada thistle, knapweed, leafy spurge and reed canary grass. The Refuge staff is mapping weed concentrations with GPS and monitoring these to track

their spread or reduction over time. Much of our control efforts focus on roadsides, public use facilities and border areas. Refuge staff works closely with the County Weed Board to identify and control high priority infestations. The Refuge staff is actively applying the most current control strategies available to infestations of all Class A and B designate species on an annual basis. If there are specific areas on the Refuge that adjacent landowners feel are contributing to weed problems on their property, then they have the opportunity to contact the Refuge manager and arrange for a site visit to map the problem area and discuss potential control strategies.

Refuge serves as model of good management for wetlands and uplands for wildlife. (L9)

RESPONSE: *It is our plan to manage refuge habitats for wildlife with the best management practices available. Continual monitoring of those practices gives us the opportunity to review and adjust management strategies as we go along. See Refuge Habitat Management Plan Summary in Appendix B for more details.*

CCP should ban trapping, new roads, grazing, logging, mining, or drilling, all two stroke vehicles, prescribed burning and using herbicides. (EM2)

RESPONSE: *There are no provisions in the CCP to allow trapping on the Refuge. No new roads are proposed under the CCP. Habitat management practices that entail prescriptions for grazing or logging require compatibility determinations. The Refuge Manager at Turnbull NWR has found that prescription grazing for wildlife management purposes is compatible with certain stipulations and it may or may not be used in the future to help manage reed canarygrass. Logging for the purpose of hazardous fuel reduction and forest health to provide improved forest habitat has been found compatible with stipulations at Turnbull NWR and is discussed in the approved Habitat Management Plan. Logging and grazing solely for economic benefit are not compatible uses on the Refuge. See compatibility determinations listed in Appendix E of this document for further discussion. Gas, oil and mineral rights were not purchased with all refuge lands within the National Wildlife Refuge System and are subject to restrictions on the purchase deeds. Some of the tracts purchased within Turnbull NWR have mineral right reservations listed on the deeds. Off-road vehicle use is not allowed at anytime of the year. There are no restrictions on the use of two-stroke street legal vehicles on the public use roads. Prescribed fire and herbicides are both irreplaceable management tools on most wildlife refuges. With 10,000 acres of fire–dependent ponderosa pine forest at Turnbull Refuge, we utilize prescribed fire to simulate the natural low intensity fire that occurred at an estimated 10 year interval in the area. Herbicide is one of several tools used to protect the native diversity of the Refuge by controlling invasive exotic weeds. For some weeds there are no viable alternatives to the use of chemicals.*

Support stable source of funding for Refuge habitat improvement (L10). Support full funding for research project and monitoring of Refuge wildlife, plants, and habitat relating for Refuge management. (L11, L14)

RESPONSE: *Currently habitat improvements are provided for with grant or special project funds. There is no dependable annual source of funds to deal with wetland or upland habitat improvement projects such as control of reed canarygrass and other exotic plants, forest and*

riparian habitat restoration and improvements. The CCP calls for additional support for research and monitoring of refuge wildlife and habitat through the addition of a second wildlife biologist and seasonal biological technician.

NON-CONSUMPTIVE PUBLIC USE PROGRAMS

Environmental Education

The proposed increases and improvements in the environmental education program were supported by the vast majority of respondents who mentioned this program. Twenty-two respondents supported all or parts of an expanded environmental education program as described under Preferred Alternative 3 of the Draft CCP/EA (EM3, EM14, EM16, EM22, EM24, L1, L2, L9, L10, L11, L13, L14, F4, F6, F15, F16, F17, F25, F27, F35, F39, F40). Some of the reasons expressed included:

- **Education programs are very important (F40)**
- **Education center will be a fantastic learning environment. (F6)**
- **Stability in funding. (F25)**
- **Imperative that we educate our young people about wildlife, the environment and the interconnections. (F25)**
- **Desire for permanent staffing (L11, F35, F40) or increased staffing. (EM3, EM14)**
- **Increase in environmental education programs. (F17, F25, L1, L2, L10, L13, EM14, EM16)**
- **Full funding for environmental education. (F39, EM22)**
- **Increased classroom space (L14, L11, L10); and improvement in the program. (L9)**
- **Refuge is an important learning environment for urban children. (F39)**
- **Addresses Inland Northwest Wildlife Council goal of improving and expanding environmental education opportunities. (L1)**
- **Plenty of demand in the Cheney-Spokane area for a year-round EE specialist and off-Refuge programs in schools. (L10)**
- **Staffed visitor centers are a wonderful feature – an adjunct to an education program and a ready source of information about the refuge. (L10)**

RESPONSE: *There is a huge demand for environmental education from the greater Spokane area and other communities throughout Eastern Washington. The demand has always exceeded the current Refuge staffing and funds and we regularly turn away requests due to staff limitations. The current education program is facilitated by volunteers directed by a volunteer coordinator. The program would benefit tremendously if there were permanently funded staff that could carry the program over season to season, year to year. The current program requires annual if not monthly and quarterly orientation and training of volunteers. The addition of a permanent EE specialist and increased classroom space will allow the Refuge staff to provide additional environmental education opportunities to schools in the Spokane area and be better able to meet the demands of the community.*

Support increasing environmental education but concerned that an expanded program might divert resources from wildlife and habitat conservation. (EM14, EM16)

RESPONSE: *Wildlife is always the first priority on National Wildlife Refuges. The National Wildlife Refuge System Administration Act, as amended, states that the Secretary shall provide for the conservation of fish, wildlife and plants, and their habitats within the System as well as ensure that the biological integrity, diversity, and environmental health of the System is maintained. Through the NWRS Improvement Act of 1997 (which amended the NWRS Administration Act of 1966), the U.S. Congress directed the FWS to grant six wildlife-dependent public uses special consideration in the planning for, management of, and establishment and expansion of units of the National Wildlife Refuge System. The six priority public uses are to be considered after taking care of the needs of wildlife. All uses have to meet a compatibility standard. If a use increased to a point it was no longer compatible with the purposes for which the Refuge was established, the use would have to be reduced or eliminated.*

I do not want the environmental education expanded nor any more concrete buildings taking over refuges. I do not want greater numbers of students trooping into these areas. We need to get people outdoors, not into concrete buildings. (EM2).

RESPONSE: *Environmental education is one of the six priority public uses identified for special consideration in National Wildlife Refuge System Administration Act, as amended. Environmental education has been found to be compatible with the purpose of Turnbull NWR and will be kept limited to specific areas of the Public Use Area and the Turnbull Lab for Ecological Studies. All uses are monitored on the Refuge and through adaptive management can have added stipulations or be reduced or eliminated should habitat or wildlife disturbance reach a level that would be incompatible. Under the CCP, all visitors will be restricted to trails only. Student use will be restricted to trails and specific environmental education sites. Less than one hour of the students average four hour field trip is spent inside the environmental education classroom. Most of the student's time on the Refuge is associated with outdoor activities.*

Hiking

Most respondents who commented on hiking and pedestrian trails supported the expansion of trails as envisioned under Preferred Alternative 3 of the Draft CCP/EA. (EM3, EM18, F4, F6, F15, F16, F27, L2, L9, L11, L13). Some of the reasons cited by the respondents included:

- **When we work the store on weekends, most people are asking about trails, how long they are, where they are, and there are some who ask about biking. The public we talk with is definitely interested in more trails. (F25)**
- **Turnbull is an inexpensive getaway and an increase in pedestrian trails would allow a wider wildlife experience. (L13)**
- **Really like the extension of loop trails. (F6)**

We support an increase in pedestrian trails, with more signage to educate users. However, we are opposed to all off-trail public use by individuals or groups, except as needed for projects under the direct supervision of Refuge staff. (L11)

RESPONSE: *Under the CCP, visitors will be restricted to trails only. The CCP also calls for interpretive signs at various observation points and trails to enhance the visitors understanding of the habitat and wildlife in the area.*

Two respondents questioned whether the public really wants increased trails and questioned whether the Service has sufficient resources to enforce no off-trail use (EM14, EM16).

RESPONSE: *Under the CCP, the Service will enforce no off-trail use in the public use area. The CCP calls for the addition of a full time law enforcement officer for the Refuge.*

Access

Support increased access. (F36) More access for hiking, driving, educational efforts. (F4)

RESPONSE: *The CCP will add 390 acres to the currently designated Public Use Area and will add seasonally the 5000+ acres of the proposed hunting area.*

Provide access on the east side of Refuge from Cheney Spangle Road. (EM3)

RESPONSE: *Because of the requirement to collect entrance fees we have not developed a public access on the east side of the Refuge. Creating a second fee station at Gate 19 could be a future consideration.*

Wildlife Viewing, Photography and Interpretation

Several people wrote in supporting improvements and increases in viewpoints and photo blinds and/or the proposal to include interpretive signs at most or all of the viewpoints. (L9, L11, L13, L14). Other specific comments and responses follow:

Viewpoints (wetland) off Cheney-Spangle Road should be developed. (EM3)

RESPONSE: *There is one viewpoint proposed along Cheney-Spangle Road.*

Include Native American and early settlement history with wildlife for kiosks and brochures. This would provide friendly connection with the "old timers". (EM3)

RESPONSE: *Our existing Interpretive Prospectus proposes providing historical interpretive panels as well as natural history and management interpretive panels within the public use area.*

Suggest showcasing elk and waterfowl viewing, interpretation, and photography. (EM12)

RESPONSE: *Our Interpretive Prospectus calls for interpretive panels about wildlife on the Refuge which would include waterfowl and elk. We can add to our discussions of elk and waterfowl in our environmental education program.*

Would like tour of Native American and early settler's historic use of Refuge area. (L4)

RESPONSE: *Refuge staff often accommodates special requests for tours of the Refuge. A tour highlighting historic uses of the Refuge could be arranged.*

Bicycle Trails

The idea of establishing bike trails was mostly favored by the public who responded. Approximately ten of the comments received favored the idea of designated bike trails (EM3, EM18, F4, F6, F15, F16, F27, F35, L11, L14) while comments received from four opposed this idea (EM14, EM 16, EM 19, F5). More specific comments and responses follow:

Two connections to Columbia Plateau Trail would be much better. A loop trip through the Refuge is a much more stimulating challenge. This fits in with the goals of Cheney to develop as a gateway community to Turnbull and the extensive trail system that is present and will be developed in the next few years. Connection to the Centennial Trail and the proposed cross-state trail (State Parks project) will tie Turnbull into the system and make the Refuge an even more important part of the community. (EM3) Extending trail down Cheney Spangle Rd. to Kepple Lake is the best idea. Cheney Plaza Rd. trail might go unused due to mostly mountain bikes on Plateau trail at that junction. (F27)

RESPONSE: Because of the requirement to collect entrance fees we have not developed a public access on the east side of the Refuge. Creating a second fee station at Gate 19 could be a future consideration. Alternative 4 in the Draft CCP/EA included a proposal to extend the bicycle trail as a loop down the Cheney Plaza Road around the auto tour route and out Gate 19 to Cheney Spangle Road. This would have necessitated creating a public entrance there that would require an entrance fee station and public gate system similar to what exists at the entrance on Smith Road. Creating a trail system adjacent to the Cheney Plaza Road will be easier as most of the land along that route is within the Refuge. The plan is to use the old county highway as much as possible and where it no longer exists, use the county road right of way. Cheney Plaza Road is used extensively at the time by bicyclists accessing the Refuge or points south.

I do not support expanded bike trails; this is purely recreational. Refuges must focus on their primary goal, not become parks. (EM14)

RESPONSE: The purpose of the trail is to provide access to the Refuge public use area to view and enjoy wildlife and wildlands by bicycle and not for the purely recreational aspect of bicycling.

Providing bicycle trails would have negative impacts on wildlife. (EM16)

RESPONSE: Pedestrians, bicyclists, and motorists all have some negative impact on wildlife. However, these are the preferred forms of travel by most visitors. A bicycle trail alongside the Cheney-Plaza Road will provide a safe path for bicyclists already accessing the Refuge.

Oppose increased bike trails in a region that has many bike trails. (EM19)

RESPONSE: The proposed bicycle trail will not create a new use. Bicyclists are already pedaling to the Refuge from Cheney using the Cheney Plaza Road which has no bike lane or safe shoulder. Using the old Cheney Plaza road bed and creating a bike lane on some portions of the existing highway (where the old highway no longer exists) will merely create a safe path for the

bicyclist and assist bicycles to avoid vehicles using the highway. Creation of this bicycle trail will probably increase the number of bicyclists accessing the Refuge Public Use Area.

Public Use Area Size

Maintain Public Use Area Size as specified under Alternative 1. (EM14)

RESPONSE: Although actual acres delineated for the Public Use Area under the CCP will increase by 390 acres through the addition of the bike trail from the Columbia Plateau Trail and the addition of a trail out to Stubblefield Lake, users will also be required to stay on trails or roads and not venture off-trail. Under the current management situation (Alternative 1 in the Draft CCP/EA), visitors may come and go anywhere within the 2200 acre Public Use Area without restriction, which causes more impact to wildlife, not less.

Miscellaneous Public Use Comments

There should be limited contact for people with wildlife. (PM1)

RESPONSE: By limiting visitors to trails only under the CCP (no more cross country hiking) the Service expects to reduce the potential for wildlife and habitat disturbance.

Consider campground facility to make Refuge more accessible from Spokane. (EM3)

RESPONSE: Camping is not a use that was considered under the CCP. Camping is not a wildlife-dependent public use. Turnbull NWR is only a 45 minute drive from Spokane and visitors from the Spokane area can easily make a day visit to the Refuge. Visitors from outside the Spokane area can find public camping facilities within an hour of the Refuge and private camping facilities within 15 minutes.

Concern Refuge becoming more of place for people than for wildlife. (L8)

RESPONSE: *Wildlife will always be the first consideration on the Refuge. Public uses will be monitored to insure that habitat and wildlife disturbances do not become incompatible with the purposes for which the Refuge was established.*

Support fishing (EM1). Support fishing catch and release program. (EM8)

RESPONSE: Since fishing is one of the six wildlife-dependent public uses identified for special consideration in National Wildlife Refuge System Administration Act, it received enhanced consideration during the development of alternatives. Historically most wetlands in the Refuge area were isolated from sources of native game fish as is the majority of the Palouse River subbasin in which the Refuge is situated. Palouse Falls on the Palouse River at the bottom of the subbasin and near its confluence with the Snake River constitutes an impassable barrier to fish migration especially for anadromous salmonids. The only native fish species that originally occurred in the Palouse Subbasin above the Palouse Falls were minnow-sized species of dace, shiners and sculpin. There were no native game fish. Several species of game fish have been

and continue to be planted in various water bodies within the Palouse sub-basin. Some plantings even occurred in the past on the Refuge in the Pine Creek Drainage and Stubblefield Lake. These plantings included rainbow and eastern brook trout. A recent inventory of refuge fish populations found that introduced game fish currently occur only in Pine Creek below Cheever Lake Dam. This half-mile reach of Pine Creek within the Refuge supports self-sustaining populations of rainbow trout and rare occurrences of smallmouth bass and kokanee that originated from introductions downstream in Chapman Lake. The fishless nature of the majority of the Refuge water bodies results in aquatic ecosystems with an abundance of invertebrate species that provide food for waterfowl, other water birds and several native amphibian species. Introduction of game fish and management for sustainable harvest would significantly impact the Refuge's aquatic ecosystems resulting in unnatural conditions that would impact much of the wetland-dependent wildlife on the Refuge. In addition, most of the wetlands on the Refuge are shallow and supported only by annual runoff from precipitation and snow. These wetlands dry out periodically and would not support a fishery. There are at least eight lakes within 10 miles of the Refuge that support public fishing so there is no lack of opportunity for fishing in this area.

HUNTING

Hunting in General

(Note: the summary of comments focusing specifically on the proposed elk and waterfowl hunts are summarized in those sub-sections below).

The proposal to initiate hunting at Turnbull Refuge elicited a great deal of comment. Several people wrote in with comments supportive of hunting in general (F1, F9, F28, EM1, EM4, L1, L5, L7). Some of the reasons expressed for the support included:

- **Nothing wrong with allowing regulated hunting to control populations. (EM1)**
- **Regulated and controlled hunting for the general public. (F28)**
- **Hunting needs to be an available management tool. Hunters can control population numbers at minimal cost while actually infusing local and state economies with needed funds. (EM4)**
- **Will increase hunter support for Turnbull. (L1, L7)**

Several people providing comment wrote in opposing hunting (F5, F16, F30, F31, EM2, EM3, F37). Some of the reasons expressed by those opposing hunting on the refuge included:

- **Hunter killers have taken to hiding the horror of what they do. They use "harvest" as if they planted the wildlife. (EM2)**
- **If a hunt is allowed there will be a major loss of public support for the Refuge. (EM3)**

RESPONSE: Hunting is one of the 6 priority public uses identified for special consideration in National Wildlife Refuge System Administration Act. These priority public uses are to receive enhanced consideration during refuge planning. Although hunting is a priority public use, it still must pass the compatibility test. Compatibility determinations were completed for the hunting programs and are included in the final CCP. These programs were found to be compatible with the Refuge purposes. The compatibility determinations specify required stipulations that

minimize impacts to non-target wildlife species and habitats, minimize impacts to other priority public uses, and take into consideration public safety on the Refuge and off-refuge areas adjacent to the hunt units.

Additional comments, suggestions, and concerns regarding hunting programs in general are addressed below.

I was told that the original Refuge deeds stipulate no hunting. (EM14, EM23)

RESPONSE: All the deeds to current tracts within the Turnbull NWR were reviewed and we found no reservations in them that would restrict hunting on the Refuge. By law, 40% of refuge lands purchased with Migratory Duck Stamp Funds can be opened to hunting. This limitation on the other 60% ensures that there are still lands managed in a sanctuary status to allow migratory birds a resting/feeding area during the fall migration.

I hunt but I believe we need places where there is no hunting allowed. (F27)

RESPONSE: There will continue to be several areas on the Refuge where hunting will not be allowed (approximately 70%) to separate hunting from other public uses, to buffer roads and adjacent homes, and to allow undisturbed zones for wildlife.

I really think the term "refuge" is a misnomer since so many refuges allow hunting and, in some cases, even trapping. The public is led to believe that these are safe havens for animals when they are not. (F14)

RESPONSE: Turnbull Refuge will still provide sanctuary to many wildlife species throughout the year. The seasonal elk hunt will help reduce an enlarging herd that is adversely impacting habitats and other wildlife that use the Refuge. In nature there is usually a balance, a food chain based on predator and prey. In the case of the expanding elk herd there are no natural local predators keeping the herd in balance. Introducing humans as the hunter/predator will help bring back a balance to the ecosystem.

How many refuges allow hunting? (L5)

RESPONSE: More than 300 of the 545 national wildlife refuges have hunting programs.

Service should use hunting income to maintain the Refuge. (F1)

RESPONSE: Although the Service collects recreation use fees, the limited fees collected do not support maintenance needs on the Refuge. At the most the recreation user fees collected would support maintenance of hunting facilities and could go toward monitoring and policing the hunt. Should the State decide to raffle a specific bull tag for the hunt on Turnbull, the proceeds would go to the State as raffles are not permitted by law on National Wildlife Refuges. The State proposes that these proceeds could go toward annual big game surveys in this area.

Elk Hunting

About thirty letters were received specifically expressing support of elk hunting (F2, F3, F4, F14, F19, F20, F25, F27, EM5, EM6, EM7, EM8, EM9, EM10, EM12, EM17, EM18, EM22, PM4, PM6, PM7, PM11, L2, L5, L6, L9, L10, L15, L11, L14, L15). Some of the respondents were very enthusiastic about initiating an elk hunt and some of the reasons expressed in support included:

- **Hunting is an excellent way to maintain elk herd size. (F20)**
- **To minimize damage to the habitat (F25)**
- **Problems with over population have gone on too long. (EM4)**
- **Washington has a relative shortage of good elk hunting (F7)**
- **Currently most of the elk hunting in the area is on leased private land and not available to people without money and special connections. (EM9)**
- **Elk do impact aspen stands which support a disproportionate number of wildlife species, especially neo-tropical migratory birds. (EM14)**
- **It's a shame that for all these years this public property hasn't been managed with any consideration for the sportsman. (L5)**
- **Refuge elk hunting will distribute elk to make them available on surrounding lands. This will help address concerns related to crop and hay damage. (L15)**
- **WDFW advocates sustainable elk hunting on the Refuge because our agency promotes recreational hunting consistent with population conservation wherever we can. (EM12)**

However, a good deal of the support for elk hunting was highly qualified. Several people stated that they were generally opposed to any kind of hunting on wildlife refuges, but could support this hunt because it was designed to be limited and carefully controlled (F4, F14, F32). Numerous others expressed support for a limited or controlled hunt for conservation purposes (F4, F25, EM4, EM10, EM17, PM6, L4, L7, L10, L11, L14, EM18, and EM22).

RESPONSE: The elk hunt has been proposed in an attempt to reduce the herd size due to increasing habitat damage on the Refuge and depredation of crops on private lands adjacent the Refuge. Hunting and other wildlife-dependent uses receive enhanced consideration during planning for all National Wildlife Refuges.

A few people stated in their comments that they were specifically opposed to elk hunting (L8, EM3). Reasons expressed included:

- **This should be a safe area for wildlife. (EM3)**

RESPONSE: See responses above to comments on sanctuary status of refuges.

Additional comments are addressed below:

Concern that elk hunting on Refuge will move elk problem off Refuge, increasing trespassing, poaching, and elk grazing on private property. What caused elk herd to get out of control in last decade versus when there was cattle grazing (circa 1993)? (EM11)

RESPONSE: An expanded distribution of elk during the hunting season will likely occur when the Refuge is opened to hunting. Establishing a hunt program on the Refuge will keep elk from congregating on the Refuge during the hunting season which may cause private land owners to have to deal with elk and hunters more than they have in the past. We believe that if we can enhance the harvest of elk both on and off the Refuge and reduce the number of animals in the herd the problems associated with the elk herd should decrease, not increase over time. Although a Refuge hunt may result in some of the private land owners to have to deal with elk and hunters more than they have in the past, it will also increase potential harvest opportunities on private adjacent lands.

Several elk collared and monitored by the Coeur D'Alene Tribe migrating between Refuge and Reservation and shows importance of connectivity and habitat areas between the two land bases. Tribe wishes to continue cooperation with Refuge staff (L2)

RESPONSE: We are pleased to have partners monitoring and managing the elk in this area.

Allow hunting where elk are, rather than just in proposed designated areas. Elk would congregate in Pine Lake Drainage and make my problem worse for damage in the winter to my haystacks. (PM6)

RESPONSE: Although the Pine Creek Area is included as a hunting unit under the CCP, the CCP will expand the Public Use Area into the area southeast of Cheever Lake where elk had a tendency to congregate in the past. This increased pressure may cause elk to move off refuge during the day or seek new areas with less activity. Hopefully it will cause the elk to move into areas on private land during state elk seasons where additional harvest could occur. The option to open this area temporarily to permitted hunters could be explored if other public activities do not adequately redistribute elk. Elk hunting will not occur in or adjacent to the Public Use Area for safety reasons. We envision a hunt plan that is flexible so that management can adjust hunt area boundaries (within reason), seasons, and numbers of permits to adjust to the annual situation. We will be monitoring elk movement in the southeast portion of the Refuge.

Introduce wolves onto the Refuge. (F27) All the elk (you undercount as I've been told) need to be harvested more readily – they attract predators – you have wolves there don't you? (F19)

RESPONSE: The Turnbull area does not presently have wolves and has not been identified in the gray wolf recovery plan for the Rocky Mountains. It would not be a likely location for reintroduction because of the high density of human development and lack of large contiguous areas of wilderness. The potential for serious human/wolf conflict in this area is too high.

What is the source of elk population estimates in CCP? Suggest changing "security cover" to "security zone" regarding Service jurisdiction over elk herd (EM12).

RESPONSE: The population estimates in the CCP were provided by biologists from the Washington Department of Fish and Wildlife. The term security zone will replace security cover in the final document.

Management of Hunt Programs

Prepare for poaching and hunter trespass problems (off season). (F27)

RESPONSE: The CCP calls for the addition of a full time refuge law enforcement officer.

All hunt methods should have opportunity. A good mix of bull and cow hunts should be used. (F27) Hunting opportunities on Refuge should be reserved for those whose limited abilities would preclude their hunting on other lands and by groups such as bow and arrow hunters. (L11, L14) Have a special season on the Refuge – also outside the Refuge at the same time. (F32) Give all licensed hunters with elk tags chance to draw. (PM4)

RESPONSE: All hunting options will be reviewed during the planning process for the step-down Turnbull NWR Hunt Plan. No matter what hunt program is finally selected all new programs/facilities on national wildlife refuges need to provide for accessibility.

Use of Other Elk Management Tools

Prefer using other elk management tools to hunting. (F16)

RESPONSE: Comment noted.

Oppose using hormones suppressing reproduction to control elk population, want to avoid consuming harmful substances (L4)

RESPONSE: This is one of many options listed in the CCP. This is a relatively new technology that may have some applicability. The use of hormones to suppress reproduction of elk in this herd will be given consideration.

Before elk hunting is permitted, Service should study archery, bioreproductive controls, and maximum translocation of elk to the nearby tribes who expressed interest (Spokane, Coeur D'Alene). (EM11)

RESPONSE: All tools available for managing the elk population will be further analyzed for cost effectiveness and given consideration.

[Instead of hunting], open up selected areas to hikers, bikers, and equestrians during hunting season to help disperse the herds onto private lands where they will be hunted. Perhaps trap elk and move to tribal lands or other areas where they would be hunted. (EM3)

RESPONSE: Relocating elk is an option that is identified in the final CCP. Although hunting as a wildlife dependent priority use is to receive enhanced consideration in refuge public use planning, other herd reduction techniques can be employed. These other options may be necessary if a compatible hunting program is not reducing elk numbers enough to prevent habitat damage. The cost effectiveness of all herd reduction techniques would also be analyzed.

If elk were fed more on the Refuge in winter they would not stray off onto private lands and do damage to farmers' stacks. If bio-bullets are the answer, I don't mind that. (F21)

RESPONSE: Winter feeding programs could alleviate some crop damage off-refuge, but it would also have many negative side effects. Feeding programs are costly to manage even if volunteers are recruited for much of the labor. Artificially concentrating large populations of any wildlife species increases the risk of disease transmission and can also result in damage to other habitats that directly affects other wildlife species.

Talk of birth control of wild animal herds is idiotic and a warm fuzzy fantasy! (F7)

RESPONSE: Birth control is just another tool for managing expanding populations.

Oppose tools other than hunting to reduce elk numbers because other methods are costly and do not provide a priority public use under the RIA (EM19)

RESPONSE: Hunting has been identified as one of the ways that will be used under the CCP to reduce elk numbers because it is identified as a priority public use in the National Wildlife Refuge System Administration Act, as amended, and is likely the least costly strategy to implement. The other management tools identified may have application if the annual hunting program which is constrained by quality and safety issues fails to appreciably reduce elk numbers and damage to aspen.

<u>Waterfowl Hunting</u>

Public reaction to the proposed youth waterfowl hunt in Preferred Alternative 3 of the Draft CCP/EA was about evenly split. Some of those who supported the hunt (F12, F20, F25, F27, EM6, EM7, EM9, EM15, EM17, L9, L11, and L14) expressed the reasons listed below. However, some of the support was guarded (like the response to elk hunting); some respondents stated that they could support a youth hunt but opposed all other kind of waterfowl hunting (L11, L14).

- **Keeps an American tradition alive. (F20)**
- **Probably not harmful especially as you've listed it in conjunction with an educational program. (F25)**
- **Actual hunt should be short, one weekend per year. (F27)**
- **Many students don't have the time or financial opportunity to secure hunting access to private land. (EM9)**

RESPONSE: Two alternatives in the Draft CCP/EA included waterfowl hunting. Under the CCP, the Service will provide a Youth Waterfowl hunt at Turnbull Refuge one weekend per year and will defer a regular season adult waterfowl hunt until a large fall wetland base can be restored. Turnbull Refuge staff has supported environmental education for youth for several years now and are willing to extend this education by offering a youth waterfowl hunt where parents can bring young hunters for an opportunity to learn about waterfowl natural history and waterfowl hunting techniques.

About a dozen respondents wrote in opposing waterfowl hunting of any kind (F3, F4, F14, F22, EM11, EM14, EM16, EM18, PM4, L4, and L8). Some of the reasons expressed for the opposition included:

- **Contrary to mission of Refuge. (EM11)**
- **Waterfowl hunting contradicts one of the purposes of the Refuge – being an inviolate sanctuary for migratory birds. (F16)**
- **What few birds we have on the refuge anymore should be left in peace (F22)**
- **No justification for duck hunting. Duck numbers have been going down both on and off the Refuge for years. (EM3)**
- **Opposed unless needed for conservation purposes. (F4)**
- **No management basis for a hunt, (EM14, EM16)**
- **We are speaking out against any use of the Refuge that does not put wildlife first. (L8)**

RESPONSE: Hunting is one of the public use priorities identified in National Wildlife Refuge System Administration and therefore must receive enhanced consideration during planning. The Refuge Administration Act also stipulates that a public use must be compatible with the Refuge purposes. A two-day youth waterfowl hunt utilizing a permit system and spaced blinds on Upper Turnbull Slough has been found compatible with refuge purposes (see Appendix E). Currently the Refuge supports the bulk of the fall migration in this area. Although a 2-day Youth hunt with restricted numbers will not impact bird use of this habitat, a larger scale hunt over the course of the State season would significantly decrease waterfowl use of the Refuge. Under the CCP, the Service decided to not open wetland areas on the Refuge to hunting during the regular season, unless and until more wetland habitat can be restored, because the Refuge habitat represents the majority of fall migration habitat in the area. In addition there was extremely low interest in opening the Refuge to waterfowl hunting expressed by the public during the scoping period.

The EA indicates that there has been a shift in waterfowl numbers to the west of TNWR. Why not address this issue first rather than devote scarce resources to a hunt? (EM16)

RESPONSE: The causes for the shift of waterfowl numbers to the west during the fall migration period is predominately a result of larger level landscape issues that cannot be resolved in the area encompassed by the Stewardship Area. Following the development of the Columbia Basin Project, the thousands of acres of "hot" foods (corn, soybeans, potatoes, etc.) that were developed using irrigation water from Coulee Dam, provided an abundant food source for migrating ducks. This new irrigation also created several thousand acres of wetlands associated with waste ways. The combination of wetlands and abundant food created optimum migration stopover habitat. The other landscape level change that contributed to the shift in fall flights to the west is the drainage of nearly 70% of the wetlands around the Refuge for pasture and cropland. This vast drainage effort had the greatest impact on fall wetland habitat reducing migration stopover habitat in this area. Through the Stewardship Area conservation programs included in the CCP, currently drained wetlands may be restored increasing the fall habitat base. This will likely result in an increase in fall waterfowl use of the area, but will not significantly shift the fall flight away from the Central Columbia Basin. The waterfowl hunt proposed under the CCP is only a 2-day youth hunt tied to the Refuge's environmental education program. A longer hunt is not proposed at this time, but may be established in the future if the fall waterfowl habitat base is increased through conservation efforts.

Have a hunting blind and lottery system like at McNary NWR. (F12)

RESPONSE: We will review hunting facilities and programs on other national wildlife refuges and discuss hunting options with local WDFW staff while developing a hunt plan for Turnbull. The public will have opportunity to comment on proposals in the hunt plan.

Hunting of Other Species

Three people providing comments wrote in expressing their desire to see the Refuge open a deer hunt. (F2, L11, L14)

RESPONSE: Deer hunting was not offered in any of the alternatives in the Draft CCP/EA for several reasons. During our planning, deer hunting was not identified as an issue by staff nor was it identified as a need by the public during the scoping process. White-tailed deer populations are regulated at relatively low numbers by an endemic viral disease. Opening the Refuge to a deer hunt that overlaps with elk seasons could interfere with our program to reduce elk numbers on the Refuge. If we were to offer deer hunting, elk hunter numbers would have to be reduced in order to preserve an overall hunting density that provides for a high quality and safe hunt.

Support turkey hunting and do not understand the delay. (EM9)

RESPONSE: Wild turkeys are a relatively new addition to the Refuge fauna. Very little is known about their population size, rate of growth, or their relationship to native wildlife and habitats on the Refuge. Future monitoring of this population and its impact on refuge habitats and wildlife will provide information for management decisions about whether or not to open a hunt.

How about opening the Refuge up for a general hunting season of other species but with limited access? (L6)

RESPONSE: See responses above regarding deer and turkey hunting. Also, there was an overall lack of support by the public during scoping. The elk hunt proposed addresses a management need as well as a recreational need.

LAND AND WATER PROTECTION

The Service proposal to protect land and waters outside the existing Refuge boundary using a variety of strategies attracted a good deal of response. Thirty-one letters were received that contained commentary supporting the Service's reasoning for land protection and supporting the tools proposed in Preferred Alternative 3 of the Draft CCP/EA to protect land and waters. Some also supported the larger proposal outlined in Alternative 4 (see following page). (F2, F3, F4, F5, F9, F10, F13, F16, F20, F28, F35, F39, F40, EM3, EM8, EM13, EM14, EM15, EM16, EM18, EM20, EM24, PM4, PM14, L2, L3, L10, L11, L12, L14, L15) The following reasons were cited in support of the land protection concept and strategies:

- **No question that as houses spread throughout Spokane County, both habitats and corridors are threatened. Protection through fees, easements or agreements from willing sellers seems like a win-win proposition. (L10)**
- **Alternative 3 provides greater protection than now exists for the flora, fauna, water resources, wetlands and critical habitat such as Palouse steppe, ponderosa pine and aspen. By enlarging the Stewardship Area, the Refuge can have a significant positive effect on adjacent lands. (L9)**
- **We need to protect the water purity and guard against water shortage. (F35)**
- **To conserve Refuge water quality (L11, L14, F2, F35, F37, EM13, EM20,EM22)**
- **Preservation of water quality is vital to the protection of habitat for water species. (F39)**
- **Will help preserve wildlife habitat. (L11, L14, F2, F35, PM4, EM13, EM18, EM22)**
- **Loss of critical habitats in Eastern Washington is occurring at a rapid rate. (EM16, EM14)**
- **I hope that you aggressively pursue more habitats for plants and animals. I am very concerned about the race to development occurring in the Cheney area. (F13)**
- **I have been deplored by the devastation of our natural resources. We have lost far too many of these precious resources and cannot afford to go on suffering these depredations. (L12)**
- **I'd like to see habitat restoration and maintenance be the highest priority (EM19)**
- **Three of the habitats (Palouse Prairie, Ponderosa Pine, and Herbaceous Wetlands) found within the area studied are key to conservation efforts in Washington. The Washington State Conservation Strategy ranks each of these as Priority One, the highest priority for current conservation action in Washington. (EM13)**
- **Cooperation and partnerships with surrounding landowners makes obvious sense. (EM14, EM16)**
- **The local region lacks adequate public lands, especially in consideration of the rapidly expanding population. Adding lands now will be easier and cheaper than if we wait. (EM3)**

The Refuge received twenty-five letters and a petition opposing land protection conceptually or opposing the Stewardship Area as proposed under Preferred Alternative 3 of the Draft CCP/EA. (F18, F19, F21, F22, F23, F26, F29, F30, F32, F33, F34, F37, F38, EM11, PM2, PM3, PM5, PM7, PM8, PM9, PM10, PM11, L8, L16, L17, EM19). Some reasons included:

- **We understand your support for the bordering land but feel this is private property and should be left that way. (L8)**
- **Too much government ownership of land is not healthy for our country. (F32, F21)**
- **Refuge is big enough now. (F23, F24)**
- **Current size of Refuge is adequate to pursue the original purpose without disturbing existing homes or economic enterprises. (F18)**
- **I have seen a well-managed ranch with great grass for cattle turn to weeds and barren land under government ownership. (F26)**
- **I don't believe that more property would do the Refuge any good. (PM7)**

RESPONSE: The neighbors within the Stewardship Area who oppose land protection efforts would be viewed as unwilling and there will be no expectation that they participate in any

program with the Refuge. Participation in a Stewardship Area concept will be entirely voluntary. Selling land to the U.S. Fish & Wildlife Service will be by willing seller only. The Service's biological reasoning for protection of additional lands surrounding the existing Refuge is sound and is presented in the CCP.

General Comments:

The Tribe takes great interest in the ecological integrity of the TNWR area as it is located within the Coeur D'Alene Tribe's Aboriginal Territory. The Tribe strongly supports the conservation actions outlined in the Draft CCP/EA that would encourage conservation within the Stewardship Area surrounding the Refuge. The Tribe believes that these types of management actions are crucial to restoration of the watershed as a whole. (L2)

RESPONSE: We will continue to work and consult with our Tribal partners on conservation issues of common interest on the Refuge.

I support protection of the maximum acreage identified under Alternative 4. (EM14, EM16). Alternative 4 is a very promising proposal. (EM13) Need to preserve more habitat. Would prefer Alt 4. (PM4) If we don't protect as much of the bugger zone and migratory corridors as possible, the quality of the refuge habitat will be eventually degraded for future generations. (F25)

RESPONSE: Under the CCP, the Service will work with willing sellers and landowners wishing to participate in voluntary conservation measures to protect habitat within the Stewardship area.

Service should establish green corridors for non-flying wildlife between Refuge and other semi-remote areas (Rock Lake, ID, Mica Peak) with State, county, or other entities. (EM3)

RESPONSE: Preserving wildlife corridors is one of the objectives of proposing a Stewardship area around Turnbull NWR.

We have had semi-drought conditions for years. As the population grows and more water is needed, who has priority? Would the Service pump water in for the Refuge? Would landowner well capping be voluntary or mandatory? (L3)

RESPONSE: There are no plans to pump water into the Refuge at this time. Groundwater pumping has been explored in the past, but the cost and potential impact to existing groundwater resources were too high to make it feasible. Well-capping or casing will be a totally voluntary program that would involve making payment to a landowner to case wells to prevent movement of shallow groundwater to the deep aquifer thereby lowering the ground table, or to discontinue use of a well. Pumping water onto the Refuge is not a feasible alternative during drought years. There are no regulatory aspects to anything proposed in the CCP.

Inland NW Land Trust requests the Service reevaluate their 15 parcels on Curtis Road as a single unit (INLT-DU Preserve) for suitability as Priority One lands for acquisition. We

own all 15 parcels as a single holding. They function together as wetlands, uplands, and wildlife habitat. (L3)

RESPONSE: The Service chose to adhere to its original process for determining priorities on individual parcels in the Land Protection Plan (Appendix A). The prioritization process was based on ecological scoring of parcels and their size. This did lead to some tracts that had been subdivided on paper being assigned a lower priority. Ultimately, the Service will use the priority system to identify those areas of most value for cooperative activities and/or acquisition but lower priority parcels can be considered for protection if there is mutual interest on the part of the Service and the landowner

I feel the Refuge should obtain as much fee ownership as possible (F3)

RESPONSE: Fee ownership is one of the tools used to conserve and protect lands in perpetuity. As funds are made available, fee title acquisition is a high priority. However, the Service will work with willing sellers only under the Service's Land Acquisition Policy (341 FW 1).

The Stewardship Area can best be described as a grandiose scheme. (F18)

RESPONSE: Throughout the National Wildlife Refuge System we are finding that refuges are increasingly isolated and squeezed by sprawl, housing and industrial development, minerals development and agriculture or other activities that put wildlife at risk Water supplies are threatened. They are being surrounded by construction and highways and thus wildlife refuges are struggling to maintain suitable habitat for wildlife. With the ever growing human populations and their demand for resources our national wildlife refuges are being threatened from the outside. While the human population has increased by 75% since 1955, the amount of land covered by urban and suburban development is estimated to have increased by nearly 300%. The Stewardship Area identifies the area where surrounding land use practices will have the most influence on the future of this Refuge. For years private lands in large tracts outside the Refuge borders buffered the Refuge from development and also provided additional resources for many wild species. This could continue if landowners stay with the traditional land use practices (ranching). However, times are changing and land use is changing. If wildlife refuges are to succeed in their mission of conserving species, refuge neighbors can help by voluntarily making their adjacent lands safe for wildlife. These adjacent lands are the key to ensuring the future of America's wildlife. By identifying land stewardship as an important activity under the CCP, we are reaching out to our community and to our neighbors and encouraging voluntary land use practices that will enhance, not threaten, wildlife and wildlife habitats. Wild animals don't recognize refuge boundaries. By some estimates, private lands protect roughly one-half of the most important wildlife habitats in the United States. We encourage private landowners to get involved and make a commitment to conservation. As long as properties around a refuge remain in their natural state, refuges are less vulnerable to threats such as reduced water supply, and diminished water quality. The Stewardship Area concept identifies opportunity areas for the Refuge to help adjacent landowners conduct voluntary conservation practices. The CCP will expand the boundary of the existing Refuge through a Stewardship Area delineating the resources important to maintaining the biological integrity and environmental health of the existing refuge lands (watersheds, open space buffers and landscape

linkages). The goal of land protection within the Stewardship Area is to promote conservation of these resources by private landowners through voluntary programs. The size of the project and the success of these conservation programs are dependent on voluntary participation by landowners. The potential level of participation is currently unknown, but through outreach efforts we hope enough interest will be generated that a moderate amount of wildlife habitat will be protected and improved.

Service will have hard time maintaining many small parcels of property scattered in large geographic area (PM6)

RESPONSE: The Service recognizes the difficulty in managing widely dispersed parcels in a large geographic area. Wetland Management Districts in the Midwest often cover several counties with hundreds of small tracts. Although these districts present significant management challenges, they are the backbone of waterfowl habitat management within the National Wildlife Refuge System. In comparison, the Stewardship Area identified in the CCP is a relatively small geographic area. The parcel priority system developed for the Refuge Land Protection Plan, however, takes into account these challenges and places a higher priority on larger parcels and those adjacent to existing refuge lands.

Service should recognize landowners who sell land to the Service by having a ceremony or through the naming of a lake, wetland, or trail (EM3)

RESPONSE: We support this idea; we believe those who work in partnership to protect important wildlife on their private property should be recognized for their efforts. Several wetlands on the Refuge already host the names of past landowners. We hope they and their heirs are proud of this legacy. Many of the lakes on the Turnbull have been named after previous landowners, i.e. McDowell Lake, Turnbull Sloughs, Hale Lakes, Tritt Lakes etc. We believe this practice could be continued.

Support additional land acquisition to the south but not to the west (EM8)

RESPONSE: Land acquisition will be based upon priority habitat becoming available from willing sellers. Lands to the west contain important resources that, if acquired, could meaningfully increase water quality and add to the conservation of important wildlife habitat in this area.

What impacts would there be on Historic Custom and Cultural practices? Have the required NEPA studies been conducted and what are the conclusions? (L16)

RESPONSE: Consistent with NEPA implementing regulations, the Environmental Assessment evaluated potential impacts of the various alternatives outlined in the Draft CCP/EA on the "human environment" - that is, "the natural and physical environment and the relationship of people with that environment" (40 CFR 1508.14). The Environmental Assessment appropriately addressed economic and/or social effects interrelated to natural or physical environmental effects and concluded that impacts to the human environment are expected to be less than significant.

Why must land be defined as within an expanded boundary in order to be purchased from a willing seller? (EM11)

RESPONSE: The Service has no authority to acquire land without an approved boundary. Likewise, lands cannot become part of the National Wildlife Refuge System unless they are within an approved refuge boundary. Should the Director approve a refuge boundary, then the Service has the authority to make offers to purchase land or enter into management agreements with willing landowners within the approved boundary.

Landowners within an approved refuge boundary can sell their land at any time to any buyer. They are not compelled to sell their lands to the Service. Landowners within a refuge boundary retain all the rights, privileges, and responsibilities of private land ownership including the rights to access, control trespass, sell to any party, and develop their properties, even if the Service has acquired interest in the surrounding land. Development of privately owned land continues to be subject to local regulations and land use zoning. The approved boundary has no regulatory effect on landowners.

As owners of 320 acres with 1st and 2nd order protection priority in the CCP, located a half-mile south of the Refuge, we suggest Service work with neighboring landowners to address natural resource management challenges, especially elk, forest health, and noxious weeds.

RESPONSE: *Under the CCP, the U.S. Fish & Wildlife Service will develop an outreach program for local landowners that will provide technical assistance and linkages to existing wildlife and habitat incentive programs to assist with natural resource management of their lands. The primary goal of the Stewardship Zone is to work with willing refuge neighbors to achieve a common goal of maintaining healthy lands that not only meet the landowner's needs but provide habitat for native wildlife.*

Expanding Refuge would cause more wildlife/human conflicts such as animal/vehicle collisions, wildlife straying into urban home areas, and crop damage. (L16)

RESPONSE: *Although conditions are rapidly changing, the current landscape around the Refuge is providing habitat that supports populations of wildlife species that are also found on the Refuge. Addition of lands to the Refuge through purchases from willing sellers would not necessarily result in significant increases in wildlife. The exception may be waterfowl populations. If newly acquired lands have wetlands that could be restored, there is a potential to increase the habitat base for wetland-dependent species. The acquisition of lands could prevent the additional loss of habitat and wildlife in the area from potential development activities, helping maintain current wildlife populations.*

How does the Service plan to address the encroachment from wildlife and the wildlife/human conflicts? If the Service plans are to increase wildlife numbers, there will be increased wildlife conflicts. If a private landowner does not wish to provide wildlife habitat, how does the Service plan to address any damage to private lands by wildlife? Health issues of disease transmitted to domestic herds by wildlife have not been addressed.

(i.e. Yellowstone buffalo infecting local herds) Does your agency have a plan in place to mitigate losses from disease transferred from wildlife to domestic herds? (L17)

RESPONSE: The CCP proposes strategies to reduce the elk herd such as opening the Refuge to hunting. It is our intent to work with the State Fish and Wildlife agency to come up with solutions for reducing the herd and thus reducing wildlife/human conflicts. We see the potential for waterfowl numbers to increase in the area if any additional wetland areas are restored, however we don't anticipate waterfowl/human conflicts. Waterfowl population problems can also be managed through hunting programs. Should a landowner have a depredation complaint due to wildlife impacts to their property they can address these through the State Department of Fish and Wildlife (resident game species). Should a landowner have a depredation complaint due to waterfowl or other migratory birds they can address that complaint through a USDA APHIS animal control agent. There is not a herd health issue such as brucellosis associated with the elk at Turnbull. There is no brucellosis in our area like that infecting the Yellowstone bison. The USFWS and State F&W are monitoring for Chronic Wasting Disease, which is also currently not in our area.

<u>Condemnation Concerns</u>

Suggest Service provide more specific information to address concerns of condemnation. Concern about the taking of private property (EM11, L15) the Stewardship Area is a way of getting a Federal Foot in the door to facilitate a later "taking" of private property. (F18)

RESPONSE: The policy of the U.S. Fish and Wildlife Service is to work with "willing sellers only" in land acquisition, as described under the Service's Land Acquisition Policy (341 FW1). The Service has no intent or desire to condemn land in this area; there will be no taking of private property. Everything associated with the proposed Stewardship Area is voluntary. If landowners are not willing to participate in any land conservation actions they will not be compelled to do so. There is nothing regulatory about any of the land protection actions in the CCP. The intent of delineating a Stewardship Area is to identify an area around the Refuge where we believe focusing cooperative conservation activities will be most beneficial for protecting and enhancing wildlife and wildlife habitat. The use of the word stewardship is the acknowledgement that everyone owning land in the area is a steward of the land. Those willing to voluntarily work toward conservation and restoration of habitats within the area will be given technical assistance commensurate with available funding.

We understand the Service at this time would only acquire lands from willing sellers. Can you assure us that if all the land surrounding ours is acquired that the Service would not use eminent domain to "take" our land to complete a segment of wildlife habitat area? (L17)

RESPONSE: See above response.

Anyone who puts their property up for sale would be obligated to have it appraised by a refuge-designated appraiser, and the bid received would be significantly less than market value. (EM11)

RESPONSE: Highly qualified appraisers familiar with the local area are contracted by the Department of the Interior to prepare a fair market appraisal, based on stringent Federal appraisal standards. The appraiser makes an estimate of market value based on the highest and best use of the property and current market conditions. The appraiser looks at the value of similar property selling in the vicinity. By law, the Service's offer must be based on market value. The landowner can then make a decision whether to accept the offer or not.

If the program remains completely at the option of the property owner, then I can see a more positive outcome. (PM14)

RESPONSE: Any participation by a property owner is entirely voluntary thus the option is entirely theirs.

Since Fish and Wildlife wishes to establish a "stewardship area", does this mean Fish and Wildlife is to be steward of that property? Blacks Law Dictionary, 6th edition, defines property as "that, which belongs exclusively to one". More specifically, ownership: "the unrestricted and exclusive right to a thing." Blacks Law defines steward as "A man appointed in the place or stead of another". As owners we are already stewards of our land and as such are unwilling to designate any other person or agency as steward. You say that Fish and Wildlife will work only in an advisory capacity, but with the legal definition of "steward" control is implied. If the goal is only protection and enhancement of wildlife, a designated "stewardship area" is unnecessary; we reject any designation as such, evidenced by the 426 signatures presented to you this past summer. (L17)

RESPONSE: We chose to use the word stewardship in the widely used context of conservation stewardship. Any search of the term conservation stewardship on the internet will bring up many examples of the use of the term. Stewardship is about landowners wisely using, managing, protecting, or conserving the natural resources which have been entrusted to them or is rightfully theirs. By delineating a Stewardship Area around the Refuge we identified the resources important to maintaining the biological integrity and environmental health of this area. Within the Stewardship Area, it is our intent to provide technical assistance and information to interested landowners on existing wildlife and habitat incentive programs. For example, conservation efforts can be accomplished through voluntary landowner participation in such incentive programs as conservation easements, and the Wetlands Reserve Program. There is nothing regulatory about our proposals and we will make no attempt to control what a private landowner does with his or her property. Our use of the word stewardship is the acknowledgement that everyone owning land in the area is a steward of their land. Within the context of conservation, stewardship means conserving important ecosystems, such as effectively managing invasive alien species, fires, grazing or harvesting without damaging the land.

Economic Concerns

Oppose land taken out of production (F19, F26)

RESPONSE: The Service is only interested in purchasing land from willing sellers. Those who are willing sellers either already have property on the market or soon will have. There is no

guarantee that any future owner is going to continue agricultural activities on the property. The trend in land use has actually been to subdivide the property to the highest density allowed by zoning, and to sell the small parcels to homeowners. The resulting parcels are usually too small to permit any significant agricultural venture effectively taking it out of "production".

How much in taxes will your expansion cost us? (L3)

RESPONSE: See response below. There should be no loss in revenue to the County.

Oppose land taken off tax rolls (F19, F23, and F26)

RESPONSE: The economic analysis provided in the Draft CCP/EA indicates that, if lands are acquired, there could be a reduction in tax revenue under the CCP when compared to what the county receives directly from landowners at present. However, overall the CCP would have a net positive economic effect in the county, which could partially or completely offset any direct loss of tax revenue.

Any decrease in property taxes will be more than offset by Refuge Revenue sharing revenues, the projected effects on employment and personal income, and the recreation benefits which will result. (EM13)

RESPONSE: See above response.

Costs for Alternatives 2, 3, and 4 are grossly underestimated. Projected land acquisition costs could easily triple or more. The Refuge should remain within existing boundaries, in part because of huge backlog of incomplete projects. (F18)

RESPONSE: The estimated costs of the alternatives presented in Appendix F of the Draft CCP/EA were based on best professional judgment at the time the Draft was written.

Has the USFWS conducted the required studies under the Regulatory Flexibility and Fairness Act? (L16)

RESPONSE: The Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act) applies to rules published by federal agencies. The publication of the CCP does not constitute a rule and none of the proposed actions within the plan are regulatory in nature and thus do not necessitate studies under the Regulatory Flexibility and Fairness Act.

There will be impacts to small businesses from displacement of landowners. Citizens on petitions request copies of all studies showing impacts on local small businesses. (L16)

RESPONSE: An economic analysis was provided in the Draft CCP/EA that took into account multiplier effects (effects to businesses that might be affected by direct changes such as displacement of landowners). The analysis showed that implementation of Preferred Alternative 3 would have negative impacts on the local agricultural economy compared to keeping refuge management as is under Alternative 1 (Table 4-20). However, these effects would be far offset

by the positive economic effects Alternative 3 would have on the local economy by additional recreational expenditures made by people using the additional trails and facilities under Alternative 3, and engaging in the hunting programs (Tables 4-18 and 4-19). Table 4-24 in the Draft CCP/EA, which summarizes the overall effects to employment and personal income, shows that Alternative 1 would result in only 165 jobs and about $3 million in personal income, while Alternative 3 would result in 225 jobs and about 4.1 million in personal income. So, overall Alternative 3 was shown to have a more positive economic benefit to the community than Alternative 1.

Overall national wildlife refuges are economically beneficial to local communities. A report released by the USFWS in September 2005 titled "Banking on Nature 2004: The Economic Benefits to Local Communities of National Wildlife Refuges" can be found on the internet at http://www.fws.gov/refuges/. This report indicates that recreational use on national wildlife refuges nationwide generated almost $1.4 billion in total economic activity during 2004. In 2004, 37 million people visited national wildlife refuges, creating almost 24,000 private sector jobs and producing $454 million in employment income. Additionally, recreational spending on refuges generated nearly $141 million in tax revenue at the local, county, state and federal levels. Ecotourism is becoming big business.

Would tourists enjoy viewing empty home sites? (L16)

RESPONSE: Purchasing homes within the Stewardship area would not be an efficient use of land acquisition dollars. The Service will generally seek to avoid acquiring established home sites. The emphasis will be on the protecting habitats and restoring wetlands. If older or mobile homes were purchased with tracts, they could be sold and removed to be used elsewhere in the community.

There have been no economic studies on what your proposed action would have on the local business community. While you state hunting and recreation opportunities would increase and benefit the local economy, we would like to bring to your attention that hunting and wildlife viewing is seasonal in this area. Local business needs year round income to stay in business. Money spent by local farmers and ranchers far outweighs that spent by tourist. NEPA and the SBREFA both require an economic study on what effects federal agency actions have on the economy, local custom, and cultures. You have not complied with these Acts. (L17)

RESPONSE: An economic analysis was provided in the Draft Comprehensive Conservation Plan/Environmental Assessment (see 4.3 Economic Effects on page 4-41). The economic analysis was contracted out to Jones and Stokes, Inc. Since there is nothing regulatory about our proposed actions there is no requirement to comply with SBREFA. We hope that the local farmer/rancher component of our community continues to stay intact and in business. Keeping the landscape in large landowner tracts such as those owned and managed by ranchers provides good wildlife habitat.

MISCELLANEOUS COMMENTS

Pages 1-5 of the CCP refer to the Inland Northwest Joint Venture, should be Intermountain West Joint Venture. (L9)

RESPONSE: We will make sure all references to IWJV are corrected.

Would like CCP to specifically mention the Centennial Riparian Restoration Project with goals for funding of equipment and seasonal personnel for watering, etc. (L11, L14)

RESPONSE: Although it is not referred to as the Centennial Legacy Riparian Project, that area is mentioned in the Habitat Management Plan summary (Appendix B)on page B-18 of the CCP under strategies for Objective 3C. The Pine Creek area is specifically mentioned in the HMP. We can add specific reference to the Centennial Legacy Riparian Restoration Project in Chapter 3 as an example of riparian restoration activity on the Refuge. The overall proposal in the CCP for additional staff positions at Turnbull would cover the needs of the Centennial project.

Service is asking for a budget increase from 1.7 to 27.7 million; tax dollars can be better utilized in other ways (L16)

RESPONSE: The 27.7 million is an estimate of the total one-time expenditure cost for Alternative 4 in the Draft CCP/EA (the maximum alternative – not the preferred alternative) summed over a 15 year period. Table F-5 in Appendix F of the Draft CCP/EA provides a budget summary which indicates that the estimated annual budget for Alternative 3 (the preferred alternative) would be close to $3.5 million. This figure was based on full implementation of the alternative including proposed acquisition. Actual annual budgets will in all likelihood be much lower than this. Table F-2 (Appendix F) which shows Operational Costs under the four alternatives shows an operational budget of $979,000 for Alternative 1 (No Action) and an operational budget of $1,561,000 for the Preferred Alternative (Alternative 3). These operating budgets include refuge operations and fire operations. The increase in operating costs reflects the new positions proposed under Alternative 3 which include a second wildlife biologist, a second maintenance worker, a second temporary biological technician, a refuge operations specialist, a purchasing agent, a law enforcement officer, an environmental education specialist and an information and education specialist, a second seasonal firefighter, and an additional forestry technician. These proposed positions indicate a best case scenario and reflect what the Refuge would need to support all of the proposals in Alternative 3. Some of these positions would not be added unless there was a significant increase in acreage added to the current Refuge. The chances of filling all these new positions are slim even in good budget times. All these new positions will support programs and acquisitions proposed under Alternative 3. All other costs listed in Tables F-1 (One Time Costs), F-3 (maintenance backlog) reflects additional project and maintenance needs, not operating costs. Table F-5 is a total estimate of all costs, not just the annual operating budget.

Petition (436 signatures)

The comment below was at the top of a petition sent to the Refuge near the close of the comment period and signed by 436 persons. Most of the petition signers provided an address though many of these were PO boxes. Judging from the addresses provided, the majority of the petition signers reside in Spokane County but do not live or own land within the Stewardship Area boundary.

The Turnbull National Wildlife Refuge currently has a boundary of 20,827 acres and if the Turnbull Wildlife Refuge is managed properly, 20,827 acres are sufficient to support the wildlife. We feel Turnbull Wildlife Refuge should be managed under Option 1. We oppose any Stewardship Area and any increase in the present size of the Turnbull Wildlife Refuge. We suggest annual independent reviews of the management of Turnbull Wildlife Refuge to ensure the wildlife and the refuge resources are maintained at a sustainable level. The Federal Fish and Wildlife presently has the option to allow public hunting as a management tool if the wildlife should become too numerous. We feel this management option should be used to control wildlife numbers. Presently, only 2,200 acres are open to public use, we feel the number of acres open to public use should be increased.

RESPONSE: The Refuge is being managed by skilled and knowledgeable wildlife managers. A state of the art habitat management program has been developed for the Refuge and has been in implementation since being approved in 1999. Staff is making progress annually in forest, wetland, riparian restoration and management practices.

The Service agrees that the existing refuge, given the current landscape of private land use, is large enough to host a viable representation of most of the native species that currently exist here. Refuges, however, cannot be managed in isolation; they are but a part of a larger ecosystem. Their value as wildlife habitat will only be maintained if refuges exist in a landscape of private and public land-use that provides connectivity for the free interchange of native wildlife and plants. If the contrast between the Refuge and the surrounding landscape becomes too great, than the effectiveness of refuge habitats for wildlife will decline overtime irrespective of the management of refuge habitats. Wildlife, especially those with large home ranges or migratory species cannot meet all their habitat requirements on the Refuge alone and move to and from the Refuge and other habitats. Resident plant and animal populations are contiguous with those on adjacent lands allowing the exchange of genetic material within in a larger population base which increases the probability of their long-term survival.

For most of the Refuge's existence, surrounding land use has mostly complemented the Refuge by maintaining open space and providing a larger habitat base for wildlife and critical linkages to other undisturbed habitats. The situation around the Refuge is, however, changing. During the past twenty years, Spokane County has grown at a rate of 15% per decade (OFM, 1999). Increased home construction, business developments, and transportation infrastructure to service this growing population has further isolated the Refuge increasing the potential for external factors such as contamination of air and water, altered or depleted supplies of surface and ground water, loss of connectivity to other suitable or complimentary habitats, disturbance

to wildlife, and the invasion of exotic plant and animal species to erode the integrity of the Refuge.

The land protection aspects of the CCP are designed more to support maintenance of existing land-use in the Refuge vicinity with some improvements for wildlife than to enact an extensive effort to expand Service land ownership. Acquisition is proposed only in situations where a willing seller exists and the land for sale contains high wildlife values that may be at risk from further development. Land acquisition by the Service is a partnership between the American public and an individual landowner to protect wildlife on their property. It is a partnership because the landowner must be a willing seller and buyers generally initiate the transaction because they want to see their land protected and managed for wildlife. The presence of a willing seller and high wildlife values are two conditions that must be present before any offer by the Service is made.

The Service already employs an extensive review process of its management activities. Refuges are visited annually by Refuge Supervisors from the Regional Office in Portland Oregon. On these visits they are shown all current management programs. Periodically programmatic reviews are done by Regional staff. Sometimes it is a habitat management programmatic review (as described below), sometimes a public use review, fire management review, or biological program review. These programmatic reviews are done by a panel of specialists, other refuge managers and Refuge supervisors.

For example for a habitat management review, this process begins with a multi-disciplinary review of each refuge's management program conducted by a team assembled by our Regional Refuge Biologist. This team is made up of subject matter experts and local individuals with specific knowledge of the areas wildlife and habitats. Members of these teams have included individuals from state and other federal agencies, university professors, members of local and national non-governmental groups, and local landowners. The outcome of this first review is a report on the present conditions of the Refuge, perceived problem areas, and recommendations for future management action including strategies for filling information gaps. The next step in this process is the development of a refuge Habitat Management Plan. This plan is developed with extensive public participation and is reviewed not only within the Service but by outside subject area experts as well. A significant part of this plan is a monitoring strategy that allows assessment of the applied actions. Annually the Refuge reports on its proposed management activities for the upcoming year and completes an accomplishments report at the end of the year that summarizes the actions taken and their effectiveness.

Hunting is our preferred method for controlling the expanding elk herd as it is the most economical strategy.

Under the CCP, there will be an increase in the general Public Use Area of approximately 390 additional acres. In addition to this increase, adding a hunting program will increase public access to 5000+ additional acres of the Refuge on a seasonal basis.

PLANNING

We received a few comments and questions on how the planning process was conducted, including the ease of finding documents, how public feedback had been summarized and used in alternatives development, and suggestions on meeting format. In addition, we received a comment on our wilderness review.

Suggest posting CCP on Turnbull NWR Web page (EM9)

RESPONSE: We will regularly update the Refuge web page and provide a link to the CCP. The planning update that was sent to approximately 1200 people on the mailing list in June 2005 included the correct web address for on-line viewing of the Turnbull CCP.

Where are the earlier rounds of feedback from public involvement summarized? (EM11)

RESPONSE: In the Draft CCP/EA, public involvement efforts were summarized in Appendix K. This information has been updated in the Appendix K attached to this final CCP. The Service's public involvement effort on behalf of the CCP involved dozens of meetings with agencies, refuge neighbors, tribes, community organizations, elected officials, and the general public, as well as information gained from an alternatives workshop, questionnaires included with planning updates, and public surveys. Because we received information from such a variety of sources in numerous formats over several years, there was no simple summary or comparison of feedback that could be easily and succinctly provided in the CCP. Some information on the preliminary scoping that was done at the start of the planning process was summarized in Planning Update #2, which was sent to about 1000 people on the mailing list in November 2000. Notes and summaries from the meetings, workshops, and questionnaires have been kept as part of our planning record.

In the definition and shaping of alternatives, why has there been no systematic poll of potentially affected property owners as opposed to a few token public meetings? (EM11)

RESPONSE: The staff at Turnbull Refuge conducted eight meetings in 2002 and 2003 specifically to solicit feedback from Refuge neighbors and potentially affected property owners. All major property owners with land inside the proposed Stewardship Area were invited. Many property owners were also personally invited to the alternatives workshop held in June 2002 (this workshop was advertised and open to the general public as well). We did not regard these meetings and workshops as token efforts. Feedback we received at the workshop played a pivotal role in the development of the Stewardship Area concept. We have heard a great variety of opinion expressed through the varied and numerous public involvement efforts undertaken (see previous question) and we remain interested in keeping channels of communication open so that we can continue to understand the points of view of various members of the public and learn from each other. Polls are useful but limited devices that capture opinion at a point in time but do not perpetuate greater understanding and communication.

An open meeting would be more beneficial. (PM 11) Don't waste people's time with these informal meetings. Last meeting much better. (PM8)

RESPONSE: A number of meetings have been conducted in a variety of meeting formats; centralized presentations with questions and answer periods, and smaller groups that afford an opportunity for one on one contact with staff members.

It would appear that without removal of all county roads, airports, railroad tracks and commercial enterprise, that Refuge goals [for wilderness character] would not be met. (F18)

RESPONSE: Wilderness goals are not part of the Refuge goals for Turnbull or the Stewardship Area (see Chapter 1 of the document). U.S. Fish and Wildlife Service policy (Section 602, also section 610 of Refuge Manual) requires wilderness reviews to be completed as part of the CCP process, including areas that are part of a Study Area for potential inclusion within the National Wildlife Refuge System. The purpose of the review is to determine whether any area on the Refuge or within the Study Area is suitable for recommendation to Congress for wilderness designation. It was concluded (see Appendix H) that there are no areas on Turnbull National Wildlife Refuge or within the Study Area that could be recommended as suitable for further consideration of wilderness designation.

Informed at the open house that priorities have not been finalized and I would like to see the final draft. (PM14).

RESPONSE: The public will have access to the final CCP.

It seems that positive measures were deliberately omitted from Alternative 1 in order to make it less attractive – they should be restored (No Action is Alternative #0). (F5)

RESPONSE: Under the National Environmental Policy Act (NEPA), we are required to analyze a "no-action" alternative. The "no action" alternative (current management) is presented to allow the public to compare the results of implementing the other alternatives. The "no-action" alternative in the Draft CCP/EA is Alternative 1. All current management strategies utilized on the Refuge remain the same under this Alternative. There was no Alternative 0 in the document.

Index to Written Comments Received on Turnbull Draft CCP/EA

Sixteen letters received through the mail were identified with the initial L before the number.
Emails received were identified with the initials EM before the number (a total of 24 were received).
Forms received at the public meeting start with PM (a total of 14 were received).
Forms received through the mail start with F (a total of 40 were received).

Identifier	Signatory	Organization Representing
L1	Lloran Johnson	Inland Northwest Wildlife Council
L2	Alfred Nomee	Coeur D'Alene Tribe
L3	Chris DeForest	Inland Northwest Land Trust
L4	Luella Dow	
L5	Brick Cortner	
L6	Gayle Cortner	
L7	T.M. Snodgrass	
L8	Bert and Karen Smith	
L9	Ivan Lines	Ducks Unlimited
L10	Edward and Janet Reynolds	
L11	Joyce Alonso	Spokane Audubon Society
L12	W. Gale Mueller	
L13	Jan Strobeck	
L14	Patty Honff *	
L15	Kristin and Terry Mansfield	
L16	Steve Barrett	Friends of Private Property
EM1	jwp6909@aol.com	
EM2	B. Sachau	
EM3	Eugene Kiver	
EM4	Richard Mathisen	
EM5	Donna Phillips	
EM6	Sandra Huggins	
EM7	Mike Roth	Gonzaga University
EM8	T.F. McLaughlin	
EM9	Michael Estes	
EM10	Shaune Gramlow	
EM11	Barry and Gail Hicks	
EM12	Don Kraege	Washington Dept. of Fish and Wildlife
EM13	Len Barson	The Nature Conservancy of Washington
EM14	Peggy O'Connell	
EM15	Rick Steenhoven	
EM16	Jim Hallett	
EM17	Brian Roth	
EM18	Brian Miller	
EM19	donlarsen@comcast.net	
EM20	Hans Krauss	
EM21	Mark Burandt	
EM22	Gina Sheridan	
EM23	Bruce Lang	
EM24	Walter and Norma Trefry	
PM1	Victoria Lamp	
PM2	Daryl Dirm *	
PM3	Steve Barrett	

PM4	John Ginsburg	
PM5	Larry Danielson	
PM6	Rick Brash	
PM7	Bret Brash	
PM8	Shawn Brash	
PM9	Herb and Nancy Sagerser	
PM10	Jennifer Dahl	
PM11	Les Harris and Sibylle Harris	
PM12	Gary Dahl	
PM13	Curt and Betty Humphrey *	
PM14	Harvey Zacher	
F1	Keith Cress	
F2	Dolores and Rober Griffith	
F3	Donald White	
F4	Joan Tracy	
F5	Maurice and Laura Vial	
F6	Ken Green	
F7	Anthony Appel	
F8	Kenneth Gudgel	
F9	Michael Miller	
F10	Jack Nisbet	
F11	No name	
F12	David Pirello	
F13	Paul Decker	
F14	Jill Herman	
F15	Linda Bolte and George Barnett	
F16	Bill Safronek *	
F17	Margo Wolf	
F18	David Babb	
F19	Gary Sayler	
F20	Paul Quinnell	
F21	Eleen Benson	
F22	Craig Olson	
F23	N.A. Cordill	
F24	Florida Goodson	
F25	Marian Frobe	
F26	Nancy McRae	
F27	Derek Hanson	
F28	Jim Kujala	
F29	Cela Kruse	
F30	Brian and Caryn Bothman	
F31	Clint Watkins	
F32	Bob and Jeanne Grogan	
F33	Margaret Coombs	
F34	Jack Coombs	
F35	Marion Henry	
F36	Thomas Fischer	
F37	Phyllis Siberman	
F38	Doug Fulton	Spangle Gun Club
F39	Laura Fallis	
F40	Marianna Boyd	

* Spelling maybe be incorrect.

APPENDIX M: LIST OF PREPARERS

U.S. Fish and Wildlife Service:

Name	Position	Degree(s)	Years of Experience
Sharon Selvaggio	Conservation Planner	M.S. Energy and Resources B.A. Biology	17
Nancy Curry	Project Leader	B.S. Wildlife Biology	28
Mike Rule	Refuge Wildlife Biologist	M.S. Natural Resource Management B.S. Wildlife Management	20
Sandy Rancourt	Volunteer and Environmental Education Coordinator	M.S. Biology B.S. Biology	25
Amy Wing	Land Protection Planner	M.A. Interdisciplinary Studies B.A. Environmental Studies	21
Wendy Castineira	Realty Specialist	B.A. Geography A.A.S. Agriculture	19
Ronnie Sanchez	Deputy Refuge Manager	B.S. Wildlife Sciences	13
Kathleen Fulmer	(former Assistant Refuge Manager)	M.S. Wildlife Resources B.S. Wildlife Resources	22
Jane Bardolf	Assistant Planner	M.S. Natural Resources B.S. Environmental Conservation	19
Nicholas Valentine	Archaeologist	M.S. Anthropology	14
Glenda Franich	Visual Information Specialist/Graphic Artist	B.S. Graphic Design	33
David Hoy	Lead Cartographer	B.S. Social Science	8
Mary Anderson	Cartographic Technician		31

Consultants:

Name and Company	Position	Degree(s)	Years of Experience
Chuck Everett EDAW, Inc.	Principal	M.L.A. Masters of Landscape Architecture B.S. Management	23
Gregg Roy Jones and Stokes	Economist	B.S. Political Economy of Natural Resources	15