SUNNYSIDE/SNAKE RIVER WILDLIFE AREA MANAGEMENT PLAN

Washington Department of Fish and Wildlife

Prepared by Wildlife Area Manager, Rocky Ross & Leray Stream, Regional Wildlife Program Manager

2006

STATE OF WASHINGTON

CHRIS GREGOIRE, GOVERNOR

DEPARTMENT OF FISH AND WILDLIFE
JEFF KOENINGS, Ph.D., DIRECTOR

WILDLIFE PROGRAM
DAVE BRITTELL, ASSISTANT DIRECTOR

LANDS DIVISION
MARK QUINN, MANAGER

The Sunnyside Wildlife Area is primarily funded by the Bonneville Power Administration to mitigate for the Federal Columbia River Hydropower System.
(Project Number 200201400)
&
The Snake River Units are funded by the Army Corp of Engineers to mitigate for the Snake River hydroelectric projects.

This report should be cited as:
Washington Department of Fish and Wildlife. 2006. Sunnyside/Snake River Wildlife Area Management Plan. Wildlife Management Program, Washington Department of Fish and Wildlife, Olympia. 214 pp.

Washington State Wildlife Area Plan

SUNNYSIDE / SNAKE RIVER WILDLIFE AREA

Washington Department of Fish and Wildlife
Wildlife Management Program
600 Capitol Way North
Olympia, WA 98501-1091

Washington State Wildlife Area Plan

Sunnyside / Snake River Wildlife Area

Washington Department of Fish and Wildlife
Wildlife Program
600 Capitol Way North
Olympia, WA 98501-1091

Prepared by:
Rocky Ross
Leray Stream

November 2006

Director, Washington Department of Fish and Wildlife

Table of Contents

EXECUTIVE SUMMARY ..... *vi*

CHAPTER I. INTRODUCTION *1*

1.1 Agency Mission Statement **1**

1.2 Agency Goals and Objectives **1**

1.3 Agency Policies **2**

1.4 Sunnyside/Snake River Wildlife Area Complex Goals **2**

1.5 Planning Process **2**

1.6 Other Stakeholders **4**

CHAPTER II. AREA DESCRIPTIONS AND MAPS *5*

2.1 Property Locations and Size **5**

2.2 Purchase History and Purpose **36**

2.3 Ownership and Use of Adjacent Lands **45**

2.4 Funding **45**

2.5 Climate **48**

2.6 Soils and Geology **49**

2.7 Hydrology and Watersheds **52**

2.8 Fire History **55**

2.9 Vegetation Characterization **56**

2.10 Important Habitats **62**

2.11 Fish and Wildlife **67**

2.11.1 Fish Resources 71

2.11.2 Amphibians/Reptiles 74

2.11.3 Birds 75

2.11.4 Mammals 82

2.11.5 Species of Concern or Special Status/ Priority Species 86

2.12 Cultural Resources **88**

CHAPTER III. MANAGEMENT OBJECTIVES, ISSUES & STRATEGIES *89*

Agency Objective: Protect, restore and enhance fish and wildlife populations and their habitats **89**

1. Improve or Maintain Big Game Populations 89

2. Protect, Enhance and Restore Function and Structure of Native Habitats 90

3. Monitor and Control Noxious Weeds 92

4. Enhance and Protect Endangered, Threatened, and Sensitive Species. 94

5. Improve and Maintain Fish Populations 95

6. Protect Upland Game Bird Habitat 96

7. Protect and Manage Other Species 98

Agency Objective: Provide sustainable fish and wildlife-related recreational and commercial opportunities compatible with maintaining healthy fish and wildlife populations and habitats. Improve the economic well being of Washington by providing diverse, high-quality recreational and commercial opportunities. 99
1. Provide Public Access Compatible With Fish, Wildlife and Habitat Protection..... 99
2. Provide Commercial Opportunities Compatible With Fish, Wildlife and Habitat Protection 100
3. Provide Fish and Wildlife Recreational Opportunities..... 101

Agency Objective: Minimize adverse interactions between humans and wildlife..... 102
1. Provide Refuge Areas for Wildlife and Reduce Winter Disturbance..... 102
2. Implement Strategies to Reduce Elk Damage on Private Lands 103

Agency Objective: Ensure WDFW activities, programs, facilities and lands are consistent with local, state and federal regulations that protect and recover fish, wildlife and their habitats..... 103
1. Manage Weeds in a Manner Consistent with Local, State, and Federal Regulations 103
2. Manage Species and Habitats in Compliance with ESA and EPA Regulations..... 104
3. Provide Fire Management on WDFW Lands 105
4. Protect Cultural Resources Consistent with State and Federal Law..... 105
5. Pay PILT and Assessment Obligations..... 105

Agency Objective: Work with Tribal governments to ensure fish and wildlife management objectives are achieved. 106
1. Discuss Mutual Concerns for Wildlife Resources with Tribal Representatives..... 106
Region wide 106

Agency Objective: Connect with those interested in Washington's fish and wildlife. 107
1. Offer Volunteer Projects to Involve the Public in Wildlife Area Efforts 107
2. Participate in Local Cooperative Projects..... 107
3. Be Responsive to Public Concerns 107

Agency objective: Provide sound operational management of WDFW lands, facilities and access sites..... 108
1. Develop, and Annually Update a Management Plan for the Sunnyside/Snake River Complex..... 108
2. Monitor All Grazing & Agricultural Leases to Ensure Proper Land Use..... 108
3. Maintain Roads and Trails as Necessary to Perform Management Functions 109
Thornton Unit..... 109
4. Maintain a Knowledgeable and Well-Trained Work Force..... 110
5. Maintain or Remove Facilities, Outbuildings and Structures..... 110
6. Other Issues or Concerns 111

CHAPTER IV. PERFORMANCE MEASURES, EVALUATION AND UPDATES OF THE SUNNYSIDE/SNAKE RIVER WILDLIFE AREA PLAN 112

1. Sunnyside/Snake River Wildlife Area Performance Measure in 2006 includes:..... 112

2. Annual Evaluation of Performance..... 114

3. Annual Plan Update..... 114

APPENDIX 1. Public Issues *115*
APPENDIX 2. Sunnyside Wildlife Area Weed Management Plan *117*
APPENDIX 3. Fire Management Plans *179*
APPENDIX 4. Water Rights *181*
APPENDIX 5. Management Plan Comments & Responses *187*
APPENDIX 6. Windmill Ranch Grazing Plan *191*
APPENDIX 7. Agricultural Lease Plan *192*
APPENDIX 8. Plant and Wildlife Species Found in the Region *194*
APPENDIX 9. BPA Project Obligations *195*
APPENDIX 10. Yakima Subbasin Plan Priority Species List *196*
APPENDIX 11. Planning Documents and Species Accounts Guiding Management *197*
APPENDIX 12. Anadromous Fish Summary *199*
APPENDIX 13. Benton County Mosquito Control Summary *207*
APPENDIX 14. Literature Cited *212*

List of Figures

Figure 1. Sunnyside/Snake River Wildlife Area *6*
Figure 2. I-82 Ponds Unit *8*
Figure 3. Headquarters (Sunnyside) Unit *10*
Figure 4. Byron Unit *12*
Figure 5. Ferry Road Unit *14*
Figure 6. Thorton Unit *16*
Figure 7. Rattlesnake Slope Unit *17*
Figure 8. Benton City Unit *19*
Figure 9. Whitstan Unit *21*
Figure 10. Windmill Ranch Unit *23*
Figure 11. Nipper Unit *25*
Figure 12. Hope Valley Unit *27*
Figure 13. McDonald Bridge Unit *29*
Figure 14. Esquatzel Coulee Unit *31*
Figure 15. WB-10 Wasteway Unit *33*
Figure 16. Clark Pond Unit *35*
Figure 17. Focal wildlife habitat types of the Yakima Subbasin (IBIS 2003) *57*

Figure 18. Waterfowl breeding abundance indexed by pair counts conducted in May from 1996 through 2004. Data are unavailable for 2002..... 80

Figure 19. General duration of successive life stages in for Yakima Subbasin summer steelhead (all stocks)..... 204

List of Tables

Table 1. Sunnyside Wildlife Area complex weeds including the state and county 2005 weed class listing and acres treated. 119

Table 2. Mean timing of successive freshwater life stages of Yakima Subbasin spring chinook199

Table 3. Mean timing of successive life stages of Yakima Subbasin fall chinook 201

EXECUTIVE SUMMARY

The Sunnyside/Snake River Wildlife Area (SSWA) is a complex of 21 separate management units, scattered over a 118-mile highway corridor in four counties of southeast and south central Washington. Beginning at the eastern end of the project, the units range from Lowden in Walla Walla County, to Basin City in Franklin County, and all along the lower Yakima River in Benton and Yakima counties. The westernmost parcel lies at the outskirts of Union Gap near Yakima. In all, the Wildlife Area encompasses about 20,836 acres.

The various management units were purchased with a variety of funds over a period of 50 years. The Snake River parcels were purchased to provide partial mitigation for the construction of 4 dams on the Lower Snake River. The Corps of Engineers provided funding for those acquisitions and for initial habitat development. The 5 major management units that make up the original Sunnyside Wildlife Area were state-funded until 1996. At that time the Bonneville Power Administration (BPA) and the Washington Department of Fish & Wildlife (WDFW) negotiated a deal where BPA would fund habitat enhancement and reasonable operation and maintenance activities in return for partial mitigation credit for dam construction on the Columbia River. Some of the units in Franklin County are owned by the Bureau of Reclamation and have historically been managed by WDFW. Although active management is currently minimal on these sites, WDFW has submitted a proposal to the Bureau, requesting funding for a shared, full-time biologist that would allow more proactive land management in Franklin and Walla Walla counties.

Although the lands within the SSWA were purchased with a variety of funds, and to provide habitat for a variety of species, the primary focus is upland wildlife and waterfowl because of their economic and recreational values. Much of the habitat that is managed for these species also benefits a wide array of other wildlife.

The primary management concerns and public issues identified in the Sunnyside/Snake River Wildlife Area Plan are:

- Control a wide range of noxious weeds, including removal of Russian Olive monocultures.
- Manage numerous wetlands to maximize wildlife diversity and recreational opportunities.
- Maintain and/or increase moist soil management areas.
- Maintain and/or improve floodplain, upland and shrub steppe habitat.
- Control illegal trespass, littering and dumping.
- Maintain multiple agricultural leases to benefit migrating waterfowl, upland wildlife and sandhill cranes.
- Protect and/or enhance habitat for ESA listed species.
- Protect cultural resources.

In 2006, the Wildlife Area staff performed nearly every task outlined in a statement of work that is annually funded by BPA for all Sunnyside units. Work performed on Snake River sites was limited to basic O&M due to shortage of staff.

Efforts in 2007 will focus on substantial wetland enhancement projects on the Byron and HQ units, with funding from a NAWCA grant that will be shared with the Yakama Nation. This will be a two- year effort. In addition, up to 4 wetland-related projects may be implemented if funding is approved through WDFW's State Duck Stamp program. Oversight on the construction of a new

shop will occur throughout the Spring. Noxious weed control and general operation and maintenance of existing lands and facilities will always be a major emphasis for this Wildlife Area.

CHAPTER I. INTRODUCTION

The Washington Department of Fish and Wildlife (WDFW) is entrusted with the management of wildlife and WDFW state-owned lands and the preservation of the natural resources associated with those properties. As a steward of the land, the WDFW is dedicated to protecting, restoring, and perpetuating healthy ecosystems throughout the state while fostering an attitude of partnership with the community. WDFW is responsible for the protection and management of all marine, anadromous and freshwater fish; shellfish; and terrestrial wildlife—thousands of animal species Statewide. WDFW regulates all legal harvest of commercial fish, sport fish and Wildlife, enforces wildlife protection laws, and manages about 840,000 acres of land. WDFW developed Washington's Comprehensive Wildlife Conservation Strategy as a guiding document to protect species from extinction. Included in that document are biodiversity protection measures along with species-specific protection measures.

Many of the wildlife highlighted in this document occur on the Sunnyside/Snake River Wildlife Area Complex (SSWA). Species section accounts in the SSWA plan document basic information available so these species will not be left behind during management considerations. However, single species management may be highlighted as an emphasis species for management in a particular area while preserving basic habitat needs for species diversity as well. In other cases wildlife biodiversity will be the emphasis for particular habitat types.

The SSWA fits within the Columbia Plateau Eco-region. Ecosystem assessments were used in providing guidance to the CWCS development. The SSWA plan utilizes both these documents in guiding management for the project.

This plan provides management direction for the Sunnyside/Snake River Wildlife Area Complex (SSWA) in Yakima, Benton, Franklin and Walla Walla Counties of South Central Washington. It will be updated annually. The planning process incorporates local needs and concerns as indicated by citizen participation, and guides management activities on wildlife areas based on the WDFW's statewide goals and objectives.

1.1 Agency Mission Statement

The Washington Department of Fish and Wildlife serves Washington's citizens by protecting, restoring and enhancing fish and wildlife and their habitats, while providing sustainable fish and wildlife-related recreational and commercial opportunities.

1.2 Agency Goals and Objectives

To accomplish the mission the following goals and objectives have been developed. The underlined goals and objectives directly apply to the management of this Wildlife Area. These goals and objectives can be found in the Agency's Strategic Plan.

<u>Goal 1: Healthy and Diverse Fish and Wildlife Populations and Habitats</u>

- Objective 1. Protect, enhance and restore fish and wildlife populations and their habitats.
- Objective 2. Ensure WDFW programs, activities, facilities and lands are consistent with local, state, and federal regulations that protect and recover fish & wildlife and their habitats.
- Objective 3. Minimize adverse interactions between humans and wildlife.

<u>Goal 2: Sustainable Fish and Wildlife-related Opportunities</u>

- Objective 1. Provide sustainable fish and wildlife-related recreational and commercial

opportunities compatible with maintaining healthy fish and wildlife populations and habitats.
- Objective 2. Improve the economic well being of Washington by providing diverse, high quality recreational and commercial opportunities.
- Objective 3. Coordinate with Tribal governments to ensure fish and wildlife management objectives are achieved.

Goal 3: Operational Excellence and Professional Service
- Objective 1. Provide sound operational management of WDFW lands, facilities and access sites.
- Objective 2. Connect with those interested in Washington's fish and wildlife.

1.3 Agency Policies
The following agency policies provide additional guidance for management of agency lands.
- Commission Policy 6003: Domestic Livestock Grazing on Department Lands
- Policy 6010: Acquiring and disposing of real property
- Policy 5211: Protecting and Restoring Wetlands: WDFW will accomplish long-term gain of properly functioning wetlands where both ecologically and financially feasible on WDFW-owned or WDFW-controlled properties.
- Policy 5001: Fish protection at water diversions/flow control structures and fish passage structures
- Policy: Recreation management on WDFW lands
- Policy: Commercial Use of WDFW lands
- Policy: Forest Management on WDFW lands
- Policy: Weed Management on WDFW lands
- Policy: Fire Management on WDFW lands
- Other policies/contractual obligations/responsibilities (BPA contracts)

1.4 Sunnyside/Snake River Wildlife Area Complex Goals
Management goals for the Sunnyside/Snake River Wildlife Area Complex are to preserve habitat including the processes that maintain healthy functioning habitat and species diversity for both fish and wildlife resources. This includes maintaining healthy populations of game and wildlife diversity species, protecting and restoring native plant communities, and providing diverse opportunities for the public to encounter, utilize, and appreciate wildlife and wildlife areas. Specific management goals and objectives for the Sunnyside/Snake River Wildlife Area can be found in Chapter 3.

1.5 Planning Process
This plan is part of a statewide planning process to ensure consistency in wildlife area management and policy implementation. It is one part of the Statewide Wildlife Area Plan currently under development. The Statewide Plan brings together federal, state and local laws, agency goals and objectives, Commission and agency policies, and other statewide policy guidance in one document that will go out for public review. A multifaceted approach has been undertaken to assess strategies proposed for management of the Sunnyside/Snake River Wildlife Area Complex (SSWA). This process includes identifying agency goals and objectives; reviewing the purpose for purchasing the area; reviewing existing habitat conditions and species; formation of a Wildlife Area Citizens Advisory Group (CAG); and soliciting input and review by an internal District Team.

The District Team helps identify existing species plans, habitat recommendations, watershed plans, ecoregional assessments, etc. that will be used to identify local issues and needs. This is to ensure that the SSWA Plan is consistent with WDFW statewide and regional priorities, in addition to addressing issues identified in previous planning efforts. The team will consist of local representatives from each WDFW program, incorporating cross-program input and review at the regional and headquarters level by the habitat, wildlife, enforcement, and fish programs.

Public participation, in the form of a Citizens Advisory Group (CAG), has been utilized as a means to identify cultural, economic and social issues important to residents of South Central Washington and influential in the management of WDFW's lands in this region. The group will also provide input in helping resolve current and future management issues and conflicts related to the wildlife areas. CAG participation in planning will add credibility and support for land management practices and help build constituencies for the wildlife areas. The CAG is comprised of concerned citizens, local landowners, and representatives of local interest groups or other land-managing agencies. CAG members are considered spokespersons for their interest groups and bring a wide variety of concerns and issues to the attention of wildlife area managers.

Other stakeholders not represented on the CAG include the Bonneville Power Association (BPA), Department of Natural Resources (DNR), Bureau of Reclamation (BOR) and Bureau of Land Management (BLM). These entities provided input during the planning process (section 1.5).

The SSWA plan will be reviewed annually with additional input from the CAG and District Team to monitor performance and desired results. Strategies and activities will be adapted where necessary to accomplish management objectives.

WDFW District 4 Team Members

Fisheries	Habitat	Enforcement	Wildlife
Paul Hoffarth	Dave Carl	Gene Beiries	Mike Livingston
Steve Richards	Eric Bartrand		Rocky Ross
John Hone	Paul La Riviere		Don Hand
			Mike Keller
			Ted Clausing

Citizen Advisory Group

Name	Interest group/representation
James Henriksen	Benton County Mosquito Control District
Kevin Shoemaker-Alternate	Benton County Mosquito Control District
Gaylord Mink	Freelance birder, photographer/videographer, Watchable Wildlife
Rachel Little	Benton County Conservation District
John Rauner	Wine Grower, Ducks Unlimited
Hugh McEachen	Franklin Co. Irrigation Dist., Pheasants Forever, Fisher & Hunter
Casey Hill-Alternate	Franklin Co. Irrigation Dist., Pheasants Forever, Fisher & Hunter
Tracy Hames	Yakama Nation
Nathan Burkepile-Alternate	Yakama Nation
Danny Chappel	Equestrian, Landowner-Farmer-Cattleman, Recreationist
Vicki Clark-Alternate	Equestrian, Landowner-Farmer-Cattleman, Recreationist
Paul Kison	Richland Rod & Gun Club, Habitat Restoration, Conservation Education
Charlotte Reep	Lower Columbia Audubon Society
Gaylord Pyle-Alternate	Richland Rod & Gun Club, Habitat Restoration, Conservation Education

1.6 Other Stakeholders

Contractual agreements with BPA apply to the Sunnyside Wildlife Area. These parcels are located on the I-82, Headquarters, Byron, Thornton, and part of the Rattlesnake Slope Unit. Specific monitoring and management tasks required by BPA are incorporated into the general wildlife area management plan. See **Appendix 9** for further discussion of BPA project obligations.

In the past, contractual agreements with the Washington State Energy Facility Site Evaluation Council (EFSEC) provided for management on the Rattlesnake Slope unit.
Currently, EFSEC funding is not available.

Contractual agreements with the U.S. Army Corp of Engineers (COE) apply to the Snake River Mitigation parcels. These parcels include the Yakima River parcels (5), Windmill Ranch, Bailie Memorial Youth Ranch and Walla Walla County public fishing units. Specific monitoring and management tasks required by COE are incorporated into the general wildlife area management plan. See **Appendix 9** for further discussion of COE project obligations.

Washington Department of Natural Resources (DNR), the Bureau of Land Management (BLM) and the Bureau of Reclamation (BOR) have various small in-holdings located within or near WDFW lands. Those parcels owned by other federal or state agencies but situated within or adjacent to WDFW lands are managed by WDFW as part of the wildlife areas to ensure land use consistencies. Additional lands are currently being considered for WDFW management if adequate funding sources can be identified for acquisition or management agreement with those landowners.

CHAPTER II. AREA DESCRIPTIONS AND MAPS

2.1 Property Locations and Size

Figure 1 gives an overall perspective of the entire Sunnyside/Snake River Wildlife Area Complex. It consists of 21 sub-units comprised of more than 20,836 acres.

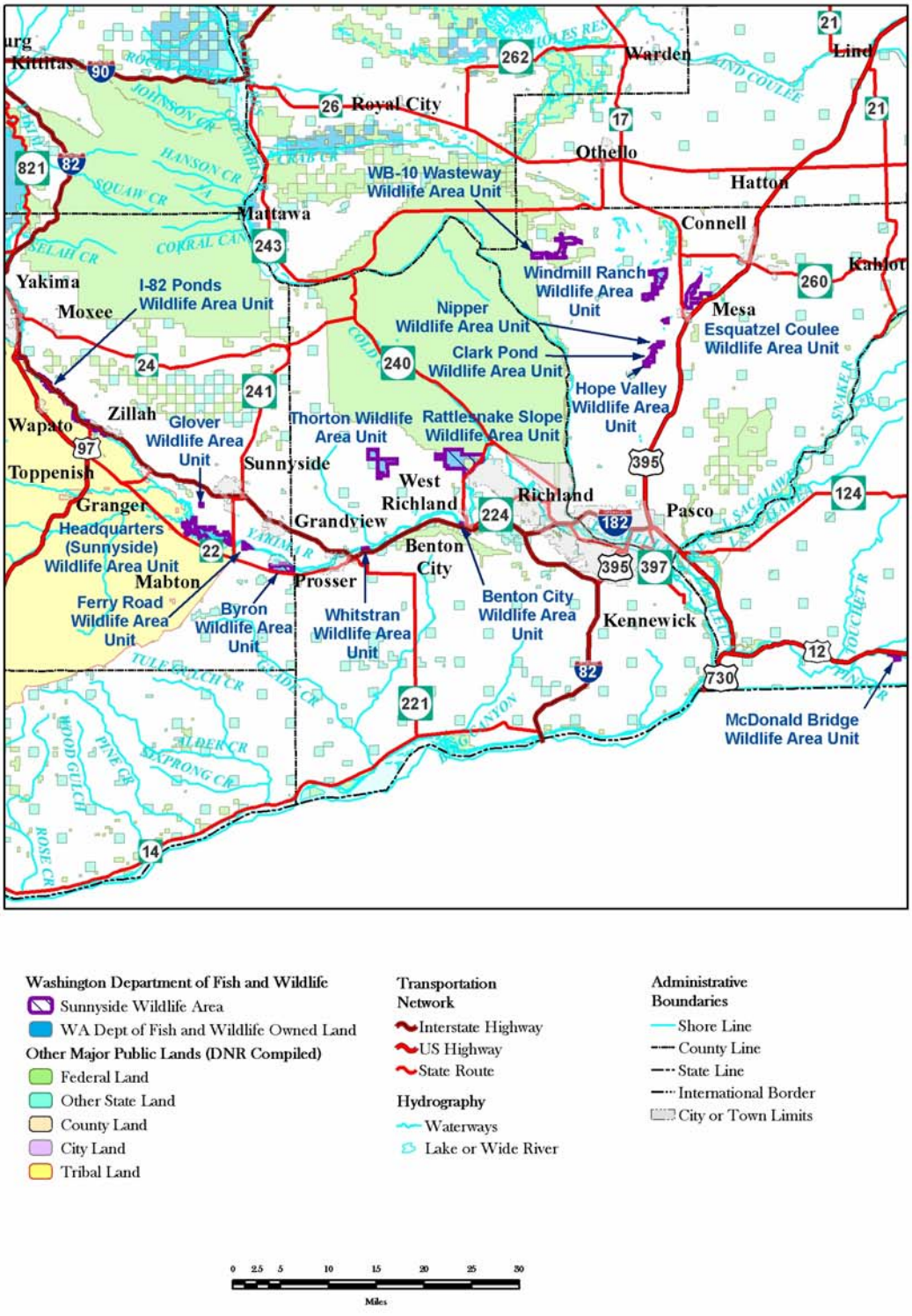

Figure 1. Sunnyside/Snake River Wildlife Area

I-82 Unit

The I-82 unit (Figure 2) consists of 17 parcels encompassing 980 acres located along the Yakima River in Yakima County, between the towns of Union Gap and Zillah. Legal description of the I-82 units: T12N, R19E, portions of sec. 17, 20, 21, 27, 28, 34 & 35; T11N, R19E, portions of sec.1, 2 & 12; T11N, R20E, portions of sec. 7, 17, 20, 21, 26, 27, 28 & 35.

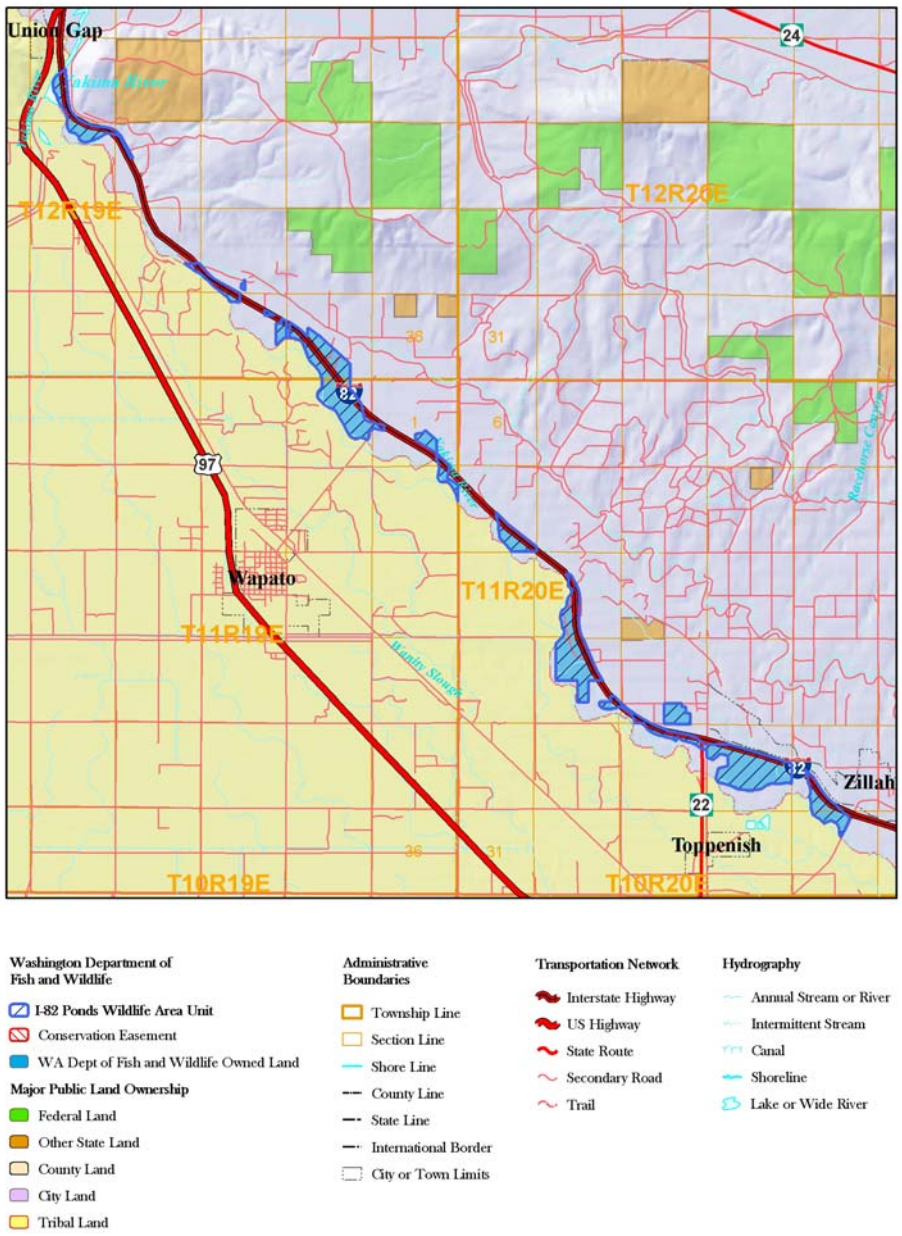

Figure 2. I-82 Ponds Unit

Donald Road Unit (*No Map Available*)

The Donald Road unit consists of one parcel of 75 acres and is located 1.5 miles north of the town of Wapato along the Donald Road and north of the Yakima River. Legal description is: T11N, R19E, sec.2. It is a Snake River mitigation site and is included as part of the I-82 Unit for discussion and management purposes.

Sunnyside Headquarters Unit

The Headquarters unit (Figure 3) consists of 9 separate parcels encompassing a total of 2,786 acres and is located one mile north of the town of Mabton. The city of Sunnyside lies 5 miles to the north. Legal descriptions of the Sunnyside HQ are: T9N, R22E, portions of sec. 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27 & 28.

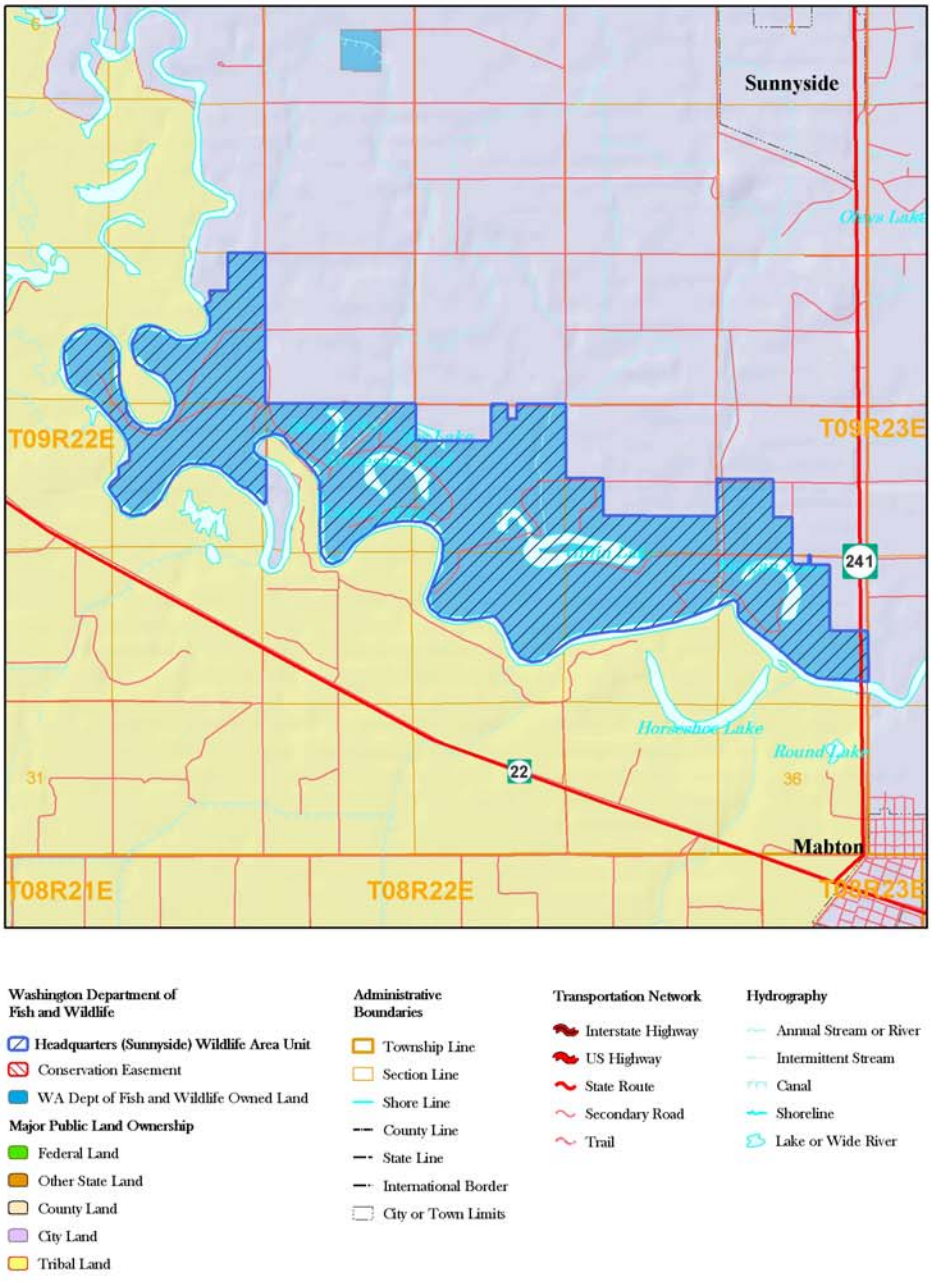

Figure 3. Headquarters (Sunnyside) Unit

Brady Unit (*No Map Available*)
The Brady unit (88 acres) is a Snake River mitigation parcel located within, and considered part of the Sunnyside HQ unit. Legal description: T9N, R22E, NE ¼ sec.26.

Glover Unit *(No Map Available)*
The Glover Unit (50.0 acres) is an Upland Restoration parcel that was assigned to the SWA in 2005. It is located about 2.5 miles north of the HQ Unit. Legal description: T9N, R22E, lying within the SE ¼ of section 4.

Byron Unit
The Byron unit (Figure 4) encompasses 1,031 acres of contiguous land and is located 5 miles east of the town of Mabton and 5 miles south of City of Grandview. Legal description: T8N, R23E, portions of sec.1, 2, 3, 10, 11 & 12.

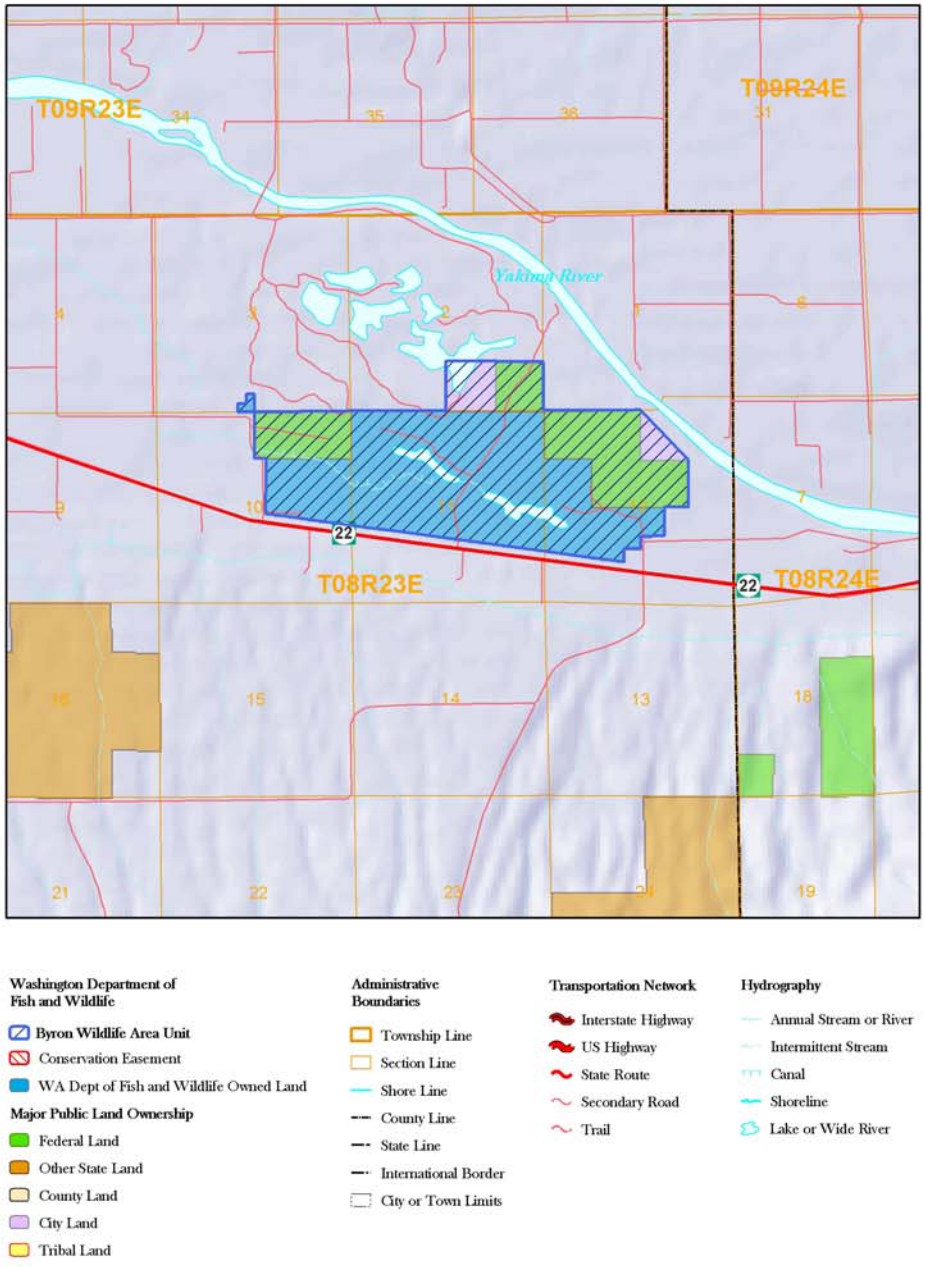

Figure 4. Byron Unit

Ferry Road (Vance) Unit

The Ferry Road (Vance) unit (Figure 5) is made of two parcels totaling 135.5 acres and is located one mile N.E. of the town of Mabton. Legal description: T9N, R23E, portions of sec. 29 &32.

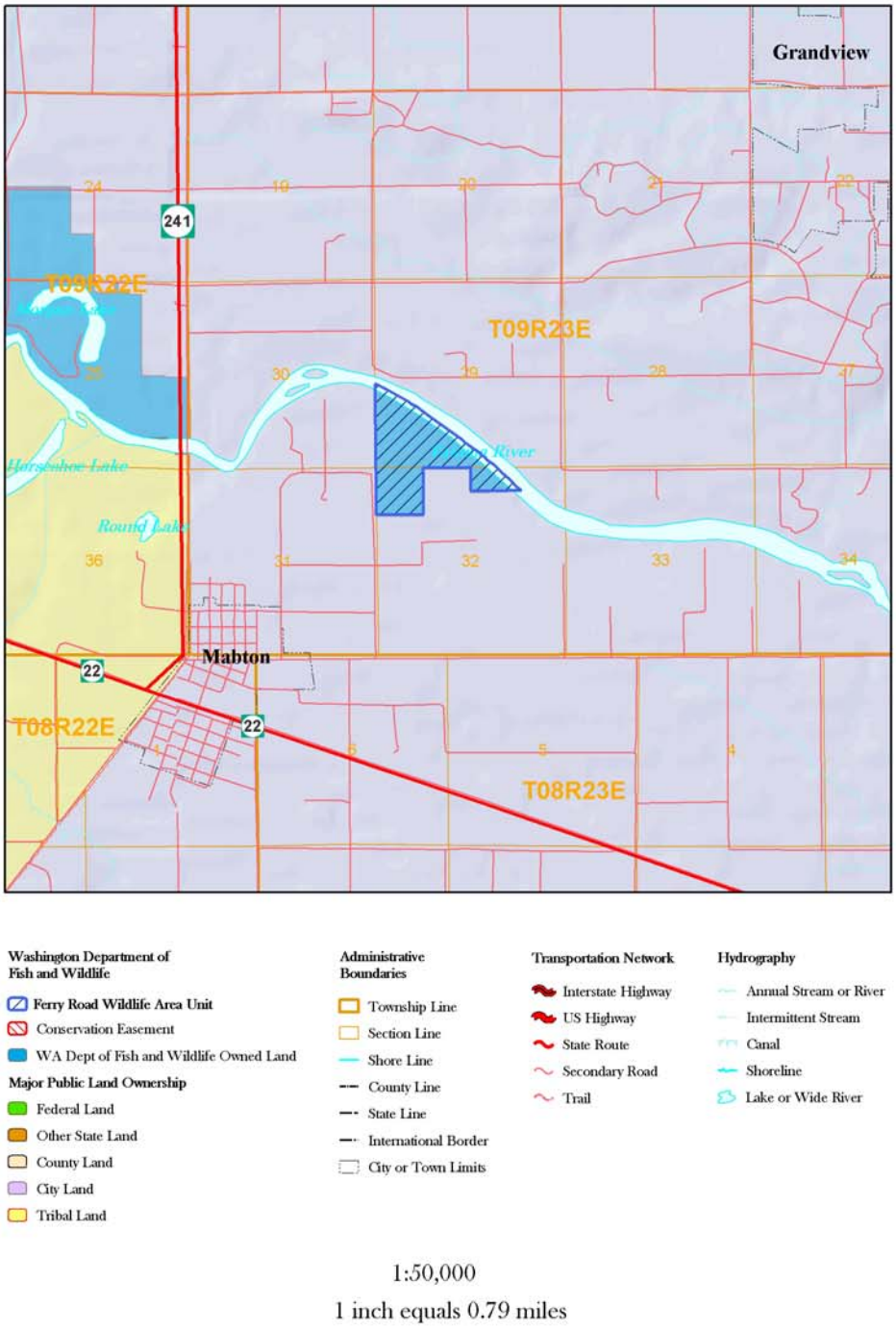

Figure 5. Ferry Road Unit

Thornton Unit

The Thornton unit (Figure 6) comprises 2,080 acres and is located 8-9 miles NE of the town of Prosser. Legal description: T10N, R25E, sec. 9, n ½ of 14, 15 & ¾ of 22.

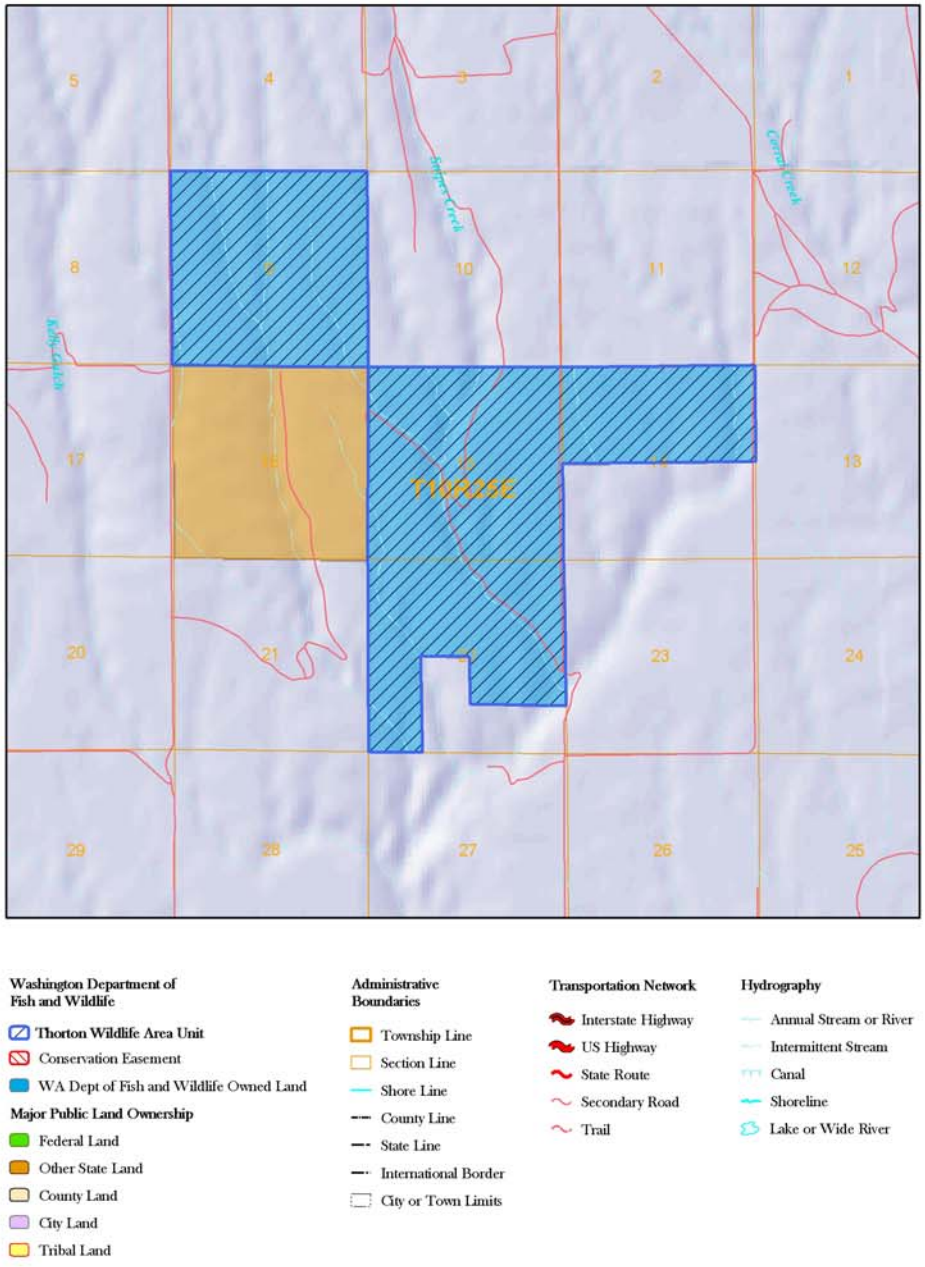

Figure 6. Thorton Unit

Rattlesnake Slope Unit

The Rattlesnake Slope (Figure 7) unit comprises 3,661 acres and is located 5 miles north of the town of Benton City. Legal description: T10N, R26E, sec.10, 11, 12, 13 & 14; T10N, R27E, portions of sec. 7, 17 & 19.

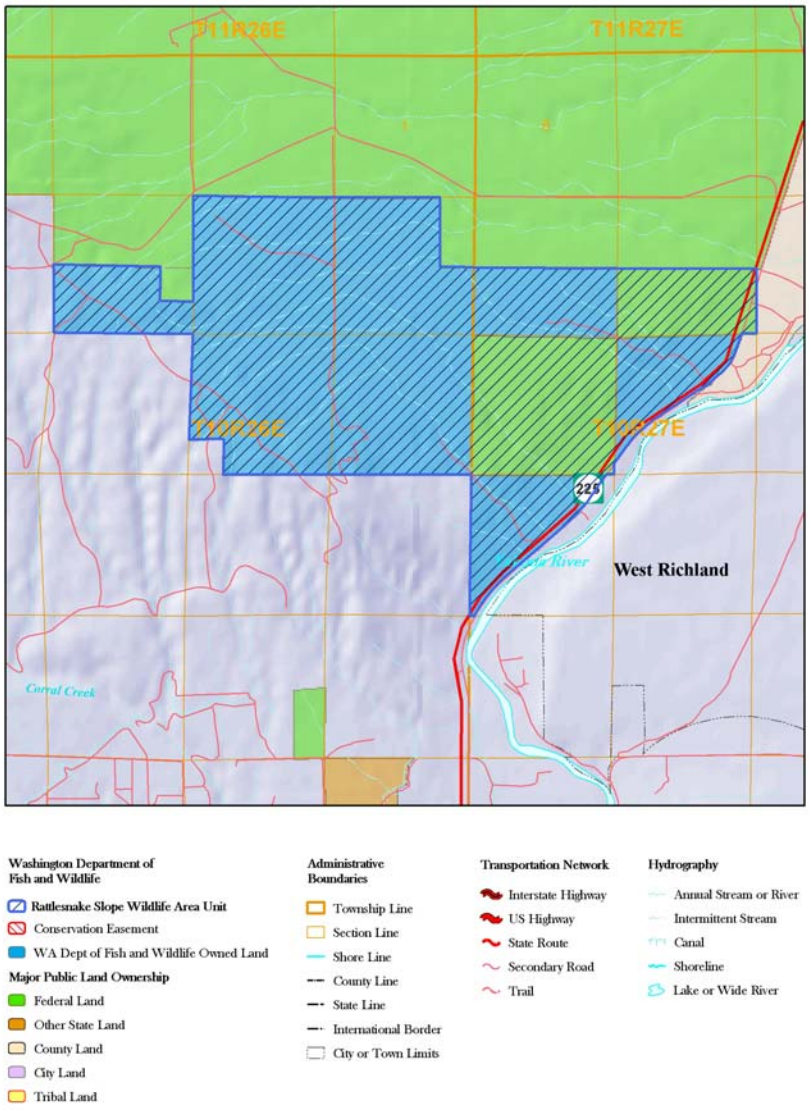

Figure 7. Rattlesnake Slope Unit

Benton City Unit

The Benton City unit (Figure 8) comprises 15.52 acres of Yakima riverfront property directly west of the town of Benton City. Legal description: T9N, R26E, sec.13

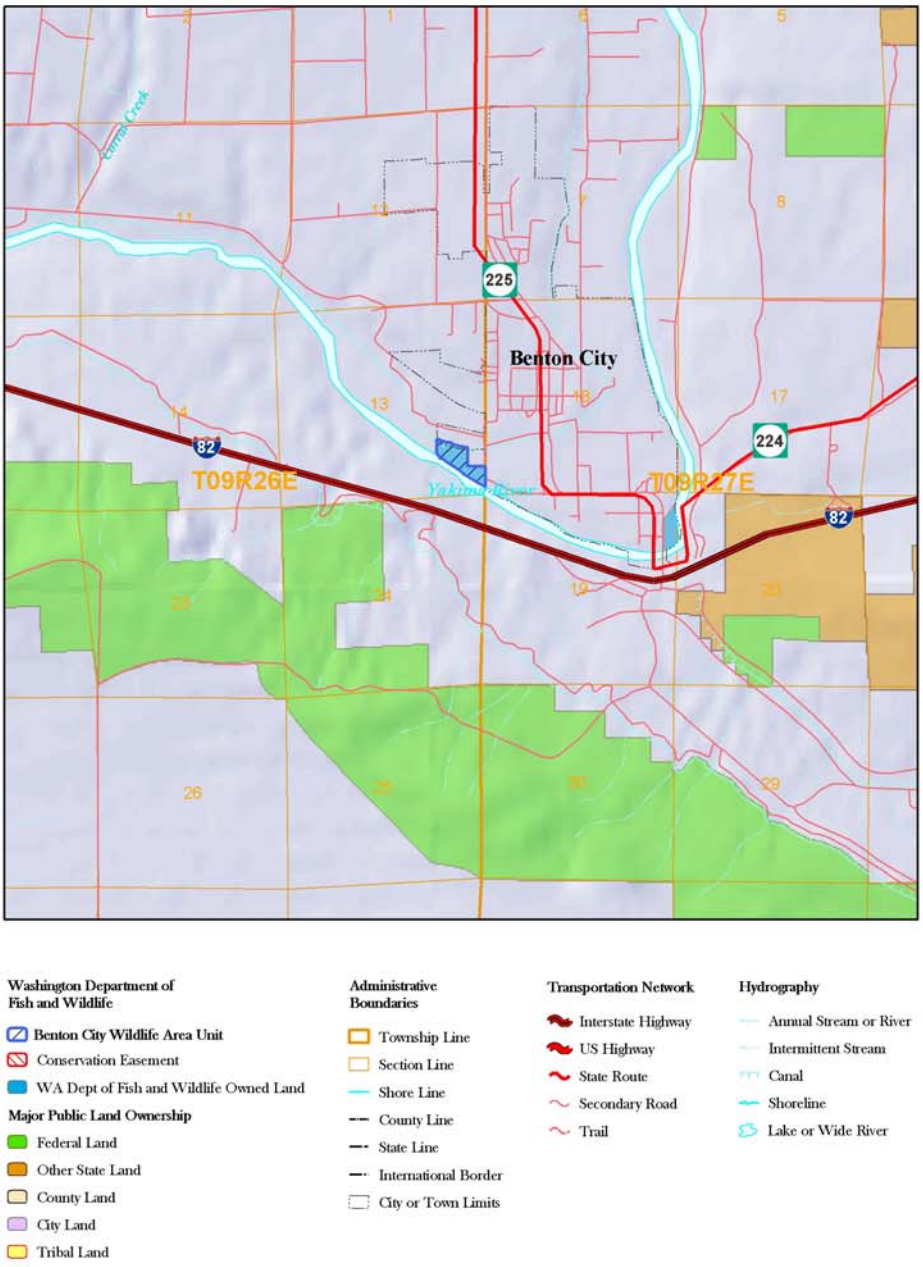

Figure 8. Benton City Unit

Whitstran Unit

The Whistan unit (Figure 9) is made of two parcels comprising 31.57 acres and is located two miles east of the town of Prosser. Legal description: T9N, R25E, Sec. 32.

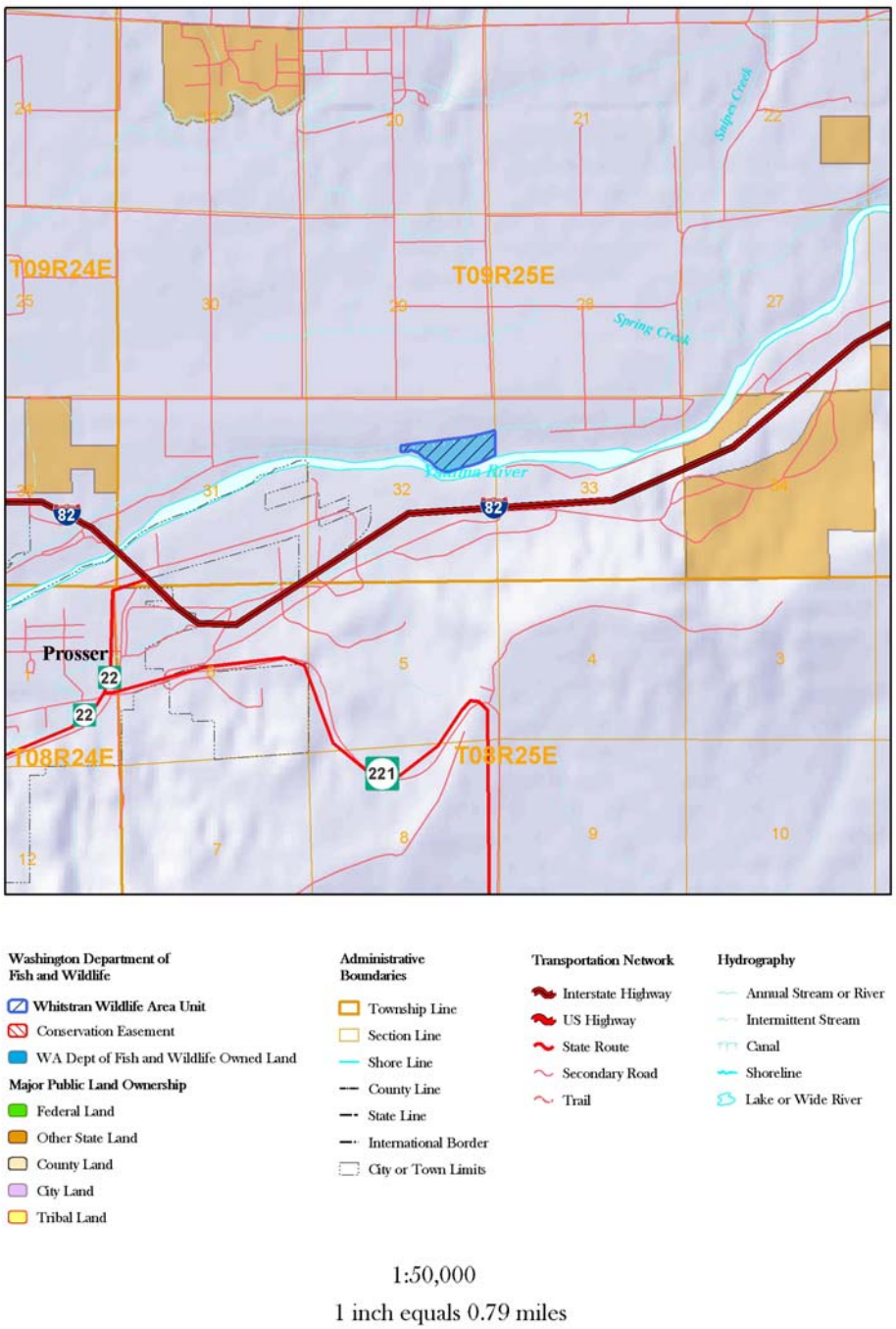

Figure 9. Whitstan Unit

Windmill Ranch Unit

The Windmill Ranch unit (Figure 10) consists of 4 separate parcels totaling 2000 acres and is located approximately 3 miles NW of the Town of Mesa. Legal description: T13N, R30E, portions of sec. 3, 4, 5, 9, 10, 16, 17, & 20.

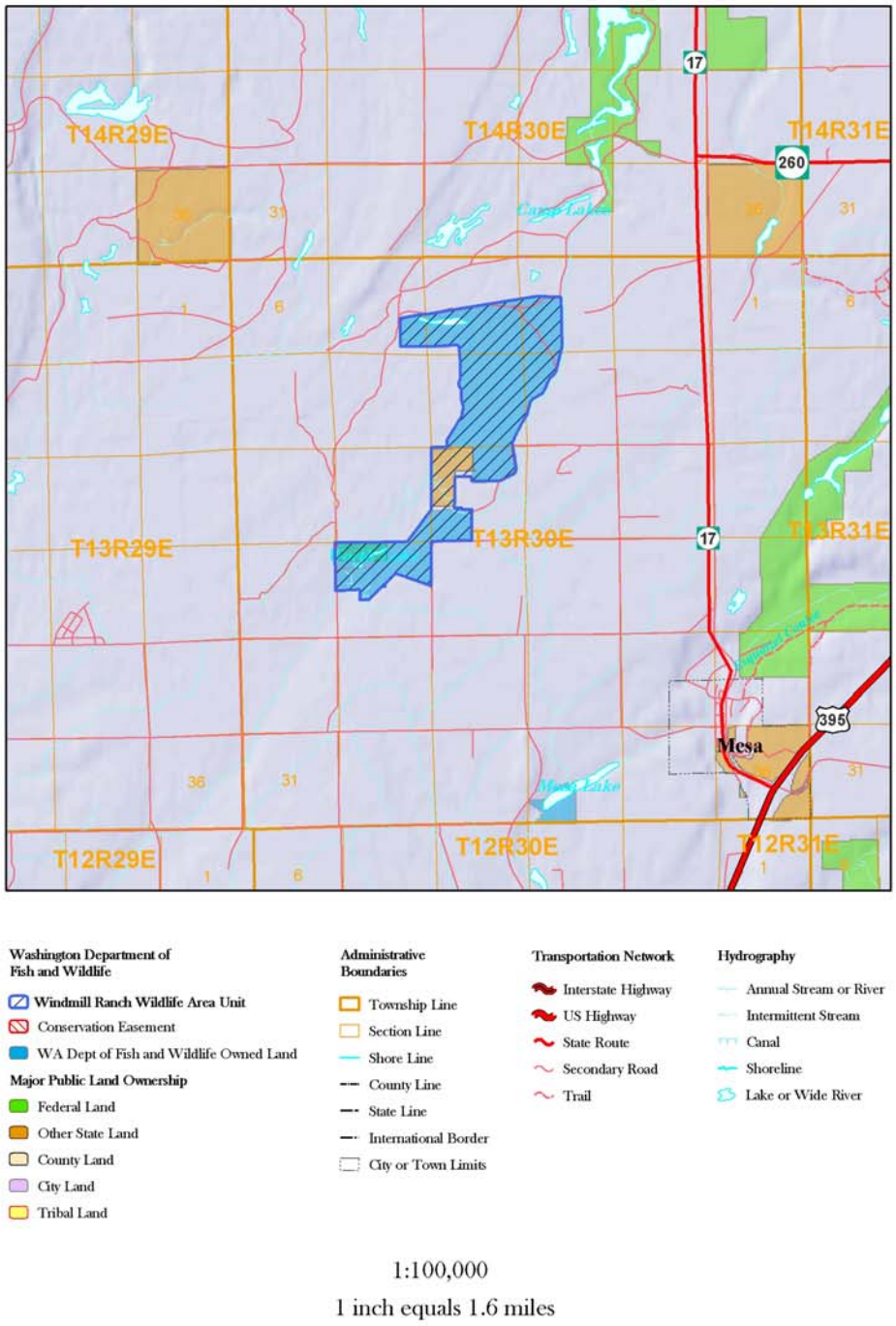

Figure 10. Windmill Ranch Unit

Nipper Unit

The Nipper unit (Figure 11) consists of 53 acres and is located approximately 4 miles S.W. of the town of Mesa. Legal description: T12N, R30E, portions of sec.16 & 17.

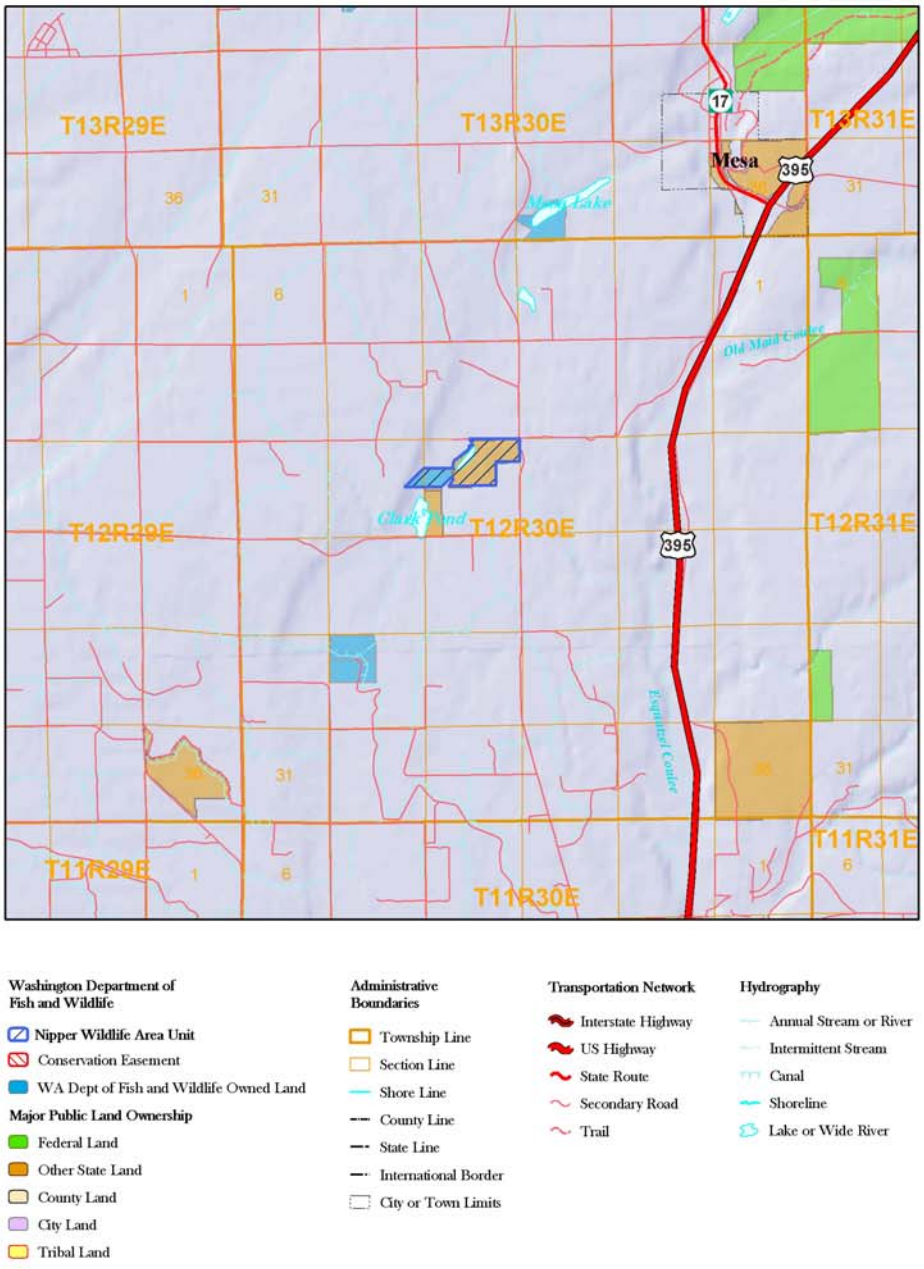

Figure 11. Nipper Unit

Hope Valley Unit

The Hope Valley unit consists of 160 acres and is located approximately 4 miles WNW of the town of Eltopia. Legal description: T12N, R30E, sec. 29.

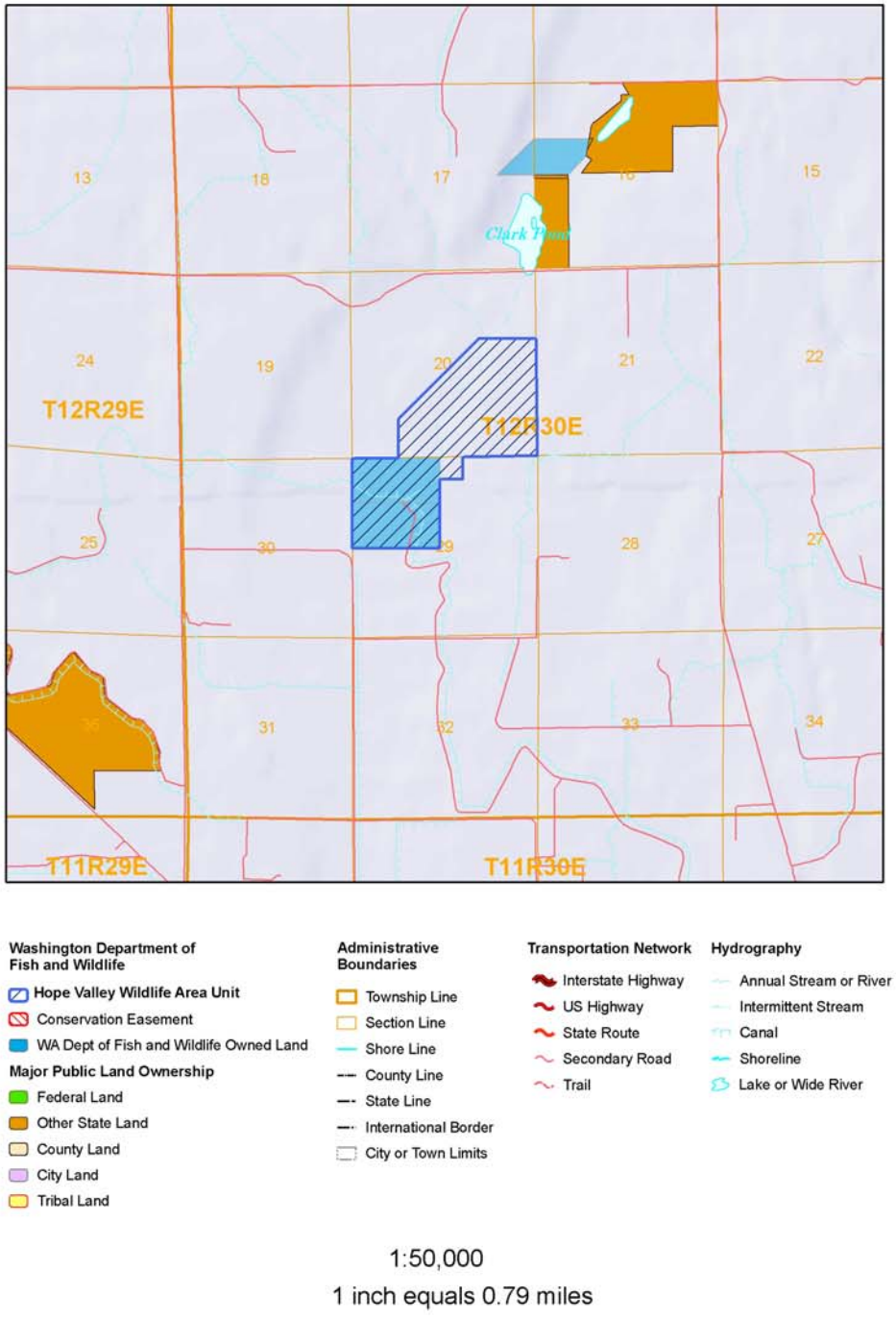

Figure 12. Hope Valley Unit

Swegle Road Unit (*No Map Available*)
The Swegle unit is made up of three parcels totaling 119.5 acres (fee title & easement) and is located approximately 3 miles west of the town of College Place. Legal description: T6N, R35E, portions of sec. 31 &32.

McDonald Bridge Unit
The McDonald Bridge unit (Figure 13) consists of two parcels adjacent to each other totaling 121.3 acres and is located 1 mile east of the town of Lowden. Legal description: T6N, R34E, sec. 33 & 34.

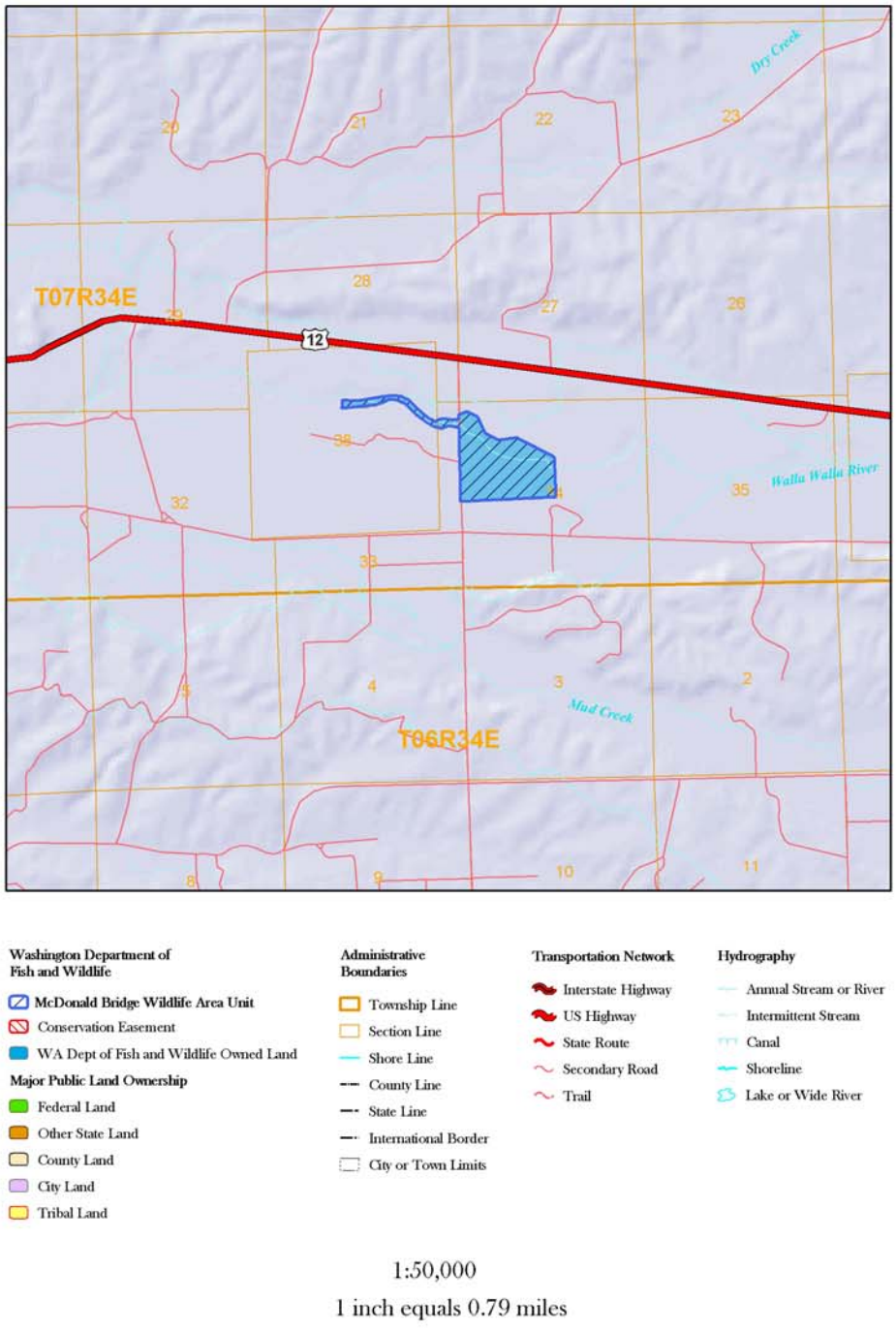

Figure 13. McDonald Bridge Unit

8 Mile Unit (*No Map Available*)
Legal description: T8N, R33E, sec.34. Twenty-five foot perpetual fishing easement on .8 mile of west bank of Walla Walla River.

Bailie Memorial Youth Ranch (*No Map Available*)
WDFW owns the hunting rights to the 3896 acre Bailie Memorial Youth Ranch located approximately 1mile north of the town of Basin City. Legal description: T13N, R29E, portions of sec. 2, 3, 10, 11, 12, 13, 14 & 15; T14N, R29E, portions of sec. 26, 27, 34 & 35. This is a Snake River mitigation site in Franklin County, the hunting access program is currently managed by the Franklin County Private Lands Biologist.

The following four units are owned and currently managed by BOR with potential WDFW management pending. WDFW has historically managed these parcels but the agreement is currently being renewed.

Esquatzel Coulee Unit
Located just north of the town of Mesa (Figure 14). Legal description: T13N, R30E, portions of sec.13, 24 & 29; T13N, R31E, portions of sec.18, 19 & 20.

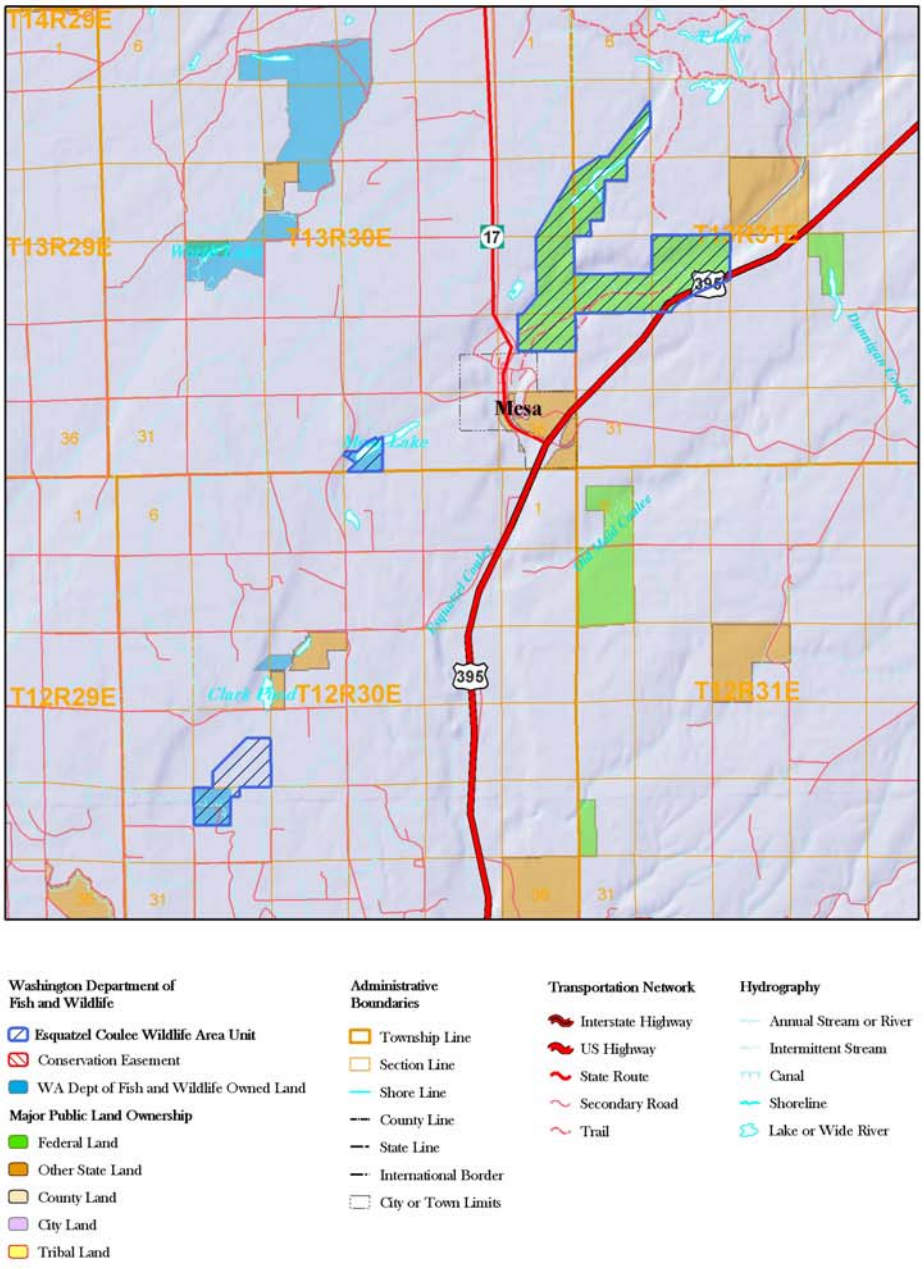

Figure 14. Esquatzel Coulee Unit

WB-10 Wasteway Unit

Located approximately 8 miles NW of Basin City (Figure 15). Legal description: T14N, R28E, portions of sec.23, 24, 26, 27, 28 & 29; T14N, R29E, portion of sec. 9.

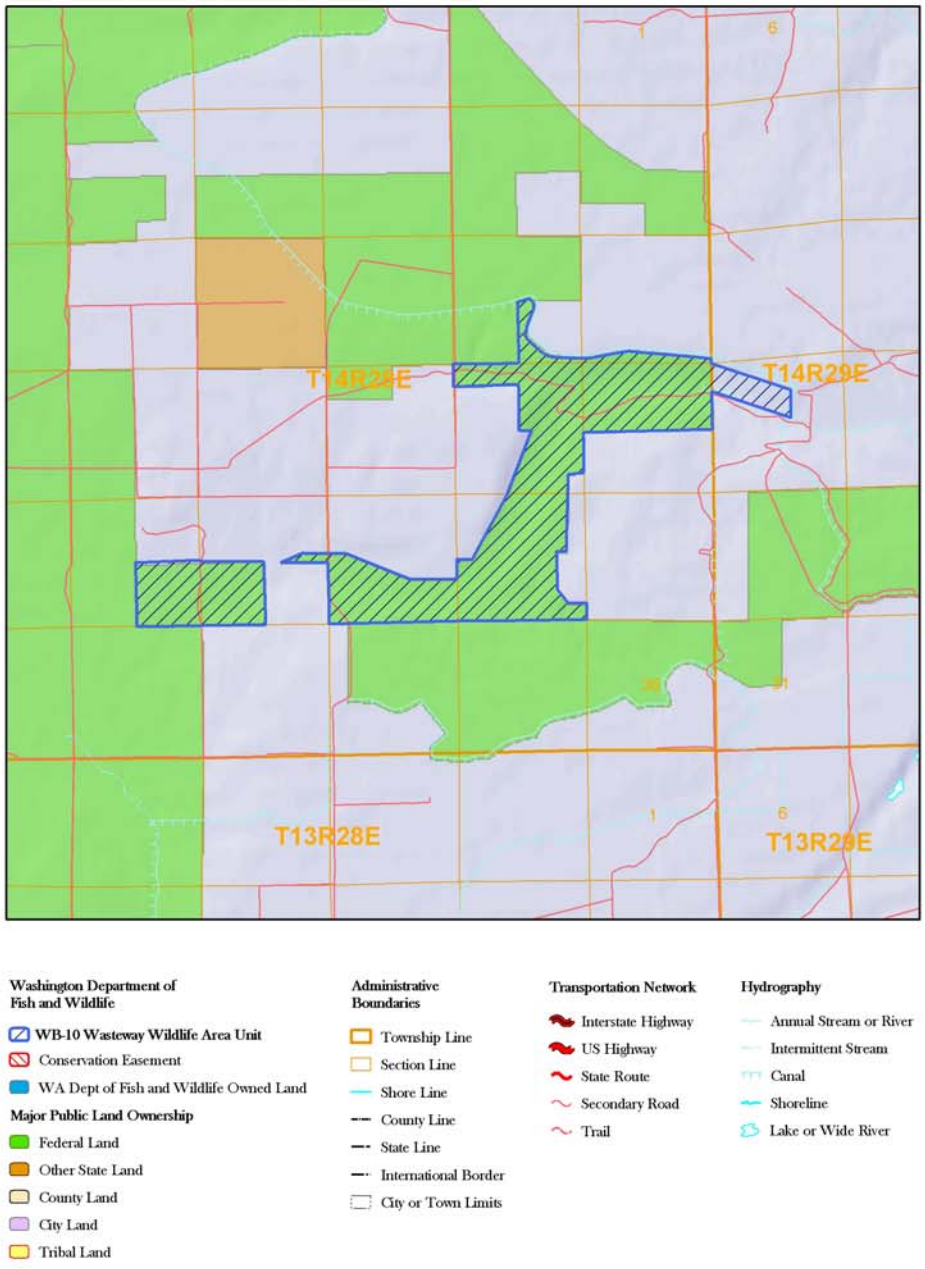

Figure 15. WB-10 Wasteway Unit

Clark Pond Unit

Located 4 -5 miles SW of the town of Mesa (Figure 16). Legal description: T12N, R30E, sec. 16.

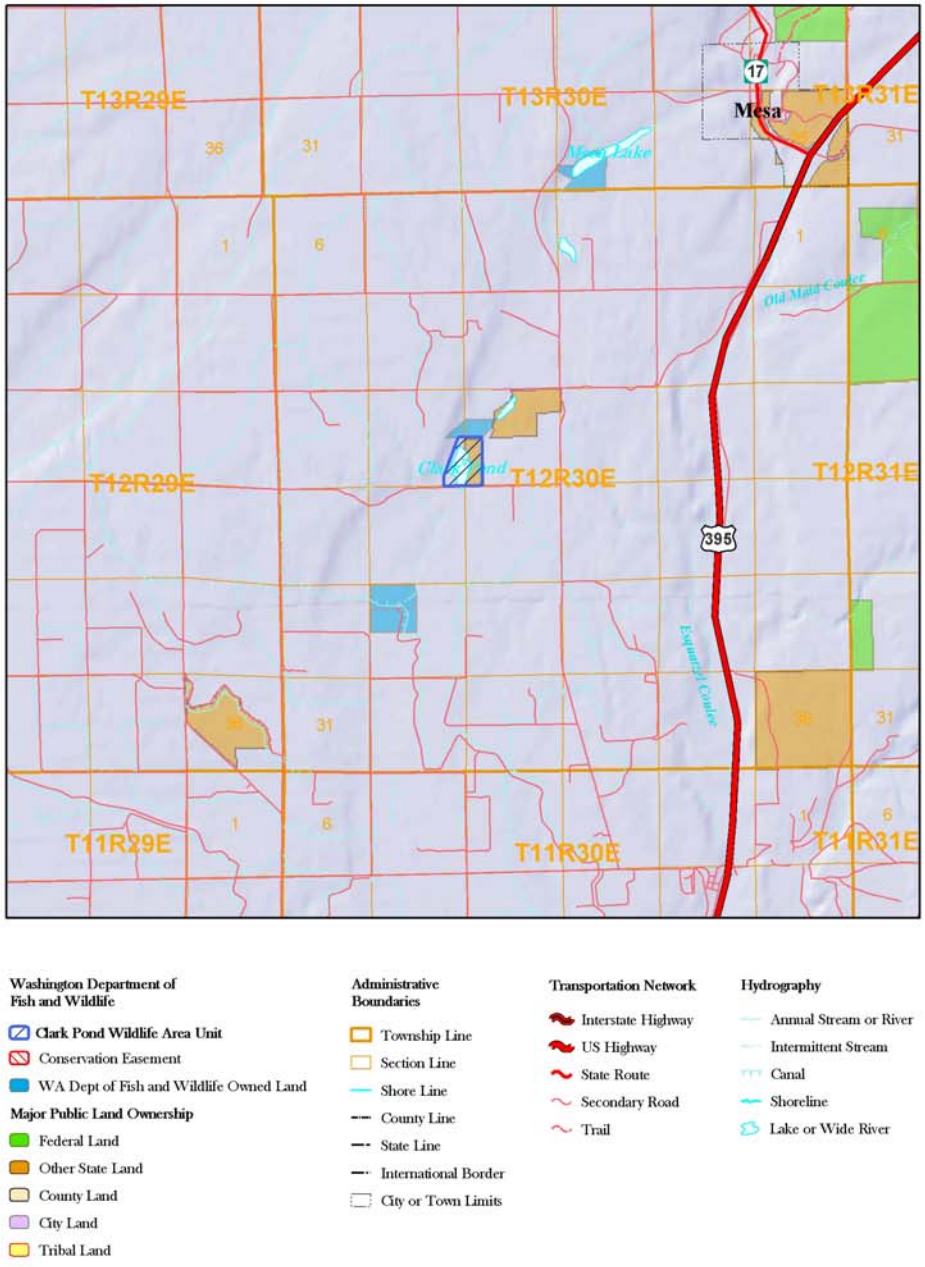

Figure 16. Clark Pond Unit

Mesa Lake Unit (*No Map Available*)
Located 2 miles SW of the town of Mesa. Legal description: T13N, R30 E, sec. 34.

2.2 Purchase History and Purpose

Acquisition History

The Sunnyside Wildlife Area (SWA) is a complex collection of properties that have been acquired over the past 60 years in Yakima and Benton counties. The various parcels were purchased with several different fund sources, and for a variety of reasons. Some of the parcels were purchased with State funds while others were acquired through mitigation agreements and some by land trades. In addition WDFW manages lands owned by other agencies. In the early years, the management costs of the SWA were covered by State funds and taxes on firearms and ammunition collected under the Pittman-Robertson (PR) Act. In 1996, as part of a mitigation agreement for habitat losses due to dam construction on the Columbia River, the Bonneville Power Administration (BPA) agreed to fund reasonable operation and maintenance activities on the SWA. This agreement only serves part of BPA's overall mitigation debt for the construction of Grand Coulee, McNary and John Day dam projects.

In the fall of 2001, as a result of budget cutbacks, the SWA was merged with a separate, but similar mitigation project: the Snake River Fish and Wildlife Compensation Program. The Lower Snake River Fish & Wildlife Compensation Program (Snake River) was designed to compensate for habitat and wildlife losses that were incurred due to the construction of four dams on the lower Snake River. The U.S. Army, Corps of Engineers (Corps) was the project proponent for dam construction on the Snake River and funded mitigation efforts to replace habitat losses. Part of that program included the acquisition of 24,000 acres within southeast Washington. Some of those lands, specifically those in Walla Walla, Franklin, Benton and Yakima counties, were combined with the SWA as a wildlife area "complex", administered by one manager and support staff. Funding remains separate for the various management facets of the complex. BPA provides no funding toward the management of these lands. Funding is derived from program income, primarily from agricultural leases.

In addition, 3 separate parcels previously managed under the Upland Restoration Program, were assigned to the wildlife area complex in 2005. Funding for these units comes from the state wildlife fund.

The fundamental reason for acquiring these lands was to protect and enhance habitat and to provide public recreation. Some of the lands also serve to help meet mitigation goals for BPA and Corps construction projects. Although the mitigation details differ somewhat between these two entities, they both essentially address habitat losses for upland wildlife, waterfowl, big game and a variety of non-game species.

Part of the Compensation Plan called for the purchase of lands that would compensate for lost fishing opportunity along the lower Snake River. The intent was to purchase in fee, or by easement, narrow corridors along streams. Landowners were often reluctant to sell just the shoreline of their lands but several were willing to sell entire parcels with stream frontage. Several small sites were purchased along the lower Yakima and Walla Walla rivers.

Site Description—Sunnyside Wildlife Area (SWA)
Because of the scattered nature of the SWA/Snake River parcels, and the different fund sources used for acquisition, site descriptions are easiest if the project is broken into sub-units for discussion purposes. These sub-units, and the lands included within them, may differ from past reports. It is approximately 118 road miles from one end of the project to the other and discussion begins on the west end, near Union Gap, in Yakima County.

I-82 Unit
This unit is made up of seventeen separate parcels of property that make up a narrow, discontinuous strip of ownership stretching from Union Gap to the Zillah interchange along Interstate 82. Most of this 980-acre unit lies between the interstate and the north shore of the Yakima River, the remainder lying along the interstate's northern right-of -way. About half the parcels were obtained from the Department of Transportation in 1983 when the interstate was built. The remaining parcels were acquired from private parties in subsequent years in an effort to block up ownership within the riparian zone. In addition, a Snake River Mitigation acquisition was made in this area (Donald Road) that provided a parking lot and public access to a larger block of state land.

The I-82 unit offers public hunting and fishing with three improved boat launches and six maintained parking areas. Seven man-made ponds, developed during the highway construction, give fishermen a variety of opportunities to catch several different species of fish. Public access to these ponds varies greatly. Some have parking areas immediately adjacent to the shoreline while others require a substantial walk. In some cases, vehicle and foot traffic is directed under the freeway via large culvert crossings.

The riparian habitat along the river, sloughs and ponds offers excellent nesting, brooding and winter cover for both waterfowl and upland birds. The area is also an important corridor for neo-tropical migrants and resident non-game birds. Historically, winter bird feeders were placed in several locations within this unit and were filled with grain on an annual basis. Reduced staff levels and other priorities have limited this work in recent years.

Headquarters (HQ) Unit
This is the second largest management unit on the SWA and includes some of the oldest state managed properties. The Bridgeman, Glover, Morgan Lake and Giffin Lake parcels (743 combined acres) were acquired between 1947 and 1949, primarily for waterfowl, upland game and hunting recreation. Other properties were later acquired that blocked up state ownership along the north shore of the Yakima River between Highway 241 and a point about 13 miles upstream. Those later acquisitions, including their purchase date and size are: Rupley (1972, 672 acres); Bleakney (1975, 600 acres); Johnson (1976, 193 acres); Snipes (1982, 490 acres); and Brady (1994, 88 acres). Brady was a Snake River acquisition and was the final piece of property that provided nearly contiguous shoreline ownership (one private in-holding remains). The total size of the Headquarters Unit is currently 2,786 acres.

The HQ Unit is a collection of small agricultural fields, interspersed with non-cropland that is made up of diverse habitat types. There are six ponds or lakes on the area that vary in size from 15 to 100 surface acres. Evidence of old river oxbows can also be found throughout this unit. All of these areas support vegetation that is typically found in wetlands and seasonally flooded areas. The

upland areas are generally comprised of greasewood flats and perennial grasses and forbs. Mature riparian woodlands still exist in places but not to the extent that they do along the upper river. Russian olives have been invading this unit for several years, becoming a monoculture in many places.
The Snipes portion of the HQ Unit was purchased over 20 years ago and has always been managed as a wildlife reserve, but the reserve status was never made formal until 2004. In August of that year, the reserve was designated as such and approved by the Fish and Wildlife Commission. Horseshoe Lake, an old river oxbow, lies within the Snipes Reserve and is an important resting place for wintering waterfowl.

Giffen Lake, at 100 surface acres, is the largest lake on the HQ Unit, and the SWA. White lily pads invaded the lake many years ago and completely cover the surface in the summer except for two small areas of deeper water. Discussions of control efforts started back in the 1970's but never reached fruition due to the daunting task. This lake receives water from springs and irrigation return flows, the latter being responsible for a silt buildup in the lake. Seasonal die back of lilies has also added to the buildup of organic matter on the lake bottom. The lily issue is a paradox. They virtually cover the lake from late spring until late fall, thereby eliminating any fishing recreation during this time. Waterfowl production is also limited due to the lack of open water. However, the lilies shade the water and remove nutrients, which ultimately results in higher quality water entering the Yakima River. Lake restoration efforts are still being considered but it will be an expensive project and will require a lot of follow up work. Recommendations for restoration include include two options: 1) Dredging the lake to remove tubers, then treating with an aquatic herbicide to kill remaining lilies. Herbicides would likely kill all submergent vegetation, even desirable species. 2) Establish constant flow water through the lake that will diminish lily establishment. Both options should reconnect water flow to the Yakima River. Both options are currently under review.

The farming program on the HQ Unit has been reduced in recent years by restoring some of the dryland fields to native grasses and shrubs. Approximately 468 acres remain under an agricultural lease. About 124 acres are in a dry land alfalfa/small grain rotation and the remainder is irrigated. Those parcels under wheel line irrigation rotate between alfalfa and wheat or barley. Three center pivots have allowed a rotation of field corn. A fourth pivot was installed in the winter of 2004, using a grant from the State Duck Stamp program. This will allow more field corn to be grown for wintering waterfowl. The state's share of the alfalfa crop (30%) has been used historically for the winter elk-feeding program or to make pellets for deer during harsh winter conditions. Administration of the hay-growing program may change in the future. All costs associated with the farming program are funded with Pittman-Robertson dollars.

Glover Unit
This 50.9-acre site was purchased in early 1992 as part of a multi-county program to protect habitat for upland wildlife. While in private ownership, the property was managed as irrigated cropland and sub-irrigated pasture which was grazed by livestock. An irrigation drain runs through the center of the property, offering some seasonal pond and wetland habitat. After it was purchased, the irrigation system was upgraded and grasses, shrubs and food plots were planted under management by the Upland Wildlife Restoration Program. When that program was restructured in 2005, this and 2 other similar parcels in Franklin County were assigned to the SWA for management purposes.

Ferry Road Unit
This 40-acre parcel was purchased in 1945, making it the oldest state-owned segment of the wildlife area complex. It is a combination of irrigated cropland and natural trees, shrubs and grasses, located about 1 mile northeast of Mabton in Yakima County. The primary purpose for acquisition was to protect upland bird habitat. The Vance property, a 117 acre parcel purchased in 1993 as part of the Snake River mitigation program, lies immediately adjacent to the Ferry Road Unit.

Byron Unit
This unit was purchased in 1948 with emphasis on waterfowl management. The sellers remained on the project for two years (Loyd Sak, Personal Communications) and it was the original headquarters for the SWA from 1950 until 1975 when it was moved to the current HQ Unit. The Byron Unit is located in a lowland area just west of the Benton/Yakima County line, on the north side of Highway 22 approximately five miles east of Mabton and five miles south of Grandview.

Two management agreements are in place for a portion of the Byron Unit. In 1950 WDFW entered into an agreement with the Northern Pacific Railroad for 35 acres and in 1955 an agreement was reached with the United States Department of Interior for an additional 320 acres. Because of the longstanding nature of these agreements, these 355 acres have been included in the mitigation project on the Sunnyside Wildlife Area. For crediting purposes these lands fall under Attachment C properties within the Memorandum of Agreement with the Bonneville Power Administration (October 1996). The total size of this management unit is 1,031 acres.

The terrain is a series of depressions and rolling hills. A major drain, carrying ground water and irrigation water, runs through the area creating a series of ponds extending approximately two miles and nearly 400 surface acres in size. The Byron Ponds, as they are called, have historically produced excellent waterfowl nesting and brooding areas. They are also important during the shorebird migration. However, a severe carp infestation has lowered the productivity as a brood rearing area. Livestock grazing was removed from the area several years ago, which has changed the complexion of the habitat. Tule and purple loosestrife infestations have increased in recent years. The surrounding uplands are used extensively by Canada geese, which graze on green cheat grass in late winter and early spring.

A distinguishing feature on the landscape is the Mabton siphon irrigation pipeline. WDFW property east of this pipeline (approx. 500 acres) was made a wildlife reserve in 1948. In 1989, WDFW entered into an agreement with the City of Grandview and Ducks Unlimited to build a pipeline and allow the City to pump treated sewage water into a series of depressions located within the Byron Reserve. This project created a lagoon system with 27 surface acres and six miles of riparian shoreline. Annual waterfowl breeding surveys have found these ponds to be extremely productive. The pumping operation is closely monitored by WDFW, Department of Ecology and the City of Grandview. Currently, the City of Grandview's treatment operation can clean wastewater to a level that allows direct discharge, via gravity flow into the Yakima River. However, the reserve ponds offer additional storage for treatment water during the winter months and the City has a strong interest in continuing this activity. Their permit requirements limit the amount of water that can be discharged to the reserve ponds which in turn, lessens their value for waterfowl. Discussions are currently ongoing to determine ways of maintaining seasonal flow to these wetlands.

The Byron Unit includes 25 acres of rill-irrigated cropland currently in an alfalfa/small grain rotation. It is under a lease agreement with 25% of the grain or 30% of the hay going to WDFW. Portions of the state's grain are left standing, and the remaining share is used to fill upland bird winter feeders or to make pellets for winter deer feeding operations. The hay is used for the elk feeding program or deer pellets.

Thornton Unit

The 2,080-acre Thornton Unit was acquired by WDFW in 1996 as part of a land exchange between the Department and Elliot Thornton. The unit is located 10 miles north of Prosser on the west side of Benton County and is approximately three miles southwest of the Rattlesnake Slope Unit.

Thornton was acquired for mule deer, upland birds, transitory elk (the Rattlesnake Hills herd), sage grouse, and other shrub-steppe obligate species. When acquired, the unit included 1,300 acres of dryland cropland (small grains) with the remainder in shrub-steppe habitat. In 1997, 598 acres of cropland were seeded to grass under the Conservation Reserve Program (CRP). In 1998 an additional 683 acres were approved for inclusion into the CRP program. By 1999 all croplands were converted to native-like grasslands.

The Department of Natural Resources (DNR) owns a full section of land that lies adjacent to the Thornton Unit. Although the land is under a private lease (grazing & CRP), it still adds another 640 acres that are available for public recreation. This property is similar in nature to the Thornton Unit and about one third of the area is enrolled in CRP.

Sharp Road runs up into the center of the property, following one of the major drainages. This county road receives heavy vehicle traffic and the end of the road is a popular spot for weekend parties. The threat of wildfire, constant disturbance to wildlife and habitat destruction are all reasons this road was vacated and closed in 2005 by the Department of Fish & Wildlife working with the Benton County Road Department. Current plans are to clean up the old homestead area and restore the habitat. Future activities on this site may include the development of small check structures within the drainages to collect spring runoff. This will help maintain available water for wildlife and support more riparian vegetation. Currently, most intermittent water disappears by mid-summer.

Rattlesnake Slope Unit

This management unit was designated surplus by the Federal government (Bureau of Reclamation and the Department of Interior) and granted to the WDFW in 1973. The property is located in Benton County seven miles north of Benton City on the lower east slopes of Rattlesnake Peak. Highway 225 is the east boundary and the only public access to the unit. The Bureau of Land Management (BLM) owns approximately 960 acres that lie immediately adjacent to state lands. Part of this property, under both ownerships, is designated as a public shooting facility with highly controlled access, and is managed by Benton County Parks and Recreation.

Elevations on this unit range from 400 feet near Highway 225 to 2000 feet along the crest of the Rattlesnake Hills. The terrain is gently rolling with abrupt inclines to the west of Horn Road and on the immediate slopes of Rattlesnake Hills. The Rattlesnake Slope has large stands of native bunch grasses with smaller patches of scattered bunchgrass and cheat grass. The cheat grass patches are

possibly the result of old sheep bedding grounds, small abandoned fields, or some other intensive land use**.** Wildfires in 1984, 2000, and 2003 have eliminated most of the native shrubs and have likely contributed to the spread of cheatgrass and other invasives.

Rattlesnake Slope Unit - Public Shooting Range
In 1986 the WDFW and Bureau of Land Management (BLM) entered into a land use agreement that allowed the Benton County Parks and Recreation Department to develop a public shooting range. The range is located along Horn Road on the east side of the property. Although four separate shooting ranges have been established, this project is still in the development phase due to intermittent funding.

The shooting range boundary includes land owned by both BLM and WDFW. The land use agreement between the two agencies allows BLM to act as the primary administrating entity on issues that involve Benton County and the shooting range. The BLM is currently evaluating a land transfer to the county for that portion of their property on which the range is located. Due to the dual ownership within the range boundary, WDFW lands may also be affected in the future.

The WDFW continues to work closely with the shooting range on issues that relate to land management and habitat enhancement. However, BPA wildlife mitigation funding will not be used for any activities associated with the shooting range.

Site Description—Snake River Mitigation Lands

Yakima River Public Fishing Areas
Benton City: This 16 acre site was purchased in 1994. It lies adjacent to the west boundary of the Benton City limits. The area includes about 2,000 feet of river frontage with a narrow but healthy riparian zone. The remainder of the property is abandoned farmland. When first purchased, the uplands were mostly dryland grasses with a few scattered elm trees. Currently, the elms have spread across the site and are a substantial component of the area. Benton City officials have expressed a strong interest in developing some public use improvements on this site such as a hiking trail and picnic tables.

Whitstran: This 21.6 acre site was purchased in 1993 and lies south of the town of Whitstran, between the Chandler irrigation canal and the Yakima River. Although relatively small, it provides a lot of habitat diversity. The shoreline is mature woody riparian cover and the uplands include Basin Big Sagebrush and dense stands of wild rose and clematis. Irrigation runoff, from agricultural operations to the north, has formed a small wetland in the center of the property. A second parcel of land, lying immediately downstream, was donated to WDFW, which effectively doubled the size of this unit.

Vance: This 117 acre parcel was purchased in 1993 and includes about ¾ of a mile of river frontage along the south shore of the river. It abuts the Ferry Road unit of the Sunnyside Wildlife Area and is managed as a single site. Most of the combined area is in irrigated agriculture, farmed in an alfalfa hay and small grain rotation. The site includes a residence, currently leased by the Vance family, and some outbuildings.

Brady: This 88 acre site, purchased in 1994, was one of two remaining in-holdings within the Headquarters Unit of the Sunnyside Wildlife Area. This purchase resulted in nearly continuous WDFW ownership from the Mabton Bridge, to a point about 13 miles upstream along the north shore. The site is a mix of perennial grasses and weeds, typical for the Yakima River floodplain. A small shrub plot was developed with mitigation funds in 1999. Part of this site, southeast of Giffen Lake, was developed into a seasonal wetland as part of a much larger wetland enhancement project on the SWA as described earlier.

Donald Road: This 75 acre site was purchased in 1993. It added additional acreage to the I-82 Unit of the SWA and provided contiguous public access from the Mellis Road site to the Wapato freeway interchange at exit #44. The site provides nearly 3,900 feet of river frontage and includes a substantial mature riparian zone, backwater slough habitat, and a small pond.

Walla Walla County Public Fishing Areas

Six different parcels were purchased within Walla Walla County for fishing access between 1991 and 1994. All but one are along the Walla Walla River with the exception being along the lower Touchet River. Several of the Walla Walla parcels are contiguous and, collectively, form two managed sites. Both are located between Lowden and Walla Walla and are described in the following 2 paragraphs:

Swegle Road: This property is a complex of 3 separate acquisitions, parts of which are fee-title and parts that are in perpetual easement. The Bughi parcel, purchased in 1991, offers a 50-foot easement along the north shore of the Walla Walla River, a 25-foot easement along both shorelines of Mill Creek and a fee title parcel along the south shoreline of the Walla Walla River. The Visser parcel, acquired in fee title in 1992, provides the only legal access to the fee title portion of Bughi, and the south shore of the river. Together, these two properties provide fishing access to one half mile of the Walla Walla River and about the same along Mill Creek. The Reser property, acquired in 1994, provides access to an additional half mile of river, upstream from Bughi and Visser. Hunting is allowed on Reser by shotgun or archery but Bughi/Visser has been designated as a Safety Zone due to the proximity of homes. The collective size of this unit is 119.5 acres.

McDonald Bridge: This property is a complex of two separate acquisitions, both of which were in fee title. The McCaw parcel (98.7 acres) was acquired in 1994, and provides access to both sides of the river, for one half mile upstream of McDonald Road. The DeMott parcel (22.6 acres) was purchased in 1993 and provides an additional one half mile of access downstream of the county road, but only along the south shore. The McCaw parcel includes about 36 acres of irrigated farm ground, which is leased to a local farmer who generally grows small grain. The irrigation system was upgraded and shrub plots were planted on this site as part of initial development. Both sites contain substantial gravel and rock dikes that were constructed for flood control prior to their purchase by WDFW. The state is currently looking at options to remove these dikes to allow floodwaters to recharge the riparian zone. Flood control activities in the Walla Walla River have been a long-standing issue as efforts to protect valuable farmland have taken precedent over fish, wildlife and their respective habitat. The McDonald Bridge complex is open to hunting by shotgun or archery.

8-Mile: This is a 2.4-acre perpetual fishing easement along the west shoreline of the lower Touchet River. It was acquired in 1992. Hunting was not included as part of the acquisition package and is only allowed by landowner permission.

Windmill Ranch: The Windmill Ranch, located between Basin City and Mesa in Franklin County, was purchased from the Booker family in 1992. The original purchase included 2 separate parcels for a total of nearly 1,534 acres. A piece of DNR property, already leased and managed by WDFW, connected the two parcels. Also, another adjoining tract of land, owned by the Bureau of Reclamation, is under a current WDFW management lease. Collectively, the total acreage of this management unit is about 2,000 acres.

The Windmill Ranch is quite diverse, both in habitat and management activity. The site is a mix of irrigated agriculture, shrub-steppe, woody riparian, wetlands and developed habitat plots. An agricultural lease on 422 irrigated acres includes 9 center pivots and one wheel line. Field corn and other small grains have been the primary crops, aimed at providing winter food for upland birds, waterfowl and migrating sandhill cranes. Income from the agricultural lease helps fund operation and maintenance of this and other Snake River lands.

A substantial amount of enhancement work has been done on this property, both from an irrigation infrastructure and habitat perspective. When the property was first acquired, all center pivots were refurbished to dependable working condition. Since that time, four of the pivots have been replaced with new equipment and more work is planned. Habitat plots have been developed throughout the property to obtain habitat credits toward the mitigation goal. Where possible, existing water has been incorporated into wetland enhancement projects.

The property is open for public hunting under a register-to-hunt and limited entry program. There are two parking lots that serve the area and only 5 cars are allowed at a time in each lot during the general hunting season. This has reduced the crowding issue on this relatively small site and helps to maintain a higher quality hunting experience throughout the season.

The Windmill Ranch has the potential for a lot of additional habitat restoration work but limited staff allows only basic maintenance. Like most sub-irrigated areas in the Columbia Basin, Russian olives and Canada thistle are widespread weeds. Purple loosestrife, phragmites spp., rush skeletonweed and salt cedar are also getting a foothold. The wetted perimeter of center pivot fields produces good broadleaf weed cover for upland bird brooding areas but are also becoming infested with troublesome and fast spreading weeds like punctureVine, sandbur and bristly foxtail.

Other Lands

At the present time, discussion is ongoing on the issue of adding more lands to the Sunnyside/Snake River complex. The WDFW currently manages other sites in Franklin County. Ownership includes the Department of Natural Resources, Bureau of Reclamation, and a privately owned ranch where WDFW holds a perpetual hunting easement, which was acquired through the Snake River mitigation program. It is unclear at this time what the final disposition of these lands will be but it is noteworthy to mention them. They are listed below by ownership and by current management:

Bailie Memorial Youth Ranch

This 3,897-acre property is privately owned and managed by a foundation with by-laws that state the land could never be sold. WDFW determined a hunting and fishing easement was the best option to provide recreational access and purchased a perpetual hunting easement in 1986. Currently, the hunting easement is managed under the Upland Wildlife Restoration Program. Changes in management of the ranch have resulted in an accelerated grazing program, which has substantially degraded the habitat. WDFW staff continues to work with managers and a board of trustees to try and minimize the effects on the resource and public recreation.

Nipper and Hope Valley
WDFW purchased these properties in 1992 as Upland bird habitat projects for nesting and wintering habitat in addition to providing hunting recreation access.

Esquatzel Coulee and WB-10 Wasteway
The Bureau of Reclamation (BOR) owns this land but it has historically been managed as part of WDFW's Columbia Basin Wildlife Area (CBWA) for fishing and hunting access in addition to providing habitat for fish, waterfowl and upland game. Discussions are currently underway regarding the future management of these and other BOR-owned sites in Franklin County.

Clark Pond and Mesa Lake
The Bureau of Reclamation (BOR) owns these lands but the access sites are managed by WDFW's Access program. Public fishing is limited in Franklin County and these sites provide fishing recreation within reasonable distance to the Tri-Cities. A small parcel owned by the Department of Natural Resources lies adjacent to Clark Pond and has been managed by WDFW for several years.

2.3 Ownership and Use of Adjacent Lands

The Sunnyside/Snake River Complex is highly scattered throughout Yakima, Benton, Franklin and Walla Walla Counties where much of the adjacent property is in private agricultural ownerships. The exceptions are as follows:

The HQ and I-82 units share the Yakima River as a common boundary with the Yakama Indian Nation (YN).

The Byron Unit is bordered on the north by the City of Grandview's water treatment facility. Numerous ponds and wetlands, created by wastewater storage, are scattered throughout shrub steppe habitat. All these lands are closed to public entry.

The Thornton Unit shares a common 2-mile boundary with DNR on the west side of the property. About one-third of the DNR section is enrolled in the CRP program; the remainder is high quality shrub steppe, which is grazed periodically under a private lease. A single, private ownership to the north separates this management unit from the Fitzner-Eberhardt Arid Lands Ecology Reserve (ALE), which is owned by the Department of Energy (DOE) and currently managed by the U.S. Fish and Wildlife Service. Until recently the DOE lands were managed by Battelle N.W. In 2000, many of the DOE lands in this area were included as part of the Hanford National Monument. At that time, management of some DOE lands, including ALE, was assigned to the U.S. Fish & Wildlife Service (FWS). The FWS currently manages the ALE under a Memorandum of Understanding with DOE. No public access is allowed on ALE, except by permission.

Rattlesnake Slope contains in-holdings owned by the Bureau of Land Management (BLM) and shares a common boundary on the north with ALE. The eastern portion of this unit has been set aside as an organized, multi-use shooting range. The Rattlesnake Slope Unit is separated from the Thornton Unit by two separate, private ownerships.

The Windmill Ranch was purchased as two separate parcels but a small parcel that is owned by DNR connects them. It is likely the DNR parcel will become WDFW property in the future. Also, a small parcel in the SW corner, owned by the Bureau of Reclamation (BOR) makes up part of this management unit.

The Bailie Memorial Youth Ranch shares one mile of common boundary with DNR, which is held under a private lease for grazing.

The Nipper Unit borders DNR property on the east and BOR property on the south (Clark Pond).

All other lands within the wildlife area complex are bordered by private lands, which are generally managed for some type of agriculture.

2.4 Funding

Funding for management comes from several venues.

1.) Bonneville Power Administration (BPA) funds have been approved as part of a large-scale wildlife mitigation program, to support the Sunnyside Wildlife Area. This project will partially meet BPA's mitigation obligation to compensate for wildlife losses resulting from the

construction of Grand Coulee, McNary and John Day dams. By funding the enhancement and reasonable operation and maintenance of the SWA for the life of the project, BPA will receive credit toward its mitigation debt. The annual operating budget is approximately $235,000 and supports a Wildlife Area Manager at the 75% level, an assistant manager (Maintenance Mechanic I) at the100% level and a nine month, career seasonal Habitat Tech I.

2.) Snake River Mitigation funds support management activities on properties acquired as partial compensation for losses resulting from construction of Snake River hydroelectric projects. The Snake River O&M account is a collection of program income from agricultural leases and rentals, and is used to fund goods and services needed to manage mitigation lands. The annual budget averages $20,000 per year. The Snake River Mop Up account is a finite source of funds that *temporarily* covers 25% of the Wildlife Area Manager's salary and most of the administrative costs such as an office, phone, and vehicle costs. The historic annual expenditures have averaged $25,000 but are approaching $30,000 currently. This fund source will likely run out within 10 years, leaving a large part of the project unfunded.
3.) Pittman/Robertson funds provide operation and maintenance funds for projects associated with game species. They are used for operating costs on agricultural programs that benefit upland wildlife and waterfowl on the HQ and Byron units. The current annual budget is $12,000.
4.) The General Fund account provides operating dollars (Non-PR) for projects that are not otherwise covered by specific fund sources, such as the Upland Restoration sites (Nipper, Hope Valley, and Glover) and assistance with weed control by the Yakima County Weed Board and seasonal WDFW staff. In 2005 and 2006, these funds were also used for support help on drafting the Wildlife Area Plan. These funds have only been available for the past two years and the annual current budget is about $31,000.

The WDFW will, as part of the implementation of this plan, submit grant proposals and applications and identify other strategies to address unfunded management needs on the wildlife area. For instance, some of the historic fund sources have been the following:

a) Ducks Unlimited funds support select waterfowl enhancement projects.
b) State Duck Stamp funds are used for waterfowl enhancement projects.
c) NRCS funds (CRP, CREP, WRP, WHIP) are used on upland and wetland enhancement projects.
d) WDFW capital budget funds provide capital improvement needs.
e) Pheasants Forever funds are used on select upland bird enhancement projects.
f) North American Wetland Conservation Act (NAWCA) funds were used for a wetland enhancement project administered by the Yakama Nation (YN) and additional funds are being sought for 2006 projects.
g) WDFW's access area staff assists with maintenance on some of the parking areas and boat launch sites within the Wildlife Area.

I-82 Parcels

About half of the Interstate Highway 82 (I-82 unit) parcels were obtained from the Washington State Department of Transportation from lands acquired for the development of the new interstate highway. DOT had no desire to manage these lands and WDFW (then called the Department of Game) recognized the opportunity to protect riparian habitat and its associated wildlife while providing lands for hunting and fishing recreation. These lands were transferred from DOT to WDFW as mitigation from development of the highway. Additional lands were purchased from

private landowners to block up management units. The Donald Road parcel, for example was purchased with Snake River mitigation funds. Operating costs come from BPA, PR and Snake River funds.

Sunnyside Wildlife Area
The 2,786 acre Headquarters Unit is located on the north shore of the Yakima River between Sunnyside and Mabton.

Parcels throughout the project have been purchased with funds from the sale of hunting and fishing licenses, Pittman-Robertson Federal Aid in Wildlife Restoration (PR) and Snake River Mitigation funds (SRM). Operational funds come through PR funding, the Bonneville Power Administration, and Snake River mitigation funds.

Historically, wildlife area budgets statewide have been rather meager which limited activities to basic operations. As part of Columbia River Mitigation, the Bonneville Power Administration agreed to fund operations and limited habitat enhancement on the SWA in 1996. This allowed project staff to focus more intently on habitat enhancement projects.

Funding for wetland enhancement projects typically come from a variety of sources: a North American Wetlands Conservation Act (NAWCA) grant, the State Duck Stamp art program, Ducks Unlimited and the Natural Resource Conservation Service's Wetland Restoration Program (WRP). The SWA staff manages these wetlands with BPA funds.

Thornton Unit
Thornton property was acquired through a trade of the old Kennewick Game Farm. The game farm had been purchased with funds from the sale of hunting licenses and PR funds but was no longer functioning as a game farm. Operational funding has been through BPA since 1996.

Rattlesnake Slope Unit
Rattlesnake Slope acquisition was through a federal surplus grant from the BOR and Department of Interior. Original operational funding came from the Washington State Energy Facility Site Evaluation Council (EFSEC) through the Hanford Atomic Power Plant 1 and 2 Mitigation accounts. In its Site Certification Agreement for the Washington Public Power Supply System (WPPSS) Nuclear Projects Number 1, 2 and 4 at Hanford, EFSEC provided for the protection and mitigation of wildlife impacted by the projects. In 1987 EFSEC accepted a mitigation plan that would improve wildlife habitat on the nearby Rattlesnake Slope Unit of the Sunnyside Wildlife Area. Later that year the WDFW entered into mitigation with WPPSS for habitat loss incurred during the construction of their atomic power plants. A project agreement was developed and approved.

Mitigation funding for the nuclear energy projects is a complicated issue and substantial changes have occurred in the past 10 years. The original mitigation was compensation for lost habitat incurred during construction of the nuclear plants. However, part of the Site Certification Agreement stated that the area must be returned to its natural state when the nuclear plants ceased operations. Only the number 2 plant was completed and is currently functional. Since plants 1 and 4 were never completed, and never will be, WPPSS, now renamed Energy Northwest, was obligated to tear down the partially completed structures and restore the area to its natural state.

The cost estimates for this work were enormous. Energy Northwest and BPA agreed to perform enough restoration work to assure public health and safety around the construction site, plus, provide a lump sum of about $3.5 million to buy large blocks of shrub steppe habitat in the nearby vicinity. A small percentage of the mitigation payment was to be used to fund future operation and maintenance activities on the Rattlesnake Slope Unit.

EFSEC wanted to roll all mitigation obligations into a single negotiated payment. The $3.5 million settlement included language that annual funding would no longer be provided for O&M on Rattlesnake Slope. At the time, WDFW was negotiating the purchase of a large ownership in the immediate vicinity, and it was generally agreed that the O&M part of the EFSEC mitigation package would be used on the new property as well as Rattlesnake Slope. Acquisition of the property failed and no other lands were acquired in the area. Essentially, the O&M funds for Rattlesnake Slope were lost. Currently, BPA funds O&M on the portion that falls outside of EFSEC's original mitigation project, and monies from the State General Fund cover O&M on the remaining portion of this management unit.

Snake River Mitigation Projects
Windmill Ranch, Bailie Memorial Youth Ranch, Brady, Benton City, Whistran, Vance, Donald Road, Swegle Road, and McDonald Road were acquired and provided with initial development funds through the Corps of Engineers Snake River Mitigation Program.

Between 1960 and 1975, the U.S. Army, Corps of Engineers (COE) built four hydroelectric dams along the lower 140 miles of the Snake River in Washington. In the order of construction, these were: Ice Harbor, Lower Monumental, Little Goose and Lower Granite. The Fish & Wildlife Coordination Act (1958) requires construction agencies responsible for project-caused wildlife losses to consult with state and federal resource agencies for mitigation/compensation needs. Under this authority, the COE prepared the Lower Snake River Fish and Wildlife Compensation Plan (Comp Plan), which was authorized by Congress in 1976.

Implementation of the Comp Plan resulted in a variety of programs, all designed to replace habitat losses on the lower Snake River. One program involved the purchase and development of 24,100 acres, mostly within Southeast Washington. Of the total acreage purchased, WDFW owns or controls nearly 20,000 acres, only some of which have become part of the SSWA. The Corps of Engineers funded the purchase and initial development of these sites but would not agree to long-term O&M costs. WDFW took the case all the way to Congress but was unsuccessful in obtaining O&M funding. Currently, funding comes from income generated by agricultural leases on a few of the mitigation parcels.

Nipper, Hope Valley and Glover Units
Funding for purchases came from hunting and fishing license sales as well as Pittman-Robertson Federal Aid in Wildlife Restoration Funds. Non-PR dollars, from the State General Fund, are used for O&M activities on these three sites.

2.5 Climate
The following website; http://www.wrcc.dri.edu/summary/climsmwa.html. Summarizes monthly climatic data and can be averaged over a period of time (5, 10, 20, 50 years). Data can also be found on the NOAA Weather Website.

I-82/ HQ/Byron Ponds/Vance/Whitstran/Benton City Units
Elevations on these units range from 928 feet at the west end of the I-82 parcels to 460 feet at Benton City on the east end. All these units lie along the Yakima River Corridor with little variation in climate. The area receives a mean annual precipitation of 6.64 inches with ranges from 3.78 to 12.92 inches registered at the Sunnyside station. The majority of the precipitation falls between September and May, with an average of 9.4 inches of snowfall annually. Some years there is little or no snow with heavy snowfall occurring about every 10 years. Extreme temperatures range from minus 43^0 to 110^0 F with monthly averages from 31-73 degrees F. (NOAA Weather Website September 2005).

Thornton/Rattlesnake Slope Units
Elevations on these units range from 2000 feet along top of Rattlesnake Ridge to 400 feet on the lower portions at Horn Rapids. Precipitation ranges from 4.24 to 13.45 inches with an annual average of 7.52 registered at the Prosser station. Winter precipitation may fall in the form of either rain or snow. Temperatures range from below zero to over 105 degrees Fahrenheit. (NOAA Weather Website September 2005).

Windmill Ranch/Bailie YMR/Nipper/Hope Valley Units
There is little change in elevations between these units with a range from 900 feet to 750 feet. Mean annual precipitation in the subbasin is 5.35 inches, with most being rain and very little snowfall. (NOAA Weather Website September 2005).

Swegle/McDonald Road Units
These units are near each other along the Walla Walla River with elevations running from 610 feet to 500 feet, in an east to west direction. Annual precipitation averages 12 to 14 inches per year, mostly in the form of rain. Temperatures range from below zero to 105 degrees Fahrenheit. (NOAA Weather Website September 2005).

2.6 Soils and Geology
The geology of the survey area is quite varied. The mountainous areas in the western part of Yakima County consist of many different types of rock, including basalt and andesite. The principal rock in the central and eastern parts is Yakima Basalt, which is the younger flow of Columbia River Basalt. This basalt originated from large fissures or rifts where the fluid lava swelled to the surface and spread in all directions. Soils such as those in the Ritzville, Starbuck, Shano, and Bickleton series formed in areas where loess is underlain by basalt. Soils such as those in the Bakeoven, Lickskillet, Kiona, McDaniel, and Rock Creek series formed in colluvium and residuum derived from basalt. Overlying the Yakima Basalt in many areas that flank foothills and ridges are the light-colored tuffaceous sandstone, siltstone, and conglomerate of the Ellensburg Formation. This old stream-deposited sediment was derived from volcanic material ejected during the early development of the Cascade Range. This formation occurs extensively in the Wenas Valley, in the lower reaches of the Naches Valley, in areas west of Yakima, and along the southern part of Rattlesnake Ridge. The formation is more than 1,800 feet thick in places. (Lenfesty and Reedy, 1985)

The upper and lower parts of Yakima Valley have been filled with material that was deposited by normal stream activity and glacial outwash. These areas include low terraces and flood plains. Extensive areas in the lower part of Yakima Valley are mantled by loess underlain by lake sediment

that was deposited during glacial flooding in the late Pleistocene. This sediment occurs at elevations of as much as 1,000 feet in the survey area. (Lenfesty and Reedy, 1985)

Soils
Soils information was obtained from the NRCS-USDA Washington State soils map/data web site: www.nrcs.usda.gov/technical/efotg

Yakima County Units
I-82 Unit
Soils in the I-82 unit consist mainly of the Weirman sandy loam series with some Zillah and Yakima series. These consist of excessively drained sandy loam soils on the low terraces and flood plains. It forms in mixed alluvium with slopes 0-5 percent. The native vegetation is mainly grasses, forbs and shrubs. This unit is subject to frequent periods of flooding in the spring. There are small patches of Yakima and Logy silt loam series that are more suitable for grasses and forbs and was used in the recent past for crop production.

Sunnyside HQ Unit
Soils in this unit consist of the silt loam series with most in the Zillah, Umapine and Esquatzel series. This very deep, artificially drained soil is on flood plains and formed in recent alluvium. The native vegetation is mainly water-tolerant trees, sedges, and forbs. Included are areas of soils that have been artificially drained and areas of salt and alkali affected soils. Salt grasses and greasewood shrubs dominate these areas. These soils are prone to wetness and flooding.

Byron Unit
Soils in this unit consist mainly of the Starbuck series. This shallow, well-drained soil is on the uplands and formed in loess. Soil depth is about 16 inches with basalt underlying it to a depth of 12-20 inches. The native vegetation is mainly grasses, forbs and shrubs. Native grass is mainly bluebunch wheatgrass and Sandberg bluegrass. The main shrub component is big sage and predominately rabbitbrush. Rock outcrops occurs in areas as exposed bedrock.

Vance Unit
This unit lies adjacent to the Yakima River with silt loam and loamy fines soils predominating. The series are made up of Fiander silt loam, Kittitas silt loam, Umapine silt loam drained (2-5 % slope) and Quincy loamy fine sand (0-10 % slope). These are generally well drained soils on floodplains formed on terraces and on alluvium. The Quincy loamy fine sand was formed in eolian sand. Also included are very deep, artificially drained, salt and alkali-affected soil on the flood plains and low terraces and formed in alluvium. Native vegetation is mainly salt and alkali tolerant grasses, forbs and shrubs. Soil blowing can be a major problem and should have a constant cover crop of vegetation.

Benton County Units
Whitstran / Benton City Units
These units are located along the Yakima River. The Benton City unit consists of the Finely fine sandy loam (2-5 % slope) association while the Whitstran unit has the Burbank loamy fine sand (0-2 % slope) series as well as the Scootney stony silt loam (0-30 % slope) and Scootney silt loam, gravelly subsoil (0-2 % slope) series. These soils formed on alluvial terraces and on bottomlands

along intermittent streams and the Yakima River. They developed under bunch grasses in stony and gravelly alluvium and in silty, windblown deposits.

Thornton Unit

The area includes six south facing parallel ridges separated by one permanent stream (Snipes Creek) and several intermittent waterways. Soils range from bare rock to over three feet deep allowing for the establishment of sagebrush stands and grasslands. Steep canyons bottom out at just under 1,500 feet in the southernmost part of the area while ridge top elevations extend to 2,400 feet on the north side of the unit.

The unit consists of silt loam soils in the Kiona stony silt loam series, Lickskillet very stony silt loam series, Starbuck silt loam 2-15 % slope series, Ritzville silt loam 15-30 % slope series and the Moxee silt loam 15-30 % series. These soils are generally well drained on uplands and formed in loess and colluvium with some derived from basalt. In the Starbuck series soil depth is about 16 inches with basalt underlying it to a depth of 12-20 inches. Rock outcrops occur in areas as exposed bedrock. In the Moxee silt loam 15-30% slope series the soil is well drained on uplands and is shallow over a hardpan and formed in loess. Lime and silica cemented hardpan is at a depth of about 18 inches and ranges from 10–20 inches. The hardpan is commonly underlain by basalt. Native vegetation consists of grasses, forbs and shrubs. These include Bluebunch wheatgrass, Sandberg bluegrass and Thurber needlegrass. As production of grasses decrease the proportion of sagebrush and rabbitbrush increases. Dustiness can be a problem and the sites should be disturbed as little as possible.

Rattlesnake Slope Unit

Soils information for this unit has not been mapped thus associations have been derived from lands adjacent to the Rattlesnake Slope unit. Series identified are Ritzville silt loam (0-5 % slope), Willis silt loam, shallow (0-15 % slope), Kiona very stony silt loam (0-30 % slope), Kiona very stony silt loam (30-65 % slope), and Willis silt loam (0-5 % slope). These soils occur on the uplands and developed under bunch grasses in silty windblown deposits mixed with small amounts of volcanic ash. The Willis series are underlain by a lime-silica hardpan overlying basalt bedrock. The Willis silt loam, shallow series are most often found on broad ridge tops.

Franklin County Units

Soil reports were not available for Franklin County however, soil maps were. Using other county descriptions the following series were available.

Nipper Unit

Soil type for the most part is the Warden-Sagemoor-Kennewick association. Soil description is dry, silty and loamy soils that formed in glaciolacustrine deposits from cataclysmic outbursts floods in the lower part and loess in the upper part. Warden soils are on terraces and are very deep and well drained. They formed in lacustine deposits that have a mantle of loess. The surface layer is silt loam and the subsoil is are silt loam and very fine sandy loam. Sagemoor soils are on terraces and are very deep and well drained. They formed in lacustrine deposits that have a mantle of loess. The surface layer and subsoil are silt loam. Kennewick soils are on terraces and are very deep and well drained. They formed in lacustine deposits and are silt loam throughout. Native vegetation is mainly grasses and shrubs.

Hope Valley Unit
Soil type is the Quincy-Hezel-Burbank association. These are dry sandy soils on terraces and dunes that have formed under sparse dune vegetation or shrub-steppe vegetation in wind deposited sand or silt over glaciolacustrine deposits from cataclysmic glacial outburst floods; most have low water holding capacity. Native vegetation is mainly grasses and shrubs.

Windmill Ranch /BYMR Units
Soil type is the Starbuck-Schawana-Prosser association. Soils of the Channeled Scablands are shallow, stony soils formed in loess over cata scoured basalt and occur in complex landscape patterns with moderately deep soil. Sandy, or cobbly flood sediment formations are small areas of very deep loessial affected alluvial soils. The Starbuck soils are on benches, hillsides and ridgetops. These are shallow and well drained and formed in loess and in material derived from basalt. Surface layer is very fine sandy loam with subsoil a silt loam. Schawana soils are shallow, somewhat excessively drained and on benches and hillsides. They formed in eolian deposits and material derived from basalt. The surface is cobbly loamy fine sand and underlying material is a gravelly very fine sandy loam. Prosser soils are on benches and hillsides and are moderately deep and well drained. They formed in loess and are very fine sandy loam. Native vegetation is mainly grasses and shrubs.

Walla Walla County Units
McDonald Road Unit
This unit has the River wash and Touchet silt loam (0-3 % slope) series. River wash consists of nearly level bars of coarse sand and gravel. It is nearly bare of vegetation but willows and cottonwoods are establishing in places. It is subject to change in size and position, even during the normal flow of the river. The Touchet series consists of moderately well drained, medium textured soils of stream bottomlands. The soils have formed in deep deposits of alluvium that washed from the uplands. Vegetation is largely cottonwood, willow and alder.

Swegle Unit
This unit consists of a variety of soil series. Pedigo silt loam, overwashed (0-3 % slope) soil formed in recent alluvium that washed from the uplands. They have a uniform profile of silt loam that is calcareous, slightly saline, and moderately to stongly alkaline. Vegetation is mainly giant wild rye and saltgrass, in wet spots it is alkali bluegrass and in the dry, fringe areas it is bluebunch wheatgrass. River wash - (see Mc Donald Road description). Yakima silt loam (0-3 % slope) and Yakima gravelly silt loam (0-3 % slope) series consist of excessively drained, medium textured soils that have formed in alluvium. The alluvium consists of basaltic material that has washed from the Blue Mountains and of some loess form the soils of the uplands. Native vegetation consisted of willow and cottonwood along the streams and beardless wheatgrass and wildrye on the dry parts of the bottom. Sagebrush and sumac grew in the more cobbly areas. Hermiston silt loam (0-3 % slope). Umapine silt loam, leached surface (0-3 % slope) is a well- drained saline-alkali soil on gently sloping terraces. The soils formed on old alluvium derived mainly from loess and pumice mixed with a small amount of basaltic material. It is low in fertility and low in water-supplying capacity. Root penetration is moderately shallow and very little wind erosion occurs as long as salt grass cover is maintained.

2.7 Hydrology and Watersheds
I-82/Sunnyside HQ/Byron/Thornton/Rattlesnake Slope/ Vance Whitstran/Benton City Units

All these units except Thornton and Rattlesnake Slope lie along the Yakima River stretching from Union Gap to Benton City. Thornton lies along the south slope of the Rattlesnake Hills and Rattlesnake Slope lies along the east slope of Rattlesnake Hills. Both eventually drain into the Yakima River, upstream and downstream of Benton City, respectively. All lie within Watershed Resource Inventory Area 37, the Lower Yakima River Watershed.

Thornton is bisected by the upper Snipes Creek and its small tributaries and lies adjacent to Sharp Road. Springs feed Snipes Creek part of the year with intermittent flows late in the summer with no fish known to reside in this section.

Rattlesnake Slope unit is bisected by three major canyons, none of which carry any water other than seasonal snowmelt or periodic, violent rainstorms.

The I-82 Unit has a relatively stable shoreline (Yakima River) due to the low bank and mature, woody riparian vegetation. The HQ Unit for the most part is bordered by a very high vertical bank and is unstable. The exceptions are outward bends in the river, which continue to create deposition sites on the inside of the bends. Willows are the first woody species to become established on these bars. Annual runoff events scour the banks heavily against the outside bends of the river. It's not uncommon for the river to cut 20 feet off these banks in a single year, adding many tons of sediment to the river. The vertical nature and height of these shoreline areas makes it virtually impossible to stabilize them. The HQ Unit lies mostly within the Yakima River floodway and much of it was underwater during the severe flood event of 1996. The unit is laced with old river oxbows, isolated from the river as it has meandered across the valley over the years. These oxbows are still influenced by groundwater and some are artificially filled with irrigation wastewater to create more wetland habitat. Three major irrigation drains enter the HQ Unit on their way to the Yakima River. At least two of these drains existed as natural streams before they were channelized and rerouted during the development of the irrigation project. Now, irrigation drain water and natural runoff are commingled in these drains. An artificial and natural series of wetlands on the HQ Unit is used to improve the quality of this water before it re-enters the river.

The Vance Unit contains about ¾ of a mile of river frontage and the shoreline condition is similar to that of the HQ Unit. A shoreline buffer was established soon after the property was purchased.

The Byron Unit has no direct river frontage and receives water from irrigation tailwater, drainage, or filtered wastewater from the City of Grandview. There is at least one small spring that enters the unit along the south boundary. Regardless of the origin, water from all these sources fills natural swales throughout the area, creating open water habitat, mixed with emergent vegetation. The water from the City of Grandview remains contained in a number of small basins, while the irrigation runoff leaves the property and eventually re-enters the Yakima River about a mile beyond the eastern boundary.

Both the Whitstran and Benton City units have Yakima River frontage. Both have relatively stable shorelines, minimal cutting, and support fair to excellent woody riparian cover.

Windmill Ranch/Bailie Ranch/Nipper/Hope Valley Units

These properties lie within the Columbia basin watershed with the bulk of water coming from irrigation wastewater that forms artificial lakes creating fish habitat and recreational hunting and fishing opportunities. All of these units existed entirely of shrub steppe habitat before the Columbia Basin Irrigation Project came on line in the early 1950's. Now, after 50+ years of irrigation seepage out of canals and underground fractures in underlying basalt, the areas have taken on a completely different complexion. All of the units have at least some low lying depressions and swales that have collected water and become open water ponds and/or areas with hydric soils that support wetland vegetation. These units lie within Watershed Resource Inventory Area 36, the Esquatzel Drain.

The Bailie Ranch has a substantial irrigation wastewater creek that flows year around along its entire length (over 5 miles). The channeled scabland nature of the property has produced several basins that are full of water on a year around basis. Some of the ponds are filled by underground flow and some are filled by direct surface flow. The Windmill Ranch has similar pond and wetland habitat but most of it is created by seepage from the Potholes Canal, underground flow, or a side benefit of direct irrigation flow used to irrigate crops. The Windmill Ranch has 3 major water bodies that provide fishing and hunting recreation. The largest, Powerline Lake, is 35 acres in size, over a mile long and 70 feet deep.

The Nipper Unit lies in a valley, which remains saturated by irrigation runoff most of the year. The gradient in this part of the valley is level and the presence of water has created highly alkaline soils. Weeds and emergent vegetation, typical of this hydrology, are present on all but the west half, which is at a slightly higher elevation. As the water leaves the Nipper unit, it collects in Clark Pond, an old borrow pit. The water is then consolidated into a ditch as it continues south toward the Hope Valley unit. Hope Valley is mostly an upland site but has 3 swales that contain wetland habitat and a small amount of open water, a result of seepage from the adjacent irrigation canal.

Swegle/McDonald Road Units

The McDonald Road Unit includes 2 separate parcels, one lying east and one lying west of McDonald Road. Together, these units contain about one mile of Walla Walla River frontage. Riparian vegetation is in excellent condition and fairly stable except during extreme flood events. Historic dike construction has altered the hydrology of this area, preventing floodwaters from recharging the riparian zone in some places. Plans to remove some of those dikes will be implemented soon. These units lie within Watershed Resource Inventory Area 32, the Touchet and Walla Walla River watersheds.

The Swegle Unit is comprised of 3 separate parcels and contains parts of Mill Creek, the Little Walla Walla River and the mainstem Walla Walla River. The WDFW owns approximately 5,800 feet of frontage on the Walla Walla River, 1,600 feet on the Little Walla Walla River and an easement along 2,600 feet of Mill Creek. Riparian vegetation along the Walla Walla River and Mill Creek is in very good condition. The Little Walla Walla River has excellent riparian habitat near the confluence with the mainstem Walla Walla River. The upper portion, however has excellent herbaceous cover but is lacking a woody vegetation component.

Shoreline areas are very stable on both the Little Walla Walla River and Mill Creek. The mainstem Walla Walla River is stable except in high runoff events when it typically scours and moves side to side.

2.8 Fire History

Uplands away from irrigation influences and riparian habitat are subject to periodic fires. Most other fires are minor and contained in small areas. Those areas where fires occur periodically are summarized below.

I-82 Units

Although this unit is composed of riparian habitat it is still subject to fires. In the summer of 2000 a lighting strike caused 100 acres to burn on the north side of the Yakima River between Parker and Buena. No restoration work was planned and habitat reappeared the following spring and has been improving since that time. The fire removed most of the large trees, which contained cavities for cavity nesting birds. It did however provide small snags for excavating bird use. An occasional human caused fire occurs but is often put out before wildlife area staff is advised. Fire frequency is in the 5-10 year range.

Sunnyside HQ Unit

A controlled burn on the south side of the river got out of control in about 1999 or 2000 and jumped the river onto the Snipes Reserve. The fire burned some mature woody riparian vegetation, an old residence and the old hunting lodge on this part of the Headquarters Unit. Fire has not occurred often on this unit and frequency would likely be in the 20-25 year range. Occasional controlled burns are used to improve habitat conditions on this unit.

Thornton Unit

Although subject to fires and capable of carrying a fire this unit has not burned often with the only reported fire being a small lightening strike, occurring in 1999, that required some fence rebuilding. Fire frequency is thought to be in the 20-25 year range.

Rattlesnake Slope Unit

Fire history is not well documented historically but it is known that a fire occurred here about 1984. In 2000 a human caused fire (vehicle accident) swept through the entire ALE including Rattlesnake Slope and adjacent lands. All shrubs and grasses were burned with the shrub component being eliminated. Grasses grew back and a shrub restoration program was implemented the following winter on 900 acres with good success. In the summer of 2003 a lightning strike fire burned portions of the area resulting in a restoration project on an additional 1200 acres that winter. In recent times the fire frequency has been 2-3 years but over the long period it is thought to be 10-20 year intervals.

Whitstran Unit

In the summer of 2005, a small fire (about 4 acres) burned some large sagebrush and wild rose on the Whitstran Unit. The source of the fire is unknown but it was presumed to have been human caused. Since records are not known to exist for this unit it is estimated that fire frequency is in the 10-20 year range with most being human caused. Some of the sagebrush on this site is extremely large, indicating that the area has not burned for an extended period of time.

Windmill Ranch Unit
Based on the absence of shrub cover on this unit, as compared to some of the adjacent properties, it can only be assumed that historic fires removed much of the sagebrush that once grew here. Remaining fragments indicate the historic quality of shrub steppe habitat here was excellent. Several small fires have started on the north end of the Windmill Ranch since 1994 and were assumed to have occurred from lightning strikes on the steel BPA transmission towers. Members of the local fire district have put all fires out before significant habitat damage had occurred. Fire frequency is estimated to be in the 5-7 year range.

2.9 Vegetation Characterization

Many of the parcels were acquired with a myriad of weed issues, which subsequently have become a major focus in restoration efforts. The weeds identified as noxious by county weed boards are controlled by legal mandate. In other cases general weed communities are controlled to obtain a more desired native plant community. An example is the Rattlesnake Slope, which has large stands of native bunch grasses with smaller patches of scattered bunchgrass and cheat grass. The cheat grass patches are possibly the result of old sheep bedding grounds, small abandoned fields, or some other intensive land use**.** Controlling cheat grass has not been successful in the past but recent technological efforts are showing promise.

The Yakima Subbasin Plan (2005) identified four focal habitats within the Yakima watershed (Figure 17).

- Montane Coniferous Wetlands
- Ponderosa Pine/Oregon White Oak
- Shrub steppe/Interior Grasslands
- Interior Riparian Wetlands.

Two, shrub-steppe and riparian wetlands, are contained within the bounds of the SSWA project area.

Although habitats at higher elevations have some influence on lower elevation habitats to the east, discussion for this plan will be limited to the Shrub Steppe and Riparian habitats that compose the bulk of vegetative communities in this area. Fortunately, a lot of the bottomland habitat types are the same, across the project. For instance, the high quality woody riparian on the I-82 unit is similar in nature to the Walla Walla sites. The Yakima system has more cottonwood groves where the Walla Walla has more willows. That's probably due to flooding that causes the Walla Walla River to move back and forth across the floodplain more often so succession is always starting over. Shrub steppe is comparable across most of the units.

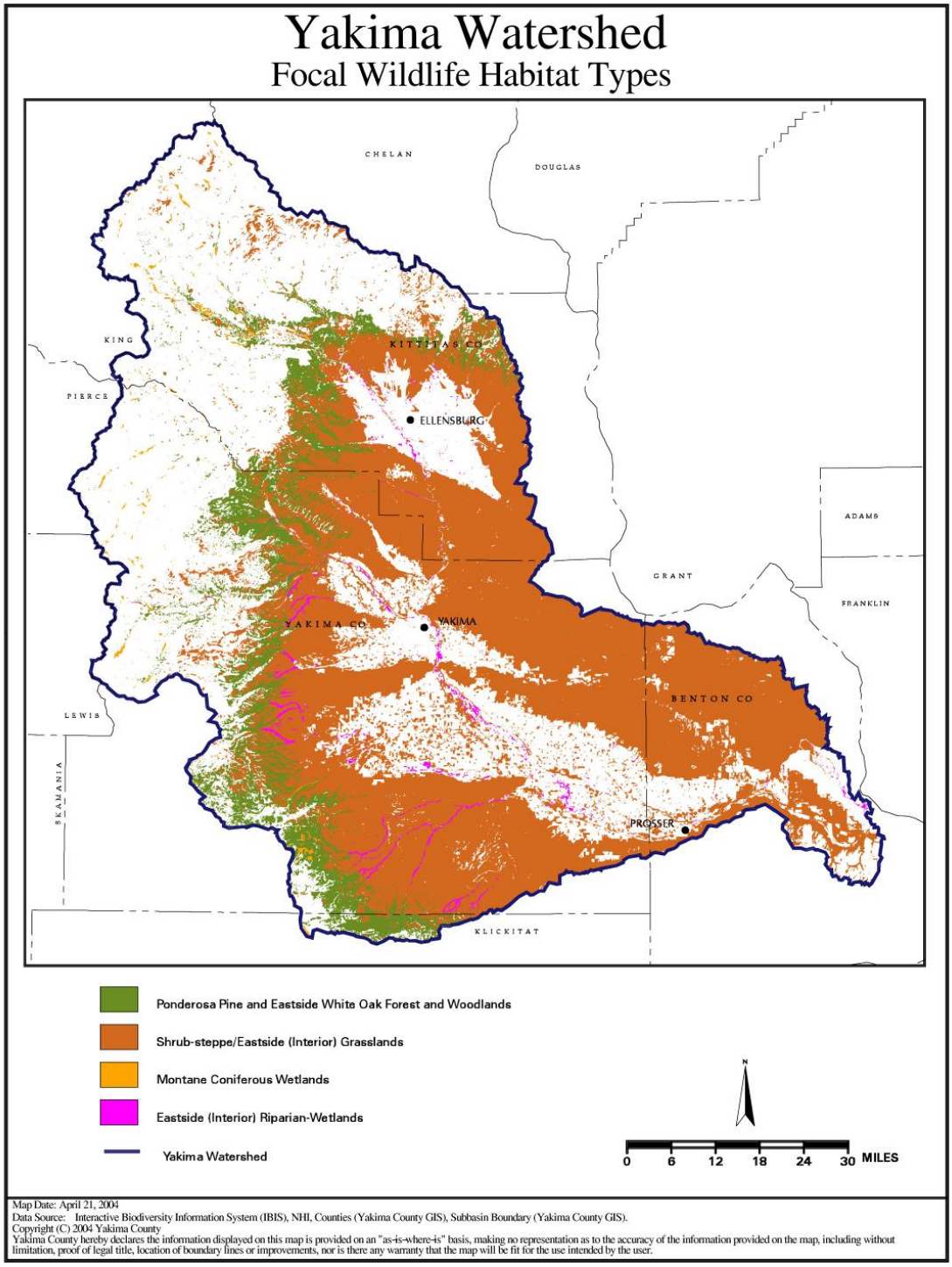

Figure 17. Focal wildlife habitat types of the Yakima Subbasin (IBIS 2003)

Landscape Disturbance
Landscape disturbance can come in many forms such as fire and flooding but for the purposes of this section, human caused disturbance that can be identified and managed is being discussed. These include grazing management, weed control and litter accumulation.

Grazing
"Grazing can lead to replacement of native vegetation by exotic annuals, particularly cheatgrass and yellow starthistle" (Mack 1986; Roche and Roche 1988). However, if done properly grazing can be used as a tool to manage vegetation to a stand compatible with the animal species being managed. Bunchgrasses can be grazed to keep the plant vigorous and growing during the spring/ summer for ungulate use but may not leave enough growth for winter forage or for ground dwelling birds using the vegetation for nesting. Historically grazing occurred regularly on most all units but has been eliminated to benefit wildlife habitat. In the future, grazing will be used for specific purposes in managing habitat to a desired condition. Cattle grazing on the Byron unit may have kept some of the emergent vegetation in an earlier successional stage, which could have been more productive for waterfowl.

Noxious Weeds
Noxious weeds are present on every management unit of the wildlife area. Several varieties of noxious weeds are present on many sites and WDFW staff coordinates with the County Weed Boards to carry out control measures. Many of the small, sub-irrigated depressions on the Yakima River sites are filled with Russian knapweed, perennial pepperweed, Canada thistle, white top and/or Russian olive. The small size of these areas, (generally less than one acre) make them difficult to restore to native vegetation. The knapweed has spread up the sides of each basin and into the dry shallow soil of adjacent areas that support shrub steppe vegetation. Weed control has been an ongoing and substantial activity across the project. Wherever possible, restoration is performed with native plant species to provide competition against reinfestation of the noxious weeds. Similarly, some of the larger groves of Russian olive have been, and will continue to be removed and the areas restored to native habitat **(Appendix 2).**


Large stand of Canada thistle on the Hope Valley Unit

Litter
Litter and dumping is a problem on all the management units, but particularly troublesome on the I-82, Headquarters, and Byron units. The dumping of garbage and dead animal carcasses has become such a severe problem on the Byron Unit that to minimize this activity, both parking areas have been closed to the public except during hunting season. This action has greatly curtailed the

problem, but has reduced public recreation on the site. Due to the amount of effort required to maintain access sites on the wildlife area WDFW's access area staff works in coordination with the SSWA staff in maintenance of these sites.

Land Use and Cover

I-82 Unit

The I-82 units include a narrow, but high quality woody riparian corridor along the Yakima River, that transitions into dryland habitat along the Interstate-82. These parcels provide public access to the river and to several ponds that were created when borrow pits for the interstate flooded with groundwater.

Open water and wetlands comprise about 25 percent of the area. The Yakima River accounts for some of the open water in the form of backwater sloughs as well as the main riparian habitat, which is dominated by hardwoods mostly in the form of cottonwood trees. Dense riparian shrubs are interspersed along the edges in many areas. In addition to natural ponds, seven artificially constructed ponds are found on this unit with shoreline cover comprised of grasses, shrubs and trees.

The major land use is recreation with most in the form of fishing and hunting activities. Several of the ponds have developed public access facilities. The pond environment attracts picnic and swimming activities as well as illegal gang and drug use, which is a major management issue. Agriculture was a major use prior to WDFW ownership and most of the fields have been converted back to native like conditions for the uses mentioned above.

Sunnyside HQ (Includes Glover Parcel) Unit

The Sunnyside HQ unit includes a variety of cover types including woody riparian, open water with emergent vegetation, subirrigated and seasonally flooded oxbow river channels, dryland and irrigated agricultural fields and alkali flats with substantial saltgrass/basin wildrye/greasewood communities. Several lakes and ponds (Bounds, Horseshoe, Haystack & Bridgeman Ponds and Bos, Giffen & Morgan Lakes) are contained within the unit and are in various stages of eutrophic condition.

Much of the area was historically farmed and in recent years rehabilitation projects have resulted in grasslands re-establishment. Some areas will take several years to convert and in the interim are still farmed to control weed invasion. Alfalfa hay and small grain production is the most prevalent, current crop type. There are four circle pivots irrigating agricultural fields rotated with grain crops (mostly corn) and alfalfa that supply food for waterfowl and other species. WDFW's portion of the sharecropped hay is either used to feed elk in the Oak Creek and Wenas area or converted to deer pellets for use statewide. Hunting (waterfowl & upland game) and fishing activities are major recreational uses with horseback riding and wildlife viewing activities increasing in recent years.

Byron Unit

This unit contains a series of wetlands, comprising at least 40% of the area, which are maintained by irrigation runoff and wastewater from the Grandview Sewage Treatment Facility. Depressions in the area allow for standing water after irrigation is shut down then transitions into a wet soils complex. Seasonal raising and lowering of the water table has created areas of extreme alkalinity. The south side of the project has continuous flows from irrigation drain water, along the entire

length of the property. A water control structure impounds this water into a substantial wetland complex. The ponds along the north side of the property receive seasonal wastewater from the City of Grandview's wastewater treatment facility. Seasonal water availability provides intermittent wetting and drying of several ponds, creating ideal conditions for waterfowl and migrating shorebirds. Most wetland areas exhibit a typical emergent vegetation fringe, with some areas being partially or totally taken over by Russian olive. The major upland habitat type is shrub steppe but a long history of fire and grazing has resulted in a severely degraded condition. Cheatgrass and Russian knapweed are the most prevalent weedy species on this site but shallow, rocky soils make it difficult to restore to native like conditions.

The west end of the unit is heavily hunted with some fishing occurring in the ponds having perennial water. The east end of the unit is made up of the Byron Reserve where hunting is excluded but bird watching has become an attraction.

Vance Unit

The major land type on this unit is comprised of agricultural fields that are farmed under an agricultural lease to a small grain/alfalfa hay rotation. The property includes about three quarters of a mile of Yakima River shoreline, which consists of a cut-bank and very limited riparian vegetation. Cattle were removed from this site and a buffer was established along the river that exists as a mix of annual and perennial grasses and broadleaf weeds. A small island of natural shrubs, trees and herbaceous vegetation separates the Vance acquisition from the old Ferry Road habitat plot. In addition, a single row of mature elm trees lies along two segments of the boundary. Two shrub plots were planted on the Vance unit to break up the agricultural fields and provide more woody cover.

Thornton Unit

The Thornton Unit supports long ridges of sagebrush, intermixed with native grasses and dryland wheat fields that have been seeded to native-like grasses under the CRP program. Snipes creek bisects the unit and provides limited, but important riparian habitat in places. Old agricultural fields were converted to CRP (Conservation Reserve Program) in 3 phases in the late 1990's. Bunch grass is now in abundance and sagebrush is showing moderate encroachment into the CRP fields. A spring in the center of this unit provides free water nearly year around and other, smaller springs also exist in other canyons. The unit is a popular hunting area for deer and elk. Historically, chukar hunting was common in this area but populations have waned in recent years. Sharp Road has recently been abandoned due to extreme vandalism and to provide wildlife with more secure areas. The unit has two access sites; one along Rothrock Road on the west side and a new one along Case Road on the east side that compensates for the closure of Sharp Road. Limited space to park on the access sites may help regulate the hunter density during high use periods particularly during the elk season.

Rattlesnake Slope Unit

Historically, this unit was a good example of native shrub-steppe habitat. A series of fires in the past few years, most notably the one in the summer of 2000, destroyed all but a few small remnants of the shrub component. A restoration seeding on about 900 acres in December 2000 is now showing very successful establishment of native grasses and shrubs. A smaller restoration project was implemented after another fire in 2003 and is showing promise. For the most part, the remainder of the area now exists as grassland but native forbs are beginning to show up.

Recreation includes horseback riding, target shooting, hiking and hunting. Chukar, deer and elk are the most likely species to be hunted.

Windmill Ranch Unit

The Windmill Ranch is a collection of property owned by the WDFW, the Dept. of Natural Resources (DNR) and the Bureau of Reclamation (BOR). All of it is managed by WDFW. Of the 2,000 total acres, about 422 is under an agricultural lease that includes 9 circle pivot irrigation systems and one wheel line. The primary crop is field corn, grown for the benefit of wintering waterfowl and migrating sandhill cranes.

The remainder of the Windmill Ranch is a mosaic of several habitat types, including shrub-steppe, grasslands, ponds, wetlands and riparian shrub and forest habitat. A history of grazing and fire has removed much of the shrub component from the shrub-steppe areas but replanting efforts have restored at least part of it. Wetlands, primarily formed by irrigation seepage and wastewater & return flows, are also scattered throughout the property. Some are intensively managed for moist soil conditions and waterfowl production and winter food. Others are left to function naturally. The Columbia Basin Irrigation Project, which is the source of all water influence on this site, has created numerous sub-irrigated areas that are rife with noxious weeds such as Canada thistle, phragmites, purple loosestrife and salt cedar. A relatively new weed, hairy willow herb, was just discovered on this site in 2005.

Several habitat plots have been developed on this site to mitigate for habitat losses incurred on the lower Snake River due to the construction of hydroelectric dams.

Nipper/Hope Valley Units

These two sites were purchased under the Upland Restoration Program in the late 1990's and were transferred to the SSWA in 2005 for management purposes. The Nipper parcel consists of about 60 acres, located within a subirrigated flat. The soil is highly alkaline and would be undesirable for farming. Grasses and shrubs were planted on the site shortly after it was purchased and the area provides good habitat for upland wildlife and non-game. The property abuts a parcel of BOR land commonly referred to "Clark Pond". Historically, WDFW has managed this parcel as well but we are currently between management agreements with BOR.

The Hope Valley unit is 160 acres in size, and split into two parcels by a main irrigation canal. The parcel west of the canal is dryland, having no irrigation allotment assigned to it. It is extremely sandy and two attempts have been made to stabilize the site with dryland grasses. Two or three shallow draws within this parcel receive some subirrigation from the canal, which supports emergent vegetation and Russian olive trees. The parcel on the north and east of the canal is a mix of shrub steppe habitat and cropland. The 29 acres of cropland are currently leased to an alfalfa/small grain rotation. An irrigated shrub plot and food plot have been established on this parcel, the latter of which has been abandoned in the last 2 years due to limited staff time.

Swegle/McDonald Road Units

These two units involve acquisitions from 5 separate parties, most of which were in fee title. However, one transaction involved perpetual easements along the Walla Walla River and Mill Creek. Much of the acquired land was limited to the natural riparian zone along the river, which supports good quality woody cover. Cottonwood, willow, alder and red-osier dogwood are the

dominant woody species with reed canary grass being the primary understory species. Two parcels included cropland. One site is being restored to native grass cover and the other is still being actively farmed to small grains under an agricultural lease.

All of the properties were purchased to provide public fishing but they also provide hunting for upland birds, turkeys, waterfowl and deer. When steelhead are migrating, the two total miles of river frontage on these units provide a substantial amount of fishing recreation.

Habitat Evaluation Procedure (HEP) Surveys

Under the Northwest Power Planning Act, BPA was mandated to mitigate for wildlife habitat losses incurred by the construction of various hydroelectric dams in the Pacific Northwest. To quantify differing project land values, BPA must measure the amount and quality of habitat lost and gained throughout their activities. The habitat accounting system adopted by BPA is a modeling strategy known as a Habitat Evaluation Procedures (HEP) developed by the U.S. Fish and Wildlife Service. This system uses wildlife species models to measure required habitat variables such as snag density, canopy cover, herbaceous cover, etc. These life requisite variables can be used to evaluate quality of habitat for each species by deriving a quantitative unit of measurement known as a Habitat Unit or HU. An HU is equivalent to one acre of optimal habitat for a target species. The HU accounting system is used on all mitigation projects to measure the progress BPA is making toward its mitigation obligation.

A WDFW crew conducted initial HEP surveys on the Sunnyside W.A. in 1998. Results of these surveys can be found in tables 1-17 of WDFW, Sunnyside Wildlife Area, Mitigation Management Plan (1997). Habitat enhancement projects will be monitored and compared against the baseline data, using follow up HEP evaluations, to determine mitigation progress. This data will be compiled and added to this plan in an appendices section **(Appendix 9)** as soon as the report is complete.

Similar HEP evaluations have been performed on Snake River mitigation lands to determine the level of mitigation progress.

2.10 Important Habitats

Shrub Steppe

The Yakima Sub-basin Plan summarizes the context of this habitat in the following manner: "Shrub steppe was selected as a focal habitat because changes in land use over the past century have resulted in the loss of over half of this once expansive habitat type in eastern Washington (Dobler et al. 1996). Shrub steppe communities support a wide diversity of wildlife. The loss of once extensive shrub steppe communities has reduced substantially the habitat available to a wide range of shrub steppe-associated wildlife, including several birds found only in this community type (Quigley and Arbelbide 1997; Saab and Rich 1997). More than 100 bird species forage and nest in sagebrush communities, and at least four of them, the greater sage grouse, sage thrasher, sage sparrow and Brewer's sparrow, are obligates (Braun et al. 1976). In a recent analysis of birds at risk within the interior Columbia Basin, the majority of species identified as having high management concern were shrub steppe species (Vander Haegen et al. 1999). Moreover, over half of these species have experienced long-term population declines according to the Breeding Bird Survey (BBS) (Saab and Rich 1997). Historically, shrub steppe was the most abundant habitat type

Post-fire shrub steppe habitat on the Rattlesnake Unit

within the subbasin deserving high conservation priority." The Sunnyside W.A. complex and its surrounding ownerships contain shrub steppe and riparian habitat in many areas. Associated obligate wildlife has been lost in most areas. Recovery plans have been developed for some species, like the sage grouse, in selected sites where shrub components are capable of being restored. The Thornton and Rattlesnake Slope units hold the most promise for these restoration efforts.

Interior Riparian Wetlands

The Yakima Sub-basin Plan summarizes the context of this habitat in the following manner: "Riparian wetlands were selected as a focal habitat because their protection, compared to other habitat types, may yield the greatest gains for fish and wildlife while involving the least amount of area (Knutson and Naef 1997). Riparian habitat covers a relatively small area yet it supports a higher diversity and abundance of fish and wildlife than any other habitat; it provides important fish and wildlife breeding habitat, seasonal ranges, and movement corridors; it is highly vulnerable to alteration; it has important social values, including water purification, flood control, recreation, and aesthetics; and, many species that primarily dwell in other habitat types, such as shrub steppe, depend on riparian areas during key portions of their life history." Nearly all units on the SSWA are influenced by riparian and wetlands in some manner. The one exception is the Rattlesnake Slope unit. There are three main river systems influencing habitat associated with the SSWA. Units in Franklin County are influenced by irrigation runoff from the Columbia River through the Columbia Basin Irrigation Project. Units in Walla Walla County are adjacent to Walla Walla River while units in Yakima and Benton County are adjacent to the Yakima River.

Special Status/ Priority Communities

Although the HEP survey was the preferred method to characterize vegetation condition on BPA and Corps-funded lands, WDFW also identifies shrub steppe communities, wetlands, and riparian cover types as priority habitats, due to their important ecological contributions (Priority Habitats Species, 1997). This priority designation is not related to mitigation or the HEP process, but is used to identify habitat features that significantly affect fish or wildlife populations.

Shrub Steppe/grasslands

The National Biological Division of the U.S. Geological Service (USGS) has identified native shrub and grassland steppe in Washington as an endangered ecosystem (Noss et al. 1995). The most significant direct cause of shrub steppe loss in the subbasin was creation of the Yakima Basin Irrigation Projects. Some shrub steppe was converted to non-irrigated wheat production especially in western Benton County. The pattern of agricultural conversion has resulted in a disproportionate loss of deep soil communities not reflected in typical measures given for habitat loss (Vander Haegen et al. 2000). Domestic plants and animals that are dependent on irrigated agriculture have replaced native shrub steppe plants and animals. Indirectly, invasive alien plant species have competed with and replaced natives (In Yakima Subbasin Plan 2004).

Three relatively large shrub steppe properties remain within the subbasin: the US Army's Yakima Training Center (YTC), the Yakama Nation, and Department of Energy's Hanford Nuclear Reservation. The WDFW owns and manages several smaller, but key parcels as well. The YTC contains 327,242 acres in Kittitas and Yakima Counties; approximately 199,000 acres are in the Yakima Subbasin. It supports one of two remaining sage grouse populations left in Washington (Hays et al. 1998). High habitat quality on YTC is largely due to its complex topography precluding early agricultural endeavors and historic low intensity livestock-grazing program (Schroeder et al. 2000). Grazing by livestock was completely eliminated in 1995. The complex topography of the site has resulted in a diversity of plant associations. YTC was determined to be critical in contributing to conservation of biological diversity within the region (The Nature Conservancy [TNC] 1999)(In Yakima Subbasin Plan 2004).

WDFW owns and manages approximately 94,000 acres of shrub steppe habitat on six separate properties within the Subbasin (see Chapter 1, Figure 1-3). East of ALE, the 3,661-acre Rattlesnake Slope Unit of WDFW's Sunnyside Wildlife Area contains a medium to high quality bluebunch wheatgrass community. Wildfires in 1984 and 2000 eliminated most sagebrush similar to the ALE. Approximately, 900 acres were seeded in fall of 2000 with a mixture of native shrubs and grasses. Recent monitoring indicates that the seeding of sagebrush, winterfat and bunchgrasses was successful over many acres (Yakima Subbasin Plan 2004).

There is a narrow band of remaining shrub steppe on the north slope of the Horse Heaven Hills. This area has been encroached by dryland wheat cultivation to the south and urban and irrigation development to the north. Most of the valley portions of the subbasin around Ellensburg, Yakima, and the Lower Valley between Union Gap and Richland have been converted to Irrigated agriculture**.** The majority of areas with suitable soils throughout the Rattlesnake Hills north of Sunnyside, Prosser, and Benton City have been converted to both irrigated and non-irrigated agriculture. Deep soils remaining in shrub steppe habitat in the Yakima Subbasin are relatively rare because productive agriculture is associated with deep soils. Shrub steppe with deep soils is required for burrowing or burrow-using wildlife such as badgers, ground squirrels, and burrowing owls. (In Yakima Subbasin Plan 2004)

The limiting factors refer to large-scale forces that threaten the viability of the shrub steppe ecosystem as a whole. Proximal limiting factors to the biota of the various shrub steppe communities take the form of reductions in the composition (species richness), structural complexity, or spatial extent and distribution of the communities. Although these losses are expressed in myriad ways, they are summarized into the general categories of: 1) reduced plant diversity, 2) reduced extent and diversity of the microbiotic crust, 3) decline or loss of shrubs, 4) reduced faunal diversity, and 5) isolation of species populations. These, in turn, are closely related

to, or are the direct result of, several ultimate limiting factors, including habitat fragmentation, too frequent fire, introduction of cheatgrass and other invasive species, inappropriate grazing, soil disturbance and drought. (In Yakima Subbasin Plan 2004).

Wetlands

Since the arrival of settlers in the early 1800's, 50 to 90 percent of riparian wetland habitat in Washington State has been lost or extensively modified (Buss 1965). Prior to 1850, riparian habitats were found at all elevations and on all stream gradients; they were the lifeblood for most wildlife species with up to 80 percent of all wildlife species dependent upon these areas at some time in their lifecycle (Thomas 1979). (In Yakima Subbasin Plan 2004).

In the Yakima Subbasin, the density and diversity of wildlife in riparian wetland areas is also high relative to other habitat types. Riparian forest habitats are critical to the structure and function of rivers and to the fish and wildlife populations dependent upon them (Rood and Mahoney 1990). Healthy forested riparian wetland habitat has an abundance of snags and downed logs that are critical to many cavity nesting birds, mammals, reptiles and amphibians. Cottonwood, alder and willow are commonly dominant tree species in riparian wetland areas from the Cascades down through the valley portion of the subbasin. This habitat is often characterized by relatively dense understory and overstory vegetation. Riparian wetland habitats also function as travel corridors between, and provide connectivity to, other essential habitats (e.g., breeding, feeding, seasonal ranges). (In Yakima Subbasin Plan 2004)

Though riparian wetland habitats are often forested, they also contain important sub-components such as marshes and ponds that provide critical habitat for a number of wildlife species. Broad floodplain mosaics consisting of cottonwood gallery forests, shrub lands, marshes, side channels, and upland grass areas contain diverse wildlife assemblages. The importance of riparian wetland habitats is increased when adjacent habitats are of sufficient quality and quantity to provide cover for nesting, roosting, and foraging. In the Lower Yakima Valley, Larsen (1999) found higher mallard brood survival in wetlands associated with floodplain areas than those located outside of floodplains. (In Yakima Subbasin Plan 2004)

Historic wetland acreage in the Yakima Subbasin is difficult to measure. The Interactive Biodiversity Information System (IBIS) riparian habitat data are incomplete; therefore riparian floodplain habitats are not well represented on IBIS maps. These sources point to extensive riparian wetland complexes in the Kittitas Valley and Lower Yakima Basin between Union Gap and Prosser. Using hydrologic and landscape information, Eitemiller et al. (2000) estimated the extent of Holocene floodplain acreage in several mainstem and tributary Yakima River reaches; the Easton 2,679 ha, Cle Elum 1,750 ha, Kittitas 5,420 ha, Selah 1,182 ha, Naches 3,310 ha, Union Gap 2,325 ha, and Upper Wapato 24,854 ha. This analysis showed that the Wapato floodplain was by far the most extensive. This is also illustrated by a map of the Wapato alluvial reach developed in 1909 (during irrigation development) by the Indian Irrigation Service. Tributaries with extensive historic riparian wetland habitats included the Teanaway and Naches Rivers, Ahtanum, Toppenish and Satus Creeks. (In Yakima Subbasin Plan 2004)

Riparian

This cover type is a primary factor influencing the quality and health of fish habitat. Riparian vegetation provides thermal cover, creates stream channel features such as pools, and maintains stream bank stability. In addition to fish benefits, riparian and wetland habitats are highly productive and significantly impact terrestrial wildlife species. These habitats comprise a major portion of the acreage and are the most ecologically important cover types. The vast majority of

wildlife species are dependent upon riparian habitats for at least some portion of their life requisites and/or life cycles. (In Yakima Subbasin Plan 2004)

Riparian areas have been extensively impacted within the Columbia Plateau such that undisturbed riparian systems are rare (Knutson and Naef 1997). In the Yakima Subbasin, altered flow regimes along with other effects discussed below have lead to severe reductions in alluvial floodplains, channel simplification and impaired ecosystem function (Ring and Watson 1999). Losses in lower elevations include large areas once dominated by cottonwoods that contributed considerable structure to riparian habitats. In higher elevations, stream degradation occurred with the trapping of beaver in the early 1800s. This began the gradual unraveling of stream function that was greatly accelerated with the introduction of livestock grazing. Woody vegetation has been extensively suppressed by grazing in some areas, many of which continue to be grazed. Herbaceous vegetation has also been highly altered with the introduction of Kentucky bluegrass that has spread to many riparian areas, forming a sod at the exclusion of other herbaceous species. The implications of riparian area degradation and alteration are wide ranging for bird populations, which utilize these habitats for nesting, foraging and resting. Secondary effects that have affected insect fauna have reduced or altered potential foods for birds as well. (In Yakima Subbasin Plan 2004)

Quigley and Arbelbide (1997) noted that the cottonwood-willow cover type covers significantly less in area now than before 1900 in the Inland Pacific Northwest. The authors concluded that although riparian shrub land originally occupied only 2 percent of the landscape, it has declined to 0.5 percent of the landscape. (In Yakima Subbasin Plan 2004)

Approximately 40 percent of riparian shrublands occurred above 3,280 ft. in elevation pre-1900; now nearly 80 percent is found above that elevation. In the Yakima Subbasin, Braatne and Jamieson (2001) documented declines in cottonwood recruitment related to alterations in the natural flow regimes. They concluded that prescribed flow regimes, such as those used in Alberta and Nevada (Mahoney and Rood 1998), could be very cost-effective mechanisms for addressing the needs of cottonwood recruitment in the Yakima Subbasin. (In Yakima Subbasin Plan 2004)

Riparian and wetland conditions in the Yakima Subbasin range from severely degraded to high quality depending on the level of impact by activities such as hydrologic alteration, land use conversion, agricultural practices, and grazing. Levee and urban development projects have constricted floodplains throughout the subbasin and reduced riparian wetland habitats. Natural stream side-channels and distributaries have been converted to canals and drains. Timing of flow in these channels has been highly altered, causing loss of natural function. Hydrologic alteration has caused loss of native vegetation and replacement by non-native species. The long history of intensive year-around livestock grazing has resulted in extensive damage to many riparian plant communities throughout the shrub steppe and valley portions of the subbasin. Riparian habitats are degraded along Toppenish and Satus Creeks because of levee development, channelization and excessive livestock grazing. Lacking vegetation to slow water run-off and to reduce stream velocity, Roza Creek's stream channel has incised as much as 20 feet in places. Irrigation canals, drains, and rights-of-way act as conduits delivering noxious weeds such as purple loosestrife to riparian wetland habitats. (In Yakima Subbasin Plan 2004)

Within the past 100 years, a large amount of Yakima Subbasin riparian wetland habitat has been altered, degraded, or destroyed. As in other areas of the Columbia Basin, impacts have been greatest at low elevations and in valleys where reservoir development, agricultural conversion, levee and road development, altered stream channel morphology, and water withdrawal have played significant roles in changing the character of streams and associated riparian areas.

Eitemiller et al. (2000) and Braatne and Jamieson (2001) estimated floodplain losses of 77 percent in the Cle Elum Reach, 82 percent in the Union Gap Reach, and 95 percent in the Upper Wapato Reach. Hauer et al. (2002) described hydrologic processes, floodplain complexity and ecological interactions related to riparian wetland abundance and health in the Yakima Subbasin. They recognized significant potentials for riparian wetland restoration in all reaches of the Yakima Subbasin. They identified the Wapato and Union Gap reaches, respectively, as being the most complex and physically intact, and as being the most restorable. (In Yakima Subbasin Plan 2004)

2.11 Fish and Wildlife

In identifying priority species the 2004 Washington State species lists were reviewed (See below). In addition two separate plans, the 1996 Sunnyside Wildlife Area Management Plan and the 2004 Yakima Subbasin Plan presented information. The information presented was reviewed for relevance by WDFW's District 4 team.

STATE LISTED SPECIES

Revised March 2006

The Washington Fish and Wildlife Commission has classified the following 46 species as Endangered, Threatened, or Sensitive. Many also hold a federal designation, such as Federal Endangered (FE), Threatened (FT), Proposed Threatened (FPT), Candidate (FC), or Species of Concern (FSC).

STATE ENDANGERED	STATE THREATENED	STATE SENSITIVE
A species native to the State of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state. **The 28 State Endangered species are designated in Washington Administrative Code 232-12-014**	***A species native to the state of Washington that is likely to become endangered within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats.*** **The 11 State Threatened species are designated in Washington Administrative Code 232-12-011**	***A species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats.*** **The 7 State Sensitive species are designated in Washington Administrative Code 232-12-011**

MAMMALS (14)

Pygmy Rabbit FE
Sperm Whale FE
Fin Whale FE
Sei Whale FE
Blue Whale FE
Humpback Whale FE
Black Right Whale FE
Killer Whale (transients, offshores, others) -
Southern Resident FE
Gray Wolf FT
Grizzly Bear FT
Fisher FC
Sea Otter -
Columbian White-tailed Deer FE
Woodland Caribou FE

BIRDS (7)

American White Pelican -
Brown Pelican FE
Sandhill Crane -
Snowy Plover FT
Upland Sandpiper -
Spotted Owl FT
Streaked Horned Lark FC

REPTILES (2)

Western Pond Turtle FSC
Leatherback Sea Turtle FE

AMPHIBIANS (2)

Oregon Spotted Frog FC
Northern Leopard Frog -

INSECTS (3)

Oregon Silverspot Butterfly FT
Taylor's Checkerspot FC
Mardon Skipper FC

MAMMALS (4)

Western Gray Squirrel FSC
Mazama Pocket Gopher FC
Steller Sea Lion FT
North American Lynx FT

BIRDS (5)

Bald Eagle FT
Ferruginous Hawk FSC
Marbled Murrelet FT
Greater Sage-Grouse FC
Sharp-tailed Grouse FSC

REPTILES (2)

Green Sea Turtle FT
Loggerhead Sea Turtle FT

Find us on-line at
http://wdfw.wa.gov/wildlife.htm

For more information on federal status, contact the US Fish and Wildlife Service or the National Marine Fisheries Service

MAMMALS (1)

Gray Whale -

BIRDS (2)

Common Loon -
Peregrine Falcon FSC

FISH (3)

Pygmy Whitefish -
Margined Sculpin FSC
Olympic Mudminnow -

AMPHIBIAN (1)

Larch Mountain Salamander FSC

For more information, contact the Wildlife Program
(360) 902-2515

STATE CANDIDATE SPECIES

Revised March 2006

The Washington Department of Fish and Wildlife has designated the following 109 species as Candidates for listing in Washington. Some of them already hold a federal designation, such as Federal Endangered (FE), Proposed Endangered (FPE), Threatened (FT), Proposed Threatened (FPT), Candidate (FC), or Species of Concern (FSC).

STATE CANDIDATE

Species that the Department will review for listing as State Endangered, Threatened, or Sensitive.

The Department reviews species for listing following procedures in Washington Administrative Code 232-12-297. Public comment is solicited before the Department takes its listing recommendation to the Washington Fish and Wildlife Commission, which makes listing decisions. Listing is based solely on the biological status of the species.

MAMMALS (11)

Merriam's Shrew -
Townsend's Big-eared Bat FSC
Keen's Myotis Bat -
White-tailed Jackrabbit -
Black-tailed Jackrabbit -
Gray-tailed Vole -
Brush Prairie Pocket Gopher -
Washington Ground Squirrel FC
Townsend's Ground Squirrel -
Wolverine FSC
Pacific Harbor Porpoise -

BIRDS (23)

Western Grebe -
Short-tailed Albatross FE
Brandt's Cormorant -
Northern Goshawk FSC
Golden Eagle -
Merlin -
Common Murre -
Cassin's Auklet FSC
Tufted Puffin FSC
Yellow-billed Cuckoo FC
Flammulated Owl -
Burrowing Owl FSC
Vaux's Swift -
Lewis' Woodpecker -
White-headed Woodpecker -
Black-backed Woodpecker -
Pileated Woodpecker -
Loggerhead Shrike FSC
Purple Martin -
Slender-billed White-breasted Nuthatch FSC
Sage Thrasher -
Oregon Vesper Sparrow FSC
Sage Sparrow -

REPTILES (4)

Sagebrush Lizard -
Sharp-tailed Snake -
California Mountain Kingsnake -
Striped Whipsnake -

AMPHIBIANS (6)

Dunn's Salamander -
Van Dyke's Salamander FSC
Cascade Torrent Salamander -
Western Toad FSC
Columbia Spotted Frog FSC
Rocky Mountain Tailed Frog FSC

FISH (37)

Mountain Sucker -
Lake Chub -
Leopard Dace -
Umatilla Dace -
River Lamprey FSC
Pacific Herring FSC
Eulachon (Columbia River Smelt) -
Pacific Cod
South and Central Puget Sound FSC
Walleye Pollock
South Puget Sound FSC
Pacific Hake (Whiting)
Georgia Basin FSC
Black Rockfish# -
Brown Rockfish# FSC
Copper Rockfish# FSC
Quillback Rockfish# FSC
Tiger Rockfish# -
Bocaccio Rockfish# -
Canary Rockfish# -
Yelloweye Rockfish# -
Yellowtail Rockfish # -
Greenstriped Rockfish# -
Widow Rockfish# -
Redstripe Rockfish# -
China Rockfish# -
Chinook Salmon
Snake River Fall FT
Snake River Spring/Summer FT
Puget Sound FT
Upper Columbia Spring FE
Lower Columbia FT
 # Puget Sound, the San Juan Islands, and the Straight of Juan de Fuca east of the Sekiu R.
Sockeye Salmon
Snake River FE
Ozette Lake FT
Steelhead
Snake River FT
Upper Columbia FT
Middle Columbia FT
Lower Columbia FT
Bull Trout **FT**

MOLLUSKS (10)

Giant Columbia River Limpet -
Great Columbia River Spire Snail FSC
Newcomb's Littorine Snail FSC
California Floater FSC
Northern Abalone FSC
Olympia Oyster -
Columbia Oregonian (snail) -
Poplar Oregonian (snail) -
Dalles Sideband (snail) -
Blue-gray Taildropper (slug) -

INSECTS (18)

Beller's Ground Beetle FSC
Mann's Mollusk-eating Ground Beetle -
Columbia River Tiger Beetle -
Hatch's Click Beetle FSC
Long-horned Leaf Beetle -
Columbia Clubtail (dragonfly) -
Sand-verbena Moth -
Yuma Skipper -
Shepard's Parnassian -
Makah Copper FSC
Chinquapin Hairstreak -
Johnson's Hairstreak -
Juniper Hairstreak -
Puget Blue -
Valley Silverspot FSC
Silver-bordered Fritillary -
Great Arctic -
Island Large Marble FSC

NOT STATE CANDIDATES

These fish stocks have been the subjects of federal register notices, but have not yet been added to the state candidate list.

Coho Salmon
Puget Sound/Strait of Georgia FSC
Lower Columbia/SW Washington FT

	Chum Salmon **Hood Canal Summer FT** **(includes Strait of Juan de Fuca, not Puget Sound)** **Columbia River FT**	Coastal Cutthroat Trout **SW Washington/Columbia River FSC**

The 1996 Sunnyside Wildlife Area Management Plan identified Management zones for specific species and habitats. The lists include Sensitive, Preferred, Game, and Priority Habitats. Preferred refers to highly visible and management emphasis for wildlife occurring on the wildlife area. Sensitive Animal Species were of concern at that point in time and some have been listed as candidate or added to the threatened and endangered species list since then.

Sensitive Animal Species	**Preferred Species**	**Game Species**
Sage grouse	Osprey	Chukar
Salmonid	Great Blue Heron	Deer
Long billed curlew	Dabbling duck	Warm water fish
	Pheasant	
	Cavity nesting duck	
	California quail	

The 1996 plan identified a list of other sensitive species that may occur on the Wildlife Area but had not been documented. Since that plan was written other properties have been added to the complex, potentially increasing the list of species using the Sunnyside/Snake River complex. The 1996 plan list and species connected with newly acquired properties were combined into the following Other sensitive species list.

Other Sensitive Species

Ferruginous hawk	Grasshopper sparrow
Loggerhead shrike	Sagebrush vole
Sage sparrow	Northern grasshopper Mouse
Merriam's shrew	Whitetail Jack Rabbit
Prairie falcon	Desert night snake
Black-necked stilt	Black-crowned night heron
Black tern	Burrowing owl
Swainson’s hawk	

Agency personnel will continue to watch for these species in hopes of identifying specific site locations where management would be effective. Activities proposed in the area will be made considering the potential use of the area by these species.

In prioritizing the management zones, the 1996 plan considered the Department's original purpose for acquiring properties and the sensitive nature of the listed species. Sage grouse became the top priority because they were listed as state threatened and federal candidate species. Salmonids were given high priority because the Yakima River runs along much of the Wildlife Area and supports sensitive salmon species, including the federally threatened Mid-Columbia Steelhead. The long billed curlew is a state monitor species and a federal candidate species and was also considered a high priority. Wetland and riparian zones are listed by WDFW as priority habitats because they are

limited across the state and they provide critical habitat to many species. The top two preferred species are osprey and great blue heron because both are listed as state monitor species. The Yakima Subbasin plan identified a total of seven bird, three mammalian and one amphibian species to be chosen as terrestrial focal species to represent four priority habitats in the Yakima Subbasin. (Appendix 10, Figure 8).

Species accounts have been written to provide information on known history and pertinent facts of select species where management is a high priority. Most of the fish species accounts are found in Appendix 14 (due to the amount of information provided) while wildlife species accounts are located below.

2.11.1 Fish Resources

Fish residing within the boundaries of the Sunnyside Wildlife Area complex can be divided into resident fish species and anadromous fish species. Resident fish include a variety of species but for current management emphasis this plan will be confined to those considered sport fish or those listed as species of concern. See Appendix M for a more detailed account of those listed as species of concern.

Species	Species of Concern	Sport Fish	Unclassified
Rainbow Trout		X	
Steelhead	X	X	
Spring Chinook	X	X	
Fall Chinook	X	X	
Brown Trout		X	
Largemouth Bass		X	
Smallmouth Bass		X	
Yellow Perch		X	
Pumpkinseed Sunfish		X	
Walleye		X	
Channel Catfish		X	
Largescale Sucker			X
Chiselmouth			X
Margined Sculpin	X		
Umatilla Dace	X		
Leopard Dace	X		

I-82, Sunnyside HQ, Vance, Whitstran and Benton City Units lie along the Yakima River stretching from Union Gap to Benton City. All have components of resident and anadromous fish in the river. Rainbow trout are resident while spring chinook, fall chinook and steelhead trout are migratory. These units provide fishing and hunting access to the Yakima River.

I-82 Ponds

The I-82 Unit incorporates 7 man-made ponds, created during the I-82 highway construction, giving anglers opportunities to catch several different species of fish. All these ponds, which are groundwater fed, are home to carp, largemouth bass, sunfish and bullheads. Ponds #1, 2, 3, 5, & 7 are managed primarily for warmwater fish angling while ponds #4 & 6 are managed for catchable trout and catfish. Walleye were stocked in Pond 1 in 1992, 1993, & 1995 to decrease prey

abundance and increase prey size (Bolding, et al., 1997). Surveys are planned for 2006 to determine the status of Walleye in this pond (Jim Cummins, Per. Comm.). In addition, the WDFW stocks Ponds #3 with brown trout and channel catfish, Pond #4 with brown trout, rainbow trout and channel catfish, Pond #6 with rainbow trout and channel catfish and Pond #7 with channel catfish (Bell, et al. 2002 & Eric Anderson, Per. Comm.). Due to inadequate screening the ponds are not actively managed as salmonid habitat beyond the hatchery-stocking program.

The I-82 Ponds were surveyed during May 2000 and September 2001. The primary objectives of these surveys were to describe the status of fish populations in each pond, to test the feasibility of sampling stocked channel catfish using trotlines and slat-traps, and to make recommendations on the future management at each pond. The following assessment identifies fish species surveyed and recommendations made by WDFW's Warmwater Fish Program for each of these ponds (Divens, 2003).

- Pond 1 fish community generally consisted of a low-density largemouth bass population, a walleye population exhibiting characteristics of a population lacking an adequate prey base, and low-density yellow perch and pumpkinseed sunfish populations. This is in sharp contrast to fish community assessments conducted pre- and post-walleye stocking in the early 1990s, which showed stunted populations of yellow perch and pumpkinseed sunfish. Management considerations for Pond 1 include: maintaining the outlet screen, installing a fishing dock, lifting the no harvest regulation for walleye, and stocking additional panfish.
- Pond 2 fish community was found to be prey crowded with yellow perch and pumpkinseed sunfish. Largemouth bass density was low and fish sampled exhibited good condition. Management considerations include: increasing largemouth bass density, designing and installing a barrier to fish passage, and installing a fishing dock to enhance angling opportunity.
- Pond 3 was dominated by non-game fish, undesirable to anglers, and low-density gamefish populations. Largemouth bass and panfish populations exhibited above average growth and condition. Largescale sucker and chiselmouth were abundant. Management considerations include: constructing a barrier to fish passage, increasing predator density, and chemical or mechanical removal of undesirable species.
- Pond 5 largemouth bass exhibited characteristics of a balanced population; however, panfish population indices exhibited characteristics of overabundance likely due to interspecific competition. Channel catfish stocking provides some angling opportunity for large fish. Largescale sucker were a large proportion of the sample by weight. Managers should consider it a high priority to build and maintain an outlet barrier to fish passage, reduce the abundance of non-game species, and increase predator densities.
- Pond 7 was prey crowded with abundant bluegill and pumpkinseed sunfish and few predators. Largemouth bass were low in abundance and high in condition. Managers should consider whole or partial rehabilitation with chemical or mechanical methods and increasing predator abundance by stocking adult largemouth bass and channel catfish.
- Ponds 4 and 6 are the primary ponds for channel catfish management. Channel catfish in several size groups were sampled at both ponds indicating successful stocking over several years. Managers should continue stocking channel catfish at the current level.

HQ Unit
The HQ Unit contains 6 ponds or lakes created by irrigation runoff. They are managed primarily for upland bird and waterfowl habitat with the shallow water bodies supporting warm water fish species such as carp and largemouth and smallmouth bass. However with the current water and land use practices in the area they offer no practical salmonid habitat (Bell, et al. 2002). Giffin Lake, the largest public body of water within a 50 mile radius, had been proposed for a major clean up project that would control aquatic weeds thus enhancing waterfowl production and resident fishery. However, this project is on hold pending funding and further analysis. Additional waters include 5 miles of irrigation drainage canals. These drains return irrigation water from surrounding agricultural lands to the Yakima River. Due to groundwater filtering and cooling as it returns to these canals, they may provide potential summer off-channel rearing/refuge habitat for salmonids indigenous to the Yakima River. These drains may also provide winter rearing habitats (Bell, et al. 2002). DID #7 (Wendell-Phillips Drain) was identified as the single existing potential salmonid habitat on the SWA (WDFW, 1997).

Byron Unit
The Byron Unit receives water from irrigation tail-water, drainage, or filtered wastewater from the City of Grandview. Regardless of the origin, water from all these sources fills natural swales throughout the area, creating open water habitat, mixed with emergent vegetation and covering approximately 400 surface acres. These ponds produce excellent waterfowl nesting and brooding areas. Unfortunately, the pond areas do not incorporate a natural drainage and preclude salmonid habitat due to lethal summer temperatures, poor water quality, and a natural barrier falls approximately 15 meters tall near the confluence with the Yakima River. They do, however, support warm water species (Bell, et al., 2002). Management emphasis for this unit is for waterfowl and upland birds with the current fishery being maintained at current level. Management direction for waterfowl is to rehab the ponds resulting in a benefit to the fishery as well.

Windmill Ranch Unit
The Windmill Ranch has similar pond and wetland habitat but most of it is created by seepage from the Potholes Canal, underground flow, or a side benefit of direct irrigation flow used to irrigate crops. The Windmill Ranch has 3 major water bodies that provide fishing and hunting recreation. The largest, Powerline Lake, has a surface area of 35 acres with a mean depth of 7 m (22 ft) and max depth = 20 m (65 ft). The lake is spring fed and has no inlets. Water intermittently flows out of the lake into wetland habitat. Development around the lake is low and limited to agriculture. A WDFW park and walk-in site provides good shoreline and float tube access to the lake. Historically, Powerline Lake was privately owned and had limited public fishing access. In 1968 the lake was rehabilitated with toxophene to eliminate a stunted pumpkinseed sunfish population. Following the rehabilitation, the lake was stocked with rainbow trout and provided some angling opportunity through a verbal angler access agreement between the landowner and the Washington Department of Game. In 1992, public access to the lake was acquired with the WDFW purchase of the Windmill Ranch. No stocking of Powerline Lake has occurred recently. Today, angling opportunities are the result of naturally reproducing warmwater fish populations and statewide general regulations apply. (Divens and Phillips 1998).

Swegle/McDonald Units
Swegle/McDonald Road units are adjacent to the Walla Walla and Touchet Rivers. Most fishery issues relate to the resident and anadromous fish in the river system but with little emphasis beyond

habitat protection along the banks of the river. Margined sculpins, listed as State-sensitive, are found in the vicinity of the Swegle/McDonald Road management units. The margined sculpin is defined as being vulnerable or declining so that it is likely to become endangered or threatened in a significant part of its range without management or removal of threats. Its habitat has been degraded through agriculture, grazing, logging, and channalization (Wydoski and Whitney, 2003). Umatilla and Leopard dace are both species of interest and may be in the same area because of their presumed historic range and the current habitat that is present. No studies have been done to verify population status.

Additional information on salmonid species and species of concern can be found in **Appendix 14.**

2.11.2 Amphibians/Reptiles

Northern Leopard Frog
The Northern Leopard Frog is listed as a State Candidate species by the State of Washington. Over the past 25 years it has declined throughout North America with as much as 90% of it's historical habitat in Washington now vacant (Mgmt. Recommendations For Washington's Priorities Species, Vol. 3. 1997). It inhabits marshes, wet meadows, riparian areas, and moist open woods at elevations ranging from 270 ft. to 1,363 ft (PHS, Vol.3, 1997). Breeding usually begins in March or April when water temperature reaches 50 degree F. Northern Leopard Frogs reach sexual maturity two or three years after hatching (Stebbins 1951, Nussbaum et al. 1983, Corkran & Thomas 1996 as cited in PHS Vol 3, 1997). The definite causes of the northern leopard frog's decline are unknown, though habitat loss, water contaminants, disease promoted by environmental stress and introduced predators are believed to contribute to the problem (Hays & Jennings 1986, et al cited in PHS Vol 3, 1997). At the Columbia National Wildlife Refuge Leonard et al (1993) and Leonard & McAllister (1996) list predation by the bullfrog as the main reason for the northern leopard frog's decline (PHS Vol. 3, 1997). Bullfrogs prey on other frogs and compete for food and space (Hays & Jennings 1986 cited in PHS Vol. 3, 1997). Management recommendations from the PHS guidelines include conducting surveys to determine population centers, monitoring over time to detect population changes, maintaining native fish and amphibian populations, managing for vegetative cover to provide refuges and leaving algae in ponds which can be eaten by tadpoles. Focal areas for this plan include all areas except the most extreme arid lands portion of the Sunnyside W.A. complex. Amphibian species live and reproduce even in the small areas of marsh habitat found in canyon bottoms on the Thornton Unit.

Striped Whipsnake
The Striped whipsnake is a State Candidate species because it is rare and little is known about it in Washington. They are in jeopardy due to diminishing habitat from habitat conversion and low population numbers (PHS Vol. 3, 1997). Striped Whipsnakes inhabit relatively undisturbed native grasslands, sagebrush flats, and dry rocky canyons up to 1,985 ft. (Storm & Leonard 1995 as cited in PHS Vol. 3 1997). Den sites and hibernacula created by rodent burrows are important habitat features that provide protection from predators, over wintering sites and birthing areas. Their diet consists of lizards, snakes, and small mammals and reportedly feed on young birds and insects (Shaw & Campbell 1974 et al as cited in PHS Vol. 3 1997). Management recommendations include protection of shrub steppe habitat that supports rodent burrow systems and avoidance of indiscriminate snake control activities (PHS Vol. 3 1997). The Thornton and Rattlesnake Slope units may provide habitat suitable for this species.

2.11.3 Birds

Burrowing Owl

The burrowing owl (*Athene cunicularia*) is a State Candidate species and a Federal Species of Concern. It is also classified as a migratory bird and is therefore protected under the Migratory Bird Treaty Act. Burrowing owls in North America have suffered population declines and significant range contraction (Dechant et al. 1999). Washington State is one of the areas population declines are thought to have occurred and as such a review of its status is in process by WDFW's Wildlife Program. As the bird's name suggests, this small (8-10 inches tall) mottled buffy-white and brown owl with long legs and yellow eyes lives in a hole in the ground made by badgers and other burrowing animals. It is active both during the day and at night and its call is a cooing similar to that of a mourning dove.

In eastern Washington, burrowing owls use burrows excavated by mammals (badger, marmots & ground squirrels) in shrub-steppe, abandoned agricultural fields, pastures and along road cut-banks surrounded by bare ground or short grass where other burrows are located. The burrow's nest cavity is located at the end of a 5 to 10 foot tunnel. Habitat conditions surrounding successful nests have more sandberg bluegrass and clasping pepperweed, and less rabbitbrush, cheatgrass and other weedy plants in the Pasco to Moses Lake study area (Conway et al. 2002).

Burrowing owls are opportunistic feeders. They consume mostly insects, especially beetles, crickets, and grasshoppers. They also prey on small mammals, birds, and lizards. They eat mostly vertebrates during the spring breeding season and insects later in the summer.

Until about 100 years ago, burrowing owls were common across the plains and prairies of North America, but the advent of agriculture and other human development greatly reduced the bird's range. Plowing and building eliminated habitat for burrowing owls as well as for mammals that made the burrows in which they live. Potential nest burrows are being destroyed each year in eastern Washington and preventing declines depends partly on maintaining available nest burrows (Conway, et al. 1999). Burrowing owls often use the same burrows in successive years and maintenance of these sites is important for the continued sustainability of their population. Protecting the fossorial mammal population should be a priority to prevent future declines in burrowing owls (Conway, et al.1999).

Burrowing owls are harmed in other ways as well. For example, the application of agricultural pesticides is thought to have harmed mature and young burrowing owls and eliminated the bird's food supply. In addition, owls that stand near roadsides to hunt are more likely to encounter mortality from vehicular collisions.

Burrowing owls likely use most of the units east of the I-82 parcels but no extensive surveys have been conducted on these sites.

White Pelican

The following was adapted from the PHS species account on White Pelicans: "The American white pelican is a State Endangered species. In Washington, colonies of American white pelicans have disappeared from historical breeding areas (Dawson and Bowles 1909, Johnsgard 1955). Currently, only one breeding colony exists in Washington (Ackerman 1994, 1997). Suitable nesting habitat that is free from human disturbance is rapidly declining (Motschenbacher 1984), thus there are few

opportunities for breeding populations of American white pelicans to become reestablished. Additionally, non-breeding and wintering populations occur in Washington throughout the year (R. Friesz, personal communication; L. Fitzner, personal communication).

American white pelicans are colonial nesters that breed most often on isolated islands in freshwater lakes and occasionally on isolated islands in rivers. Islands free from human disturbance, mammalian predators, flooding, and erosion are required for successful nesting (U. S. Fish and Wildlife Service 1984, Koonz and Rakowski 1985). If vegetation is present within the nesting colony, it primarily consists of grasses, forbs, and shrubs (U. S. Fish and Wildlife Service 1984). At the Badger Island colony in Washington, American white pelicans placed their nests on bare ground under willows (S. Ackerman, personal communication). Similar sites are used for loafing by both breeding and non-breeding birds.

American white pelicans require shallow water for foraging. Most feeding occurs between water depths of 0.3-2.5 m (1-8.3 ft) (Anderson 1991). Feeding mostly takes place along lake or river edges, in open areas within marshes, on or below rapids, and occasionally in deep waters of lakes and rivers (Evans and Knopf 1993). American white pelicans feed largely on nongame or "rough" fish, amphibians, and crustaceans (Brittell et al 1976, Lingle and Sloan 1980). Hall (1925) reported that adult pelicans consume 1.8 kg (4.8 lbs) of food per day. Therefore, an abundant prey base predominantly consisting of warm water fish is essential for American white pelican survival (Smith et al. 1984). Although foraging sites close to their breeding area are more advantageous than ones further away, American white pelicans are known to travel 50-80 km (31-50 mi) from nesting colonies to feed (Motschenbacher 1984, U.S. Fish and Wildlife Service 1984)).

The USFWS identifies 3 major factors that limit the success of breeding and non-breeding American White pelican populations: habitat destruction, utilization of wetlands and lakes for other purposes (e.g., irrigation, hydroelectricity, waterfowl production), and intentional or unintentional human disturbance of nesting colonies. They also cite several other potential factors that may limit American white pelican populations, including decreases or fluctuations in food supply and availability, shooting, mammalian predation at breeding colonies (especially coyotes), pesticide contamination, and powerline collisions (U.S. Fish and Wildlife Service 1984). In fact, it is suspected that two pelicans from the same flock died in a powerline collision near Giffen Lake in April 2006.

In Washington, management of American white pelican populations should focus on protection of breeding colonies and protection of feeding and loafing areas of both breeding and non-breeding birds."

The White Pelican has been listed as an endangered species by Washington State and the breeding population was all but eliminated in Washington and was not documented again until 1994 when the breeding colony was found on Cresent Island on the Columbia River near Wallula, Washington. The breeding population has increased and now nests on Badger Island but no documentation has occurred showing it breeding elsewhere. However, there has been an increase in dispersing pelicans throughout the Yakima and Columbia basins with sightings extending to the west as far as Ellensburg along the Yakima River and to the North into the Banks lake region (L. Stream, Pers. Obs.). Pelicans have been seen along the river on the I-82, Headquarters and Byron units. There is a concern by fish managers that pelicans may be impacting fish numbers and research is currently

underway to investigate the relative occurrence and fish species being utilized. Habitat enhancement for fish will benefit pelicans as well.

Long Billed Curlew

Long-billed Curlews are a Federal Candidate and Washington State Species of Concern and for this plan a preferred species for management purposes.

The breeding range of the long-billed curlew has been reduced to scattered populations in western North America. Records kept on curlews in the Yakima and Benton County regions indicate small populations where short grass habitat is available in arid regions or next to marsh like conditions. Areas targeted for management include the Byron, HQ and Rattlesnake Slope units.

The breeding habitat of Long-billed Curlews is typically described as short grass or mixed grass native prairie but varies from moist meadows to very dry grasslands. Within certain parameters, curlews appear to be somewhat flexible in their breeding habitat preferences. In general, Long-billed Curlews are ground nesters and prefer to nest in areas with large open expanses of relatively low vegetation. Curlew foraging efforts are hampered in years in which weather conditions resulted in abundant thick, standing-dead vegetation (Hill, 1998).

Extensive cultivation may eliminate Long-billed Curlews from an area. However, curlews will occasionally breed in agricultural land or in pastures planted with short grass. Agricultural land used by breeding Curlews typically has a similar vertical profile to that of native prairie and is usually adjacent to native grassland.

Grazing regimes that are compatible with maintaining preferred curlew habitat likely vary between regions depending on soil and moisture conditions. Relative height of vegetation may be an important habitat feature that influences the ability of curlews to detect and avoid predators. Moderate livestock grazing tends to maintain the low vegetation profile curlews require for breeding (Alberta Wildlife Status Report No. 16. 1998). However, overgrazing degrades long-billed curlew habitat and should be avoided (Bicak et al. 1992).

The availability of brood-rearing habitat is another important component of habitat selection by Long-billed Curlews. Shortly after the eggs hatch, adult curlews move their broods to areas where denser vegetative cover is available. These areas of denser vegetation may be important for reducing the chances of brood loss caused by predation (Alberta Wildlife Status Report No. 16. 1998).

Conservation and management of the Long-billed Curlew relies upon the maintenance of the remaining native grasslands and which the species uses as breeding habitat. The effects of habitat fragmentation and degradation on curlew populations are poorly understood and yet in the Yakima valley all that remains is fragmented habitat.

Long-billed Curlews are a late-maturing, long-lived species with low reproductive output. Nests are built in May in a scrape excavated in the ground and are lined with grasses, straw, and plant stems. Females lay only one clutch each breeding season and clutch size is usually four eggs, although three- and five-egg clutches are possible.

Young Long-billed Curlews are precocial (able to walk and feed themselves shortly after hatch) and hatch at the same time. Adults lead their chicks to areas of dense vegetative cover shortly after hatching where invertebrates, such as grasshoppers, constitute the majority of the diet for both adults and young. Adult curlews may also feed upon small amphibians. Major predators on curlew eggs include: Coyotes, Black-billed Magpies, Bullsnakes, Common Ravens, and Badgers. In addition to these predators, curlew chicks are also vulnerable to predation by Ferruginous Hawks, Swainson's Hawks, and Great Horned Owls (Alberta Wildlife Status Report No. 16. 1998.).

Long-billed Curlews rely upon the cryptic coloration of their plumage and eggs to avoid predation and will crouch low on the nest in the presence of potential avian predators. Curlew breeding territories are frequently clumped in loose aggregations and it has been suggested that this aids in predator defense.

Waterfowl

Waterfowl habitat management is a primary activity on the Sunnyside Headquarters, Byron Ponds, and Windmill Ranch Units. All three of these units provide breeding, migrating and wintering habitat. Breeding dabbling duck species include mallard, gadwall, blue-winged and cinnamon teal, wood duck, and Northern shoveler. Breeding diving species include redhead, ruddy duck and ring-necked duck. Canada geese also breed on the wildlife area. Migrating and wintering species include mallard, gadwall, green-winged teal, wood duck, Northern pintail, lesser scaup, American wigeon, canvasback, Canada goose, White-fronted goose, and tundra swans.

Nesting habitat for dabbling ducks, except for wood duck, is comprised of two components; upland cover for nesting and nearby shallow water wetlands with abundant cover, aquatic vegetation and invertebrates for brood rearing. Nesting cover may be up to one mile from the nearest water source and may be up to five miles from brood rearing wetlands. It includes a diversity of tall grasses such as basin wildrye, tall wheatgrass, and bluebunch wheatgrass. Dense stands of perennial pepperweed and other non-native herbaceous species may be used for nest concealment when abundant. Big sagebrush, black greasewood, and rabbitbrush may be used to conceal nests as well. The key to nesting habitat is it must be sufficiently tall and dense to conceal nests from predators that hunt from the ground or air. The plant species providing this cover is less a factor than the structure. Similar to other ground nesting species, nesting waterfowl rely on the residual plant growth from the previous year. Therefore, management practices (e.g., grazing, mowing, burning) that reduce residual growth may reduce nesting success.

Wood ducks nest in natural tree cavities or occasionally cavities created by other species (Ehrlich et al 1988). They require mid- to large-diameter trees with cavities near water. Wood duck nesting habitat is most abundant on the Sunnyside Headquarters unit.

Brood rearing habitat is characterized by emergent vegetation in wetlands with a ratio of 40% to 60% open water to 60% to 40% emergent vegetation (Rassmussen and Wright 1990). Emergent vegetation provides escape cover for the brood and hen. Submerged in the open water should be abundant aquatic plants that harbor aquatic invertebrates for brood forage. Ducklings gradually shift diets from invertebrates to aquatic vegetation as they age. Adults feed primarily on aquatic vegetation, but diversify their diets with invertebrates during the breeding season.

Non-breeding habitat consists of wetlands and riparian areas that provide feeding and loafing areas. Additionally, during late fall, winter and early spring waterfowl forage heavily in agricultural grain fields, especially corn. Modern farming practices and a shift from annual grains to perennial crops has reduced the amount of available forage in the Yakima and Columbia Basins. Farming operations and moist-soil management on the Headquarters, Byron and Windmill Ranch units are very important activities that boost waterfowl use of the Wildlife Area during fall, winter and spring. Proposals have been developed to improve and increase abilities to conduct moist soil management at all three of these units. Both ruddy duck and redhead build their nests in emergent vegetation on the edge of wetlands, usually over water. Ring-necked ducks build nests on the waters edge under shrubs or other cover, usually on dry land (Ehrlich et al. 1988). Brood rearing occurs in open water ponds and lakes. Divers eat mostly aquatic invertebrates by either capturing prey or sifting through mud on bottom. Divers also consume aquatic vegetation.

Waterfowl pair counts have been on going since 1955 in eastern Washington. Pair counts are conducted each year in May and are used to index breeding waterfowl abundance. Trends have been down recently for the irrigated portions of eastern Washington. However, in the Yakima Valley abundance trends have been slightly increasing (WDFW 2003 Game Status and Trend Report). Pair counts have been conducted at Byron Ponds unit since 1996, but none have been conducted on the Headquarters unit or Windmill Ranch. The trend for total ducks counted during the period 1996 through 2004 (excluding 2002) has been slightly downward (Figure 1). The three most common breeders at Byron Ponds are mallard, gadwall and redhead. No clear trend in mallard numbers was apparent during the survey period. Gadwalls declined in numbers from1996 to 2000 and have only showed moderate increases since 2000. Redheads declined the most during the survey period. Canada goose numbers have gradually increased each year since 1996 (Figure 18).

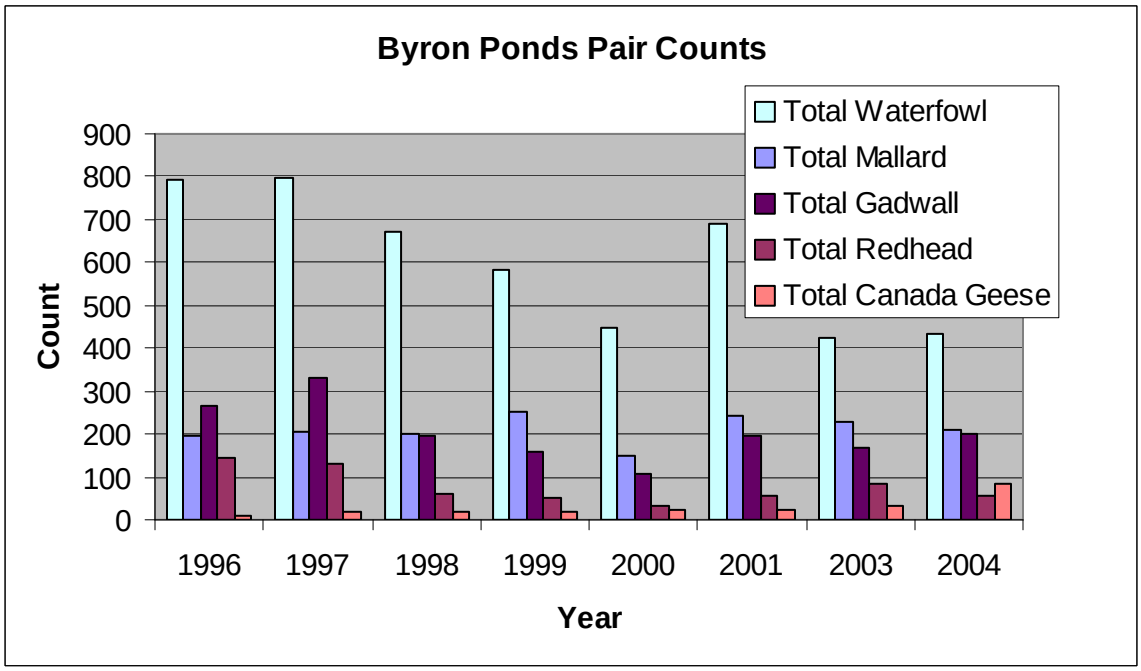

Figure 18. Waterfowl breeding abundance indexed by pair counts conducted in May from 1996 through 2004. Data are unavailable for 2002.

Winter abundance of waterfowl is determined each year during aerial surveys conducted October through February. The Headquarters and Byron Ponds units are surveyed as part of the Yakima Valley count conducted by the Yakama Nation. Windmill Ranch is surveyed as part of the north Columbia Basin counts conducted by the USFWS and WDFW (Region 2). Survey data for these units are lumped with data from surrounding lands. Therefore, winter abundances by individual units cannot be determined. Observational data have indicated that abundances at Byron Ponds and Sunnyside Headquarters have been declining during fall and winter. At Byron Ponds the decline is likely due to a combination of loss of water, carp infestations, and lack of ability to manipulate water levels. At the Headquarters unit white lily pad infestations on Giffin and Morgan lakes have likely contributed to declines.

Upland Birds

All upland birds are exotic species in this area. They include Ring-necked Pheasant, California Quail, Chukar and Hungarian Partridge. The most common is the quail, which utilizes the woody vegetation along the wet areas. Pheasants were introduced in the late 1800's and did well in the agricultural producing areas until crop changes and land use patterns eliminated many areas that once supported abundant numbers. Pen-reared pheasants are currently released on the HQ and Byron units for hunting recreation each year. Although not abundant, chukar and partridge can be found inhabiting the shrub steppe areas.

Osprey

The Osprey, a management Preferred species and a fish-eating hawk is highly dependent on riparian, pond and lake habitat for its existence. Osprey resided in the mountainous lake areas of the region for many years but until 1982 they had been absent from the Yakima valley where

historical records indicated they had existed. The effects of DDT and it's derivative DDE likely played a role in the decline of the this species from the area. Suppressed fish stocks in the area may have contributed to the decline as well. With the ban of DDT in 1972 and the improvement of fish stocks from the 1980's to the present the osprey has re-inhabited the Yakima valley. The first known pair showed up in 1982 adjacent to pond 4 where it built a nest on a power structure adjacent to the newly built I-82 interstate highway. The adults successfully nested and two juvenile Osprey fledged from this nest that year. The nest structure was moved during the following year to the dike between ponds 4 & 5 to provide security for the birds and to minimize traffic hazard concerns from sticks dropping on the freeway. This nest has been occupied and produced young nearly every year since then. Since that time additional nests have been built with nine documented in WDFW data system but there may be up to 20 nests total in the valley between Selah and Mabton. The I-82 Units and the Sunnyside HQ unit provide the necessary habitat for nesting and foraging by Osprey. Currently nests are located on most of the pond units where osprey nest on artificial platforms provided by local power companies. These structures provide an alternate nest sites to prevent birds from building nests on active hot power line structures. The ponds as well as the adjacent Yakima River provide fish for food to the young and adult osprey.

Bald Eagle

The Bald Eagle is listed as a Federally Threatened species but it has recovered well in Washington over the last 25 years. The first documented nest site in the Yakima basin was found at Rimrock Lake in the early 1980's. In more recent years Bald Eagles have built nests along Toppenish Creek and the Columbia River near the old Hanford Town site (L. Stream, Pers. Obs.). Nest trees are usually selected by structure with the dominant tree in the stand being the nest tree with limbs large enough to support the nest (Bald Eagle PHS Recommendations). There have been reports of eagle nests along the Yakima River below Union Gap with four confirmed to date. As fish stocks improve more bald eagles are likely to breed in the area. The Yakima Valley has long been a wintering area for bald eagles that migrate from the north due to the amount of waterfowl along the system and fish that inhabit the river that provide the bulk of the food supply. When freeze up occurs bald eagles feed on carrion created by winterkill of a variety of wildlife but most particularly big game. Nest structures may be somewhat limiting for long-term nest stability along the Yakima River system but in the short term eagles have used cottonwood trees for nest platforms until they become decadent and break apart. Disturbance and habitat alterations are considered detrimental to bald eagle use of an area (Bald Eagle PHS). The I-82 and HQ Units provide the best opportunities for nesting bald eagles while all units provide some level of wintering use.

Sandhill Crane

The Sandhill Crane has been listed as an endangered species by the state of Washington since 1981 and are represented by a small number of greater sandhills that breed in Klickitat and Yakima Counties (Sandhill Crane Recovery Plan, 2004). In addition about 23,000 Lesser Sandhill cranes stop in eastern Washington as they migrate through Washington. The Sandhill Crane Recovery Plan lists the records submitted for sandhill crane sightings. Many of the earliest sightings were from interviews with interested birders as the fledging Washington State Non-game program was being developed. Sandhill Cranes are seen every year as they migrate north to breeding grounds but emphasis on records has been toward those staying in Washington and potentially breeding here. Although not identified in the Recovery Plan it is plausible the Yakima Valley between White Swan and Toppenish was used by sandhills prior to agricultural development. In the Yakima Subbasin, montane coniferous wetlands are currently the primary breeding habitats. It is thought,

though, that the historic wetland complexes of Toppenish Creek likely supported breeding cranes (T. Hames, YN, pers. comm. In: Yakima Subbasin Plan 2004). Two adults and a fledged juvenile were observed along wetlands adjacent to Toppenish Creek near White Swan on 26 September 1997 (T.Hames, YN, pers.comm. in Yakima Subbasin Plan 2004). Their origin is unknown.

Much of this area was a wide expanse of marsh habitat, which could have provided breeding habitat prior to dredging for agricultural use. Current areas of interest in relation to the Sunnyside W.A. complex are the Byron Pond, Sunnyside HQ Unit and Units in Franklin County where large numbers forage seasonally on crop aftermath. Long time residents in the area indicated they may have bred on the Byron Ponds at one time but to date there is no documentation to substantiate these assertions. Maintaining consistent water levels at the Byron Ponds may help in attracting sandhills for resting and potentially breeding in future years. The Sunnyside HQ unit and Franklin County units provide food and staging areas during migration.

Shrub steppe obligates

More than 100 bird species forage and nest in sagebrush communities, and at least four of them, the greater sage grouse, sage thrasher, sage sparrow and Brewer's sparrow are obligates (Braun et al. 1976). In a recent analysis of birds at risk within the interior Columbia Basin, the majority of species identified as of high management concern were shrub steppe species (Vander Haegen et al. 1999). Moreover, over half of these species have experienced long-term population declines according to the Breeding Bird Survey (BBS) (Saab and Rich 1997). Historically, shrub steppe was the most abundant habitat type within the subbasin deserving high conservation priority (Yakima Subbasin Plan). Changes in land use over the past century have resulted in the loss of over half of Washington's shrub steppe habitat. Dramatic increases in dryland agriculture and use of irrigation to expand farming and orchards has reduced the once expansive native grasslands and shrub steppe to a fragmented landscape with very few large areas of native vegetation (Dobler, et al, 1996). The Thornton and Rattlesnake Slope units provide habitat for these species. In addition habitat restoration projects are projected to improve the quantity and quality of shrub steppe in these units.

2.11.4 Mammals

Elk

Historical records indicate elk were present in the plains regions of the west and existed in the Yakima Valley prior to man's alteration of the landscape. Elk were documented on the Arid Lands Ecology Reserve (ALE) in 1974 and they formed the nucleus of the current population of what is now called the Rattlesnake Hills Elk Herd. In addition elk have expanded to adjacent areas south of the Yakima River and to the east of the Columbia River. The current (2005) summer population is around 800+ elk. Efforts have been made to control the growth of the herd with varying results.

The Rattlesnake Hills elk herd continues to be a contentious issue with neighboring landowners. The elk seek refuge on the Arid Lands Ecology Reserve (ALE) to the north, which is managed by the U.S. Fish & Wildlife Service. Since no hunting is allowed on ALE, the herd continues to grow and causes increasing damage to agricultural crops on adjacent private land. The Thornton/DNR complex and Rattlesnake Slope / BLM lands are the only public land outside and surrounding the ALE but even collectively, they are not large enough to allow for substantial elk harvest. Trespass is a significant concern among private landowners in this area. Steps are currently being taken to better inform user groups of the distinction between government ownership and private land.

Mule Deer
Mule deer have been an important member of eastern Washington's landscape, serving as a food and clothing source for Native Americans prior to settlement by Euro-Americans. Today mule deer remain an important component of the landscape, providing food for Native Americans, recreational opportunities for hunters and wildlife watchers, and tremendous economic benefits to local communities and the state of Washington. Mule deer range throughout the Yakima Subbasin, occupying various habitats from alpine areas in the Cascades, to the farmlands and shrub steppe/grassland habitats along the Yakima and Naches rivers and their tributaries. (Yakima Subbasin Plan 2004)

The most important habitat factors affecting deer in the subbasin are: 1) Availability of suitable cover and forage to survive harsh winter conditions, and 2) the availability of forage year round. Fire can destroy shrub steppe sagebrush, an important source of cover and food source in winter. (Yakima Subbasin Plan 2004)

Mule deer reside on most lands within the Wildlife Area with more significant numbers confined to the Yakima River bottom, Rattlesnake Hills, Department of Energy Lands including ALE and adjacent private lands. Generally, populations are scattered in small herds and do not present significant agricultural damage issues. Most hunting recreation occurs on private lands with hunting somewhat limited on the Wildlife Area because of the size and location of the parcels.

Townsend's & Washington Ground Squirrels
Ground squirrels are common throughout the western two thirds of the North American Continent. Most are common to areas of open sagebrush and grasslands and are often found in and around dry land grain fields, meadows, hay land and irrigated pastures (Askam 1994). Fossils of Townsend's have been recovered from late Wisconsin-early Holocene localities within the present range in Washington (Rickart, 1987). These same records probably represent the Washington ground squirrel as well (Rickart, 1991) The Washington ground squirrel is listed as a State Candidate Species while the Townsend's ground squirrel is a Species of Concern in Washington. The Washington ground squirrel ranges north of the Columbia River particularly in Franklin, Adams and Grant Counties while the Townsend's ground squirrel range is south of the Columbia River in Benton, Yakima, Kittitas and Klickitat Counties. Ground squirrels are preyed upon by badger and in these areas are considered an important food source for Ferruginous Hawks as well as other avian predators. Badgers excavate ground squirrel holes, which provide for burrowing owl nest sites. Until recently (early 1980's) populations seemed to be stable, however, with the decline of shrub steppe for agricultural production many species, including these, have come under scrutiny to determine the status of the populations. Likely areas within the Sunnyside W.A. complex where these squirrels might be found include some units in Franklin County where shrub steppe exists and within the Thornton, Rattlesnake Slope, Sunnyside HQ, and Byron Pond units.

Black-tailed & White-tailed Hare (Jackrabbit)
These two jackrabbits are listed as a State Candidate species in Washington and hunting is currently not allowed. Declines in historic numbers caused concern throughout eastern Washington where they reside. The White-tailed Hare is the largest hare weighing 6-9 pounds and is found in shrub steppe communities of eastern Washington. The Black-tailed Hare weighing 4-6 pounds is thought to be a relative recent addition to Washington invading the state from the south around 1870 (WA-PS-154). It is found in areas with less than l0 inches of rainfall within the shrub steppe

communities. They both feed on almost any green vegetation during the summer and switch to available vegetation including buds, twigs and bark in the winter. Hares are preyed upon by raptors and coyotes and may play a role in raptor population abundance. Both hares occur on the Thornton and Rattlesnake Slope units with the black-tailed hare also residing on the Sunnyside HQ and Byron units and most likely on the Vance unit. Maintaining the shrub steppe community is key to continued management for these species.

Beaver

Beaver are listed as a furbearing animal and are trapped annually with season limits. They were historically trapped for their fur and still are today but with less vigor than historically occurred. The result of early trapping efforts led to large declines in the beaver population but in recent years with more protective management the species has recovered so well that its urban presence is of concern in the more human populated areas. A recent legislative bill in Washington State, limiting the use of body-gripping traps, plus the general decline in value of furs play a large role in this species population increase. Beaver create habitat suitable for a variety of wildlife but have also been maligned due to their use of ornamental trees in residential areas, their ability to interfere with irrigation canals and dam building activities that flood agricultural fields. Beaver are present on most all the Sunnyside complex parcels that have water as an attribute of the area. Consideration should be given to the overall benefits of beaver activity and its resultant habitat values when managing a parcel of land. Only when its activity conflicts with the stated goals of the parcel should there be measures to limit its influence on the landscape.

Beaver are central to the maintenance of healthy riparian wetland habitats. Their abundant activity created flooded conditions throughout the subbasin. A testimony to their abundance is reflected in the fact that the Pacific Northwest was revered for its fur trade. Extensive trapping is routinely listed as a major factor in their decline. Healthy beaver populations, however, are returning to many restoration areas in the lower portions of Yakima Subbasin. As restoration projects move up the watersheds, there is a possibility that beaver populations will move upstream with them. Beaver damage complaints often will increase in areas adjacent to restoration projects. Restoration managers must be prepared to address these affects if projects are to succeed in the long term. Priority should be given to projects that address the factors necessary to support healthy populations of beavers and to address the unintended impacts to adjacent lands. (In Yakima Subbasin Plan 2004)

Muskrat

Muskrat are found throughout the Yakima basin and are considered furbearing animals, which can be trapped annually with season limits established. Trapping is constrained in Washington State in the same way beaver are through the limitations of body-gripping traps. Muskrat are found on the waterways of the basin where they live year around. They feed on aquatic vegetation as well as some field crops nearby. Very young muskrats are sometimes taken as prey by waterfowl, but more frequently by coyotes, hawks, owls, raccoon, mink, and in some areas by largemouth bass. Muskrats can cause problems in dirt lined irrigation canals where they bore holes for security, causing canals to break and thereby flooding fields, destroying crops and causing other property damage. Muskrats are found on all units where an aquatic environment exists. Maintaining the natural aquatic environment is sufficient management for muskrats but in some cases special measures may be needed to prevent damage by muskrats to projects for other species.

River Otter

The following account was taken from Ellis and Dewey, 2003. "North American river otters once occurred throughout Canada and the United States, except for areas of southern California, New Mexico, and Texas, and the Mohave desert of Nevada and Colorado. These otters are now rare or locally extinct throughout much of the eastern, central, and southern United States. North American river otters are found anywhere there is a permanent food supply and easy access to water. They can live in freshwater and coastal marine habitats, including rivers, lakes, marshes, swamps, and estuaries. River otters can tolerate a variety of environments, including cold and warmer latitudes and high elevations. River otters seem to be sensitive to pollution and disappear from areas with polluted waters. River otters build dens in the burrows of other mammals, in natural hollows, such as under a log, or in river banks. Dens have underwater entrances and a tunnel leading to a nest chamber that is lined with leaves, grass, moss, bark, and hair. Males and females do not associate except during the mating season. Males often breed with several females, probably those whose home ranges overlap with their own. They breed in late winter or early spring with gestation lasting two months. The young may be born up to a year after mating because these otters employ delayed implantation of the fertilized egg in the uterus. Births occur from November to May, with a peak in March and April. Litter sizes range from 1 to 6 young, with an average of 2 to 3. Females give birth to, nurse, and care for their young in a den near the water. The young are weaned at about 3 months old and begin to leave their mother at 6 months old.

River otter individuals are solitary, except for females with their young. They are known as playful animals, exhibiting behaviors such as mud/snow sliding, burrowing through the snow, and waterplay. Many "play" activities actually serve a purpose. Some are used to strengthen social bonds, to practice hunting techniques, and to scent mark. North American river otters get their boundless energy from their very high metabolism, which also requires them to eat a great deal during the day. They are excellent swimmers and divers, able to stay underwater for up to 8 minutes. They are also fast on land, capable of running at up to 29 km/hr. These otters normally hunt at night, but can be seen at all times of day.

River otters have large home ranges, between 2 and 78km of waterway, and are constantly on the move within this range. Home range sizes vary considerably and seem to depend on the richness of food resources and habitat quality. Despite these large ranges, river otters are only slightly territorial and generally practice mutual avoidance. They also scent mark using paired scent glands near the base of their tails or by urinating/defecating on vegetation within their home range. These glands produce a very strong, musky odor. North American river otters perceive their environment through vision, touch, smell, and hearing. Their large and abundant whiskers are very sensitive and are important in tactile sensation. These whiskers are used extensively in hunting, as smell, vision, and hearing are diminished in the water.

North American river otters eat mainly aquatic organisms such as amphibians, fish, turtles, crayfish, crabs, and other invertebrates. Birds, their eggs, and small terrestrial mammals are also eaten on occasion. They sometimes eat aquatic plants. Prey is captured with the mouth, and mainly slow, non-game fish species are taken, e.g., suckers. The otter's long whiskers are used to detect organisms in the substrate and the dark water. Prey is eaten immediately after capture, usually in the water, although larger prey is eaten on land. They mainly escape predation through their agility in the water and on land, their vigilance, and their ability to fiercely defend themselves and their young. North American river otters are important predators of fish and aquatic invertebrates often

eating "trash fish" that compete with more economically desirable game fish." River otter are found along the Yakima River system year around.

Mink

Mink is classified as a furbearer in Washington State and is one of the primary indicator species used for the Columbia River mitigation project. Mink belongs to the family Mustelidae, which are a group of carnivores with short legs and five toes on each foot, fine fur and scent glands. They are commonly found throughout the pacific states along mountain stream or around the cattail marshes of lowland lakes and ponds. This semi-aquatic animal is generally nocturnal and will eat various species of fish, frog, crayfish, mice, muskrats, rabbits, and many kinds of birds, particularly crippled water birds (Ingals, 1965). Ingals points out the males home range is as large as 1,100 acres with females having much smaller home ranges and remaining relatively sedentary during the breeding season. Mink are polygamous with the breeding season lasting from late January to late March. Litter size varies from 3-6 young which are born in late April or early May. Young are born in a den, which may be a bank burrow, a muskrat house, a hole under a log, or a rock crevice (Hygnstrom, 1994). Young mink disperse from the family in late summer and become sexually mature about 10 months of age. Mink are most active at night and only hole up during times of heavy snow and low temperatures.

2.11.5 Species of Concern or Special Status/ Priority Species

Lamprey

As summarized and described in the Priest Rapids Hydroelectric Project Draft license Application (2003) and Wydoski and Whitney (2003), the Pacific lamprey is a prehistoric jawless fish with a cartilaginous skeleton that is parasitic as an adult. In salt water, Pacific lamprey feed on the blood and body fluids of fishes. They may spend two to four years in the ocean before returning to freshwater to spawn. Adults may reach 30 inches in length and weigh about 1 pound. Pacific lamprey are anadromous, and their historical distribution encompassed the entire Columbia River Basin. These fish were especially important to Native Americans for medicinal and ceremonial purposes and were considered a delicacy by many Columbia Basin tribes.

Lampreys follow a similar life cycle as salmonids. The young spend the first 5-6 years in fresh water then migrate down to the ocean where they stay for up to 3.5 years. Adult lampreys return to small tributary streams and construct a crude redd. After spawning they soon die.

Little is known about the historic distribution and abundance of Pacific lamprey in the Yakima Subbbasin but since the completion of the hydropower dams in the Columbia Basin, the abundance and distribution of lampreys are thought to have declined significantly compared to historic levels.

Pacific Lamprey are currently found in the mainstem Yakima and Naches Rivers. Fewer than 15 have been observed in the Yakima system since 1992 (Wydoski and Whitney 2003). Recent observations at the Prosser bypass and fish ladder have identified 1 in 1996, 22 in 2002, 85 in 2003, and 65 in 2004 migrating into the Yakima Subbasin. Pacific lamprey is a Washington State species of concern and is under consideration for ESA listing by USFWS. Population levels of Pacific lamprey have been dramatically reduced from pre-1850 levels, more study of the presence and life history of lamprey in the Yakima Subbasin is warranted.

Sage Grouse

The Sage Grouse is listed as a State Threatened and Federal Candidate species. The distribution of sage grouse has dramatically decreased across its range. Historically they occurred in 16 western states and 3 Canadian provinces (Aldrich 1963, Schroeder et al. 1999). They have been extirpated from British Columbia, Arizona, New Mexico, Oklahoma, Kansas, and Nebraska (Connelly and Braun 1977, Braun 1998, Schroeder et al. 1999). They historically occupied 57,741 km^2 within 16 counties in eastern Washington (Schroeder et al. 2000). Today they are restricted to two relatively isolated populations roughly separated by 50 km: one in Douglas and Grant Counties and the other in Yakima and Kittitas Counties (Schroeder et al. 2000). The Yakima/Kittitas population resides on the Army's Yakima Training Center. Within the Yakima Subbasin, the last known active lek in Benton County was in 1991 on the ALE reserve, currently managed by the USFWS as part of the Hanford Reach National Monument (HRNM). Wildfires during the 1980's that eliminated sagebrush are likely responsible for sage grouse extirpation from this property (Hays et al. 1998). Extirpation of other local populations occurred on the Yakama Reservation, and WDFW's Wenas, LT Murray, and Quilomene Wildlife Areas during the 1960's, 1970's, and 1980's (L. Stream, WDFW, pers. comm.). (In Yakima Subbasin Plan 2004)

Population trends have followed a similar pattern as distribution. Given the significant range contraction within Washington, population declines since European settlement likely approach 95 percent (Schroeder et al. 2000). However, incomplete data prior to 1960 prevent solid estimates. The earliest reliable estimates of past abundance are 4,682 in 1960 (Schroeder et al. 2000). In 2003, the population was estimated to be 1,009; 627 in Douglas and Grant Counties (M. Schroeder, unpublished data) and 382 on YTC (US Army 2003); representing a 78 percent decline since 1960. (In Yakima Subbasin Plan 2004)

Historically, sage grouse ranged from the southern portion of the Columbia River to Oroville in the north, west to the Cascade foothills, and east to the Spokane River (Yocum 1956 as cited in Washington State Mgmt. Plan for Sage Grouse, July 1995). That plan identifies the mouth of the Snake River, Priest Rapids and the Yakima Valley as specific sites where early explorers reported seeing sage grouse. Sage grouse have been sighted on the Rattlesnake Hills in recent years but no leks are known to exist currently. The Thornton and Rattlesnake Slope units provide habitat conducive to sage grouse year around. The Rattlesnake Hills are considered important habitat and linkage corridors to habitat to the south on the Yakama Indian Nation lands. If sage grouse populations are to recover in Washington this area will be an important component of the recovery area.

Ferruginous hawk

The Ferruginous Hawk is the largest North American Buteo inhabiting open arid country in 17 western states including Washington. It exists in low numbers in shrub steppe habitat in Washington and has been listed as a Washington State Threatened species. Over 70% of the known 204 territories listed for 1996 were found in the four counties the SWA complex resides in (Washington State Recovery Plan for Ferruginous Hawk 1996). A 2002 survey of all 208 Ferruginous Hawk territories in Washington showed only 59 occupied (28% occupancy rate) (Ferruginous Hawk Surveys 2002, Jim Watson). No known nests are currently documented on the SWA complex but habitat that may contain ground squirrel populations particularly on the Thornton and Rattlesnake Slope provide important foraging areas.

2.12 Cultural Resources.
Cultural, geological, and other non-renewable resources are protected, and may not be removed unless such removal is beneficial to wildlife, habitat, or the Wildlife Area, or for scientific or educational purposes. WDFW will coordinate with the appropriate agency of jurisdiction for the protection of such resources. Past issues have included the removal of various rock formations, Native American artifacts, plants, seeds, and other items by members of the public.

CHAPTER III. MANAGEMENT OBJECTIVES, ISSUES & STRATEGIES

Statewide goals and objectives listed in chapter one shape management priorities on wildlife areas. Agency priorities are driven by the presence of species and habitats in a given area, the legal status of species, funding, and purchase objectives. Unless otherwise noted, the strategies listed below apply to all lands within the Sunnyside/Snake River Wildlife Area Complex. Strategies that are underlined means there is no funding for the activity.

Agency Objective: Protect, restore and enhance fish and wildlife populations and their habitats

1. Improve or Maintain Big Game Populations

WDFW has identified Rocky Mountain elk, white-tailed deer, mule deer and bighorn sheep as Priority Species due to the significant role they play in local economies and ecosystems. Big game populations are often highly visible and attract citizens to public lands for numerous reasons. Big game species generate hunting and recreation revenues, attract recreational users, and fill important niches in the environment.

Most of the SWA management units contain some combination of all of these big game species except bighorn sheep. However, the SSWA is generally not considered a primary big game management project, except for the Rattlesnake Slope and Thornton units where management activities cater more to deer and elk than on the other management units. Still, several of the other management units do offer big game recreational opportunities.

The following Strategies will be implemented as a means to address the issues and concerns expressed by the District Team and CAG. Strategies are identified at a broad landscape level, followed by specific strategies for individual management units.

Regional

A. *Strategy*: Enforce hunting and land use regulations on all Wildlife Areas to ensure protection of resources. Timeframe: On-going, but limited to short staffing of Enforcement personnel. *Justification*: Maintain order.

B. *Strategy*: Reduce the elk population of the Rattlesnake Hills herd to a minimum of 350 & maintain at that level. This herd resides mostly on non-State land. Timeframe: On-going, but slow progress. *Justification*: Manage elk and hunter numbers at socially and biologically acceptable levels.

C. *Strategy*: Reduce or maintain elk population in Franklin County. Monitor to determine baseline populations on state-owned and managed lands. *Justification*: Reduce crop damage.

D. *Strategy:* Maintain Mule Deer populations at current levels. Monitor to determine baseline populations on state-owned and managed lands. *Justification*: Manage for socially and biologically acceptable levels.

I-82 & Sunnyside HQ Unit

A. *Strategy:* Monitor trespass cattle on the HQ unit that come across unfenced river boundary from YN. Herd cattle back across river or contact owner for roundup. Timeframe: On-going. *Justification*: Maintain habitat capabilities for wildlife and recreation.

B. *Strategy:* Survey and inventory boundary fence needs on I-82 for controlling trespass livestock. Evaluate condition annually and maintain or rebuild as necessary. Need additional funding. *Justification*: Maintenance needs, property boundary identification and habitat protection.

Thornton & Rattlesnake Slope Unit

A. *Strategy*: Manage hunter access consistent with negotiated agreements with adjacent landowners. Timeframe: Sept. 1-Jan. 31. *Justification*: Control access related problems. Need additional funding

B. *Strategy*: Perform post-wildfire restoration, using proven techniques, on both units to provide native habitat and quality feed for elk & mule deer in the area. Planning starts after fire is extinguished. Timeframe: Fieldwork from Nov. 1-Feb. 1. *Justification*: Enhance wildlife food/cover & survival.

C. *Strategy*: Maintain strategic fire lines to protect habitat, while minimizing habitat disturbance. 1) On Rattlesnake Slope, work with local fire districts on cooperative discing of fire lines. Sterilize BPA transmission line access road, Timeframe: Annually in Jan-Feb. 2) On Thornton, work with Benton Co. Road Dept. to manage roadside cover to effectively widen fire lines at county roads. Timeframe: Annually in April. 3) Mow internal roads once per year to reduce fuel contact with vehicles during management activities and trespass vehicles. Timeframe: Annually in early June. *Justification*: Wildfire prevention.

D. *Strategy*: Improve existing water sources & develop water sources where lacking. Replace guzzlers damaged in fires (5 on Thornton, 3 on R. Slope). Two guzzlers to be replaced on R. Slope in May 2006. Spring development on Thornton in Aug. 2006. *Justification*: Provide greater wildlife distribution. Attract elk away from private land and reduce crop damage.

2. Protect, Enhance and Restore Function and Structure of Native Habitats

All lands within this Wildlife Area provide partial mitigation for the loss of native habitat due to construction of Snake River and Columbia River dams. Mitigation credit is received for restoring habitat to native conditions. The following Strategies will be implemented as a means to address the issues and concerns expressed by the District Team and CAG. Strategies are identified at a broad landscape level, followed by specific strategies for individual management units.

Regional

A. *Strategy*: Produce vegetation map delineating cover type distribution on Sunnyside Wildlife Areas complex. Update every 5-10 years to track changes due to restoration work. Need additional funding. *Justification*: Identification of management focus. Prioritize future enhancement activities.

Sunnyside HQ/Byron Units

A. *Strategy*: Update vegetation maps & conduct Habitat Evaluation Procedure (HEP) surveys to assess condition and health of vegetation communities. Repeat select transects at 10-year intervals to monitor changes over time (10 year intervals will detect changes at meaningful levels). *Justification*: BPA requirement; detects level of achievement toward goals.

B. *Strategy*: Initiate restoration on a minimum of 10 acres of floodplain and/or shrub steppe habitat to near native condition each year. Maintain previously restored sites annually. *Justification*: Provide wildlife with niches of habitat consistent with needs. Annual effort is matched to a small, full-time workforce, which is more efficient than multiple, seasonal staff.

C. *Strategy:* Maintain seasonal water flow through old river oxbows, swales, etc. to maintain wetland habitat. Timeframe: Annually. *Justification*: Provides brooding and resting areas for waterfowl. Restores hydrology to the floodplain

D. *Strategy*: Operate and maintain at least 130 acres of moist soil management units annually**.** *Justification*: Mimics natural floodplain flow regime; provides nesting, brood-rearing and winter food for waterfowl and other wetland obligate species; spring foraging for migrating shorebirds.

E. *Strategy*: Remove manageable blocks (10-15 acres) of Russian olive monocultures each year. Seed small grain cover crops during resprout control. Treat re-sprouts for 2-3 years, seed to native herbaceous & woody vegetation. Survey and produce vegetative maps, showing remaining olive stands; plan future removal efforts for 10 year interval. *Justification*: Recovery of habitat for focal species management.

F. *Strategy*: Control reed canary grass and Russian knapweed in river oxbows and swales, plant to native species. Do as time allows, with other noxious weed control the priority. Survey and produce vegetative maps with inventory of target weeds. Develop 5 year control plan. *Justification*: Legally mandated by district weed boards and the desire to restore native habitats.

G. *Strategy*: Coordinate with U.S. Fish & Wildlife Service and YN to implement expected award of NAWCA grant. Timeframe: June 2006-June 2008. *Justification*: Large-scale wetland enhancement projects on Byron and HQ units that would not be possible without grant funding.

H. *Strategy*: Continue cross-program discussions on future management/restoration of Morgan and Giffen Lakes, and search for funding options. As time permits, and additional funding covers existing workload. *Justification*: Determine long term goals for both of these lakes and reverse succession if that is the chosen goal.

Thornton and Rattlesnake Units

A. *Strategy*: Reseed CRP fields to more native grass, forb and shrub species as renewal contracts come up and as additional funding allows. Justification: Recover native habitats for native wildlife especially sage grouse.

B. *Strategy:* Plant scattered blocks of sagebrush on Rattlesnake Slope grasslands to provide nursery areas for natural reproduction of shrub cover. Map target areas & plan projects. *Justification*: Provide natural more cost effective recovery of native habitat.

C. *Strategy:* Reseed any areas burned by wildfire in the first winter following the fire. Use native seed mixes (local ecotypes when possible) that include grasses, forbs and shrubs. Use techniques that have proved successful on R. Slope. Monitor closely for weeds and arrange control measures. Timing on this step is extremely critical so fire events will reset project priorities. *Justification*: Enhance and quicken recovery from fires before competitive weeds invade**.**

Windmill Ranch Unit

A. *Strategy:* *Restore 200 acres of historic shrub steppe habitat that has been degraded by fire and overgrazing.* *Justification: Return to native habitat; increase mitigation credits for this habitat type.*

Swegle & McDonald Bridge Units

A. *Strategy*: Monitor results of 2005 dike removal/reseeding project along the Walla Walla River that was initiated to reconnect river with perched riparian zones. Monitor during high flows in winter of 2006 and spring of 2007**.** Plan additional dike removal work based on results. *Justification*: Provide floodplain relief and restore to natural condition.

B. *Strategy:* Enroll maximum allowable shoreline area on the McDonald Bridge unit in CREP and replace some of crops with native habitat (use ag lessee as sponsor). Timeframe: Summer/Fall 2006. *Justification*: Enhances riparian habitat.

C. *Strategy*: Restore old ag field to native grass cover on Visser parcel. Timeframe: Spring/summer 2006. *Justification*: Part of restoration effort. Improved HEP values & mitigation credit. Response to County Weed Board request to control kochia.

All Management Units Containing Wetland Habitats

A. *Strategy*: Map, label and survey all wetland habitats for species use, water source, successional stage, then develop 5-10 year management plan based on attributes of each. Determine which areas should be managed as moist soil units and which should be managed as "no action" units. *Justification*: Maximize diversity by providing a mixture of early and late successional wetland habitats.

B. *Strategy:* Apply for State Duck Stamp funding and coordinate projects with awarded funds. Timeframe: Fall/Winter 2006. *Justification*: Initiate wetland enhancement projects that would not be possible without grant funding.

3. Monitor and Control Noxious Weeds

Subbasin planning identified noxious weeds and degradation of native habitats as a limiting factor for many native plant/fish/wildlife species. Priority species such as Salmonids, elk, mule deer and sage grouse all suffer detrimental effects due to exotics. The subsequent invasion of weed species such as cheatgrass, scotch thistle, yellow starthistle, Russian knapweed and several others has degraded a large percentage of the native habitat originally found on the Wildlife Area.

The District Team and CAG have identified the following concerns related to the control of noxious weeds: identify, control and map noxious weeds; identify ecologically sensitive areas and preserve them; give new invasive weed species the highest priority for control efforts; develop good weed baseline data; utilize recreational visitors to identify new weed outbreaks; investigate the use of livestock to control noxious weeds; work in cooperation with neighboring landowners' weed control efforts; and participate in cooperative weed control efforts to manage weeds on a landscape level.

The following Strategies will be implemented as a means to address the issues and concerns expressed by the District Team and CAG. Strategies are identified at a broad landscape level, followed by specific strategies for individual management units.

Regional

A. *Strategy*: Treat weed outbreaks on a minimum of 500 acres per year, per Weed Management Plan, prioritizing efforts using State and local lists identifying those species of greatest concern (See Appendix 2). *Justification*: Reasonable effort to meet legal requirements.

B. *Strategy*: Prioritize weed control efforts by: "A" and "B-designate" list weed species, critical wildlife habitats or plant communities, riparian cover types, trails/access sites/roads, and neighboring boundaries. Timeframe: Annually, Feb. through Oct. <u>All other sites shall be treated as funds and opportunities allow.</u> *Justification*: Reasonable effort to meet legal requirements.

C. *Strategy*: <u>Produce a weed map delineating populations of specific exotic weed species that exist in outbreaks small enough to eradicate.</u> *Justification*: Reasonable effort to meet legal requirements. Stop new infestations while they are easy to control.

D. *Strategy*: Perform systematic, chemical control of large outbreaks of perennial, hard to control noxious weeds. Burn residual growth & treat actively growing weeds. Restore areas to native vegetation to compete against re-infestation. Timeframe: Some aspect of this work is performed year around except the hottest part of summer and coldest part of winter. *Justification*: To meet restoration objectives and legal mandates.

E. *Strategy*: Perform chemical control of perennial noxious weeds as needed within native cover to release native species. Timeframe: Annually, spring and fall. *Justification*: Helps in recovery effort of native habitat.

F. *Strategy:* Order and/or collect and release bio control agents as part of integrated pest management. Current agents being used offer partial control on purple loosestrife, diffuse knapweed, dalmation toadflax, puncturevine, water hemlock and rush skeletonweed. Timeframe: Annually, in the Fall to lock in orders. *Justification*: Reduce the reliance on expensive herbicides and impacts to non-target plant species.

G. *Strategy*: Contract with aerial and ground applicators for weed control projects existing staff cannot perform due to time or equipment constraints. Timeframe: Annually, as needed in spring and fall. *Justification*: Needed to meet objectives.

H. *Strategy*: Annually spot treat roadways and access sites throughout the Wildlife Areas as necessary. Timeframe: Year around, on growing weeds and through soil sterilization in late winter and early spring. *Justification*: Control spread of weeds and incidence of wildfire. *Strategy*: <u>Consider experimental program for using goats to graze Russian knapweed. Monitor results. Expand program if it helps meet management objectives.</u> *Justification*: Reduces the use of herbicides.

I. *Strategy*: Coordinate closely with county weed boards for assistance with weed control issues. Timeframe: Annually, spring through fall. *Justification:* Takes advantage of additional field staff to monitor, locate and control new outbreaks of existing weeds and outbreaks of new weeds (i.e. parrotfeather and yellow flag iris on I-82, or wooly willow herb on Windmill)

HQ/Byron/Ferry Road/Thornton/Windmill/McDonald Bridge Units

A. *Strategy*: Maintain ag leases that stipulate lessees must control noxious/undesirable weeds on the lands under their lease agreements. Monitor for compliance at least **twice annually.** *Justification*: Prevent weed invasion due to farming operations.

B. *Strategy*: Hire 3-month (minimum), Weed Technician to specifically focus on weed issues on the Windmill Ranch and other Franklin Co. lands. Consider pooling funds for a full time weed control technician and share with Columbia Basin WA. Timeframe: Ongoing. *Justification*: Current staff unable to meet all needs. Shared, full time position provides incentive against frequent turnover in staff.

4. Enhance and Protect Endangered, Threatened, and Sensitive Species.

Federal and State listed species receive the highest priority when considering management actions to be employed on the SSWA. Occurrence for many listed species is unknown, and survey methods need to be researched to better understand the limiting factors or possible habitat needs that can be created to enhance populations of these species. Protection of Endangered or Threatened species takes precedence over other management activities.

The District Team and CAG have identified the following concerns related to Endangered Threatened and Sensitive species: conserve and manage for bio-diversity while taking into consideration the needs of T&E species, identify ecologically sensitive areas and preserve them; and rare plant surveys need to be conducted on all areas before grazing is implemented outside of crop residue leases on agricultural lands.

The following Strategies will be implemented as a means to address the issues and concerns expressed by the District Team and CAG. Strategies are identified at a broad landscape level, followed by specific strategies for individual management units.

Thornton Unit

A. *Strategy*: Sage Grouse-Ensure habitat objectives are met to support viable numbers and protect shrub steppe community from fire. Timeframe: Ongoing. *Justification*: Meet recovery objectives.

B. *Strategy*: Ferruginous Hawk- Ensure habitat objectives are met to support viable prey populations and protect sage steppe community from fire. Timeframe: Ongoing. *Justification*: Meet recovery objectives.

Rattlesnake Unit

A. *Strategy*: Sage Grouse- Ensure habitat objectives are met to support viable numbers and protect sage steppe community from fire. Timeframe: Ongoing. *Justification*: Meet recovery objectives.

B. *Strategy:* Ferruginous Hawk- Ensure habitat objectives are met to support viable prey populations and protect sage steppe community from fire. Timeframe: Ongoing. *Justification*: Meet recovery objectives.

All Units

A. *Strategy:* Ensure farming and habitat management activities for waterfowl and upland wildlife do not disturb T&E species and be alert for endangered plants that were historically on the area. (Ute ladies'-tresses, *Spiranthes diluvialis*) Timeframe: Ongoing. *Justification:* Required by BPA and WDFW for proper protection.

5. Improve and Maintain Fish Populations

Chinook salmon, Steelhead and Bull Trout are all federally listed, and WDFW has identified them as Priority Species due to the significant role they play in local economies and ecosystems. These species are often highly sought by anglers, generating substantial fishing and recreation revenues, and attracting citizens to pubic lands. In addition, Salmonids fill important niches in the environment by providing nutrient sources for many aquatic and terrestrial species.

The SSWA management units include shoreline along the Yakima, Walla Walla, Little Walla Walla and Touchet rivers, and Mill Creek. Yakima River shoreline makes up the bulk of this important geographic attribute. Listed fish stocks are found in all these streams so managing for quality riparian habitat and water quality are management priorities.

The following Strategies will be implemented as a means to address the issues and concerns expressed by the District Team and CAG. Strategies are identified at a broad landscape level, followed by specific strategies for individual management units.

Regional

A. *Strategy*: SSWA includes a number of ponds, lakes and several miles of Yakima River and Walla Walla River shoreline. Wildlife Area staff will coordinate with Fish Program staff on fish-related issues that are specific to SSRWA lands. *Justification*: Many of the terrestrial habitat enhancement projects on the SSRWA indirectly or directly benefit fish.

B. Strategy: Maintain/improve riparian vegetation along the Yakima and Walla Walla rivers and tributaries by controlling noxious weeds, protecting from fire, planting native vegetation and minimizing disturbance. Timeframe: Ongoing. *Justification*: Provides shade, lowers water temperature, increases insect production, adds to large woody debris in the stream systems. Also improves habitat for terrestrial species.

HQ and Byron Units

A. *Strategy*: Seek assistance of WDFW engineering department to implement recommended modifications to Giffen Lake as funds become available. *Justification*: Ensure adequate contract administration and quality control of lake improvements to benefit warm water fishery and waterfowl.

B. *Strategy*: Control carp in Giffen Lake and Byron Ponds to improve the quality of water re-entering the Yakima River. *Justification*: Clean water for fish & improve quality of aquatic vegetation for waterfowl reproduction.

C. *Strategy*: Resolve siltation buildup and reverse eutrophication in Giffen and Morgan lakes & Bridgeman Pond to improve warm water fishery. *Justification*: Maintain fisheries and waterfowl programs.
D. *Strategy*: Continue working with the Port of Sunnyside and the City of Grandview to obtain additional water for wetland systems that can be treated naturally in State-owned wetlands before re-entering the Yakima River. Timeframe: Ongoing. *Justification*: Improved water quality for fish and provide waterfowl production and hunting opportunities.
E. *Strategy*: Control beaver populations to reduce turbidity in lakes and wetland systems, resulting from constant damming of water control structures. *Justification*: Maintain appropriate water quality and levels for managed wetland systems.

Thornton Unit

A. *Strategy*: Improve storage capability of seasonal runoff by constructing low elevation rock check structures in canyon bottoms to collect high volume runoff events. Timeframe: Annually, as time permits in late fall through winter. *Justification*: Provide more water in the Yakima River drainage during periods that are critical to fish survival. Also benefits terrestrial wildlife.
B. *Strategy*: Conduct spring developments to supplement water flows in the canyons. Timeframe: Late summer 2006. *Justification*: Provide more water in the Yakima River drainage during periods that are critical to fish survival. Also benefits terrestrial wildlife.

Windmill Ranch Unit

A. *Strategy*: Control carp in Worth Lake, restore warm water and 'put and take' trout fisheries. *Justification*: Maintain/improve fishery.
B. *Strategy*: Manage Powerline & Windmill lakes for better age class of warm water species. *Justification*: Maintain quality fishery.

McDonald Bridge Unit

A. *Strategy*: Work with various entities on planning and funding for dike removal to re-connect river with riparian zone. Start discussions after monitoring effects of Spring 2007 runoff season on prior project. *Justification*: Provides flood relief & broader terrestrial habitat base. Improved instream habitat and reduced water temperatures for anadromous fish stocks.
B. *Strategy:* Enroll maximum shoreline area in CREP. Expand buffer of shrubs, trees, herbaceous vegetation. Timeframe: Late 2006, if eligible. *Justification*: Protect shoreline, soils in fields & maintain a wider riparian zone.

6. Protect Upland Game Bird Habitat

Of the priority upland birds listed as priority species by WDFW, the Ring-necked Pheasant, California Quail and Grey Partridge are most commonly found on the SSWA. As game birds, these species generate hunting and recreation revenues and attract sportmen and recreational users to public lands.

Basic management activities on the SSWA protect and enhance habitat for these species but more could be done with additional funding and staff. The following Strategies will

be implemented as a means to address the issues and concerns expressed by the District Team and CAG. Strategies are identified at a broad landscape level, followed by specific strategies for individual management units.

I-82 Unit

A. *Strategy*: Improve quality of upland grasslands on highly disturbed sites for better quality nesting cover by chemically and mechanically fallowing some of the larger, open, disturbed sites. Requires waiting for adequate seeding conditions, then seed with dryland, native grass/forb/shrub species. *Justification*: Control noxious weeds and provide native dryland habitat.

B. Strategy: Re-locate, map and repair historic winter feeders and resume seasonal filling with small grains. Develop dependable volunteer worker base for this task. *Justification*: Provide expanded food opportunities for upland birds to expand populations where food is the limiting factor. More efficient than scattered, annual food plots. Volunteers save SSRWA staff time.

HQ/Byron Units

A. *Strategy*: Gradually reduce production of alfalfa hay to minimize conflict during the nesting season. Timeline needs to be determined. *Justification*: Protect upland bird nests. Alfalfa hay provides minimal benefits to upland birds/waterfowl and the State's share is no longer significant for winter elk feeding purposes (historical justification).

B. *Strategy*: Maintain small, scattered food plots; replant every other year, controlling noxious weeds in the second year. Maintain 50% of foodplots in new seeding annually to spread out undisturbed food/cover. Timeframe, Annually, spring through early summer. Locate, restore and resume filling of winter feeders in areas that are not farmable. Use volunteers for the latter. *Justification*: Provide additional food & cover to increase bird population & enhance hunting opportunities.

C. *Strategy*: Encourage non-noxious, desirable broadleaf plants where possible for high quality nesting/brood cover. *Justification*: Provides optimal nesting/brood rearing habitat, but is difficult to achieve with the high incidence of broadleaf noxious weeds.

Thornton & Rattlesnake Slope Units

A. *Strategy*: Maintain (check, clean & repair) existing guzzlers on Thornton annually. Replace at least 3 fire-damaged guzzlers on Rattlesnake Slope (use steel for collection structure). Timeframe: Two in 2006; one in 2007. *Justification*: Augmenting free water for wildlife.

B. *Strategy*: Resume filling winter bird feeder on Thornton & add at least one more feeder. *Justification*: Attract & hold additional upland birds on WDFW property.

C. *Strategy:* Enhance existing springs by cleaning out silt to make them more productive, ie provide more open water during the dry season. Start in late summer 2006, then as needed and time permits. *Justification*: Allows constant water flow & more riparian vegetation for wildlife use.

Windmill Ranch Unit

A. *Strategy*: Annually maintain ag lease program, focusing on small grain production. *Justification*: Attract waterfowl and increase upland bird populations for hunting opportunities.

B. *Strategy*: Establish and maintain desirable broadleaf nesting/brood rearing cover in sub-irrigated areas currently comprised of noxious weeds. Mow or burn noxious weeds, spray the re-growth, re-seed with desirable species. *Justification*: Controls weeds and provides upland bird nesting & brood-rearing cover.

C. *Strategy:* Restore degraded shrub steppe habitat. Either direct plant sage seedlings in rangeland, or, do controlled burns and follow up with seeding of multiple shrub-steppe species. *Justification*: Provides nesting and escape cover. Increases mitigation credits.

McDonald Bridge Unit

A. Strategy: Increase buffer width along river & plant native vegetation. Maintain at least 2-3 acres of small grain production annually using ag. lessee to maintain food plots. *Justification*: Provides nesting and escape cover, winter food & shoreline stability. Increases mitigation credits.

7. Protect and Manage Other Species

Federal and state listed species draw significant funding and interest, but the SSWA provides habitat for a wide variety of other species as well. These need to be considered in the wildlife area planning process to both identify and ensure their continued existence. Often presence of a species is unknown, even if sufficient habitat exists, and baseline surveys need to be conducted so that populations or requisite habitat features are not inadvertently lost. As funding allows, inventories of non-game species should be conducted to help define the status and range of these populations, particularly those with a record of historic occurrence.

The following Strategies will be implemented as a means to address the issues and concerns with regard to non-game wildlife. Strategies are identified at a broad landscape level, followed by specific strategies for individual management units.

Regional

A. *Strategy:* Conduct bat inventory on all major management units of the wildlife areas using most appropriate method (ANABAT, mist net, or visual observation) to cause least amount of disturbance. Document all bat species found at any building before removing or destroying the structure. Elicit help from District Bios & ask statewide Bat Team to set up inventory and monitoring program. *Justification*: Determine structures and natural features that need protection for bat use.

B. *Strategy*: Monitor amphibian populations in a representative sample of pond/wetland habitat throughout the wildlife areas. Establish baseline species diversity and population data. Monitor pond/wetland transects three times between March and August. Annually submit data to the Declining Amphibian Population Task Force (DAPTF) database. Suggest statewide Amphibian Team to set up inventory and monitoring program. *Justification*: Determine species presence and management needs for amphibians.

C. *Strategy:* Conduct surveys for neotropical and other non-game bird use on the wildlife areas. Coordinate results with other statewide efforts. *Justification*: Establish long-term indices of population changes, especially in areas of habitat restoration to determine effects.

D. *Strategy:* Conduct herpetological inventory of the wildlife areas by 2008 or sooner. Perform appropriate literature search to find suitable survey methodology. Elicit help from District Bios. Suggest statewide Herp Team to set up inventory & monitoring program. *Justification*: To know where to focus management needs and balance efforts to benefit all species.

E. *Strategy:* Annually maintain a mosaic of early, mid and late successional wetland areas by mowing, burning, intermittent flooding, grazing and/or herbicide application to create diverse wetland habitats that serve multiple species. Research habitat needs of all wetland obligate species that are expected to use management units to determine ideal conditions by site. *Justification*: Maximize species diversity and richness & maximize waterfowl nesting, brood rearing and wintering habitat.

F. *Strategy:* Survey waterfowl use/production annually and adjust habitat management techniques based on survey results. *Justification*: Determine what works and what does not (drives future management activities).

G. *Strategy*: Work with statewide species experts to set up transects for inventory of species using the wildlife area. Prioritize PHS and ESA species. *Justification*: Ensure proper techniques employed.

H. *Strategy*: Work with statewide species experts to set up transects for monitoring species populations and reactions to existing management actions. *Justification*: Make changes as needed through adaptive management.

Agency Objective: Provide sustainable fish and wildlife-related recreational and commercial opportunities compatible with maintaining healthy fish and wildlife populations and habitats. Improve the economic well being of Washington by providing diverse, high-quality recreational and commercial opportunities.

1. Provide Public Access Compatible With Fish, Wildlife and Habitat Protection

Protecting fish, wildlife, and quality habitat is the highest priority of wildlife area management, but there are many opportunities for recreation and public use that improve local economies and are compatible with preservation of the ecological setting. WDFW is committed to providing many recreational opportunities while still maintaining and protecting the needs of plants, fish, wildlife and habitats on these lands.

There are a number of issues on the SSWA that relate to public access, including access for the elderly and disabled, road closures, horseback riding and associated impacts improvements to ponds and lakes for sustained public fishing, management of reserve areas and many more. The following strategies will be implemented as a means to address the issues and concerns expressed by the District Team and CAG. Strategies are identified at a broad landscape level followed by specific strategies for individual management units.

A. *Strategy*: Maintain hunting opportunity for disabled hunters on the HQ Unit (permanent blinds on haystack ponds; pheasant release site on Bottom Rupley). Post areas accordingly, schedule appointments to assure access is available through

locked gates. Explain disabled opportunities to non-affected hunters to avoid conflicts in the field. Timeframe: Ongoing. *Justification*: Enhance disabled opportunities; minimize conflicts with other user groups.

B. *Strategy*: Develop ADA access on the Thornton Unit, from Rothrock Road, to provide deer and elk hunting opportunities. Start process in 2007. Consider limited entry program to assure quality experience. Maintain no vehicle access along Sharp Road annually to minimize disturbance within core habitat (need more help from Enforcement. Meet with ADA reps to consider and plan additional recreational opportunities for persons with disabilities. Timeframe: Late 2006 or early 2007. *Justification*: Meet statewide ADA objectives.

C. *Strategy*: Limit trail access to non-motorized travel such as hiking, biking, or horseback riding to reduce erosion, noise, and disturbance to wildlife. Timeframe: Ongoing, but sporadic. Need more help from Enforcement. *Justification*: Maintain quality recreational experience.

D. *Strategy*: Maintain 5-car limit, Register to Hunt program on the Windmill & Bailie Units. Timeframe: Ongoing, with primary focus during hunting season. *Justification*: Prevent overcrowding, overuse and provide season-long quality hunting experience.

E. *Strategy:* Protect critical habitat areas by allowing no access during vulnerable times. (Snipes Reserve, seasonal closure on Byron). Timeframe: Ongoing, nesting & brood rearing seasons. *Justification*: Allow waterfowl resting areas that hold birds in region. Limit disturbance during the nesting season.

F. *Strategy:* Maintain all current parking areas in presentable, usable condition. Maintain signs to direct/control user group activities. Timeframe: Annually, ongoing. *Justification*: Professional image of public agency.

G. *Strategy:* Maintain fences, gates, etc. to control traffic and access. Timeframe: Ongoing. *Justification*: To maintain orderly hunting opportunities.

2. Provide Commercial Opportunities Compatible With Fish, Wildlife and Habitat Protection

Protecting fish, wildlife, and quality habitat is the highest priority of wildlife area management, but there are many opportunities for recreation and public use that improve local economies and are compatible with preservation of the ecological setting. WDFW is committed to providing many recreational opportunities while still maintaining and protecting the needs of plants, fish, wildlife and habitats on these lands.

There are a few issues on the SSWA that relate to commercial use of the SSWA, assuming they can be incorporated with species and habitat protection: continued and expanded grazing of agricultural crop residues, management of noxious weeds and other natural vegetation through the use of grazing and the use of commercial carp harvesting to improve public fishing and waterfowl production. The following strategies will be implemented as a means to address these issues and related concerns.

HQ, Ferry Road Byron, Windmill, Hope Valley, McDonald Bridge units

A. *Strategy*: Continue agricultural sharecropping of crops to promote food for wintering waterfowl and upland birds. Timeframe: Ongoing. *Justification*: Provides cost effective method of wildlife management.

B. *Strategy*: Work with Fish Management to incorporate commercial harvest of carp from affected wetland systems. Timeframe: Ongoing. *Justification*: Provide commercial opportunity that is compatible with net gain in water quality and waterfowl & fish habitat

C. Strategy: Use project-specific grazing agreements for select habitat projects. Currently ongoing on Windmill Ranch only. Justification: Uses livestock to remove target vegetation, thus saving staff time. Cooperation between WDFW & livestock owners is achieved. Reduces the time cows graze on other public rangeland, timberland or other critical areas.

3. Provide Fish and Wildlife Recreational Opportunities

WDFW has identified many Priority species that contribute significant economic and aesthetic value to the wildlife area system. Ring-necked pheasant, California quail, Mule deer and elk are just a few of the species that are sought by the public on the SSWA. Sportsmen, hikers, campers, photographers and horseback riders can all enjoy the recreational opportunities offered by these species. Hunting of upland game birds and big game species attract sportsmen and recreational users from across the country. Game species generate hunting and recreation revenues that support public lands, and WDFW is committed to providing the public with the numerous opportunities associated with these species.

The following strategies are some that will be implemented on the SSWA as a means to address the issues and concern that arise when the public is invited to use WDFW lands.

Regional

A. *Strategy:* Focus on and prioritize habitat enhancement & restoration projects on all management units to maximize use by fish & wildlife. *Justification*: Helps assure the highest priority projects, with the most wildlife benefits are completed.

B. *Strategy:* Maintain ag leases and focus on small grain production for attracting waterfowl, upland wildlife, sandhill cranes, etc. Timeframe: Ongoing. *Justification*: To meet wildlife needs while providing recreational opportunities such as hunting and watchable wildlife.

C. *Strategy:* Maintain mix of wetland habitats in early and late successional stages to benefit wide array of dependent species for consumptive and non-consumptive use. Timeframe: Ongoing, annually. *Justification*: Increases public opportunities for consumptive and non-consumptive uses.

D. *Strategy:* Continue/increase moist soil management to provide habitat for resident wildlife and food for migrating shorebirds and wintering waterfowl. As time and opportunities arise. *Justification*: Increases public opportunities.

E. *Strategy:* Control undesirable vegetation to protect, enhance and restore native habitat and attract non-hunted species for wildlife viewing. Timeframe: Ongoing, annually. *Justification*: Increases public opportunities. Meets legal weed control obligations.

F. *Strategy:* Improve condition of Giffen Lake, Morgan Lake, Byron Ponds & Worth Lake to maximize fish & wildlife benefits. *Justification*: Increases multiple use recreation by the public.

***G.** Strategy:* Maintain regulated entry program on Windmill & Bailie Units to avoid over-hunting and provide season-long quality hunting. Timeframe: Annually, Sept. through January. *Justification*: Quality hunting opportunities.
***H.** Strategy:* Maintain weapons restriction on the McDonald Bridge unit and portions of the Swegle unit to allow hunting opportunities within highly populated areas. Timeframe: Enforcement regulates September through January. *Justification*: Allow hunting while maintaining public safety.
***I.** Strategy*: Release pen-reared pheasants on selected areas within the HQ and Byron units. Timeframe: Annually, September through December. *Justification*: To provide local hunting opportunities for members of the public that may otherwise lack that opportunity. Provide readily available hunting opportunity for youth and persons with disabilities.

Agency Objective: Minimize adverse interactions between humans and wildlife.

1. Provide Refuge Areas for Wildlife and Reduce Winter Disturbance

The highest priority of wildlife area management is to protect and preserve wildlife and quality wildlife habitat. WDFW is committed to providing many recreational opportunities while still maintaining the requisite needs of wildlife found on these lands.

The SSWA is an important area for wintering waterfowl, and reserve areas have been set aside to provide either no or low disturbance during periods of breeding and migration. Other site-specific regulations have been enacted to reduce pressure on wildlife by the various user groups, while maintaining some level of recreation. The following strategies will be implemented to address some of these issues.

I-82 Unit

***A.** Strategy*: Post dike and maintain signs between ponds 4 & 5 to no entry between April 1 – July 30 to protect nesting and fledging Osprey. Timeframe: Ongoing. *Justification*: Provides greater opportunity for nesting success.

HQ Unit

***A.** Strategy*: Post Snipes Reserve to exclude year around entry to protect wintering and breeding waterfowl. Minimize staff entry during critical times. Timeframe: Ongoing. *Justification*: Improves waterfowl production and holds waterfowl in region for recreation opportunities.

Thornton Unit

***A.** Strategy*: Maintain walk in only access to Sharp Road to provide a security area for elk**.** Monitor periodically on a year around basis for violations. Need more Enforcement presence. *Justification*: Allows more elk to use WDFW property & hopefully fewer elk on private lands (higher elk harvest & less crop damage).

Byron Unit

***A.** Strategy*: Maintain refuge status on the Byron Reserve and seasonal closure on the west half of Byron to protect breeding waterfowl. Timeframe: Ongoing. *Justification*: Allow continued waterfowl production & holds birds in region for hunting opportunities.

Swegle Unit

A. *Strategy*: Maintain Safety Zone status on that portion of the Swegle Unit that lies west of Swegle Road. Timeframe: Ongoing. *Justification*: Public safety and refuge for upland wildlife

All Units

A. *Strategy*: Monitor Boundary Signs. Timeframe: Annually and replace as needed. *Justification*: Identifies WDFW property and reduces incidence of trespass.

2. Implement Strategies to Reduce Elk Damage on Private Lands

Currently, elk only reside on 3 of the SSWA management units. These units are small in comparison to the surrounding agricultural lands where they create damage issues or are likely to do so in the future. There are only a few strategies that can logically be implemented on the Wildlife Area, which will help solve the damage issue.

Thornton Unit

A. *Strategy*: Evaluate the potential of using mineral stations to draw elk away from private land adjacent to the Thornton parcel. Consider on a trial basis and monitor to assure it does not result in more animals on private land. Timeframe: 2006. Justification: Potential to reduce crop damage.

B. *Strategy:* Maintain closure on Sharp Road to limit disturbance and allow elk to fully utilize the unit. Timeframe: Monitor year around for violations of closed status. Justification: Should result in higher elk harvest in the area and therefore reduce crop damage.

C. *Strategy:* Improve existing water sources to create perennial water in late 2006 through 2008, or, evaluate/consider installing artificial watering sources designed for big game. Justification: Enhance big game use. Draw elk off private lands; reduce crop damage.

D. *Strategy*: Consider burning and/or fertilizing CRP grasses to make more palatable, or inter-seeding more palatable species. Timeframe: Recommend in 2006. Justification: Enhance big game use. Attract elk away from surrounding private lands and reduce crop damage.

Windmill Unit

A. *Strategy*: Consider a longer hunting season for a higher elk harvest since this is not an elk management unit. Timeframe: Recommend in 2006. *Justification*: Prevent elk damage to irrigated crops.

Agency Objective: Ensure WDFW activities, programs, facilities and lands are consistent with local, state and federal regulations that protect and recover fish, wildlife and their habitats.

1. Manage Weeds in a Manner Consistent with Local, State, and Federal Regulations

Subbasin planning identified noxious weeds and subsequent degradation of native habitats as a limiting factor for many native plant/fish/wildlife species. The invasion of weed species such as cheatgrass, scotch thistle, rush skeletonweed, yellow starthistle, Canada thistle, perennial pepperweed, dalmation toadflax and Russian and diffuse

knapweed has degraded a large percentage of riparian cover types. Noxious weeds have invaded some of the shrub steppe habitat as well but currently not at the level of other Wildlife Areas. Management units with subirrigated riparian zones, or, that are influenced by irrigation water, all produce excellent growing conditions for perennial noxious weeds. These are generally very competitive and are difficult to control. These areas require constant vigilance. Strategies are limited.

Regionwide

A. *Strategy*: Always follow pesticide label guidelines and restrictions, and control weeds as required by state law. Timeframe: Annually, ongoing. *Justification*: Legal requirement.

B. *Strategy:* Perform noxious weed control within limitations of approved pesticide list. Timeframe: Annually, ongoing. Petition to have other products added to approved list as needed to effectively manage hard to control perennial weeds. *Justification*: New methods needed to control weeds.

2. Manage Species and Habitats in Compliance with ESA and EPA Regulations.

A multifaceted approach has been undertaken to assess strategies proposed for management of the SSWA. This process includes identifying agency goals and objectives, reviewing the purpose for purchasing the area; reviewing existing habitat conditions and species, reviewing mitigation agreements for Columbia and Snake River loss assessments, formation of a Wildlife Area Citizens Advisory Group (CAG) and soliciting input and review from an internal, multi-disciplinary District Team. This plan is part of a statewide planning process to ensure consistency in management and policy implementation. It is one part of the Statewide Wildlife Area Plan, currently under development. The Statewide Plan brings together federal, state and local laws, agency goals and objectives, Commission and agency policies, and other statewide policy guidance in one document that will go out for public review.

Subbasin plans were used in the compilation of the SSWA Plan due to their comprehensive recommendation for landscape level management. Subbasin plans represent the efforts and knowledge of multiple cooperative parties, and include members from Federal, Tribal State and County governments, Conservation Districts, and Landowner groups. As such, the prioritization of resource protection identified in subbasin plans represents an integrated view of regional needs.

Regional planning efforts must consider issues such as weed management on a landscape scale and the need for coordination with public and private landowners; working cooperatively with area tribes concerning protection and management of cultural resources; documenting the use of water rights on state lands; coordinate management activities for T&E species where appropriate, and survey for rare plants within native plant communities before grazing is implemented.

Regionwide

A. *Strategy*: Work with statewide experts to set up sampling transects for plant & wildlife inventory on all wildlife area units. *Justification*: Determine needs in these areas.

B. *Strategy*: Identify and protect priority species and habitats as indicated in the Yakima Subbasin plan. (Appendix 10) *Justification*: Helps maintain a healthy and functioning ecosystem.

3. Provide Fire Management on WDFW Lands

The SSWA is unique in that it is made up of many, relatively small management units that are scattered over a wide area. Under severe fire conditions, a wild fire could burn completely through a single management unit before anyone arrives on the scene. Therefore, it is important to coordinate with local fire districts and assure reasonable access is available to these lands to mitigate potential fire damage. Some of the strategies for fire management are listed below:

Regionwide & All Management Units

A. *Strategy*: Create a Fire Management Plan (**Appendix 3**) identified in regional planning efforts, assess risk areas, and prioritize protection needs. Timeframe: Ongoing. *Justification*: Quick response and allows for greatest fire protection needs.

B. *Strategy*: Maintain and update contacts with local fire districts for fire reporting & suppression efforts. Maintain fire-fighting contracts where needed to assure timely response to wildfire. Timeframe: Ongoing. *Justification*: Professional & cost effective measure.

C. Strategy: Maintain fire breaks where reasonable to protect habitat from wildfire. Timeframe: Annually, sterilization in early spring; mow road centers in early summer. *Justification*: Prevents wildfire spread while minimizing habitat disturbance.

4. Protect Cultural Resources Consistent with State and Federal Law

Once lost, cultural and historic resources are irreplaceable, and WDFW is committed to making every effort to provide protection for any known sites located on WDFW lands. All Sunnyside and Snake River lands receive federal funding and the prerequisite was general cultural resource surveys. A follow up strategy calls for site-specific inspections wherever ground-disturbing work is performed.

Region Wide

A. *Strategy*: Contract for cultural resources survey at least 6 months in advance for any proposed ground disturbance activity. Provide maps, lead site visits, etc. for contractors. Timeframe: Annually, place request September 15 for following year. *Justification*: Prevents destruction of cultural resources.

5. Pay PILT and Assessment Obligations

These fees are paid in Olympia and are not directly dealt with in normal management and operation of the wildlife areas. PILT (payment in lieu of taxes) is similar in nature to property tax but is calculated differently. The assessment rate is sometimes higher than normal property tax rates. The individual counties choose whether to receive PILT payments **or** the alternative, a percentage of fines and forfeitures that are generated by citations issued by WDFW Enforcement personnel.

The SSWA includes management units in 4 counties. Currently, PILT is only paid in Yakima County. Fines and forfeitures are collected in Benton, Franklin and Walla Walla counties. Agricultural leases on WDFW land in the latter 3 counties are assessed a Leasehold Excise Tax (LET) on the value of the lease. Agricultural leases generated in Yakima County are exempt from LET.

Other assessments on WDFW lands are also paid. These include, but are not limited to, irrigation, fire protection, weed control, storm water control, mosquito control and other services provided by lake management districts and conservation districts. In some cases, when WDFW property falls outside of a specific fire district or fire protection zone, a separate fire protection agreement may be generated.

Agency Objective: Work with Tribal governments to ensure fish and wildlife management objectives are achieved.

1. Discuss Mutual Concerns for Wildlife Resources with Tribal Representatives

Because plant and wildlife populations and their requisite resources extend beyond individual subbasins or socio-political jurisdictions, a system of cooperative management must include participation by all affected agencies and land managers. Resource planning efforts should include members from Federal, Tribal, State and County governments, Conservation Districts, and Landowner groups.

The District Team and CAG have identified the following concerns and issues related to the protection of wildlife and fisheries resources: Work cooperatively with area tribes concerning protection and management of cultural resources; Work with tribal governments to ensure management objectives of fish and wildlife are achieved while providing opportunities for treaty right harvest; Protect tribal treaty rights and consider traditional hunting and gathering sites.

The following strategies will be implemented as a means to address the issues and concerns expressed by the District Team and CAG. Strategies are identified at a broad landscape level.

Region wide

A. *Strategy*: Maintain communication with the Yakama Nation Wildlife and Fisheries Programs to assure management consistency on both sides of the Yakima River. *Justification*: Assures complementary management activities within larger portion of the subbasin.

B. *Strategy*: Assist with waterfowl banding activities along the Yakima River corridor with tribal biologists. Timeframe: As needed and time permits, early summer. *Justification*: Meet waterfowl flyway objectives.

C. *Strategy*: Coordinate NAWCA grant opportunities between WDFW, USFWS and YN to enhance waterfowl habitat in the Lower Yakima Valley. Timeframe: Ongoing, Summer 2006 through Fall 2008. *Justification*: Ensures wetland projects are prioritized and integrated.

Agency Objective: Connect with those interested in Washington's fish and wildlife.

1. Offer Volunteer Projects to Involve the Public in Wildlife Area Efforts

WDFW makes a concerted effort to preserve and protect fish, wildlife and plant communities, while still offering diverse opportunities for the public to encounter, utilize, and appreciate wildlife and wild areas.

The use of volunteers serves several purposes. It gives user groups a more clear understanding of the work that is performed on the Wildlife Areas and of some of the management challenges involved in that work. It gives user groups a feeling of ownership of the resource, especially when they contribute to a specific habitat improvement project. Lastly, WDFW and the resource benefit from an enhancement project that may not have been completed without the help of volunteers.

Region wide

A. *Strategy*: Recruit volunteers for habitat improvement projects such as fencing, planting, refuse cleanup, etc. *Justification*: Cost effective measure & builds public support.

B. *Strategy*: Recruit volunteers to remove old fence sections. *Justification*: Cost effective measure.

C. *Strategy*: Create local bird species list and make available to public. Encourage public to participate in visiting Wildlife Areas and adding new species. *Justification*: Increases non-consumptive wildlife viewing opportunities.

2. Participate in Local Cooperative Projects

Protecting fish, wildlife and quality habitat is the highest priority of wildlife area management, but many management issues occur on a landscape level. Because plant and wildlife populations and their requisite resources extend beyond individual subbasins or socio-political jurisdictions, a system of cooperative management must include participation by all affected agencies and land mangers.

Working cooperatively with neighboring landowners on noxious weed control, elk damage, fire management and trespass issues are extremely important in reaching mutual goals.

Region wide

A. *Strategy*: Participate and cooperate with local weed control districts on cooperative weed control efforts. Timeframe: Annually, ongoing. *Justification*: Ensures proper weed control efforts are being met. Helps identify new outbreaks.

B. *Strategy*: Work with neighboring landowners on cooperative projects to control wildfire and elk damage. Timeframe: Ongoing, annually. *Justification*: Coordination leads to overall greater success & achievement

3. Be Responsive to Public Concerns

WDFW is entrusted with the management of State-owned lands and the preservation of the natural resources associated with those properties. As a steward of the land, the Department is dedicated to protecting, restoring and perpetuating healthy ecosystems throughout the State while fostering an attitude of partnership with the community.

A number of issues have been identified that relate to WDFW's responsiveness to local concerns: Consider neighboring landowners' (private and public) weed control plans; work cooperatively with area tribes concerning protection and management of cultural resources; keep County Commissioners advised of the management planning process; coordinate fire protection activities; use local sportsmen or conservation group volunteers for Wildlife Area projects; provide field trip opportunities for local schools; make considerations for elderly or disabled hunters; explain reasons for road closures to the public by posting appropriate signs; establish more grazing permits on state lands where applicable; work with neighboring landowners to reduce elk depredation on crops; consider effects to the local economy when making management decisions.

Region wide

A. *Strategy*: Respond to local agencies or landowners' reports of new weed sightings within 2 weeks, either by treatment or explanation of when treatment may occur. Timeframe: Annually, as response is needed. *Justification*: Ensures WDFW is meeting statewide objectives.

B. *Strategy*: Make and take opportunities to coordinate with the multiple user groups that have an interest in management of state lands. Timeframe: Ongoing. *Justification*: Open door policy

HQ, Byron and Windmill Ranch Units

A. *Strategy:* Work closely with Mosquito Control Districts in Benton and Franklin Counties. Timeframe: Annually, Spring through late Fall. *Justification*: Allows for control of mosquitoes within WDFW-managed wetlands, while providing checks and balances against wholesale insect control, and harm to the wildlife that feed on them. Also, it assures coordination takes place prior to the release of Gambusia fish for mosquito control.

Agency objective: Provide sound operational management of WDFW lands, facilities and access sites.

1. Develop, and Annually Update a Management Plan for the Sunnyside/Snake River Complex

A comprehensive plan provides a vision for the current and future management of State lands. Updating the plan allows for continued input and adaptive management as issues and conditions change over time.

Region wide

A. *Strategy*: Address local concerns and management issues identified by a Citizen Advisory Group and past planning documents. Timeframe: Annually, mid-Summer. *Justification*: Ensures public input.

B. *Strategy*: Have a draft plan in place by April 30, 2006. *Justification*: Allows timely management objectives to be met.

2. Monitor All Grazing & Agricultural Leases to Ensure Proper Land Use.

Protecting fish, wildlife and quality native habitat is the heist priority of wildlife area management. However, there are many opportunities for recreation and pubic use that improve local economies in a manner that is compatible with landscape preservation.

Grazing is an historic land use practice that, when properly applied, can benefit wildlife. Agricultural leases can result in crops that benefit farmland wildlife and migratory waterfowl, while adding benefits to the local economy.

HQ, Byron, Ferry Road, HopeValley, Thornton, Windmill, McDonald Bridge Units

A. *Strategy*: Spend more time in the field instead of the office, monitoring land use. *Justification*: Professional development. Maintain intimacy with habitat units for a more proactive management approach.

3. Maintain Roads and Trails as Necessary to Perform Management Functions

The highest priority of wildlife area management is to protect and preserve wildlife and quality wildlife habitat. Often this limits recreational use due to detrimental impacts to fish, plants, wildlife or their habitats. WDFW is committed to providing many recreational opportunities while still maintaining the requisite needs of native species found on these lands.

The District Team and CAG have identified the following concerns related to maintenance of roads and trails: identify ecologically sensitive area and protect hem; explain reasons for road closure and affected resources by posting informational signs; maintain trailheads & allow space for horse trailers; consider ADA access by "permit only" on select road closures; maintain adequate road system for fire control and habitat management purposes.

Thornton Unit

A. *Strategy*: Allow minimal "authorized vehicle use only" along Sharp Road, as required by wildlife area maintenance needs. Timeframe: Year around. *Justification*: Allows habitat restoration, greater wildlife use and decreased vandalism.

B. *Strategy:* Maintain Sharp road and select internal roads for access by project personnel, fire fighting teams, etc. Timeframe: Year around with focus on early Summer. *Justification*: Maintain management needs.

C. *Strategy*: Provide and maintain public access via Rothrock and Case road access/parking sites. (exception for ADA hunters; see Agency Objective Provide sustainable fish and wildlife-related recreational and commercial opportunities compatible with maintaining healthy fish and wildlife populations and habitats. Improve the economic well being of Washington by providing diverse, high-quality recreational and commercial opportunities. Sub-objective 1.). Allow minimal "authorized vehicle use only" as required by wildlife area maintenance needs. Timeframe: Ongoing. *Justification*: Prevents overcrowding of hunters and may increase wildlife use.

All Other Management Units

A. *Strategy*: Manage all existing internal roads for access by project personnel. Annually, as time permits and soil moisture allows for grading. Weed control/mowing as needed. *Justification*: To conduct necessary management activities. Adequate access reduces travel time when conducting management activities.

B. *Strategy*: Assess all roads on all units and determine the minimum needed for access & management. *Justification*: Provide reasonable public access & maximize management efficiency, while minimizing disturbance.
C. *Strategy*: Decommission those that are unnecessary and restore to native habitat. *Justification*: Limits wildlife disturbance.

4. Maintain a Knowledgeable and Well-Trained Work Force
WDFW strives to utilize appropriate and current methodologies when implementing management activities. Training of WDFW staff often reflects the issues and concerns that have arisen in the past, and the Department continues to provide training as it is deemed necessary to maintain worker safety, requisite skill levels, or resource protection.

A staff comprised of well trained, adequately compensated, full time employees is an important criteria of a well managed wildlife area. A stable staff maintains corporate knowledge of the area and is familiar with the intimate details of the land which is important for efficiency in operation.

Region wide (Sunnyside W.A. Staff)

A. *Strategy*: Provide Manager and Assistant Manager with fire training. Red card training for manager in May 2006. Red card refresher for asst. mgr. In May 2006. Refresher training for both annually. *Justification*: Meet WDFW policy objectives.
B. *Strategy*: Send employees with herbicide applicators licenses to recertification workshops. Timeframe: Annually, January/February. *Justification*: Legal requirement.
C. *Strategy*: Have all staff attend First Aid training annually, when offered at nearby location. *Justification*: Meets WDFW policy.
D. *Strategy*: Other training – Professional level (Manager) as opportunity and need arises. *Justification*: To stay up to date on current management issues/ideas/research.
E. *Strategy*: Conduct a reclassification of the Habitat Technician job class series. Completed in May 2006. *Justification*: to improve status/pay level to attract and maintain qualified personnel.
F. *Strategy:* Maintain CDL licenses for manager and assistant manager (minimum staff requirement). Physical exam required every 2 years plus random drug & alcohol testing (4 potential tests per year). *Justification*: legally required to haul equipment & necessary for efficient operations.

5. Maintain or Remove Facilities, Outbuildings and Structures
Many structures, statewide, have reached or exceeded their useful life and have become safety hazards for wildlife area staff and/or the general public.

Region wide

A. *Strategy*: Remove those buildings indicated as unstable or unnecessary in the WDFW wildlife area building assessment. Perform surveys for any resident wildlife (i.e. bats) before removing any structure. Timeframe: Mid to late 2006. *Justification*: Safety and cost effective measure.

Sunnyside HQ Unit

A. *Strategy*: Continue discussions about the need to maintain the current on-site residence that can be used to improve security and reduce theft at the headquarters and surrounding area. Timeframe: Annually, periodic upkeep of house. *Justification*: Provide Security at HQ facility; reduce theft at HQ and surrounding area.

B. *Strategy*: Improve existing shop building to accommodate equipment and maintenance projects during the winter months, while maintaining efficient heating system. *Justification*: Improves working conditions. Increases the ability of WA staff to perform winter equipment maintenance & repair and fabrication projects.

C. *Strategy*: Assess condition of remaining buildings. Timeframe: Ongoing. *Justification*: Determines need for improvement or demolition.

Thornton Unit

A. *Strategy*: Monitor condition of granary for historical needs. Take appropriate action when condition becomes unsafe. Timeframe: Ongoing. *Justification*: Safety and historical issue.

Windmill Unit

A. *Strategy*: Demolish old home. Timeframe: Mid to late 2006. *Justification*: Safety issue.

B. *Strategy*: Repair basic structure of barn, equipment shed & storage area to prolong usable life. *Justification*: Continue storage needs.

6. Other Issues or Concerns

There are too many units, with too many issues, scattered over too large of an area for the current staff to manage this wildlife area effectively. Management success on the Sunnyside/Snake River Wildlife Area complex will be measured against the strategies identified in Section 3 of the plan and the following performance measure for 2006. The proposal to manage Bureau of Reclamation Lands in Franklin County should not be undertaken without additional staffing. A full time biologist position is needed on the west end of the project to assist with fieldwork so the manager can better monitor operations and perform the ever increasing level of administrative tasks.

CHAPTER IV. PERFORMANCE MEASURES, EVALUATION AND UPDATES OF THE SUNNYSIDE/SNAKE RIVER WILDLIFE AREA PLAN

Wildlife Area Plan performance measures are listed below. Accomplishments and desired outcomes will be monitored and evaluated to produce an annual performance report. The wildlife area plan is a working document that will evolve as habitat and species conditions change, as new regulations are enacted and as public issues and concerns change. Plan updates will address these changes.

1. Sunnyside/Snake River Wildlife Area Performance Measure in 2006 includes:

- Renew and incorporate changes to agricultural leases, annually and as terms expire, on Windmill, McDonald Bridge, Thornton, Hope Valley, Ferry Road, Byron and HQ units. Research complete cost information for irrigation and power on the HQ unit in preparation for changing from sharecrop to cash rent agreement.
- Reseed 16 acres of degraded shrub steppe habitat on Rattlesnake Slope; monitor weed status closely; arrange for weed control as needed.
- Reseed 20 acres of degraded herbaceous floodplain habitat on the HQ and Byron units and perform follow up weed control.
- Remove 10-15 acres of Russian olives on Byron with rented excavator, clean up debris with dozer/brush rake, control weeds/resprouts for future restoration.
- Perform weed control on a minimum of 500 combined acres on all management units, using a variety of state-owned equipment, plus contracted ground rig and aerial applicators. Train new weed tech for Franklin Co..
- Maintain previously restored shrub and herbaceous habitat (weed control, mowing, etc.) on HQ, Vance, Byron, Windmill, Hope Valley, Nipper, McDonald Bridge, Swegle Road units.
- Maintain 130 acres of moist soil management units on the HQ unit, 10 acres on Windmill. Includes frequent monitoring of water control structures, pumps, etc..
- Maintain minimum of 5 miles of boundary fences annually (many more miles of fence exists, but no staff to inventory or check)
- Maintain all shop/office/storage facilities on a weekly/monthly basis
- Install and/or maintain signs, kiosks, etc..as time permits throughout the year.
- Perform myriad of currently assigned administrative duties & new assignments that are deemed higher priority.
- Maintain project equipment on a scheduled basis. Repair on an as-needed basis.
- Outreach & Education; Coordination with CAG, Tribes, other agencies. Lead school field trips as requested and as time permits.
- Conduct controlled burns as needed for habitat restoration projects, obtain burn permits from county clean air authorities or DOE; provide status reports as required.
- Develop alternative water sources where needed; 3 rock checks + one spring development on Thornton, 2 guzzler replacements on Rattlesnake Slope.
- Coordinate with research staff to collect HEP and species population data. SSWA staff will only provide assistance as time permits.
- Monitor for presence of sage grouse on Thornton and Rattlesnake Slope. Run 2 routes, plus periodic monitoring as other work is performed during the course of the year.

- Monitor public use throughout the year with emphasis during hunting seasons. Assist Private Lands Biologist with managing Register to Hunt program on Windmill and the Bailie Youth Ranch.
- Use NAWCA grant funding to enhance wetland habitat on HQ & Byron. This will be a 2 year effort if grant is approved. Will require coordination with multiple partners.
- Continue working with the Port of Sunnyside and the City of Grandview to obtain excess water for further enhancement of project wetlands.
- Monitor for and resolve trespass issues. Cattle on HQ and I-82 units are most prevalent problem.
- Coordinate with private landowners adjacent to Thornton and Rattlesnake Slope units on elk damage and hunter trespass issues. Monitor elk hunters during expected high use periods to inform them of state property boundaries and minimize trespass issues.
- Monitor and maintain assigned access areas. SSRWA staff manages the access areas where the bulk of the habitat restoration/management work is being performed. Access area personnel manage the more remote sites. Maintain full and complete informational sign program on all sites.
- Monitor shrub plots on Windmill periodically to assure ag lessee is watering as needed.
- Monitor grazing permit on Windmill weekly while cattle are present
- Plant and maintain 6 food plots on HQ unit & 2 on Windmill
- Work out logistics of pooling funds to establish a full-time, shared weed technician with the Columbia Basin Wildlife Area.
- Monitor for endangered plants (Ute ladies'-tresses *Spiranthes diluvialis)* in areas of habitat restoration activity.
- Monitor listed wildlife that use the SSWA and assure our activities do not impact that use.
- Coordinate with ADA representatives to consider additional options for disabled access on the Wildlife Area
- Monitor closed road areas on all units for illegal entry at least monthly; more often if time allows.
- Continue coordinating with Benton and Franklin County Mosquito Control districts on their control efforts/activities on the SSRWA. Post signs describing West Nile Virus potential.
- Produce quarterly BPA reports in Pisces. Develop Statement of Work and associated budget for FY 2007.
- Coordinate fire line discing on Rattlesnake Slope with Benton Co. Fire Control District #2. Mow select internal roads on HQ, Thornton, Windmill once after growing season ends to remove fuels and reduce incidence of fire.
- Coordinate with BPA contract archaeologist for cultural resource review at all restoration sites prior to ground disturbance.
- Coordinate with Tri Cities Shooting Association on issues of mutual concern such as wild fire, weed control, trespass, off-road vehicle use.
- Attend mandatory red card fire training and annual refresher.
- Attend annual pesticide classes to maintain pesticide licenses.

- Attend annual first aid refresher training
- Attend annual mandatory hearing test
- Attend other meetings as directed

2. Annual Evaluation of Performance.
Evaluate performance measures and produce an annual report. At the beginning of each calendar year, the manager will convene the CAG and district team to assess wildlife area specific performance measures and accomplishments that will be used to develop the annual plan update.

3. Annual Plan Update.
As projects are completed and new issues arise, this plan will be updated, without needing to be re-written. With CAG and District Team input, the plan will continually reflect the strategies, goals and objectives of the current year.

APPENDIX 1. PUBLIC ISSUES

Citizens Advisory Group (CAG) and District Team (DT) Issues and Concerns
Sunnyside/Snake River Wildlife Area Complex
June 2005 & April 2006

The purpose of meeting with the CAG and DT was to obtain input to help guide management actions on the wildlife area. A draft of the introduction and history of the wildlife area and copies of the Agency's goals and objectives were distributed for review and discussion. Below is a list of issues and concerns identified by the CAG and DT.
This input will assist in developing strategies to implement management goals and objectives. Underlined statements below indicate that the input was received from the DT. Issues that are not underlined originated from the CAG.

Issue A. Access/Recreation

Rattlesnake Slope:

1) The Horse folks want to pick up scattered wire and fill in the old valve boxers from the original drip line system. Those are high priorities for safety. They also want to install "Pack it in, Pack it out" signs on Thornton and Rattlesnake Slope.
2) The parking lot on Rattlesnake Slope needs improving for horse trailers. DOT fixed that problem for us. That is not an issue now.
3) Someone raised the question about having a place to shoot trap and skeet on the area. Deferred to the shooting facility next door.

Whitstran:

1) Suggestion that WDFW needs to secure assured access if the Irrigation District closes off public access along Chandler Canal.
2) Suggestion that the Fish Program should be tapped for funds to manage all fishing access sites.

Walla Walla Public Fishing Areas:

1) Question of who takes care of the parking lot. The manager or the access maintenance staff?
2) Person suggested the Adopt-A-Site proposal. Question about the management of surrounding lands outside the access site.
3) Person suggested closing the access site to minimize vandalism and garbage dumping. Still leaves the question of managing the surrounding lands

Issue B. Wildlife Area Management

General:

1) Would like to see the operating budgets in the plan.

Byron Unit:

1) A portion of Byron has been fenced off by the City of Grandview as part of their property. A survey may need to be performed to correct this issue.
2) Do springs feed the Byron pond units?

Issue C. Habitat

Sunnyside HQ Unit

1) Need to establish water flow through Giffin and Morgan Lakes to control lily pads to enhance waterfowl production. Reconnect to Yakima River.

Byron Ponds

1) Tule and purple loose strife growth has increased since 1980's. When was cattle grazing discontinued?

Issue D. Roads

General:

1) Can more internal roads be made available for persons with disabilities?

Issue E. Enforcement

No comments received

Issue F. Public Information, Education and Involvement

General:

1) Use more volunteer help

Issue G. Monitor, Survey and Inventory

General:

1) Use Audubon to run bird surveys

Issue H. Other

No comments received

APPENDIX 2. SUNNYSIDE WILDLIFE AREA WEED MANAGEMENT PLAN

Weed Control Goals on WDFW Lands

The goal of weed control on Department lands is to maintain and improve the habitat for wildlife, meet legal obligations, provide good stewardship and protect adjacent private lands.

Weed control activities and restoration projects that protect and enhance fish and wildlife populations and their habitats on Department lands are a high priority. When managing for specific wildlife species on our lands the weed densities that trigger control are sometimes different than on lands managed for other purposes (e.g. agricultural, etc.). For example, if a weed is present at low densities and does not diminish the overall habitat value, nor pose an immediate threat to adjacent lands, control may not be warranted. WDFW focuses land management activities for the desired plant species and communities, rather than simply eliminating weeds.

Control for certain, listed species is mandated by state law (RCW 17.10 and 17.26) and enforced by the County Noxious Weed Board. WDFW will strive to meet its legal obligation to control noxious weeds listed according to state law (Class A, Class B, Class C, and county listed weeds). The Sunnyside/Snake River Wildlife Area lands lie within the jurisdiction of four different Weed Boards / Weed Districts. Class A weeds will receive the highest priority for complete elimination. Class B weeds will be controlled to the best degree possible within budget constraints. Class C weeds will be controlled if they interfere with management goals or cause other unacceptable problems.

WDFW will continue to be a good neighbor and partner regarding weed control issues on adjacent lands. Weeds do not respect property boundaries. The agency believes the best way to gain long-term control is to work cooperatively on a regional scale. As funding and mutual management objectives allow, WDFW will work to find solutions to collective weed control problems.

Weed Management Approach

State law (RCW 17.15) requires that WDFW use integrated pest management (IPM), defined as a coordinated decision-making and action process that uses the most appropriate pest control methods and strategy in an environmentally and economically sound manner to meet agency programmatic pest management objectives, to accomplish weed control. The elements of IPM include:

Prevention- Prevention programs are implemented to keep the management area free of species that are not yet established but which are known to be pests elsewhere.

Monitoring- Monitoring is necessary to implement prevention and to document the weed species, the distribution and the relative density on the management area.

Prioritizing- Prioritizing weed control is based on many factors such as monitoring data, the invasiveness of the species, management objectives for the infested area, the value of invaded habitat, the feasibility of control, the legal status of the weed, past control efforts, and available budget.

Treatment- Treatment of a weeds using biological, cultural, mechanical, and chemical control serves to eradicate pioneering infestations, reduce established weed populations below densities

that impact management objectives for the site, or otherwise diminish their impacts. The method used for control considers human health, ecological impact, feasibility, and cost-effectiveness.

Adaptive Management- Adaptive management evaluates the effects and efficacy of weed treatments and makes adjustments to improve the desired outcome for the management area.

The premise behind a weed management plan is that a structured, logical approach to weed management, based on the best available information, is cheaper and more effective than an ad-hoc approach where one only deals with weed problems as they arise. However, even the best weed management plan is rendered ineffective if there is not enough trained staff available to implement it.

Weed Species of Concern on the Sunnyside/Snake River WA

Canada thistle (*Cirsium arvense L.*), Dalmatian toadflax (*Linaria dalmatica ssp.dalmatica L.*), Houndstongue (*Cynoglossum officinale*), Perennial pepperweed (*Lepidium latifolium L.),* Scotch thistle (*Onopordum acanthium L.),* Yellow starthistle (*Centaurea solstitialis L.*), Rush skeletonweed (*Chondrilla juncea L.),* Purple loosestrife (*Lythrum salicaria L.),* Bristly foxtail (*Setaria verticillata L.*), Puncturevine (*Tribulus terrestris L.),* Longspine sandbur (*Cenchrus longispinus L.*), Saltcedar (*Tamarisk ramosissima L.),* Phragmites (*Phragmites australis L.),* Yellow flag iris (*Iris pseudacorus L.*), Hairy willow-herb (*Epilobium hirsutum L.),* Kochia (*Kochia scoparia L.),* Common cocklebur (*Xanthium strumarium L.*), Wild oat (*Avena fatua L.*), Russian olive (*Elaeagnus angustifolia L.),* Downy brome (*Bromus tectorum L.*), Russian knapweed (*Acroptilon repens L.),* and Diffuse knapweed (*Centaurea diffusa L.)*

Table 1. Sunnyside Wildlife Area complex weeds including the state and county 2005 weed class listing and acres treated.

Weed Species	State Weed Class	Yakima County Weed Class	Benton County Weed Class	Franklin County Weed Class	Walla Walla County Weed Class	Wildlife Area Unit(s)	2005 Treated Acres
Canada Thistle	C	C	C	C	C	Most	43
Dalmatian Toadflax	B	B	B	B	B	I-82	4
Houndstongue	B	B	B	B	B	I-82	4
Perrenial Pepperweed	B	B			B	HQ	Rest.
Scotch Thistle	B	B	B	B	B	I-82/Windmill	Spot
Yellowstar Thistle	B	B-Designate	B	B	B	Walla2/Windmill	3
Rush Skeletonweed	B	B-Designate	B-Designate	B	B	Rattle S./Windmill	Secondary
Purple Loosestrife		B-Designate	B-Designate	B	B-Designate	I-82, HQ, Byron, Windmill, Nipper	YCWB + 20 by SWA staff
Bristly Foxtail						Windmill	13
Puncturevine		B		T/E		Most	5
Longspine Sandbur	B	B		T/E	B	HQ/Windmill	5
Salt Cedar	B	B-Designate			B	Windmill	Spot
Phragmites						HQ/Windmill	3
Yellow Flag Iris		C	C		C	I-82	Test plots
Hairy Willowherb		C	C			Windmill	0
Kochia	B	B				Most	20
Common Cocklebur						HQ/Windmill	10
Wild Oat						Monitoring All	Rest
Russian Olive						Most	10-15
Downy Brome						Most	Rest
Russian Knapweed	B	B	B	Not listed		I-82, Byron, HQ	100
Diffuse Knapweed	B	B	B	B		I-82, R. Slope, Thornton, Windmill, McDonald	100

B-Designate are state-listed and mandatory for control to prevent seed production/spread.
Rest (Restoration projects only) Contol only effective through restoration efforts.
Spot (Spot treatment only)
Secondary treatment is during other weed control measures.
YCWB (Yakima County Weed Board) conducts this control effort.
T/E (Transition/Education)

Management and control recommendations for individual weed species can be found in the following sections, as follows:

CANADA THISTLE

Scientific name: *Cirsium arvense L.* **Common name:** Canada thistle
Updated: 2006

DESCRIPTION: Canada thistle is a perennial herb with a deep-seated complex system of roots spreading horizontally which give rise to aerial shoots. The one to four foot tall stems are slender, green, and freely branched. The leaves are alternate, sessile, and deeply lobed. The leaf margins have stiff yellowish spines. The heads are many and relatively small. The plants are dioecious (all flowers on a plant are either male or female). The flowers are purple. The fruits are about 1/8 inch long, somewhat flattened, and brownish with an apical circle of long hairs, these eventually falling. Four varieties of Canada thistle have been recognized based on variation in leaf characters, texture, vestiture, segmentation, and spinyness. The weed is an effective competitor for light, moisture, and nutrients and it thus able to reduce crop yields.
Canada thistle also serves as an alternate host for insects and pathogenic microorganisms that attack various crops. Canada thistle can grow on a wide variety of soil types: clay loam, sandy loam, sandy clay, and sand dunes. It does poorly on wet soils without much aeration. Canada thistle is found in almost every plant community disturbed by man. It is common to roadsides, railway embankments, lawns, gardens, abandoned fields, sand dunes, agricultural fields, margins of forests, and waterways. It grows poorly in shaded conditions and produces few flowers. Since Canada thistle is dioecious, it is mainly insect pollinated. Many insect visitors have been reported. The average seed production is about 1,530 seeds per plant, but exceptional plants may produce up to 5,300 seeds. The mechanism for long distance seed dispersal is not known. Possible means of seed transport are irrigation water and wind transport. Studies have shown that freshly collected seeds had germination rates of up to 95 percent. Different ecotypes of this species have different germination rates. Two-year-old seeds had a 38-71 percent germination rate. The seedlings of Canada thistle develop a fibrous taproot, and within a few months, the main root thickens and develops lateral roots. After growing 6-12 cm, the horizontal roots bend downwards, growing towards the water table. A new horizontal root develops at this point of bending and continues the horizontal spread. Aerial shoots develop from the original vertical root or from buds on the arching branches of the horizontal system. Canada thistle is a state -listed class C weed.

MANAGEMENT INFORMATION:
Cultivation is not a viable option as the weedy nature of this plant is also due to the ability of the root to regenerate from small pieces. Root fragments as small as 3 to 6 mm thick and 8 mm in length have been found to produce shoots about 15 percent of the time. Fragments of 12.5 mm produce shoots 100 percent of the time. Herbicides can be an effective tool for control. Several biological control agents have been released but the most promising has been *Larinus planus.*

CURRENT DISTRIBUTION
Canada thistle can be found on every unit on the Sunnyside/Snake River Wildlife Area (SSRWA) except the Rattlesnake Slope unit.

ACRES AFFECTED BY WEED: ~ 1,000 **WEED DENSITY:** Low to High

GOALS
Control expanding populations

Prevent new occurrences
Add to bio control distribution

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by Canada thistle
Release biological agents
Treat priority infestations before they produce seed
Survey nearby units for pioneering infestations

ACTIONS PLANNED
In 2006, WDFW crews, ground contractors, and an aerial contractor will treat priority areas.

Monitoring will continue on an annual basis on nearby units.

CONTROL SUMMARY AND TREND
2002 - Approximately 30 acres were treated
2003 - Approximately 40 acres were treated
2004 – Approximately 50 acres were treated
2005 – Approximately 50 acres were treated

REFERENCES:
Moore, R.J. 1975. The Biology of Canadian Weeds. 13. *Cirsium arvense* L. Scop. Can J. Plant Sci. 55: 1033-1048.

DALMATIAN TOADFLAX

Scientific name: *Linaria dalmatica ssp. Dalmatica* **Common name:** Dalmatian toadflax
Updated: 2006

DESCRIPTION: *Dalmatian toadflax is an erect, short-lived, perennial herb, 0.8 to 1.5 m tall. Dalmatian toadflax is a perennial species that spreads by horizontal or creeping rootstocks and by seed. A mature plant can produce up to 500,000 seeds, which are primarily dispersed by wind. The seeds may live up to ten years in the soil (Robocker 1974; Morishita 1991). Most seedlings emerge in the spring when soil temperature reaches 8° C at 2.5 cm. Germination in the fall is probably limited by soil water content, as well as possibly seed dormancy with the average life span of a plant being three years (Robocker 1974).*
Mature Dalmatian toadflax plants are strongly competitive. Studies indicate that plots without Dalmatian toadflax may produce two and a half times as much grass as plots with toadflax (Robocker 1974). Mature plants are especially competitive with shallow-rooted perennials and winter annuals. Because of its competitive ability, Dalmatian toadflax is a concern in pasture and rangelands, as well as in natural areas, where it may out-compete more desirable, native species. Dalmatian toadflax occurs in a variety of habitats, including: roadsides, pastures, rangelands, and waste areas. It has spread most extensively west of the 100th meridian, occurring primarily on coarse-textured soils, ranging from sandy loams to coarse gravels (Alex 1962). Cars, off road vehicles, deer, and birds, can spread Dalmatian toadflax. Dalmatian toadflax is a state-listed class B weed.

MANAGEMENT INFORMATION:
Intensive clean cultivation can effectively control Dalmatian toadflax. A successful approach includes at least a two year effort, with eight to ten cultivations in the first year and four to five cultivations in the second year (Morishita 1991; Butler and Burrill 1994). Cultivation should begin in early June and be repeated so that there are never more than seven to ten days with green growth visible (Butler and Burrill 1994). Since Dalmatian toadflax seedlings do not compete well for soil moisture against established winter annuals and perennials, control efforts should include attempting to establish and manage desirable species that will compete with toadflax (Morishita 1991; Butler and Burrill 1994). Herbicides can be an effective tool for control. *Calophasia lunula,* a defoliating moth, is well established in Washington and reportedly provides good control (William et al. 1996) and *Mecinus janthinus,* a recently introduced stem-boring weevil, shows promise. *Brachypterolus pulicarius,* although usually associated with yellow toadflax, can survive and may reduce seed production of Dalmatian toadflax.

CURRENT DISTRIBUTION
Dalmatian Toadflax is mainly found on the I-82 Unit. Distribution is spotty. A single toadflax plant was also found on the HQ unit in 2002. Floodwaters typically carry seed from the upper reaches of the Yakima River where it is more widespread.

ACRES AFFECTED BY WEED: ~ 250 **WEED DENSITY:** Low (Widely Scattered)

GOALS
Control expanding populations
Prevent new occurrences

Add to Bio Control distribution

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by Dalmatian toadflax
Release biological controls
Treat all plants that can be reached before they produce seed
Survey nearby units for pioneering infestations

ACTIONS PLANNED
In 2006, the I-82 Unit will be surveyed and spot treated in the spring using herbicide. Monitoring will continue on an annual basis on nearby units.

CONTROL SUMMARY AND TREND

2003- Initial discovery on I-82 unit
2004- Approximately 50 acres were treated.
2005- Approximately 50 acres were treated. Biocontrol released.

REFERENCES:
*Robocker, W.C. 1974. Life history, ecology, and control of Dalmatian toadflax. Technical Bulletin

*Morishita, D.W. 1991. Dalmatian toadflax, yellow toadflax, black henbane, and tansymustard: Importance, distribution, and control. *In* James, L.F., J.O. Evans, M.H. Ralphs, R.D. Child, eds.

*Alex, J.F. 1962. The taxonomy, history, and distribution of *Linaria dalmatica*. Canadian Journal of Botany 40: 295-307.

*Butler, M.D. and L.C. Burrill. 1994. Yellow toadflax and Dalmatian toadflax. Pacific Northwest Extension Bulletin 135. Oregon State University, Corvallis, OR.

*William, R.D., D. Ball, T.L. Miller, R. Parker, K. Al-Khatib, R.H. Callihan, C. Eberlein, and D.W. Morishita. 1996. Pacific Northwest Weed Control Handbook. Washington State University, Pullman, WA.

HOUNDSTONGUE

Scientific Name: *Cynoglossum officinale* **Common name:** Houndstongue
Updated: 2006

DESCRIPTION: Houndstongue is a biennial or short-lived perennial that grows 1-4 ft tall. Houndstongue is a very strong competitor that competes with desirable forage. Its thick, deep taproot enables it to be a strong competitor for soil resources. The seeds have the ability to attach to people, the coats of livestock and vehicles, enabling the plant to spread great distances. Houndstongue is poisonous. It contains pyrrolizidine alkaloids that stop the reproduction of liver cells. Considered non-palatable under range conditions, livestock will avoid it. However, houndstongue is eaten when dried plants are found in hay, and the toxic properties are still capable of poisoning livestock.

Seeds germinate from February to May. Seeds remaining on the soil surface can remain viable up to two years. At 1-6 inch soil depth the seeds germinate within one year. The highest germination percentage occurred in seeds buried at 1/2inch. A rosette forms the first year and is able to resist mowing and grazing and also able to withstand severe drought. Flowering occurs the following year around June and seeds are formed and dropped at the end of the summer. The seeds over-winter in about the top 1cm of soil.

MANAGEMENT INFORMATION:
Herbicide can be an effective tool for control and applicators should refer to the PNW Weed Management Handbook, or other reputable resources, for product recommendations and timing.

Cultivation of young rosettes in the autumn or early spring gives effective control. Mow flowering stems close to ground to reduce seed set. Clipping during the second year flowering can greatly reduce seed production. Reseed problem areas with fast growing grasses. Do not overgraze. Biocontrols for houndstongue include *Mogulones cruciger* (approved and released in Canada) is a root-feeding weevil. Another, *Longitarsus quadriguttatus*, has good results but may have an effect on native North American Boranginaceae (Lamming).

CURRENT DISTRIBUTION
The only known infestations of houndstongue are found on the I-82 unit, and are most prominent on the Steckler acquisition.

ACRES AFFECTED BY WEED: > 10 acres **WEED DENSITY:** Low to Moderate

GOALS
Control expanding populations
Prevent new occurrences

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by houndstongue
Treat priority infestations before they produce seed
Survey nearby units for pioneering infestations

ACTIONS PLANNED

Continue herbicide treatments. Access area personnel currently assisting with control measures. Monitoring will continue on an annual basis on all units.

CONTROL SUMMARY AND TREND

2002- 5 acres
2003- 5 acres
2004- 8 acres
2005- 10 acres

PERENNIAL PEPPERWEED

Scientific name: *Lepidium latifolium L* **Common name:** Perennial pepperweed
Updated: 2006

DESCRIPTION: Perennial pepperweed normally grows 1 to 3 feet tall, but may reach up to 6 feet. The plant has many stems that emerge from a somewhat woody root crown. The alternate, waxy leaves may have smooth or toothed margins and a prominent, whitish midvein. Basal leaves are lance-shaped and up to 12 inches long; they are attached by a stalk that can be almost as long as the leaf blade. Stem leaves are smaller, with shorter stalks. The milky white flowers grow in dense, rounded clusters at branch tips. Each flower has 4 sepals and 4 petals. Fruits are small (1/16 inch), round or egg-shaped, and contain 2 reddish-brown seeds (Callihan and Miller 1998; Whitson 1987; Bureau of Land Management).

An aggressive plant, perennial pepperweed tends to establish and rapidly colonize pastures, riparian habitats, and waste places in wetter areas. The plant is very tolerant of salty soils, but it is not restricted to these habitats (Young et al. 1995). The plant can also be a problem in roadside, rangeland, and field crop situations. Dense infestations of the plant can form near monocultures. Annual biomass production by perennial pepperweed builds a dense organic layer on the soil surface, which may have a significant consequence on carbon-nitrogen ratios over time. The plant is adapted to using water with a high salt content. The salts build up in the plant biomass. As a result, perennial pepperweed may act as a salt pump in some areas, as it removes salts from the soil solution and deposits the on the soil surface (Young et al. 1997).

In riparian zones, the weed interferes with the regeneration of willow and cottonwood species. Accumulations of perennial pepperweed's semi-woody stems degrade nesting habitat for wildlife. The extremely competitive plant may also completely displace more desirable species, which poses a particular threat to natural areas and hay meadows. Perennial pepperweed lowers the digestibility and protein content of hay, and the accumulation of old pepperweed stems inhibits grazing. Livestock avoid eating this weed if other forage is available (Young et al. 1995).

A perennial with creeping rhizomes, established perennial pepperweed plants have shoots that emerge in late winter and early spring (Fisher and McCaskill 1990; Young et al. 1997). Initially, the plant forms a rosette. Stem elongation is rapid during May (Young et al. 1997). The large amounts of semi-woody herbage produced by the plant can persist for several years (Young et al. 1995). Seeds germinate in February and March. The plant flowers from early summer through fall (Whitson 1987). Rosette leaves die back by flowering time. Fruits do not open at maturity; instead, they fall at irregular intervals throughout the winter (Young et al. 1995).

Perennial pepperweed can spread by seed or rhizome. The plant produces abundant seed, which has a high germination rate. California studies have indicated that perennial pepperweed can produce over 16 million seeds per hectare (Young et al. 1997). Seeds have no heavy seed coat and no dormancy requirement. A wide and fluctuating temperature range produces the highest germination rates. Constant cold or warm temperatures produce a low germination rate (Miller et al. 1986). There is no definitive information on the persistence of the soil seed bank, but the seeds appear to have a very short half-life (Young et al. 1997).

Although the plant can spread by seed, populations more commonly expand by creeping rhizomes, which may advance 3 to 6 feet from the parent plant (Young et al. 1997). Root fragments may spread the plant. Movement of contaminated agricultural products and the transportation of root fragments on earth-moving and tillage equipment can spread the weed (Young et al. 1995). Perennial pepperweed is a state-listed class B weed.

MANAGEMENT INFORMATION:
Mechanical control of this plant is very difficult because very small sections of root contain buds that will sprout into new plants. Plant tops are easily killed, but root and crown buds can sprout and continue the infestation (Young et al. 1995; Young et al. 1998). Small infestations may be hand-pulled or dug, but as much of the root must be removed as possible. After control work, it is important to continue to monitor sites and remove all regrowth and seedlings. No biocontrol agents are available. Herbicides can be an effective tool for control.

CURRENT DISTRIBUTION
Perennial pepperweed is found on most sub-irrigated units in Franklin and Yakima counties. It is rapidly spreading.

ACRES AFFECTED BY WEED: ~ 300 **WEED DENSITY:** Medium to Heavy

GOALS
Control spreading populations
Prevent new occurrences

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by perennial pepperweed
Treat all plants that can be reached before they produce seed
Survey nearby units for pioneering infestations

ACTIONS PLANNED
In 2006, herbicide will be used to control some populations, but current staff is far below that which is needed for effective control.
Monitoring will continue on an annual basis on nearby units
Future activity could include simple mowing to remove decadent vegetation so new growth may provide nesting and brood rearing cover for ground nesting birds.

CONTROL SUMMARY AND TREND
2002 – Approximately 10 acres were treated
2003 – Approximately 10 acres were treated
2004 – Approximately 10 acres were treated
2005 – Approximately 10 acres were treated

REFERENCES
*Callihan, R.H. and T.W. Miller. 1998. Perennial pepperweed. Idaho's Noxious Weeds. http://www.oneplan.state.id.us/pest/nw19.htm.

*Whitson, T.D. ed. 1987. Weeds and Poisonous Plants of Wyoming and Utah. Cooperative Extension. University of Wyoming.

*Bureau of Land Management. Undated. Perennial pepperweed or tall whitetop. U.S. Bureau of Land Management web page.

*Young, J.A., D.E. Palmquist, and R.R. Blank. 1998. The ecology and control of perennial pepperweed (*Lepidium latifolium* L.). Weed Technology 12:402-405.

*Young, J.A., D.E. Palmquist, and S.O. Wotring. 1997. The invasive nature of *Lepidium latifolium:* A review. *In:* Brock, J.H., M. Wade, P. Pysek, and D. Green, eds. Plant Invasions: Studies from North America and Europe, pp. 59-68. Backhuys Publishers, Leiden, The Netherlands.

*Young, J.A., C.E. Turner, and L.F. James. 1995. Perennial pepperweed. Rangelands 17:121-123.

*Miller, G.K., J.A. Young and R.A. Evans. 1986. Germination of seeds of perennial pepperweed (*Lepidium latifolium*). Weed Science 34:252-255.

*Fisher, B.B. and J. McCaskill. 1990. Perennial pepperweed - *Lepidium latifolium* L. *In:* Growers Weed Identification Handbook. Publication 4030. University of California, Division of Agriculture and Natural Resources, Oakland, CA.

SCOTCH THISTLE

Scientific name: *Onopordum acanthium* **Common name:** Scotch thistle
Updated: 2006

DESCRIPTION: Scotch thistle is a branched, robust biennial (or sometimes annual) that often grows 8 feet or more in height and 6 feet in width. Main stems may be up to 4 inches wide at the base. Stems have vertical rows of prominent, spiny, ribbon-like leaf material or "wings" that extend to the base of the flower heads. Leaves, which are armed with sharp, yellow spines, are up to 2 feet long and 1 foot wide. Upper and lower leaf surfaces are covered with a thick mat of cotton-like or woolly hairs, which give the foliage a gray-green appearance. Plants flower in mid-summer. The globe-shaped flower heads are borne in groups of 2 or 3 on branch tips. Flower heads are up to 2 inches in diameter, with long, stiff, needle-like bracts at the base. Flowers range from dark pink to lavender. Seeds are smooth, slender, and plumed (Dewey 1991; Callihan and Miller 1998).

Infestations of Scotch thistle reduce forage production and can virtually prohibit land utilization for livestock. Dense stands of the large, spiny plants constitute a barrier to livestock movement, almost totally excluding animals from grazing and access to water (Hooper et al. 1970; Sindel 1991).
Scotch thistle is usually a biennial, although it can behave as a winter or summer annual or a short-lived perennial under certain situations (Piper 1984; Hooper et al. 1970). As a biennial, Scotch thistle typically lives for two growing seasons. Seeds usually germinate in the late fall, but germination can occur at other times, as well. Seedlings that appear in late autumn behave as true biennials, but seedlings produced during late summer or early autumn behave as annuals. During its first year, Scotch thistle produces a rosette with a taproot that may extend down 1 foot or more. Early in the second year, the plant bolts (Piper 1984). Flowering occurs July to September (Hitchcock et al. 1955). Scotch thistle is a state-listed class B weed.

MANAGEMENT INFORMATION:
Small areas can be eradicated by digging. Plants must be cut off below the soil, leaving no leaves attached (Julian and Rife). Mowing has limited effectiveness for controlling Scotch thistle. It usually only prevents seed production if done either immediately prior to flowering or when plants are just starting to flower. When mowing is conducted too early, it may only delay flowering. However, when plants are cut too late in the flowering process, viable seed may still develop in the capitula following cutting. Because there can be a wide variety in the maturity of plants, a single mowing is unlikely to provide satisfactory control (Sindel 1991).
Establishing and maintaining dense, vigorous, competitive pasture can effectively prevent Scotch thistle establishment. Healthy pasture is particularly important in the autumn, when most Scotch thistle seeds germinate. Thistle invasion is unlikely to occur in ungrazed pasture. (Sindel 1991). Herbicides can be an effective management tool for control. No biological controls are currently available in the United States.

CURRENT DISTRIBUTION
Scotch thistle is mainly found on the I-82, McDonald Bridge and Swegle units but scattered plants have also been discovered on other units.

ACRES AFFECTED BY WEED: ~ 2000 **WEED DENSITY:** Low to moderate

GOALS
Control expanding populations
Prevent new occurrences

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by Scotch thistle
Treat all plants that can be reached before they produce seed
Survey nearby units for pioneering infestations

ACTIONS PLANNED
In 2006, the I-82 Unit will be surveyed and spot treated using herbicide. On the McDonald Bridge unit, thistle will be chopped by hand. The Swegle unit will receive hand, chemical treatment and a grass restoration project will help provide competition.
Monitoring will continue on an annual basis on nearby units.

CONTROL SUMMARY AND TREND
2002 – Approximately 30 acres were treated
2003 – Approximately 30 acres were treated
2004 – Approximately 30 acres were treated
2005 – Approximately 30 acres were treated

REFERENCES
Callihan, R.H. and T.W. Miller. 1998. Scotch Thistle. Idaho's Noxious Weeds. http://www.oneplan.state.id.us/pest/nw27.htm.

Dewey, S.A. 1991. Weed thistles of the western United States. *In:* James, L.F., J.O. Evans, M.H. Ralphs, and R.D. Child, eds. Noxious Range Weeds. Westview Press, Boulder, Colorado. pp. 247-253.
Seattle.

Hooper, J.F., J.A. Young, and R.A. Evans. 1970. Economic evaluation of Scotch thistle suppression. Weed Science 18:583-586.

Sindel, B.M. 1991. A review of the ecology and control of thistles in Australia. Weed Research 31:189-201.

Piper, G. 1984. Scotch thistle – a continuing menace in the Pacific Northwest. Pacific Northwest Weed Topics 84:1-2.

Hitchcock, C.L., A. Cronquist, M. Ownbey, and J.W. Thompson.. 1955. Vascular Plants of the Pacific Northwest. Volume 5: Compositae. University of Washington Press,
Agriculture web page.

Julian, J. and J. Rife. Undated. Integrated weed management of Scotch thistle. Douglas County, Colorado web page.

YELLOW STARTHISTLE

Scientific name: *Centaurea solstitalus* **Common name:** Yellow starthistle
Updated: 2006

DESCRIPTION: Yellow starthistle is a gray-green to blue-green, winter annual plant with a vigorous taproot. It produces bright, dandelion like yellow flowers with sharp spines surrounding the base. The stems are rigid, branching, covered with a cottony fiber, and vary from 6 inches to 3 feet. Basal leaves are 2 to 3 inches long and deeply lobed. The upper leaves are not lobed and are small and sharply pointed.

Yellow star-thistle seeds germinate in the fall through spring, depending on moisture. Seed output can be as high as 29,000 seeds per square meter, with about 95 percent of the seed being viable. Most seed germinate the following year, but some can last 10 years or more in the soil. After germination, the plant initially allocates most of its resources to root growth. By late spring, roots can extend 3 feet or deeper into the soil profile although the portion above ground is a relatively small basal rosette. This allows yellow starthistle to out compete shallow rooted annual species during the drier summer months. This also allows it to survive well into the summer long after other annual species have dried up. Yellow starthistle bolts in late spring and flowers June through August.

Yellow starthistle invades rangelands, pastures, roadsides, croplands and wastelands. It is intolerant of shade and requires light on the soil surface for winter growth and taproot development. Yellow starthistle is capable of establishing on deep, well-drained soils as well as shallow, rocky soils that receive from 10 to 40 inches of annual precipitation. In the Pacific Northwest, yellow starthistle favors sites that were formally dominated by big sagebrush, bluebunch wheatgrass, Idaho fescue and Sandberg bluegrass.

Yellow starthistle causes a neurological disease (nigropallidal encephalomalacia) in horses that eat it.

MANAGEMENT INFORMATION:

Yellow starthistle is readily controlled with herbicides such as Tordon, Transline, Banvel or Clarity. One pint/A. of Tordon may control yellow starthistle for two to three years, but the weed will reinvade the area unless other management techniques are used. As with diffuse knapweed, seeding competitive, desirable native plant species after control of yellow starthistle is required to prevent re-invasion.

Hand pulling and mowing can reduce weed densities but is labor intensive and not suited to large infestations. Seed production must be prevented for many years to prevent reestablishment.

CURRENT DISTRIBTUTION ON THE SITE

Yellow starthistle is found on all of the Walla Walla County units and is common throughout that county. Neighboring landowners do little to control this weed so re-infestation is expected. The Windmill Ranch also has small, scattered infestations, the result of an initial introduction by a contractor from Orofino, Idaho in 1995. Small scattered patches on Rattlesnake Slope and Thornton have also been recently been discovered.

ACRES AFFECTED BY WEED: 100 **WEED DENSITY:** Low to Moderate

GOALS
Eliminate presence of yellow starthistle on the SSRWA.

OBJECTIVE
Survey and map existing Yellow Starthistle populations.
Eradicate this weed by using an integrated weed management approach.
Rehabilitate degraded areas with competitive native plants.

ACTIONS PLANNED
Continue chemical applications on local infestation(s) where feasible. Continue to survey WA to identify any new infestations. Hand pull new infestations if time permits.

CONTROL SUMMARY AND TREND
2002: Spot Spray 5 acres
2003: Spot Spray 5 acres
2004: Spot Spray 5 acres; hand pull in Rattlesnake Slope parking lot.
2005: Spot Spray 3 acres

RUSH SKELETONWEED

Scientific name: *Chondrilla juncea L* **Common name:** Rush skeletonweed
Updated: 2006

DESCRIPTION: Rush skeletonweed belongs to the chicory tribe of the sunflower family. This herbaceous perennial ranges from one to four feet tall, with a taproot reaching down seven feet, or more. The seedlings have a long thin taproot. Rush skeletonweed over winters as a rosette of hairless, basal leaves that are two to five inches long and ½ to 2 inches wide and broader at the tip. The lateral lobes point back toward the base - very similar to a dandelion. The mature plant consists of a dark green, nearly leafless flowering stem, with many aerial branches. The basal rosette is absent at this stage. The stem and aerial branches support a few leaves, which are narrow and linear, and mostly entire. A distinguishing characteristic of rush skeletonweed is the presence of coarse, downward pointing brown hairs near the base of the stem. The stems and roots of rush skeletonweed exude a white latex sap when cut. The flower heads, about ½ inch in diameter, grow along the stem in the leaf axils or at the branch tips, and they are found individually or in clusters of two to five. Each flower head has 7-15 (usually 11) ray flowers, with yellow ligules resembling petals. These yellow ligules are strap shaped with small teeth across the blunt end. Mature, vigorous plants can produce 1,500 flower heads, with the capability of producing 20,000 seeds. The immature seeds are greenish-white, and they gradually darken to a yellow-brown or olive-green in the 13-15 days it takes to mature. The seed color can be used as an indication of maturity, with light colored seeds showing low germination rates (Old 1981). Each seed has a pappus, which is capable of carrying seeds along wind currents up to 20 miles (Cuthbertson 1967 and Schirman and Robocker 1967 as cited in McLellan 1991).

Rush skeletonweed is a threat to irrigated lands of the Columbia Basin, to the sandy soils of dry land wheat areas (Old 1981), and it is a threat to rangelands. Rangeland infestations impact the cattle industry when rush skeletonweed displaces native or beneficial forage species grazed by livestock and wildlife. Forage production is lowered when rush skeletonweed successfully out competes beneficial species for limited resources, particularly nitrogen. Often, the cost of herbicide control is not economical due to low productivity of the land (Sheley).

Rush skeletonweed prefers two soils types found in the pacific northwest: the sandy to gravely and well drained soils typical in the glacial lobe soils of Spokane, and the shallow soils over bedrock, typical in the channeled scablands. Roadside populations of rush skeletonweed are established when the seed is moved along transportation routes. Plant fragments can develop in areas not conducive to seedling establishment, with contaminated cultivation machinery responsible for the majority of this type of spread (Old 1981). Rush skeletonweed is a state-listed class B weed.

MANAGEMENT INFORMATION:
Using beneficial forage species for competition, will not suppress the dominance of rush skeletonweed. A more integrated approach using both plant competition and biological control agents often result in better control then either method used separately (Groves and Williams 1975 as cited in Prather 1993; Prather 1993). Continual grazing as a control method decreased the populations of rush skeletonweed when seed production was prevented, but rotational grazing increased the plant densities (Kohn and Cuthbertson 1975 as cited in McLellan 1991).

Any mechanical damage to the plant stimulates new growth, often resulting in satellite plants. Root fragment regeneration depths varied with fragment size and soil type, with sandy soils producing regeneration from greater depths than clay soils. Cultivation as a control method can be considered on seedlings less than 36 days old, as they are unable to develop roots from root fragments (Old 1981). Frequently mowing rush skeletonweed plants infested with and impacted by the gall mite (*Eriophyes chondrillae*) may decrease the rate of spread of this plant (McLellan 1991). The gall midge (*C. schmidti*) was introduced to California in 1975, and is established throughout the Pacific Northwest. The gall midge impacts the rosette and flowering stems of all biotypes in this region, and affected stands are often a noticeable purple to reddish color (Martin 1996; Rees et al. 1996). The rust fungus, *P. chondrillina*, was introduced to Washington in 1978. The early-flowering rush skeletonweed biotype in Washington and Idaho, and the late-flowering biotype in Oregon are resistant to this rust (Martin 1996; Rees et al. 1996).
A gall mite (*Eriophyes chondrillae*) was introduced to Washington in 1979, and it is considered the most effective biological control agent available, to date. This mite is effective against all biotypes of rush skeletonweed. The visible impacts to flowering buds are leaf-like galls, up to two inches in diameter, which can reduce or prevent seed production. The gall mite also affects the roots carbohydrate reserves, preventing the formation of satellite plants. The seedlings and satellite plants often die. Soil disturbance associated with cultivation in croplands interferes with the life cycle of the mite, and as a result, there is a reduction in the persistence of gall mite infestations to rush skeletonweed (Martin 1996; Rees et al. 1996). Rush skeletonweed often remains the dominant species in gall-infested populations.

CURRENT DISTRIBUTION
Rush Skeletonweed is mainly found on the Windmill, Rattlesnake Slope and Thornton Units but it is also found on several other units.

ACRES AFFECTED BY THE WEED: ~ 3000 **WEED DENSITY:** Low to Medium

GOALS
Control expanding populations
Prevent new occurrences
Add to bio-control distribution

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by Rush skeletonweed
Release biological agents
Survey nearby units for pioneering infestations

ACTIONS PLANNED
None. Other priority assignments leave no time for control efforts and existing bio-controls are present in most infestations
Monitoring will continue on an annual basis

CONTROL SUMMARY AND TREND
2002 – Approximately 50 acres were treated
2003 – Approximately 50 acres were treated

2004 – Approximately 100 acres were treated w/ herbicides
2005 – Approximately 100 acres were treated w/ bio control release

REFERENCES

McLellan, P. W. 1991. Effects of Mowing on the Efficacy of the Gall Mite, *Eriophyes chondrillae*, on rush skeletonweed, *Chondrilla juncea*. Master of Science Thesis in entomology. Washington State University. Pp. 51.

Old, R. 1981. Rush skeletonweed (*Chondrilla juncea* L.) It's biology, ecology and agronomic history. A master's thesis, Washington State University, Department of Agronomy. 92 pp.

Sheley, R., J. M. Hudak and R. T. Grubb. (not yet published). Rush skeletonweed chapter from: Biology and Management of Noxious Rangeland Weeds.

Prather, T. S. 1993. Combined Effects of Biological Control and Plant Competition on Rush Skeletonweed. A dissertation in partial fulfillment for the degree of Doctor of Philosophy with a major in plant sciences. University of Idaho. 63 pp.

Martin, M. E. 1996. Rush skeletonweed (Chondrilla juncea) and Parasitic Associates: A Synopsis of Selected Information. Web site: http://infoweb.magi.com/~ehaber/skeleton.html.

Rees, N. and P. Quimby, G. Piper, E. Coombs, C. Turner, N. Spencer and L. Knutson (eds.), 1996. Rush skeletonweed; *Cystiphora schmidti*; *Eriophyes chondrillae*; *Puccinia chondrillina*. Biological Control of Weeds in the West. Western Society of Weed Science in cooperation with USDA Agricultural Research Service, Montana Department of Agriculture and Montana State University.

PURPLE LOOSESTRIFE

Scientific name: *Lythrum salicaria L* **Common name:** Purple loosestrife
Updated: 2006

DESCRIPTION: Purple loosestrife is a perennial, emergent aquatic plant (Thompson, et al. 1987; Malecki, 1991). As many as 30 -50 herbaceous, erect, annual stems rise to about nine feet tall from a persistent perennial tap root and spreading rootstock. Short, slender branches spread out to form a crown five feet wide on established plants (Thompson, et al. 1987). The somewhat squarish stems are four to six sided, with nodes evenly spaced. Stems submerged under water develop aerenchyma tissue characteristic of aquatic plants. The stalk less leaves can be opposite or decussate (opposite with alternating pairs at 90 degree angles) or sometimes in whorls of three, near the base. The upper leaves and floral bracts can be alternate (Mal, et al. 1992). The leaves are 1 ½ to four inches long, wider and rounded or heart-shaped at the base. Leaf shape varies from lanceolate to narrowly oblong, and the leaves are sometimes covered with fine hairs. Light levels influence the variability in pubescence and leaf shape - leaf area increases and fine hairs decrease with lower light levels. The showy, magenta flowering stems end in a 4-16 inch flowering spike. Flowers appear from July to early October. The (usually) magenta flowers are in pairs or clusters of the upper leaf axils. Each flower is complete, containing five to seven petals, with the same number of sepals as petals, and twice as many stamens as petals. Typical flowers have six sepals, six petals and twelve stamens. The ovary is superior, with two fused carpels. The narrow, wrinkled petals are from 1/4 to 5/8 inch long. The petal color can range from white to pink to red to purple. The fruit is a two-valved capsule enclosed in the pubescent calyx. The pollen grain color and size varies, depending on the style length of the flower.

The negative impact from purple loosestrife establishment in wetland habitat far outweighs any economic gain from horticultural or medicinal uses (Blossey and Schroeder 1992, Thompson et al. 1987). Wetland ecosystems are altered. Purple loosestrife is invasive and competitive and unavailing to native wildlife. It can quickly adapt to environmental changes and expand its range to replace native plants used for ground cover, food, or nesting material. Loosestrife stands are dense at the top, and open at the base. Structures of root masses create a three-foot opening, in the water, between plants. This provides no cover for nesting ducks (Timmerman 1992). Large loosestrife infestations are hard to mow and manage. Recreational hunting or trapping grounds are lost, decreasing the land value to those that own or manage operational wetlands.

Cutting alone is not a control option for purple loosestrife. Shoots and adventitious roots will develop. Cutting late in the season reduced shoot production more than mid summer cutting, indicating that carbohydrate reserves could not be restored for next year's growth. Purple loosestrife is a state-listed class B weed.

MANAGEMENT INFORMATION:
In 1992 three beetles were released in Washington. Their damaging impact on purple loosestrife populations was evident in the Winchester Wasteway area of Grant County in 1997. Biological control agents may provide the long-term success in controlling this noxious weed. *Galerucella calmariensis* and *G. pusilla* - are both leaf-feeding chrysomelids. These beetles defoliate, and attack the terminal bud area, drastically reducing seed production. The mortality rate to purple loosestrife seedlings is high. Evidence of *Galerucella* ssp. damage is round holes in the leaves. Four to six

eggs are laid on the stems, axils, or leaf underside. The larvae feed constantly on the leaf underside, leaving only the thin cuticle layer on the top of the leaf. By 1996 populations of *Galerucella* ssp. visibly impacted purple loosestrife stands in the Winchester Wasteway. Herbicides can be an effective tool for control.

CURRENT DISTRIBUTION
Purple loosestrife infestations are found on virtually all management units that contain year around water. Only the true shrub steppe units (Rattlesnake Slop and Thornton) are free of this weed. The HQ and Byron units have the heaviest infestations but loosestrife is found all along the lower Yakima River, which runs adjacent to the I-82 parcels. Cooperative efforts with the Yakima County Weed Board, and the release of bio agents, have shown substantial gains against the spread of loosestrife. Insect activity is present on most units, and has even been found on units where no releases have occurred.

ACRES AFFECTED BY WEED: ~ 1,000 **WEED DENSITY:** Spotty to Dense

GOALS
Control expanding populations
Prevent new occurrences
Add to bio-control distribution

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by Purple loosestrife
Release biological controls
Treat all plants that can be reached before they produce seed
Survey nearby units for pioneering infestations

ACTIONS PLANNED
In 2006, herbicide applications will be done on the I-82 and HQ units by the YCWB.
Monitoring will continue on an annual basis.

CONTROL SUMMARY AND TREND
2002 – Approximately 100 acres were treated (bugs & herbicides)
2003 – Approximately 120 acres were treated (bugs & herbicides)
2004 – Approximately 150 acres were treated (bugs & herbicides)
2005 – Approximately 50 acres were treated (herbicides)

REFERENCES
*Thompson, D.Q., R.L. Stuckey and E.B. Thompson. 1987. Spread, Impact and Control of Purple Loosestrife (*Lythrum salicaria*) in North American wetlands. United States Fish and Wildlife Service, Fish and Wildlife Research No. 2. United States Department of Interior, Washington, D.C. 55pp.

*Malecki, R. A., S. Hight, L. Kok, D. Schroeder, and J. Coulson. 1991. Information for the Preparation of an Environmental Assessment. Host plant specificity testing of *Hylobius transversovittatus, Galerucella calmarienses* and *G. pusilla* for use in the biological control of

Lythrum salicaria L. in North America. New York Cooperative Fish and Wildlife Research Unit, Department of Natural Resources, Fernow Hall, Cornell University, Ithaca, NY. 79 pp.
954.

*Mal, T.K., J. Lovett-Doust and L. Lovett-Doust. 1992. The biology of Canadian weeds. 100. *Lythrum salicaria.* Canadian Journal of Plant Science. Pp 1305 - 1331.

*Blossey, B. and D. Schroeder. 1992. Final Report. Biocontrol of Lythrum salicaria in the United States. Sponsored by subagreement No. 20057-57083 with the Cornell University under cooperative agreement No. 14-16-0009-1553 from the US Dept. of the Interior, Fish and Wildlife Service, the Washington State Dept. of Agriculture and the Washington State Dept. of Wildlife.

*Timmerman, K. 1992. Purple Loosestrife: Noxious Knockout. Idaho wildlife: Vol. 12, no. 2. (spring 1992) pp 26-27.

BRISTLY FOXTAIL

Scientific Name: *Setaria verticillata* **Common name:** Bristly foxtail
Updated: 2006

DESCRIPTION: Bristly foxtail is an annual grass, 1 to 3 feet tall, although it will reach 5 feet in height in some cases. Leaf blades are flat, 3/16 to ½ inch wide, smooth or with a few hairs near the base on the upper surface, having open sheaths and lacking auricles, with a ligule of hairs or a hair-fringed membrane. The inflorescence is a spike-like panicle that appears somewhat segmented or interrupted. Spikelets are subtended by long scabrous bristles that remain attached to the rachis after seeds drop.

Bristly foxtail, a native of Eurasia and Africa, closely resembles green foxtail when in the vegetative growth stage. The primary difference between this and other *Setaria* species is the fact that minute barbs on the stiff bristles of *S. verticillata* are oriented downward, causing seedheads to cling strongly to clothing and animals.

MANAGEMENT INFORMATION:
As an annual grass, this species should be easily controlled by tillage or herbicides. However, in irrigated cornfields, even residual, pre-emergent herbicide has not had a visible effect on controlling infestations. The foxtail grows readily within the outer 2 to 6 rows of a cornfield where sunlight penetrates. Mowing seedheads to prevent them from maturing, or applications of glyphosate will help control plants growing outside of the corn but the plants growing within the corn itself will always provide a new seed source.

The barbed seedheads are an annoying problem for hunters and their bird dogs. Barbs are difficult to impossible to remove from both dogs and clothing and hunters report of actually throwing clothes away. Some hunters do not return because of this weed. In addition, raptors hunting for rodents become entangled in the foxtail during their descent, and die from stress, exhaustion, hypothermia, starvation or some combination of these elements.

CURRENT DISTRIBUTION
Bristly foxtail is a serious problem within irrigated agricultural fields and sub-irrigated areas on the Windmill Ranch unit. It is probably present on other Franklin County sites but in much smaller quantities.

ACRES AFFECTED BY WEED: ~500 **WEED DENSITY:** Low to High

GOALS
Eradicate weed from Wildlife Area

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by bristly foxtail
Stop annual seed production
Plant competitive vegetation

ACTIONS PLANNED
In 2006-2008, till field perimeters, mechanically/chemically fallow sites to reduce seed production, seed to warm-season grass mix that will compete with foxtail

CONTROL SUMMARY AND TREND
2002: No treatment
2003: Approximately 13 acres treated by mowing one time
2004: Approximately 25 acres treated by mowing 3 times
2005: Approximately 30 acres treated by mowing 4 times

REFERENCES
Burrill, Larry C., and David W. Cudney, Steven A. Dewey, Richard D. Lee, B.E. Nelson, Robert Parker, Tom D. Whitson, Weeds of the West, 5th Edition, 1996, pages 492-493.

Ross, Rocky J., personal observation

PUNCTUREVINE

Scientific name: *Tribulus terrestris L* **Common name:** Puncturevine
Updated: 2006

DESCRIPTION: Puncturevine is a prostrate annual herb that grows from a simple, woody taproot. The plant produces numerous stems, up to six feet long, that are much branched and arise from the crown to produce a dense mat. The leaves are opposite, have short petioles, one to three inches long, oblong, pubescent, and divided into pinnate leaflets; each leaflet is about 1/4 inch long. The small, yellow, flowers have five petals and are borne on short stalks at leaf nodes. The fruit is a woody burr with sharp, rigid spines (strong enough to puncture bicycle tires or penetrate shoe soles).

Puncturevine is a serious weed in pastures, roadsides, waste places, and cultivated fields. The spines of the fruit can cause damage to the feet of animals and are a nuisance to children. If growing in orchards or vineyards, it is a problem to the fruit pickers. If grazing animals happen to eat a bur, it may cause injury to the mouth, stomach, and intestines. Generally puncturevine is not grazed, but if it is, it is also toxic.

Puncturevine is adapted to warm temperate conditions. It requires relatively high temperatures for germination and growth. It is highly adaptable to a wide range of conditions. Puncturevine prefers light-textured soils, but will grow on almost any type of soil.
Puncturevine reproduces completely by seeds, and there is considerable seed dormancy over the autumn and winter. Seeds germinate in late spring and early summer under suitably moist conditions. Flowers may form within three weeks and continue for several months. Fruits are thus produced through summer and fall. Puncturevine flowers are cross-pollinated by insects. A single plant can produce as many as 400 fruits, each containing two to three seeds. Seed dispersal is by animals and by rubber-tired vehicles. The seeds have an initial dormancy and very few will germinate immediately after development. A germination rate of 84 percent has been reported in six-month-old seed. Seeds may remain viable for many years if buried in the soil. Puncturevine is a state-listed class B weed.

MANAGEMENT INFORMATION:
Repeated cultivation just after germination is an effective control. If burrs are produced before cultivation, it is necessary to remove the plants and burrs and burn them. Two weevils, *Microlarinus lareynii* and *M. lypriformis*, native to India, France, and Italy, have been introduced into the United States as biocontrol agents. The larvae attack the seed and stems and have given reasonably good results. No microorganisms or viruses are known to give control. Herbicides can be an effective tool for control.

CURRENT DISTRIBUTION
Puncturevine is currently known to exist on all the Franklin Co. units, plus the HQ, Byron and Vance units. To a lesser degree, it can be found in parking areas on Rattlesnake Slope and has been present on Sharp Road within the Thornton unit.

ACRES AFFECTED BY WEED: ~ 500 **WEED DENSITY:** Low to high

GOALS
Control expanding populations
Prevent new occurrences

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by puncturevine
Treat all plants that can be reached before they produce seed
Survey nearby units for pioneering populations

ACTIONS PLANNED
In 2006, puncturevine will be spot sprayed as found. Plants will be controlled before seed is produced. Agricultural field perimeters will be treated with higher rates of pre-emergent herbicides.
Monitoring will continue on an annual basis on nearby units.

CONTROL SUMMARY AND TREND
Puncturevine is just spot sprayed in conjunction with other spray activities so no hard numbers are available. The Windmill Ranch has the most serious problem because puncturevine is present in several of the irrigated fields and historic pre-emergent herbicide applications have not been effective. Farm equipment drags the seed around to other areas of the ranch.

REFERENCES
Johnson, E. 1932. The puncturevine in California. Univ. of Calif. Agric. Expt. Sta. Bull. 528: 42 pp.

Parsons, W.T. 1973. The Noxious Weeds of Victoria. Inkata Press, Melbourne.

Squires, V.R. 1979. The biology of Australian weeds. 1. *Tribulus terrestris* L. J. of the Australian Inst. of Agric. Sci. 179: 75-82.

U.S. Department of Agriculture. 1970. Selected Weeds of the United States. Agric. Hndbk. No. 366. USDA-ARS, Washington, D.C.

LONGSPINE SANDBUR

Scientific name: *Cenchrus longispinus* **Common name:** Longspine sandbur
Updated: 2006

DESCRIPTION: A warm-season annual grass with tufted stems. It grows 8 inches to 3 feet tall, occasionally erect, but usually spreading horizontally and forming dense mats. Leaf sheaths are flattened, very loose, smooth with hairy margins. Leaf blades are flat, roughened, 2 to 6 inches long and ¼ inch wide with rounded margins. The spikes are 1 to 3 inches long and bear clusters of 10 to 30 burs. Burs are thickly set with stiff, sharp spreading spines. They usually contain two light brown, oval to oblong seeds.

A native of Europe, lonspine sandbur is a nuisance throughout most of the U.S. It grows in cultivated fields, pastures and waste areas; but favors sandy or well-drained, gravelly soils. It can be particularly troublesome to livestock causing inujury to mouths, noses or eyes that come in contact with the mature burs. It causes the same problems for hunters and their bird dogs. The presence of burs also reduces the value of wool. Sandbur is commonly spread by animals and machinery. Flowering and seed production occur from July to September.

MANAGEMENT INFORMATION:
Cultivation and herbicides are both effective means of controlling sandbur. However, when it is present under a stand of maturing field corn, neither control method will work. Sandbur frequently grows among other desirable grasses, which makes it difficult to control without harming the beneficial plants. When sandbur is in the initial vegetative state, it has a very similar appearance to certain desirable grasses and therefore cannot be spot sprayed without also removing competing vegetation. Mowing is basically ineffective due to the prostrate growth form, which allows continued seed production right at ground level. Sandbur seems to be most prolific in areas of ground disturbance such as graded road shoulders or tilled agricultural fields. Dense, perennial vegetation will usually compete effectively with this weed.

CURRENT DISTRIBUTION
Sandbur is present in the highest densities on the Windmill Ranch. It is also present in one field on the HQ unit and as been found in some of the “Rice Paddies” on that same unit. It is common around Franklin County and is probably present on other management units, although none has been found to date.

ACRES AFFECTED BY WEED: ~100 **WEED DENSITY:** Low to high

GOALS
Control expanding populations
Prevent new occurrences
Stop spread within irrigated agricultural fields

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by Sandbur
Treat priority infestations before they produce seed

Survey nearby units for pioneering infestations

ACTIONS PLANNED
In 2006, infestations will be mowed to reduce seed production and treat with herbicide where feasible and as time permits. Known infestations will be disced in the Fall of 2006 and mechanical/chemical fallowing will be continued to create a seedbed for future planting of perennial, competing, warm-season grasses.

CONTROL SUMMARY AND TREND
No significant control efforts have been made to date, due to the ineffectiveness of available measures and lack of time. Spot treatment by mowing and herbicides only.

REFERENCES
Burrill, Larry C., and David W. Cudney, Steven A. Dewey, Richard D. Lee, B.E. Nelson, Robert Parker, Tom D. Whitson, Weeds of the West, 5th Edition, 1996, pages 434-435.

Ross, Rocky J., personal observation

SALTCEDAR

Scientific name: *Tamarix ramosissima L.* **Common name:** Saltcedar
Updated: 2006

DESCRIPTION: Salt cedar plants are spreading shrubs or small trees, 5-20 feet tall, with numerous slender branches and small, alternate, scale-like leaves. The pale pink to white flowers are small, perfect and regular, and arranged in spike-like racemes. The distinct petals and sepals occur in fours or fives. The fruit is a capsule (Hitchcock and Cronquist 1961). As an aggressive colonizer that is able to survive in a wide variety of habitats, saltcedar often forms monotypic stands, replacing willows, cottonwoods, and other native riparian vegetation. The stems and leaves of mature plants secrete salt, forming a crust above and below ground that inhibits other plants (Sudbrock 1993). Saltcedar is also an enormous water consumer. A single large plant can absorb 200 gallons of water a day (Hoddenbach 1987), although evapotranspiration rates vary based on water availability, stand density, and weather conditions (Davenport et al. 1982). Saltcedar's high water consumption further stresses native vegetation by lowering ground water levels and can also dry up springs and marshy areas. Paradoxically, saltcedar infestations can also lead to flooding, as its extensive root system can choke streambeds (Rush 1994).

Infestations also have detrimental impacts on wildlife. Saltcedar seeds have almost no protein and are too small to be eaten by most animals. In addition, its scale-like leaves offer little suitable forage for browsing animals (Hoddenbach 1987). Studies indicate that saltcedar is not favored bird habitat. In their study of habitat use by birds along the lower Colorado River, (Anderson and Ohmart 1977) found that saltcedar stands supported only four species per hundred acres, as opposed to 154 species per hundred acres of native vegetation. Seedlings establish most frequently in soils that are seasonally saturated at the surface. It appears to grow best in saline soils (up to 15,000 ppm sodium), but saltcedar is adaptable and tolerant of a wide variety of environmental conditions (Brotherson and Field 1987). A single mature saltcedar may produce hundreds of thousands of seeds between April and October (Sudbrock 1993). The tiny, hairy, pollen-sized seeds are widely dispersed by wind and water throughout the growing season, and they will germinate within 24 hours of moistening. In Arizona, seeds have been known to germinate in May and June, while floating on water. Early seedling growth is slow, but older seedlings grow rapidly and are tolerant of submergence, saline soils, and drought (Frasier and Johnsen 1991); seedlings may grow up to a foot a month in early spring (Sudbrock 1993). Once saltcedar is established, not even dramatic changes in soil moisture will completely eliminate it, as long as abundant ground water is available (Frasier and Johnsen 1991). Saltcedar spreads by seed and also resprouts vigorously from roots if the top portion of the plant is damaged or removed. It can also readily establish from cuttings, if buried in moist soil (Frasier and Johnsen 1991). Saltcedar is a state-listed class B weed.

MANAGEMENT INFORMATION:
Because of saltcedar's ability to resprout from roots, many mechanical methods are largely unsuccessful. Root plowing 35 to 60 cm deep with a cutting blade equipped with fins to pull up roots and buried stems can be effective but destroys other vegetation as well (Frasier and Johnsen 1991). It is advisable to remove cut brush from a treated site (Sudbrock 1993). Effective control projects often utilize both mechanical and chemical control methods (see above).

A feasibility study, funded in part by the Bureau of Reclamation, has been done on the biological control of saltcedar. Research has indicated approximately a dozen insect species that might be used to fight saltcedar (Hays 1989). Currently none are available. Herbicides can be an effective tool for control.

ACRES AFFECTED BY WEED: ~ 150 **WEED DENSITY:** Occasional

GOALS
Eradicate all new seedlings
Prevent new occurrences

OBJECTIVES
Survey and map existing populations and/or potential sites of invasion
More accurately calculate the acres affected by Saltcedar
Treat all plants that can be reached before they produce seed
Survey nearby units for pioneering infestations

ACTIONS PLANNED
In 2006, many areas will be surveyed and spot treated using herbicide.
Monitoring will continue on an annual basis on nearby units.

CURRENT DISTRIBUTION
Saltcedar has been found in scattered locations on the Windmill Ranch and the Byron Unit. It's entirely possible it is present within wetland habitat on other units but has not been found to date. Saltcedar infestations on lands adjacent to SSRWA management units will always provide a seed source for reinfestation.

CONTROL SUMMARY AND TREND
2002 – Approximately 150 acres were treated
2003 – Approximately 100 acres were treated
2004 – Approximately 100 acres were treated
2005 – Approximately 100 acres were treated

REFERENCES
Hitchcock, C.L. and A. Cronquist. 1961. Vascular Plants of the Pacific Northwest. Volume 3: Saxifragaceae to Ericaceae. University of Washington Press, Seattle.

Sudbrock, A. 1993. Tamarisk control. I. Fighting Back: An overview of the invasion, and a low-impact way of fighting it. Restoration and Management Notes 11: 31-34.

Hoddenbach, G. 1987. Tamarix control. Tamarisk control in southwestern United States. Cooperative National Park Resources Studies Unit, Special Report No. 9: 116-125.

Davenport, D.C., P.E. Martin, and R.M. Hagan. 1982. Evapotranspiration from riparian vegetation: Water relations and irrecoverable losses for saltcedar (*Tamarix chinensis*). Journal of Soil and Water Conservation 37: 233-236.

Davenport, D.C., P.E. Martin, and R.M. Hagan. 1982. Evapotranspiration from riparian vegetation: Conserving water by reducing saltcedar transpiration. Journal of Soil and Water Conservation 37: 237-239.

Meeting of the Society for Ecological Restoration.

Rush, E. 1994. Strangers in the wilderness. Pacific Horticulture 55: 20-23.

Anderson, B.W. and R.D Ohmart. 1982. Revegetation for wildlife enhancement along the lower Colorado River. Final report to the U.S. Bureau of Reclamation, Boulder City, Nevada.

Brotherson, J.D. and D, Field. 1987. *Tamarix:* Impacts of a successful weed. Rangelands 9: 110-112.

Hays, S.M. 1989. Scientists fight brush with imported insects. Agricultural Research 37: 16-17.

PHRAGMITES

Scientific name: *Phragmites australis L* **Common name:** Phragmites
Updated: 2006

DESCRIPTION: The non-native genotype of Phragmites is a large perennial, grass or reed with creeping rhizomes, and often also with stolons. The woody hollow culms (stems) can grow to 12 feet tall. Leaves are lanceolate, ranging from 8-16 inches long and .5- 1.5 inches wide. The sheath of the leaf blade is glabrous (smooth, no hairs or glands), and it is loose, allowing it to twist in the wind, so the blades turn to one side. Dense silky flowers develop in mid July through October. The densely flowered panicle (floral spikelets) is feathery, tawny or purplish, 6–16 inches long, with the branches ascending. When in flower, the glumes (the lower bracts at the base of the flowering spikelet) are glabrous. The glumes are smaller than the lemmas (the bracts at the base of the individual flowers in a grass spikelet).

The non-native genotype of Phragmites is frequently regarded as an aggressive, unwanted invader. It displaces native species that provide valuable forage for wildlife, (Hauber et al 1991). The non-native genotype of Phragmites is a problem when and where stands appear to be spreading while other species typical of the community are diminishing (Marks et al, 1994). Disturbances or stresses such as pollution, alteration of the natural hydrologic regime, dredging, and increased sedimentation favor invasion and spread of Phragmites (Roman et al. 1984). Phragmites is also thought to be the sole known host plant for the Yuma Skipper butterfly (*Ochlodes yuma)*. This skipper is the largest most conspicuous of the tawny, grass–feeding Hesperiine skippers. The skipper is distributed in the Great Basin area ranging from Arizona to south-central Washington. The occurrence of this obligate herbivore indicates the potential presence of a native Phragmites species.

Phragmites australis is found in disturbed and non-disturbed (pristine) sites that hold water, including roadside ditches and depressions. It is typically found in or near wetlands including marshes, swamps, fens, prairie potholes, and marsh upland areas. Phragmites has been known to inhabit areas near freshwater, brackish (slightly saline) and alkaline wetlands in the temperate zones worldwide (Haslam 1972, Roman et al. 1984). *Phragmites* will inhabit any slight depression that has the ability to hold water.
Phragmites seeds are shed from November through January. When seeds germinate and become established the young plants would usually persist for at least two years in a small, inconspicuous stage where they resemble many other grass species. *Phragmites*' primary mode of reproduction is vegetative, through its extensive rhizomatous network. Individual rhizomes live for 3 to 6 years developing buds at the base of the vertical rhizomes in late summer each year. The buds grow horizontally approximately 1 meter before going dormant until spring. Phragmites is a state-listed class C weed.

MANAGEMENT INFORMATION:
Beall (1984) discourages mowing and disking. Mowing only affects the above ground portion of the plant, so mowing would have to occur annually. To remove the rhizome, disking could be employed. However, disking could potentially result in an increase of Phragmites since pieces of the rhizome can produce new plants. Cross and Fleming (1989) describe successful mowing

regimes of several year duration during the summer (August and September) and disking in summer or fall.

Prescribed burning does not reduce the growing ability of Phragmites unless root burn occurs. Root burn seldom occurs, however, because a layer of soil, mud and/or water usually covers the rhizomes. Burning does remove accumulated Phragmites leaf litter, giving the seeds of other species area to germinate. Prescribed burning has been used with success after chemical treatment for this purpose at The Brigantine National Wildlife Refuge, NJ (Beall 1984). Occasional burning has been used in Delaware in conjunction with intensive spraying and water level management. This helps remove old canes and allows other vegetation to grow.
Dredging and draining are methods that have often been used to reduce stand vigor, however, draining and dredging are not appropriate for use on most preserves (Osterbrock, 1984).
Herbicides can be an effective tool for control if adequate coverage can be achieved. There are no biocontrol agents available.

CURRENT DISTRIBUTION
Phragmites is currently known to exist on the Windmill Ranch, HQ and Byron units, but it is probably present on other wetland sites.

ACRES AFFECTED BY WEED: ~ 100 **WEED DENSITY:** Low; small scattered plots

GOALS
Control expanding population
Prevent new occurrences

OBJECTIVES
Survey and map existing populations
Treat all plants that can be reached before they produce seed
Survey nearby units for pioneering infestations

ACTIONS PLANNED
In 2006, fall ground applications of herbicides.
Monitoring will continue on an annual basis on nearby units.

CONTROL SUMMARY
2002 – Approximately –0- acres were treated
2003 – Approximately 2 acres were treated
2004 – Approximately 3 acres were sprayed
2005 – Approximately –0- acres were treated

REFERENCES
Hauber, D.P., White, D.A., Powers, S.P., DeFrancesch, F.R., 1991. Isozyme variation and correspondence with unusual infrared reflectance patterns in *Phragmites astralis* (Poaceae.) Plant System. Evol. 178, 1-8.

Marks, M., B. Lapin, and J. Randall. 1994. *Phragmites australis (P. communis):* threats, management and monitoring. Natural Areas Journal 14:285 - 294

Roman, C.T., Niering, W.A., and Warren, R.S. 1984. Salt marsh vegetation change in response to tidal restriction. Environmental Management 8:141-150.
Haslam, S.M. 1972. Phragmites communis. Journal of Ecology 60:585-610.
Beall, D. L. 1984. Brigantine Division - Marsh vegetation rehabilitation - chemical control of Phragmites. USFWS, 8 p.
Cross, Diana H.; Fleming, Karen L. 1989. Control of phragmites or common reed. Fish and Wildlife Leaflet 13.4.12. Washington, DC: U.S. Department of the Interior, Fish and Wildlife Service. 5 p.

Osterbrock, A. J. 1984. Phragmites australis. The problem and potential solutions. Ohio Field Office, Stewardship. 8 pp.

YELLOW FLAG IRIS

Scientific name: *Iris pseudacorus* **Common name:** Yellow Flag Iris
Updated: 2006

DESCRIPTION: When flowering, yellow flag is unmistakable with its showy yellow flowers colorfully displayed along the edge of water and in wetlands. In Washington, the flowers occur in late spring or early summer. Several flowers can occur on each stem, along with one or two leafy bracts. Each flower resembles a common garden iris with 3 large (3 to 8 cm) downward facing yellow sepals and three smaller upward pointing petals. The sepals are often streaked with brown to purple lines. The plant, including flower stalk, is up to 1.5 m tall. The leaves are mostly basal and are folded and clasp the stem at the base in a fan-like fashion. They stand erect or bent at the top, with shorter leaves toward the outside of the plant. Yellow flag iris is perennial, and will remain green during winter where the weather is mild. It has stout rhizomes 1 to 4 cm in diameter and roots to 30 cm long. The fruits are a large capsule to 8 cm long. It is 3-angled, glossy green and contains many flattened brown seeds. The seeds are corky and about 7 mm across. The plants spread rhizomatously and grow tightly bunched together. This is the only yellow iris found in Washington's wet areas, but when not flowering it may be confused with cattail (Typha latifolia) or broad-fruited bur-reed (Sparganium eurycarpum). Look for the fruits in the summer, or the fan-shaped plant-base at other times of year.

There is little variation in the appearance of yellow flag, aside from flowers which may range from cream to bright yellow. Some horticultural varieties have been developed with variegated leaf color.

Yellow flag is a popular ornamental plant for wet areas or well-mulched soil. It is widely sold in nurseries and on the internet. It has often been planted in wastewater or stormwater treatment ponds. Yellow flag has been used medicinally. The roots have been used for several ailments, but all parts of the plant can also causes vomiting and diarrhea. Flowers have been used to make a yellow dye, and the roots a black or brown dye. It will sicken livestock if ingested, and is generally avoided by herbivores (although muskrats will eat the rhizomes). Contact with the resins can cause skin irritation in humans. Yellow flag is listed on invasive species lists in Vermont, Virginia, Connecticut, and Massachusetts. It is also considered invasive in New Zealand and Australia. The Pacific Northwest Exotic Pest Plant Council lists it as 'A-2 Most Invasive-Regional' (highly to moderately invasive but still with a potential to spread).

Yellow flag is native to Europe, Great Britain, North Africa and the Mediterranean region. It has been introduced in temperate areas nearly world wide and occurs throughout the United States except in the Rocky Mountains. It is found in wet areas throughout Washington, though it appears to be most common near developed areas. Yellow flag grows in temperate wetlands (to 68° N in Scandinavia). It is found on both sides of the Cascades in wetlands and along the margins of lakes and slow-moving rivers. It will grow in water to .25 meters deep, though is most common in very shallow water or mud. It will tolerate drying and anoxic sediment and is also tolerant of at least some salinity, as it is found in brackish marshes in its native range. It is also tolerant of high soil acidity, occurring from pH 3.6 to 7.7. It does well in nutrient rich conditions, and has a high nitrogen requirement. It prefers part shade or full sun exposure.

Yellow flag is native to Europe, the British Isles, North Africa and the Mediterranean. It is a very popular garden plant for wet or very well mulched soil, and has been introduced as an ornamental throughout the world. It was first collected in North America in 1911 in Newfoundland, and was established in British Columbia by 1931. The earliest collection in Washington is from Lake McMurray in Skagit County in 1948. It has also been used to control erosion, and is known to take up metals and nutrients in waste water treatment facilities. Yellow flag dies back in harsh winter conditions, but the rhizomes will overwinter. In spring the long leaves and flower stalks regrow from the rhizomes and flower by late spring or early summer. The rhizomes spread to form dense stands that exclude native wetland species, including typically aggressive species such as *Typha latifolia* (common cattail).

Yellow flag spreads by rhizomes and seeds. Up to several hundred flowering plants may be connected rhizomatously. Rhizome fragments can form new plants if they break off and drift to suitable habitat. The flowers are pollinated by bumble bees and long-tongued flies. Seed germination is not light dependent, needs temperatures above 15° C and is most successful at temperatures of 20° to 30° C. Germination is increased by scarification. Submersed seeds will not germinate.

MANAGEMENT INFORMATION:
Seeds germinate and grow well after being burned in late summer. Also readily resprouts from rhizomes after burning. If pulling or digging yellow flag care should be used to protect the skin as resins in the leaves and rhizomes can cause irritation. Because rhizome fragments can grow to form new plants, care must be taken to collect all fragments.

The Yakima County Noxious Weed Board sponsored an experimental control program through WSU on the I-82 Unit in 2005. The project team tried different rates and combinations of aquatic formulations of glyphosate (Aquamaster) and imazapyr (Habitat), as well as different types of ground cover. Fall treatments appeared to have better control and the Aquamaster/Habitat combination or Habitat alone gave the highest % control. Habitat at a 1% solution, in a Fall application, provided 99% control after 7 months. All spring treatments had new seedlings in the plots after one year, indicating that the herbicide treatments did not provide residual control. No seedlings were present in the Fall treatments and no information beyond the May 6, 2006 follow up survey were available.

Four different types of ground cover were used: clear plastic, black plastic, woven plastic and landscape fabric. The woven tarp provided 99% control but labor is intensive and unrealistic on large infestations.

No biological control work has been done for yellow flag iris.

CURRENT DISTRIBUTION
Iris is common around backwater sloughs and slow moving water on the I-82 Unit. A few plants are showing up in the HQ Unit wetland areas. The Yakima River shoreline is full of iris within the Ellensburg canyon below Rosa Dam, so it's reasonable to expect that seeds and plant parts will continue to wash downstream and on to State lands.

ACRES AFFECTED BY WEED: ~Have not surveyed along waterline within certain backwater sloughs

WEED DENSITY: Heavy

GOALS

Survey and map existing populations
More accurately calculate the acres affected by Yellow flag iris
Survey nearby units for pioneering infestations

ACTIONS PLANNED

None. There is not enough staff time to address this weed problem, especially with such a substantial seed source available immediately upstream and extending for several miles.

CONTROL SUMMARY

2002- No treatment
2003- No treatment
2004- No treatment
2005- Test plots started on I-82 Unit

REFERENCES

Boule, M. K. Brunner, J. Malek, F. Weinmann, V. Yoshino. Wetland Plants of the Pacific Northwest. US Army Corps of Engineers, Seattle. 85 pp.

Correll, D.S. and H.B. Correll. 1975. Aquatic and Wetland Plants of Southwestern United States Vol 1. Stanford University Press, Stanford, CA. 856 pp.

Guard, B.J. 1995. Wetland Plants of Oregon and Washington. Lone Pine Publishing, Redmond, WA. 239 pp.

Jacobsen, Dick, Yakima County Noxious Weed Board, pers. comm.

HAIRY WILLOW-HERB

Scientific name: Epilobium hirsutum L **Common name:** Hairy Willow-Herb
Updated: 2006

DESCRIPTION: Hairy willow-herb is a semi-aquatic, soft-hairy herb that ranges in height from 3 feet to 6 feet tall. The overall plant is covered with fine soft hairs. The leaf arrangement is mostly opposite, and the toothed leaves are lanceolate shaped (much longer than wide, and widest below the middle). The showy rose-purple flowers extend from leaf axils near the top of the plant. Flowers are approximately 3/4" across. Each flower has four sepals, four notched petals and eight stamens. Flowering occurs in July and August. Hairy willow-herb is a tall, attractive plant capable of escaping cultivation to form monotypic stands in natural wetland areas, where aggressive and dense growth can crowd out native or beneficial species. While initially found along ditch-banks and roadsides, hairy willow-herb is capable of spreading to undisturbed meadows. Records indicate this species is considered established throughout most of the northeastern United States, and the distribution continues to spread westward. The majority of Washington populations are limited to Whatcom County, where this plant is regularly found as a garden ornamental, and as an escapee to natural wetland areas.

Hairy willow-herb shares habitat, and the northeast to westward movement and establishment history, with purple loosestrife. These two exotic species co-exist and establish in riparian areas. Purple loosestrife has the ability to take advantage of early spring growing conditions, and hairy willow-herb takes advantage of increased growth in autumn growing conditions. Hairy willow-herb is aggressive and capable of spreading by wind-dispersed seeds, and by a large root system that produce rhizomes that facilitate vegetative spread. Hairy willow-herb is another exotic, aquatic species capable of disrupting the ecology of our wetlands by altering food chains, hydrologic cycles and floral composition. These factors all determine the succession or long-term management plans of these wetland areas.

This semi-aquatic, perennial herb is found in a wide range of moist soils, including wetlands, ditch and stream banks, low fields, pastures and meadows. In its native range hairy willow-herb is found in damp lands and waste places to an elevation of 8100 feet, and it is intolerant of shade. Once established, hairy willow-herb is somewhat shade tolerant. In England (and WA), hairy willow-herb co-exists with purple loosestrife, where both species colonize gaps along riparian areas created by erosion. Hairy willow-herb out competes and grows faster than purple loosestrife in the shorter days and colder temperatures of autumn. In the spring, this relationship is reversed, with purple loosestrife having a faster growth rate. Hairy willow-herb requires habitat with a pH of 5.5 or higher for seed germination.

Hairy willow-herb is a perennial, and it spreads by seeds and by rhizomes. Flower buds develop after 10 to 12 weeks of growth. Side shoots also produce flowering stems, and the whole plant is flowering by mid-summer (July – August). Self-pollination is possible, but seed production is reduced by self-pollination. Seeds are ripe and begin to disperse 4 to 6 weeks after flowering. Each seed is oblong and flattened, with a tuft of long white hairs.

Auxiliary buds found at the base of the stem, produce stolons. These stolons develop adventitious roots, which pull the stolons into the ground, where they develop into fleshy, soft rhizomes. These

rhizomes branch repeatedly, and spread to new areas. When the axillary buds produce stolons that spread along the soil surface, the stolons root and produce a pseudo-rosette of leaves. If this rosette gets separated from the parent plant, it produces an aerial shoot and develops much the same way as an autumn seedling. The aerial shoots die back each autumn, but the rhizome system remains. These rhizomes can reach almost 2 feet in length from the time of initial development to aerial shoot production. Hairy willow-herb adapts to its growing condition. The rhizomes growing in submerged water or water-saturated mud, develops arenchyma tissue. Rhizomes not submerged are mostly cork. Hairy willow-herb is a state-listed class C weed.

MANAGEMENT INFORMATION:
The most effective management tool to date is the herbicide 2,4-D.
Cultivation is not practical in a wetland environment.
No biological control agents are available at this time.

CURRENT DISTRIBUTION
Hairy willow-herb is currently known to exist only on the Windmill Ranch

ACRES AFFECTED BY WEED: ~ 50 **WEED DENSITY:** Low

GOALS
Control expanding populations
Prevent new occurrences

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by Hairy willow-herb
Treat all plants that can be reached before they set seed
Survey nearby units for pioneering infestations

ACTIONS PLANNED
In 2006, plant populations will be sprayed if time allows
Monitoring will continue on an annual basis on nearby units.

CONTROL SUMMARY AND TREND
Hairy willow-herb was first observed in of 2004
2004 – Approximately –0- acres were treated
2005 – Approximately –0- acres were treated

REFERENCES
Baldwin, L. September 1999. Article (Whatcom Co.) for the newsletter of the Washington State Noxious Weed Control Board

Muenscher. W.C. 1995. Weeds. 2nd Ed. Cornell Univ. Press. P. 319-20.

Shamsi, S.R.A. and F.W. Whitehead. 1974. Comparative Eco-physiology of *Epilobium hirsutum* L. and *Lythrum salicaria* L. I. General biology, distribution and germination. The Journal of Ecology. Vol. 62, pp. 279-290.

Shamsi, S.R.A. and F.W. Whitehead. 1974. Comparative Eco-physiology of *Epilobium hirsutum* L. and *Lythrum salicaria* L. II. Growth and development in relation to light. The Journal of Ecology. Pp. 631-645.

Stuckey, R.L. 1970. Distributional History of *Epilobium hirsutum* (great hairy willow-herb) in North America. Rhodora. Vol. 72, pp. 164-181.

Taylor, R.J. 1990. Northwest Weeds. Mountain Press Publishing Co. Missoula, MT. P 88-9.

Whatcom Co. *Epilobium hirsutum* Survey. 1999.

Monitor List files of the Washington State Noxious Weed Control Board office in Kent, WA.

KOCHIA

Scientific name: Kochia scoparia L. **Common name:** Kochia
Updated: 2006

DESCRIPTION: Kochia is an annual plant that reproduces from seeds. It has a deep taproot. The erect, much-branched stems are three to seven feet long, smooth below and usually hairy above. The alternate, simple leaves are pubescent to nearly glabrous; one to two inches long, lanceolate to linear with hairy margins, and without petioles. The small green flowers lack petals and are found in clusters in the axils of the upper leaves and in terminal spikes. The brown flattened seeds are about 1/16 inch long and grooved on each side.

Kochia is an effective competitor for light, nutrients, and soil moisture, and can reduce crop yield. There is a high variation in the flowering time of populations of Kochia.

Kochia has a wide tolerance of soil types and is even adapted to salty soils. It is found on pasture, rangeland, roadsides, ditch banks, wastelands, and cultivated fields. Like many other species of the Chenopodiaceae, it becomes tumbleweed when mature. An abscission zone develops at the base of the stem in autumn. When winds reach velocities of 25 miles per hour, the stem breaks and the plants tumble, dispersing seeds along the way. The seeds germinate very early in spring because of their frost tolerance. Kochia grows very rapidly through spring and summer and sends down a very long taproot (up to 16 feet). It flowers in late summer and sets seed.

The species typically produces around 14,600 seeds per plant. Seeds are dispersed in the fall when the plant becomes tumbleweed. Laboratory studies report germination rates of 76 percent or better over a temperature range of 39-106 degrees F. Seeds buried in the soil have five percent viability after one year and zero percent after two years. Kochia reproduces by seed only. Kochia is a state-listed class B weed.

MANAGEMENT INFORMATION:
Early tillage in the spring gives good control of the Kochia seedlings. Infestations of triazine resistant Kochia has been found along railroad lines in eleven states. Research has shown that triazine resistant biotypes were more susceptible to 2,4-D ester than triazine susceptible biotypes. There are also biotypes resistant to 2,4-D or Banvel (dicamba). It is suggested that rotating herbicides would reduce the possibility of an increase in the proportion of plants tolerant to 2,4-D or Banvel. No biocontrol agents are available.

CURRENT DISTRIBUTION
Kochia is common on all management units and is normally only a problem along roadsides, around water control structures and in parking areas and other disturbed sites. It is also targeted for control in annual food plots and native grass restoration sites. It has recently been added to the noxious weed list for eastern Franklin County.

ACRES AFFECTED BY WEED: ~ 300 **WEED DENSITY:** Medium to High

GOALS
Control expanding populations
Prevent new occurrences

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by Kochia
Treat all plants that can be reached before they set seed
Survey nearby units for pioneering infestations

ACTIONS PLANNED
In 2006, all known problem areas (parking lots, etc.) will be treated with a pre-emergent herbicide.
Roadsides will be sprayed as needed and time permits.
Monitoring will continue on an annual basis on nearby units.

CONTROL SUMMARY
2002 Approximately 100 acres treated
2003 Approximately 100 acres treated
2004 Approximately 100 acres treated
2005 Approximately 100 acres treated

REFERENCES
Reed. 1970. Selected Weeds of the United States.

USDA. 1970. Selected Weeds of the United States. Agriculture Handbook. No. 366.

USDA-ARS, Washington D.C.

Holm, L., J.V. Pancho, J.P. Herberger, D.L. Plucknett. 1979. A Geographical Atlas of World Weeds.

Mitich, L.W. 1981. The Intriguing World of Weeds, Part IX. Weeds Today. 12(2):26.

Smith, L.J., S. Dewey, D. Thill and B. Gallihan. 1983. *Kochia scoparia*. Univ. of Idaho, Ag. Extension, Bulletin #722.

Eberlein, C.V. and Z.Q. Fore. 1984. Kochia Biology. Weeds Today 15(3): 5-7.

Forcella, F. 1985. Spread of Kochia in the North-Western United States. Weeds Today 16(4): 4-6.

Hawkes, R.B., Whitson, T.D. and L.J. Dennis. 1985. A Guide to Selected Weeds of Oregon. Oregon Dept. of Agriculture Press, Salem.

COMMON COCKLEBUR

Scientific name: *Xanthium strumarium* **Common name:** Common Cocklebur
Updated: 2006

DESCRIPTION: Common cocklebur, an annual, 2 to 4 feet tall with the stem erect, branched, ridged, spotted and very rough. Leaves alternate, triangular or heart-shaped, rough on both sides and long petioled. Flower heads are small, in axils of upper leaves; male and female flowers are separate. Fruits are 1 inch long, woody, with hooked prickles and two curved spines at the tip and two seeds. Dark brown seeds are flattened and pointed on tips.

Common cocklebur is native to North America, but is now worldwide in distribution. Several other species are present in the West. Cocklebur is common in cultivated fields, abandoned land, run-down pastures, road ditches and waste areas. The burs are irritating both to humans and animals, and when found in wool, depreciate its value. Both the seeds and seedlings contain a substance toxic to livestock. Flowering may occur from July to September.

MANAGEMENT INFORMATION:
Cocklebur is found mostly in irrigated agricultural fields and within moist soil management units on the SSRWA. Over-watered agricultural fields, sub-irrigated areas or purposely-flooded moist soil management units generally have the highest infestations. Seed production can be controlled by mowing when the seed heads are green, flooding newly emerged seedlings or by herbicides such as dicamba.

CURRENT DISTRIBUTION
Common cocklebur is generally found on all sites with managed wetlands

ACRES AFFECTED BY WEED: ~120 **WEED DENSITY**: Low to Moderate

GOALS
Control expanding populations
Prevent new occurrences

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by common cocklebur
Continue discing, mowing and/or flooding plants within moist soil management units
Continue working with agricultural lessee for better water management
Treat priority infestations before they produce seed
Survey nearby units for pioneering infestations

ACTIONS PLANNED
In 2006, ag lessee on Windmill will chemically treat weeds around perimeters of farmed fields. Moist soil units will be managed for minimal seed production.

CONTROL SUMMARY
2002- Treated approximately 40 acres

2003- Treated approximately 42 acres
2004- Treated approximately 30 acres
2005- Treated approximately 30 acres

REFERENCES

Burrill, Larry C., and David W. Cudney, Steven A. Dewey, Richard D. Lee, B.E. Nelson, Robert Parker, Tom D. Whitson, Weeds of the West, 5th Edition, 1996, pages 194-195.

Ross, Rocky J., personal observation

WILD OAT

Scientific name: *Avena fatua* **Common name:** Wild Oat
Updated: 2006

DESCRIPTION: Wild oat is an annual, 1 to 4 feet tall with erect hollow stems. Leaf blades are 1/8 o 5/8 inch wide, sheaths open, ligules membranous. The seedling leaves twist counterclockwise. The inflorescence is an open panicle, 4 to 18 inches long, drooping, spikelets contain 2 to 3 florets which disarticulate above the glumes. Seeds are yellow to black, narrowly oval, ¼ to ½ inch long.

This species is distinguished from domestic oats by the twisted awn, which bends at right angles and a horseshoe-shaped scar at its seed base. Slender oat (*A. barbata* Brot.) has smaller florets and a more slender rachis. Wild oat is a native of Europe, but is common throughout much of western North America. It is a serious problem in spring-seeded small grain, but it also occurs along roadsides in pastures and waste areas. Seed can remain dormant in the soil for as long as 10 years, making it difficult to eliminate once established. Flowering and seed production occur from June to August.

MANAGEMENT INFORMATION:
Wild oats generally pose a problem on the Wildlife Area both in spring-seeded grainfields and in newly seeded native grass plots. Heavy oat concentrations compete heavily with desired plants in either case. Mowing new grass plantings when the oat seeds are in the milk stage will generally thin the stand enough to release the grass seedlings. Control in small grain fields is generally limited to herbicide treatment with wicking applicators or a broadcast application of fenoxyprop when the plants are small.

CURRENT DISTRIBUTION
Wild oat infestations are currently limited to the HQ and Windmill Ranch units

ACRES AFFECTED BY WEED: ~350 D**ENSITY:** currently low to moderate

GOALS
Control and/or reduce expanding populations
Prevent new occurrences

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by wild oat
Treat problem plants before they can produce seeds
Survey nearby units for pioneering infestations

ACTIONS PLANNED
In 2006, treat oats in bottom Rupley grain fields

CONTROL SUMMARY AND TREND
2002- Approximately 200 acres treated

2003- Approximately 100 acres treated
2004- Approximately 50 acres treated
2005- Approximately 50 acres treated

REFERENCES

Burrill, Larry C., and David W. Cudney, Steven A. Dewey, Richard D. Lee, B.E. Nelson, Robert Parker, Tom D. Whitson, Weeds of the West, 5th Edition, 1996, pages 418-419.

Benson, Jerry, personal communication

Ross, Rocky J., personal observation

RUSSIAN OLIVE

Scientific name: *Elaeagnus angustifolia L.* **Common name:** Russian Olive
Updated: 2006

DESCRIPTION: Russian olive is a small, usually thorny shrub or small tree that can grow to 30 feet in height. Its stems, buds, and leaves have a dense covering of silvery to rusty scales. Leaves are egg or lance-shaped, smooth margined, and alternate along the stem. At three years of age, plants begin to flower and fruit. Highly aromatic, creamy yellow flowers appear in June and July and are later replaced by clusters of abundant silvery fruits.

Russian-olive can out compete native vegetation, interfere with natural plant succession and nutrient cycling, and tax water reserves. Because Russian olive is capable of fixing nitrogen in its roots, it can grow on bare, mineral substrates and dominate riparian vegetation where overstory cottonwoods have died. Although Russian olive provides a plentiful source of edible fruits for birds, ecologists have found that bird species richness is actually higher in riparian areas dominated by native vegetation.

Russian olive is found along streams, fields and open areas. Seedlings are tolerant of shade and it thrives in a variety of soil and moisture conditions, including bare mineral substrates. Establishment and reproduction of Russian olive is by primarily by seed, although some vegetative propagation also occurs. The fruit of Russian olive is a small cherry-like drupe that is readily eaten and disseminated by many species of birds. Russian olive is a state-listed class C weed.

MANAGEMENT INFORMATION:
Mowing hedges with a brush type mower, followed by removal of cut material may be the most effective method for eradication. Herbivorous animals are not known to feed on it and few insects seem to utilize or bother it. Canker disease is occasionally a problem but not enough to be useful as a control agent. Establishment and reproduction of Russian olive is by primarily by seed, although some vegetative propagation also occurs. Herbicides can be an effective tool for control.

On the SSRWA, one of the techniques used on mature, monotypic stands of Russian olive is to remove whole trees with an excavator, and pile them in windrows where they are either burned or left for wildlife cover. The disturbed area is then raked smooth with a dozer and brush rake attachment, then disced with a heavy offset disc to prepare a smooth seedbed. The area is chemically fallowed for one year, then planted to spring grain. The grain serves as a cover crop while another year of weed control is performed on broadleaf weeds and olive resprouts. Eventually, the area is seeded to native grasses and shrubs.

CURRENT DISTRIBUTION
Russian olive is found on all units except the Walla Walla River sites, Rattlesnake Slope and the Thornton units.

ACRES AFFECTED BY WEED: ~ 1,500 **WEED DENSITY:** Low to Dense

GOALS
Control and/or reduce expanding populations
Prevent new occurrences

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by Russian olive
Treat problem plants before they can produce seeds
Survey nearby units for pioneering infestations

ACTIONS PLANNED
In 2006, priority areas will be surveyed and spot treated using herbicide
Monitoring will continue on an annual basis on nearby units.

CONTROL SUMMARY AND TREND
2002 – Approximately 35 acres were treated
2003 – Approximately 60 acres were treated
2004 – Approximately 100 acres were treated
2005 – Approximately 80 acres were treated

REFERENCES
Knopf, F.L., and T.E. Olson. 1984. Naturalization of Russian-olive: implications for Rocky Mountain wildlife. Wildlife Society Bulletin 12:289-298.

Shafroth, P.R., G.T. Aubla, and M.L. Scott. 1995. Germination and establishment of the native plains cottonwood (Populus deltoides Marshall subsp. moniifera) and the exotic Russian-olive (Elaeagnus angustifolia L.). Conservation Biology 9:1169-1175.

RUSSIAN KNAPWEED

Scientific name: *Acroptilon repens L.* **Common name:** Russian Knapweed
Updated: 2006

DESCRIPTION: A bushy, branched perennial, Russian knapweed grows one to three feet tall and forms clones or colonies from its vigorous, spreading root system. The erect, hairy stems branch from above the middle or not at all. While young plants may have whitish and woolly stems, older plants will turn dark brown to black. The basal leaves are deeply notched and gray-green in color, while the upper leaves are smaller and linear with broken edges. The stem leaves are intermediate in size with toothed edges. The pinks to purple flowers grow in solitary heads at the tips of leafy branches. The bracts under the flower heads are greenish to straw colored, with a broad, papery tip. Russian knapweed flowers from June to September, producing ivory-white seeds with a feather-like plume. Russian knapweed is an aggressive and invasive noxious weed of pastures, non-crop areas, grain fields, and other cultivated fields. Livestock may avoid this species; in addition, the plant is poisonous to horses, causing chewing disease (nigropallidal encephalomalacia). Russian knapweed is common on the heavier, often saline soils of bottomlands, as well as subirrigated slopes and flats. The species is also competitive in hayfields, pastures, grain fields, and along roads or irrigation ditches. In eastern Washington, Russian knapweed is commonly found on sites occupied by basin wildrye (*Elymus cinereus*). The plant reproduces by seed, although the seeds are too heavy to be wind-borne. Long-distance transport is typically as a contaminant in hay or seed lots. Plants can spread locally via lateral extension of the roots. Russian knapweed is a state-listed class B weed.

MANAGEMENT INFORMATION:
Productivity is likely to be maximized in a minimum amount of time if Russian knapweed populations can be treated with a suitable herbicide, farmed, and seeded with competitive forage. Depending on the moisture regime, nitrogen fertilizer applied in conjunction with an herbicide can significantly improve the competitiveness of residual grasses. In addition, improved grazing management will significantly influence the life span of Russian knapweed control efforts. Herbicides can be effective depending on timing and consistency. There are no known effective biological control agents at this time.

CURRENT DISTRIBUTION
Russian knapweed is currently found on all of the Benton and Yakima county sites except Rattlesnake Slope and Thornton.

ACRES AFFECTED BY WEED: ~ 1,000 **WEED DENSITY:** Medium to dense in spots

GOALS
Reduce existing populations
Prevent new occurrences

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by Russian knapweed
Treat all plants that can be reached before they produce seed

Survey nearby units for pioneering populations
Plant competitive vegetation

ACTIONS PLANNED
In 2006, spring and fall treatments are planned on HQ, I-82 and Byron. The Byron plots are scheduled for seeding to native grass when knapweed is controlled.
Monitoring will continue on an annual basis on nearby units

CONTROL SUMMARY AND TREND
2002 – Approximately 150 acres were treated
2003 – Approximately 100 acres were treated
2004 – Approximately 100 acres were treated
2005 – Approximately 100 acres were treated

REFERENCES
Delorit, R.J. 1970. An Illustrated Taxonomy Manual of Weed Seeds. Agronomy Publications. River Falls, WI.

Dennis, L.J. 1980. Gilkey's Weeds of the Pacific Northwest. Oregon State University Press, Corvallis.

Gaines, X. M. and D.G. Swan. 1972. Weeds of Eastern Washington and Adjacent Areas. CampNa-Bor-Lee Association, Davenport, WA.

Hawkes, R.B., T.D. Whitson, and L.J. Dennis. 1985. A Guide to Selected Weeds of Oregon.Oregon Department of Agriculture, Salem.

Hitchcock, C.L. and A. Cronquist. 1973. Flora of the Pacific Northwest. University of Washington Press, Seattle.

Nelson, E.W. and O. Burnside, eds. 1979. Nebraska Weeds. Nebraska Department of Agriculture, Lincoln.

Roche', B. 1983. Range plants: Their identification, usefulness, and management. SBC, Washington State University, Pullman.

Roche', B.F. Jr., G.L. Piper, and C.J. Talbott. 1986. Knapweeds of Washington. Cooperative Extension Bulletin EB1393. Washington State University, Pullman.

Roche', B.F. Jr. and C.J. Talbott. 1986. The collection history of *Centaurea*s found in Washington State. Research Bulletin EB 0978. Agricultural Research Center, Washington State University, Pullman.

Roche', B.F. Jr. and C.T. Roche'. 1991. Identification, introduction, distribution, ecology, and economics of *Centaurea* species. *In* James, L.F., J.O. Evans, M.H. Ralphs, and R.D. Child, eds.

Noxious Range Weeds, pp. 369-388. Westview Press, Boulder, CO.

Wilkinson, R.E. and H.E. Jaques. 1959. How to Know the Weeds. Wm. C. Brown Co. Publishers, Dubuque, IA.

DIFFUSE KNAPWEED

Scientific name: *Centaurea diffusa L.* **Common name:** Diffuse Knapweed
Updated: 2006

DESCRIPTION: Diffuse knapweed is an 8 to 40 inch tall, biennial or short-lived perennial species, with a long tap root. The single, upright stem produces several spreading branches. The basal leaves are short-stalked and divided into lobes on both sides of the center vein. The stem leaves are stalk less, becoming smaller and less divided near the top of the stem. The flowers, which are generally white (sometimes pink or lavender), occur in urn-shaped heads that grow in clusters at the ends of the branches. The bracts of the flower heads are leathery, with obvious veins. The lower and middle bracts are yellowish-green with a buff or brown margin; they are edged with a fringe of spines plus a longer, spreading spine at the tip.

Diffuse knapweed is a very aggressive species that can infest large areas quickly. The species has little value as forage for cattle and limited seasonal value for big game. Knapweed infestations increase production costs for ranchers, impair the quality of wildlife habitat, decrease plant diversity, increase soil erosion rates, decrease the visual quality and appeal of recreational lands, and pose wildfire hazards.

Diffuse knapweed has been found in a wide range of habitats, including sandy river shores, gravel banks, cracks in rocks on cliffs and outcrops, rangelands, pastures, and hayfields on sandy loams, loams, and silt loams. Diffuse knapweed appears to grow best on well-drained, light textured soils. It is not tolerant of flooding or shade. While it is not tolerant of cultivation with annual crops, diffuse knapweed thrives in gravel pits, roadsides, railroad tracks, vacant lots, airports, trails, and heavily grazed pastures.

Diffuse knapweed is a biennial or short-lived perennial plant. It establishes a rosette in its first season of growth and it commonly bolts the second year. However, when stressed by drought, grazing, or mowing, it may show short-term perennial characteristics: Diffuse knapweed is a biennial or short-lived perennial plant. It establishes a rosette in its first season of growth and it commonly bolts the second year. However, when stressed by drought, grazing, or mowing, it may show short-term perennial characteristics.

While plants may regenerate from the crown, diffuse knapweed reproduces primarily by seed. A single flower stalk can produce 1,200 seeds. The seeds are dispersed when the plant breaks off at the base and behaves as a tumbleweed. Vehicles can often transport these tumbleweeds. The seeds are moved in shoelaces, by feeding rodents, and in contaminated hay and crop seed. Diffuse knapweed is a state-listed class B weed.

MANAGEMENT INFORMATION:
Cultivation will eliminate diffuse knapweed. Grazing or mowing delays flowering and may increase the number of stems, thereby increasing seed production. Five biocontrol agents have been established on diffuse knapweed in Washington. Two seed head weevils, *Bangasternus fausti* and *Larinus minutus,* do not occur in collectable numbers at present. *Urophora affinis (*seed head fly), *Urophora quadrifasciata* (seed head fly), and *Sphenoptera jugoslavica* (root boring/gall beetle) are available for mass collections. Herbicides can be an effective tool for control.

CURRENT DISTRIBUTION
Diffuse knapweed is currently known to occur on the I-82, Thornton, Rattlesnake Slope, Windmill Ranch and McDonald Road management units. It is likely that this weed also exists on other sites as well.

ACRES AFFECTED BY WEED: ~ 800 **WEED DENSITY:** Low to Medium

GOALS
Control expanding populations
Prevent new occurrences
Add to bio control distribution (Benton Co. Weed Board releases on Rattlesnake Slope)

OBJECTIVES
Survey and map existing populations
More accurately calculate the acres affected by diffuse knapweed
Release biological controls
Treat all plants that can be reached before they produce seed
Survey nearby units for pioneering infestations

ACTIONS PLANNED
In 2006, as many locations as possible will be sprayed. Monitoring will continue on an annual basis on nearby units.

CONTROL SUMMARY
2002 – Approximately 200 acres were treated
2003 – Approximately 200 acres were treated
2004 – Approximately 200 acres were treated
2005 – Approximately 100 acres were treated

REFERENCES
Dennis, L.J. 1980. Gilkey's Weeds of the Pacific Northwest. Oregon State University Press, Corvallis.

*Gaines, X. M. and D.G. Swan. 1972. Weeds of Eastern Washington and Adjacent Areas. Camp Na-Bor-Lee Association, Davenport, WA.

*Hawkes, R.B., T.D. Whitson, and L.J. Dennis. 1985. A Guide to Selected Weeds of Oregon. Oregon Department of Agriculture, Salem.

*Hitchcock, C.L. and A. Cronquist. 1973. Flora of the Pacific Northwest. University of Washington Press, Seattle.
Roche', B. 1983. Range plants: Their identification, usefulness and management. SBC, Washington State University, Pullman.

*Roche', B. and C.J. Talbott. 1984. Eastern Washington Range Plants. Extension Bulletin 1302. Washington State University, Pullman.

*Roche', B.F. Jr., G.L. Piper, and C.J. Talbott. 1986. Knapweeds of Washington. Cooperative Extension Bulletin EB1393. Washington State University, Pullman.

*Roche', B.F. Jr. and C.J. Talbott. 1986. The collection history of *Centaurea*s found in Washington State. Research Bulletin EB 0978. Agricultural Research Center, Washington State University, Pullman.

*Roche', B.F. Jr. and C.T. Roche'. 1991. Identification, introduction, distribution, ecology, and economics of *Centaurea* species. *In* James, L.F., J.O. Evans, M.H. Ralphs, and R.D. Child, eds. Noxious Range Weeds, pp. 369-388. Westview Press, Boulder, CO.
**References available from the Washington State Noxious Weed Control Board Office in Olympia.*

General Weed Control

There is a lot of general weed control that is performed on the Wildlife Area each year. Any new restoration project requires a minimum of one herbicide treatment, and multiple treatments are more likely. As older grass restoration projects age, particularly those in the floodplain, desirable plant species become decadent and sparse, allowing niches for weedy species to invade. Periodically, these areas must be manipulated in some way to restore vigor to the target vegetation. Herbicide treatments are generally part of the prescription.

Downy brome, or cheatgrass, is common throughout the wildlife area but poses the most significant problem in shrub steppe restoration projects. Techniques have been developed to at least temporarily control cheatgrass in these projects but it will never be eliminated from existing landscapes.

In addition, roadways, parking lots, equipment yards, water control structures, emergent wetlands, etc. all need some level of maintenance with regard to weed control. Any weed control activity that does not target a specific species is lumped into the general weed category. In 2005, nearly 500 acres were treated.

2005

Yakima County Noxious Weed List and Control Policy

The YAKIMA COUNTY NOXIOUS WEED BOARD (here in after referred to as the BOARD) shall promote weed control by personal contact with LANDOWNERS and through public media. The BOARD will also promote weed control through public seminars, hearings, demonstrations, field tours, school lectures, and at regularly scheduled board meetings. LANDOWNERS are responsible for the control of noxious weeds on their property as per RCW 17.10.140 prior to blooming stage, seed maturity and the development of a root system that would enable said weeds to propagate and spread.

The BOARD shall encourage landowners to control noxious weeds on their own property through their own means, or by means commercially available. Control is defined as stopping all seed production, and containing the noxious weeds to the current infested locations. The Weed Board Coordinator and Inspectors will assist landowners in locating and identifying noxious weeds and encourage the landowner to report to the BOARD other noxious weed infestations. The BOARD, or AUTHORIZED STAFF, has the authority to enter all property within the jurisdiction of this BOARD for the purpose of administering the weed laws of the State of Washington under R.C.W. Chapter 17.10.160.

If the property owner does not promptly take action to control the noxious weeds in accordance with R.C.W. 17.10 and this policy, the YAKIMA COUNTY NOXIOUS WEED BOARD may cause their being controlled at the expense of the landowner as per R.C.W. 17.10.170. Charges for regulatory work shall be incurred by the landowner on the basis of the cost, including labor and materials and, if necessary, legal and administrative fees. Such expenses when necessary shall constitute a lien against the property after a hearing and determination has been made on such expense and approved by the BOARD.

The W.A.C. Chapter 16.750 constitutes the Washington State Noxious Weed List, which is classified as “A”, “B”, and “C” weeds. The following shall constitute Yakima County’s Noxious Weed List and control is required within Yakima County.

All Class “A” Weeds,
Class “B” Weeds, (All designated, some listed)
Yellow Starthistle-*Centaurea solstitialis*
Tansy ragwort-*Senccio jacobaea*
Scotch thistle-*Onoprodum acanthiun*
Meadow knapweed-*Centaurea pratensis*
Yellow nutsedge-*Cyperus esculentus*
Purple loosestrife-*Lythrum salicaria*

Educational Weed List
Knapweed species-All known species
Canada thistle-*Cirsium arvense*
Perennial pepperweed-*Lepidium latifolium*

The Yakima County Noxious Weed Board will conduct regularly scheduled meetings and will encourage public attendance and participation.

Resolution: #55 The following requirements will be the policy for placing a weed on the County’s Noxious Weed List:

A. The Weed Board shall announce the noxious weed list within the guidelines set forth in R.C.W. 17.10.090.

B. The order in which a weed be submitted to the Board for consideration to be placed on the noxious weed list, the following information must be submitted to the Noxious Weed Board.

1. Location of weed, with an estimation of acreage.
2. Verification that adjacent property owners have been notified on the intent to have the weed placed on the Noxious Weed List.
3. Characteristics of the weed in consideration.

C. The Weed Board has the right to place the weed in question on a review and study list for a set period of time not to exceed one year and, at that time, make a policy statement on the weed in question.

RESOLUTION #118

YAKIMA COUNTY NOXIOUS WEED LIST FOR 2005

In accordance with R.C.W. 17.10 a County Noxious Weed List comprising the names of the following plants, which have been declared noxious by the State of Washington Noxious Weed Board, and Yakima County Weed Control Board. Said Board find these plants to be weedy; highly destructive, competitive, or difficult to control by cultural or chemical practices. Said weeds shall comprise the NOXIOUS WEED LIST for Yakima County for 2005 or until another list is adopted by this Board.

Yakima County lies in Regions 6 and 9.

ALL CLASS "A" NOXIOUS WEEDS. (Mandatory Control)
(** Known to be in Yakima County)

COMMON NAME:	SCIENTIFIC NAME:	COMMON NAME:	SCIENTIFIC NAME:
bean-caper, Syrian	*Zygophyllum fabago*	knapweed, bighead	*Centaurea macrocephala*
blueweed, Texas **	*Helianthus ciliaris*	knapweed, Vochin	*Centaurea nigrescens*
broom, Spanish	*Spartium junceum*	kudzu	*Pueraria Montana* var. *lobata*
buffalobur **	*Solanum rostratum*	lawnweed	*Soliva sessilis*
clary, meadow	*Salvia pratensis*	mustard, garlic	*Alliaria petiolata*
cordgrass, denseflower	*Spartina densiflora*	nightshade, silverleaf	*Solanum elaeagnifolium*
cordgrass, salt meadow	*Spartina patens*	sage, clary	*Salvia sclarea*
crupina, common	*Crupina vulgaris*	sage, Mediterranean	*Salvia aethiopis*
flax, spurge	*Thymelaea passerina*	spurge, eggleaf	*Euphorbia oblongata*
four o'clock, wild	*Mirabilis nyctaginea*	starthistle, purple	*Centaurea calcitrapa*
goatsrue	*Galega officinalis*	thistle, Italian	*Carduus pycnocephalus*
hawkweed, yellow devil	*Hieracium floribundum*	thistle, milk	*Silybum marianum*
hogweed, giant	*Heracleum mantegazzianum*	thistle, slenderflower	*Carduus tenuiflorus*
hydrilla	*Hydrilla verticillata*	velvetleaf **	*Abutilon theophrasti*
johnsongrass **	*Sorghum halepense*	woad, dyers	*Isatis tinctoria*

CLASS "B" NOXIOUS WEEDS (**Known to be in Yakima County)
(bd classifications require mandatory control) Note: bd - Class B designate

COMMON NAME:	SCIENTIFIC NAME:	COMMON NAME:	SCIENTIFIC NAME:
arrowhead, grass-leavedbd	*Sagittaria graminea*	anwort bd	*Cabomba caroliniana*
alyssum, hoary bd	*Berteroa incana*	fieldcress, Austrian bd	*Rorippa austriaca*
blackgrass bd	*Alopecurus myosuroides*	floating heart, yellow bd	*Nymphoides peltata*
blueweed bd	*Echium vulgare*	gorse bd	*Ulex europaeus*
broom, Scotch bd**	*Cytisus scoparius*	hawkweed, mouseear bd	*Hieracium pilosella*
bryony, white bd	*Bryonia alba*	hawkweed, orange bd	*Hieracium aurantiacum*
bugloss, annual bd	*Anchusa arvensis*	hawkweed, polar bd	*Hieracium atratu*
bugloss, common bd	*Anchusa officinalis*	hawkweed,Queen-devil bd	*Hieracium glomeratum*
camelthorn bd	*Alhagi maurorum*	hawkweed, smooth bd	*Hieracium laevigatum*
carrot, wild bd**	*Daucus carota*	hawkweed, yellow bd	*Hieracium caespitosum*
catsear, common bd **	*Hypocharis radicata*	hedgeparsley bd	*Torilis arvensis*
chervil, wild bd	*Anthriscus sylvestris*	helmet, policeman's bd	*Impatiens glandulifera*
cinquefoil, sulfur bd	*Potentilla recta*	herb-Robert bd	*Geranium robertianum*
cordgrass, common bd	*Spartina alterniflora*	houndstongue**	*Cynoglossum officinale*
cordgrass, smooth bd	*Spartina anglica*	indigobush bd	*Amorpha fruticosa*
daisy, oxeye bd**	*Leucanthemum vulgare*	knapweed, black bd	*Centaurea nigra*
elodea, Brazilian bd	*Egeria densa*	knapweed, brown bd	*Centaurea jacea*

COMMON NAME:	SCIENTIFIC NAME:
knapweed, diffuse **	*Centaurea diffusa*
knapweed, meadow bd**	*Centaurea jacea x nigra*
knapweed, Russian **	*Acroptilon repens*
knapweed, spotted bd**	*Centaurea biebersteinii*
knotweed, Bohemian	*Polygonum bohemicum*
knotweed, giant	*Polygonum sachalinense*
knotweed, Himalayan	*Polygonum polystachyum*
knotweed, Japanese **	*Polygonum cuspidatum*
kochia**	*Kochia scoparia*
lepyrodiclis bd	*Lepyrodiclis holosteoides*
loosestrife, garden bd	*Lu\ysimachia vulgaris*
loosestrife, purple bd**	Lythrum salicaria
loosestrife, wand bd	*Lythrum virgatum*
nutsedge, yellow **	*Cyperus esculentus*
oxtonge, hawkweed bd	*Picris hieracioides*
parrotfeather bd**	*Myriophyllum aquaticum*

Class "C" Noxious Weeds

COMMON NAME:	SCIENTIFIC NAME:
babysbreath	*Gypsophila paniculata*
bindweed, field	*Convolvulus arvensis*
butterfly bush	*Buddleja davidii*
canarygrass, reed	*Phalaris arundinacea*
cockle, white	*Silene latofolia*
cocklebur, spiny	*Xanthium spinosum*
cress, hoary	*Cardaria draba*
dodder,smoothseed alfalfa	*Cuscuta approximata*
goatgrass, jointed	*Aegilops cylindrica*
groundsel, common	*Senecio vulgaris*
hawkweed, spp*	non-native *Hieracium*
henbane, black	*Hyoscyamus niger*
iris, yellow flag	*Iris pseudocorus*
ivy, English	*Herdera Hibernica*
ivy, English	*Hedera helix, Baltica*
ivy, English	*Hedera helix, Pittsburgh*
ivy, English	*Hedera helix, Star*

COMMON NAME:	SCIENTIFIC NAME:
mayweed, scentless	*Matricaria perforata*
old man's beard	*Clematis vitalba*
pondweed, curly-leaf	*Potamogeton crispus*
poison-hemlock	*Conium maculatum*
reed, common	*Phragmities australis*
rye, cereal	*Secale cereale*
spikeweed	*Hemizonia pungens*
St. Johnswort, common	*Hypericum perforatum*
tansy, common	*Tanacetum vulgare*
thistle, bull	*Cirsium vulgare*
thistle, Canada	*Cirsium arvense*
toadflax, yellow	*Linaria vulgaris*
water lily, fragrant	*Nymphaea odorata*
whitetop, hairy	*Cardaria pubescens*
willowherb, hairy	*Epilobium hirsutum*
wormwood, absinth	*Artemisia absinthium*

COMMON NAME:	SCIENTIFIC NAME:
pepperweed, perennial **	*Lepidium latifolium*
primrose, water	*Ludwigia hexapetala*
puncturevine**	*Tribulus terrestris*
ragwort, tansy bd**	*Senecio jacobaea*
saltcedar bd	*Tamariz ramosissima*
sandbur, longspine	*Cenchrus longispinus*
skeletonweed, rush bd**	*Chondrilla juncea*
sowthistle, perennial bd**	*Sonchus arvensis*
spurge, leafy bd**	*Euphorbia esula*
spurge, Myrtle**	*Euphorbia myrsinites*
starthistle, yellow bd**	*Centaurea solstitialis*
swainsonpea**	*Sphaerophysa salsula*
thistle, musk bd**	*Carduus nutans*
thistle, plumeless bd	*Carduus acanthoides*
thistle, Scotch bd**	*Onopordum acanthoides*
toadflax, Dalmatian **	*Linaria dalmatica*
watermilfoil,Eurasian bd**	*Myriophyllum spicat*

2005
BENTON COUNTY NOXIOUS WEED LIST
BENTON COUNTY NOXIOUS WEED CONTROL BOARD
1215 DUDLEY AVE., PROSSER, WA 99350
P.O. BOX 311, PROSSER
PH 509.786.6988, FAX 509.786.6990

CLASS A WEEDS: Non-native species in Washington. Preventing new infestations and eradicating existing infestations **is required by law**.

buffalobur (Solanum rostratum)
johnsongrass (Sorghum halepense)
velvetleaf (Abutilon theophrasti)

CLASS B WEEDS: Non-native species designated for control in regions where they are not yet widespread. In regions where a Class B species is already abundant, control is decided at the local level.

houndstongue *(Cynoglossum officinale)*
indigobush *(Amorpha fruticosa)*
knapweed, diffuse *(Centaurea diffusa)*
knapweed, Russian *(Acroptilon repens)*
knapweed, spotted *(Centaurea biebersteinii)*
knotweed, Japanese *(Polygonum cuspidatum)*
loosestrife, purple *(Lythrum salicaria)*
nutsedge, yellow *Cyperus esculentus)*
skeletonweed, rush *(Chondrilla juncea)*
sowthistle, perennial *(Sonchus arvensis ssp.)*
starthistle, yellow *(Centaurea solstitalis)*
thistle, musk *(Carduus nutans)*
thistle, scotch *(Onopordum acanthium)*
toadflax, Dalmatian *(Linaria dalmatica)*
watermilfoil, Eurasian *(Myriophyllum spicatum)*

CLASS C WEEDS: Non-native species that are widespread. Long term programs of suppression and control are a County option.

babysbreath *(Gypsophila paniculata)*
goatgrass, jointed *(Aegilops cylindrical)*
groundsel, common *(Senecio vulgaris)*
iris, yellow flag *(I ris pseudocorus)*
Willowherb, hairy *(Epilobium hirsutum)*
poison hemlock *(Conium maculatum)*
rye, cereal *(Secale cereale)*
thistle, bull *(Cirsium vulgare)*
thistle, Canada *(Cirsium arvense)*

EDUCATION LIST: The Weed Board will assist Landowners in the control of these weeds.

bull thistle *(Cirsium vulgare)*
kochia *(Kochia scoparia)*
canada thistle *(Cirsium arvense)*
punctureVine *(Tribulus terrestris)*

FRANKLIN COUNTY
POLICY STATEMENT AND WEED LIST 2005

A. General Philosophy

The Franklin County Noxious Weed Control Board (FCNWCB) shall promote weed control by personal contact with landowners and through appropriate public media. The FCNWCB has elected to emphasize an educational control program that will assist landowners in weed identification and proper control with emphasis placed on weeds on the control list. The FCNWCB will provide a trained field staff to assist the landowners. The field staff are regulatory inspectors and if needed will require control of weeds on the weed control list. The FCNWCB will promote weed control through public seminars, newsletters, displays, and regular board meetings. Landowners are responsible for controlling noxious weeds on their property and the spread to other areas.

B. Course of Action

1) The FCNWCB will employ a Weed Control Coordinator, and a field staff. The Coordinator and field staff should have both educational background in, and hands on experience with weeds. The staff should be familiar with both chemical and cultural weed control practices. They should also be familiar with agricultural chemicals, their application, and have the appropriate pesticide licenses. The staff must work well with the public and use a diplomatic approach. Wage and benefits will be commensurate with experience and comparable to other similar positions. Office, and telephone access as well as Weed Board vehicles will be provided.

2) It is the policy of the FCNWCB to work closely with all public agencies, municipalities, and landowners to control their noxious weeds by whatever means they have at their disposal. The FCNWCB believes that the most effective spirit with which to approach weed control is one of cooperation. The spread of weeds causes economic losses for the entire community and creates a hardship on the producer. Stopping propagation and spread of noxious weeds is the goal of the FCNWCB. Reasonable alternatives will be pursued on a given case before enforcement proceedings are taken. If the property owner does not take actions to control the noxious weeds in accordance with Chapter 17.10, Revised Code of Washington (RCW), the FCNWCB shall cause their being controlled at the expense of the landowner as per RCW 17.10.170. Charges for the regulatory work shall be incurred on the basis of a cost of application plus labor and material. The amount of such expense shall constitute a lien against the property after a hearing has been held on such expense and approved by the FCNWCB. For those who have a severe infestation, an approved, reasonable, continuous effort will be considered in compliance with our goals. The Weed Board staff will be available to assist in formulating an approved control plan. A strong emphasis will be made to prevent new weeds from establishing. It will take help from everyone in locating and reporting noxious weed infestations to the FCNWCB. We intend to reserve our cost share dollars, should they become available, to target and eliminate these new invaders.
The FCNWCB recognizes that situations may arise where the Coordinator or staff may, in the pursuance of their duties, find it necessary to enter private property. The FCNWCB or duly authorized personnel has the authority to enter all property for the purposes of enforcing the weed laws of the State of Washington under RCW 17.10.160. Reasonable efforts will be made to gain the landowner's permission and cooperation before doing so.

3) The FCNWCB has designated three separate classes of land: Irrigated farmland; dryland farm land; and range which will include rights-of-way and other undeveloped land. Each classification will be assessed separately, and will be treated as having its own problems and economics.

4) The FCNWCB will address specific complaints on a case by case basis. These complaints will be addressed at regularly scheduled Board Meetings. The Board will have regular meetings the third Monday of each month at 1:00 p.m. October through March and 7:00 p.m. April through September. Meetings shall be open to the public and held in the Franklin County Emergency Management Center Board Room, 502 Boeing Street, Pasco, Washington.

5) The FCNWCB will hold a public hearing and solicit public input in regard to the formation of a noxious weed list for control within Franklin County. The following Noxious Weeds have been selected from the State Noxious Weed List for control within the county. An (*) marks those weed found in Franklin County.

Franklin County Weed List 2005

Class	Common Name	Scientific Name
B	alyssum, hoary	*Bertero aincang*
B	arrowhead, grass-leaved	*Sagittaria gramninea*
A	bean-caper, syrian	*Zygophyllum fabago*
B	blackgrass	*Alopecurus myosuroides*
A	blueweed, texas	*Helianthus ciliaris*
B	blueweed, (vipers bugloss)	*Echium vulgare*
B	broom, scotch	*Cytisus scoparius*
A	broom, Spanish	*Spartium junceum*
B	*bryony, white	*Bryonia alba*
A	*buffalobur	*Solanum rostratum*
B	bugloss, annual	*Anchusa arvensis*
B	bugloss, common	*Anchusa officianalis*
B	*camelthorn	*Alhagi maurorum*
B	*carrot, wild	*Daucus carota*
B	catsear, common	*Hypochaeris radicata*
B	chervil, wild	*Anthriscus sylvestris*
B	cinquefoil, sulfur	*Potentilla recta*
A	clary, meadow	*Salvia pratensis*
B	cordgrass, common	*Spartina anglica*
A	cordgrass, denseflower	*Spartina densiflora*
A	cordgrass, salt meadow	*Spartina patens*
B	cordgrass, smooth	*Spartina alterniflora*
C	*cocklebur, spiny	*Xanthium spinosum*
A	crupina, common	*Crupina vulgaris*
B	daisy, oxeye	*Leucanthemum vulgare*
B	elodea, brazilian	*Egeria densa*
B	fanwort	*Cabomba caroliniana*
B	fieldcress, Austrian	*Rorripa austriaca*
A	flax, spurge	*Thymelaea passerina*
B	floating heart, yellow	*Nymphoides peltata*
A	four o'clock, wild	*Mirabilis, nyctaginea*
C	*goatgrass, jointed	*Triticum cylindricum*
A	goatsrue	*Galega officinalis*
B	gorse	*Ulex europaeus*
B	hawkweed, mouseear	*Hieraceum pilosella*
B	hawkweed, orange	*Hieraceum auranthiacum*
B	hawkweed, polar	*Hieraceum atratum*
B	hawkweed, queendevil	*Hieraceum glomeratum*
B	hawkweed, smooth	*Hieraceum laevigatum*
B	hawkweed, yellow	*Hieraceum caespitosum*
A	hawkweed, yellow devil	*Hieraceum floribundum*
B	hedgeparsley	*Torilis arvensis*
B	helmet. policeman's	*Impatiens glandulifera*
B	herb-Robert	*Geranium robertianum*
B	houndstongue	*Cyngoglossum officinale*
A	hogweed, giant	*Heracleum mantegazzianum*
A	hydrilla	*Hydrilla verticillata*
A	johnsongrass	*Sorghum halapense*
A	knapweed, bighead	*Centaurea macrocephala*
B	knapweed, black	*Centaurea nigra*
B	knapweed, brown	*Centaurea jacea*
B	*knapweed, diffuse	*Centaurea diffusa*
B	knapweed, meadow	*Centaurea jacea x nigra*
B	* knapweed, spotted	*Centuarea biebersteinii*
A	knapweed, Vochin	*Centaurea nigrescens*
B	*kochia (E. part of county)	*Kochia scoparia*
A	kudzu	*Puerarua montana var. lobata*
A	lawnweed	*Soliva sessilis*
B	lepyrodiclis	*Lepyrodiclis holosteoides*
B	loosestrife, garden	*Lysimachia vulgaris*
B	*lythrum, purple(loosestrife)	*Lythrum salicaria*
B	lythrum, wand (loosestrife)	*Lythrum virgatum*
A	mustard, garlic	*Alliaria petiolata*
A	nightshade, silverleaf	*Solanum elaeagnifolium*
B	*nutsedge, yellow	*Cyperus esculentus*
B	oxtongue, hawkweed	*Picris hieracioides*
B	parrotfeather	*Myriophyllum aquaticum*
B	primrose, water	*Ludwigia heapetala*
B	ragwort, tansy	*Senecio jacobaea*
C	*rye, cereal (E part county)	*Secale cereale*
A	sage, clary	*Salvia sclarea*
A	sage, mediterranean	*Salvia aethiopis*
B	*saltcedar	*Tamarix ramosissima*
B	*skeletonweed, rush	*Chondrilla juncea*
B	*sowthistle, perennial	*Sonchus arvensis spp arvensis*
C	*spikeweed	*Hemizonia pungens*
A	spurge, eggleaf	*Euphorbia oblongata*
B	spurge, leafy	*Euphorbia esula*
B	*starthistle, yellow	*Centaurea solstitialis*
A	starthistle, purple	*Centaurea calcitrapa*
B	swainsonpea	*Sphaerphysa salsula*
C	*thistle, canada	*Cirsium arvense*
A	thistle, italian	*Carduus pycnocephalus*
A	thistle, milk	*Silybum marianum*
B	*thistle, musk	*Carduus nutans*
B	thistle, plumeless	*Carduus acanthoides*
B	*thistle, scotch	*Onopordum acanthium*
A	thistle, slenderflower	*Carduus tenuiflorus*
B	*toadflax, dalmatian	*Linaria dalmatica spp dalmatica*
A	*velvetleaf	*Abutilon theophrasti*
B	*watermilfoil, eurasian	*Myriophyllum spicatum*
A	woad, dyers	*Isatis tinctoris*

WEEDS IN TRANSITION / EDUCATIONAL

Common Name	Scientific Name	Common Name	Scientific Name
bindweed, field	*Convolvulus arvensis*	puncturevine	*Tribulus terrestris*
kochia (w part of county)	*Kochia scoparia*	sandbur, longspine	*Cenchrus longispinus*

APPENDIX 3. FIRE MANAGEMENT PLANS

Responsible Fire-Suppression Entities: The Sunnyside/Snake River Wildlife Area Complex (all Satellite Units) fall within the jurisdiction of the following County Local Fire District's (LFD's): District 5 in Yakima County, Districts 2 & 3 in Benton County, District 1 in Franklin County, and Districts 4 & 6 in Walla Walla County.

WDFW pays an annual fee to Yakima County LFD #5 to maintain an existing fire protection services contract on the I-82, HQ and Byron units. This fee is in addition to Payment In Lieu of Taxes (PILT) paid to the county and is based on the assessed value of the Wildlife Area within their district. WDFW pays an assessment fee for each acre within the fire protection boundary for these services. WDFW also pays an annual fee to Benton County LFD #3 for fire coverage on the Thornton and Whitstran units. Fire chiefs in all other related LFD's have provided verbal assurance that WDFW lands within their districts are covered for fire protection by existing assessments.

Department Fire Management Policy: It is the Departments policy that wildlife area staffs are not firefighters and should not fight fires. Wildlife Area staff are trained in fire fighting and fire behavior, however, staff will only provide logistical support and information regarding critical habitat values to the Incident Commander of the responding fire entity.

Wildlife Habitat Concerns: Commander or other fire fighting personnel on site will notify WDFW personnel immediately in the order listed below. A WDFW Advisor will provide information to the Incident Commander regarding habitat concerns.

Reporting: Report any fire on or adjacent to all units of the Sunnyside Wildlife Area by contacting the local fire district (See contacts below).

Fire Districts – DIAL 911

NAME	TELEPHONE	CELL
Yakima Co. Dist 5: Brian Vogel (I-82, HQ, Byron)	(509) 829-5111	
Benton Co. Dist 3: Doug Merritt (Thornton, Whitstran)	(509) 786-3873	(509) 781-0050
Benton Co. Dist 2: Ron Duncan (Rattlesnake Slope)	(509) 588-3212	
Franklin Co. Dist. 1: Eric Mauseth (Windmill)	**(509) 234-2421**	
Walla Walla Co. Dist. 6: Darryl Loney (McDonald)	(509) 394-2624	
Walla Walla Co. Dist. 4: Ron Ayers (Swegle)	(509) 529-1282	

The following table provides telephone numbers in priority order of Department staff to be contacted in the event of a fire.

Department of Fish and Wildlife Fire Contact List - contact in order listed

NAME	TELEPHONE	PRIVATE TELEPHONE	CELL
Rocky Ross, SSWA Manager	509-545-2420	509-545-4898	509-539-1136
Robby Sak, Assistant manager	509-837-7644		509-840-2877

Wildlife Agent, Heidi Grant			509-840-5564
Sergeant, Chris Erhardt			509-521-0308
Sergeant, Morgan Grant			509-969-8894
Regional Office – Yakima	509-575-2740		
Regional Wildlife Manager Ted Clausng	509-457-9313		509-952-8990

APPENDIX 4. WATER RIGHTS

This Table has been split to accommodate a large spreadsheet into 2 sections with data following location for each water right. There are corrections that need to be made and will be a part of the tasks for future work.

Region 3 - All water rights

Location	File #	Cert #	Person	Stat	Doc	Priority Dt	Purpose	Qi	UOM	Qa
McNary NWR*	G3-+22055C		WA Game Dept	A	Cert	11/9/1973	IR	210	GPM	198
McNary NWR*	G4-046046CL		WN ST DEPT GAME	A	Claim L		DG		GPM	
Rattlesnake Slope	G4-29396CWRIS		WA DFW	A	Cert	8/14/87	WL	50	GPM	6.3
Sunnyside Canal*	S4-31966		WDFW and US Bureau Reclamation	A	NewApp	4/8/94	FS	7.3	CFS	
Yakima R*	S4-098526CL		DEPT OF GAME	A	Claim L		No ID		CFS	
Yakima R*	G4-048137CL		WN ST DEPT GAME	A	Claim S		DG		GPM	
Sunnyside WA*	G4-048138CL		WN ST DEPT GAME	A	Claim S		DG		GPM	

Location	WRIA	County	TRS	QQ/Q	Src's	1stSrc
McNary NWR*	31	BENTON	08.0N 30.0E 23		1	WELL
McNary NWR*	31	BENTON	08.0N 30.0E 23		1	WELL
Rattlesnake Slope	37	BENTON	10.0N 26.0E 11	NW/NW	1	WELL
Sunnyside Canal*	37	BENTON	09.0N 26.0E 09		1	YAKIMA RIVER
Yakima R*	37	YAKIMA	08.0N 23.0E 10		1	DITCH
Yakima R*	37	YAKIMA	08.0N 23.0E 11		1	WELL
Sunnyside WA*	37	YAKIMA	09.0N 22.0E 23		1	WELL

Location	File #	Cert #	Person	Stat	Doc	Priority Dt	Purpose	Qi	UOM	Qa
Yakima R*	R4-*09653CWRIS	4233	WA DFW	A	Cert	6/2/50	WL,FS		CFS	100
Sunnyside	G4-01153CWRIS		WA DFW	A	Cert	1/26/67	IR	275	GPM	222
Sunnyside WA*	G4-30171		WA DFW *	A	NewApp	11/28/89	IR	1500	GPM	
Sunnyside WA*	G4-30077AWRIS		WA DFW	I	NewApp	10/5/89	IR	800	GPM	
Sunnyside WA*	S4-28186AWRIS		WA DFW	I	NewApp	4/21/86	IR	1.7	CFS	
Sunnyside WA*	S4-28246		WA DFW**	A	NewApp	6/27/83	WL,IR	3	CFS	
Sunnyside WA*	S4-30078ALAWRIS		WA DFW	I	NewApp	10/15/89	WL	1.8	CFS	
Sunnyside WA*	CS4-WRC098852		WA DFW Yakima	A	ChgApp	5/12/88			CFS	
Sunnyside WA*	S3-+20677CWRIS		WA DFW	A	Cert	12/18/72	IR	4.5	CFS	200

Location	WRIA	County	TRS	QQ/Q	Src's	1stSrc
Yakima R*	37	YAKIMA	08.0N 23.0E 12	SW/NW	1	UNNAMED SOURCE
Sunnyside	37	YAKIMA	09.0N 22.0E 17		1	WELL
Sunnyside WA*	37	YAKIMA	09.0N 22.0E 17		1	WELL
Sunnyside WA*	37	YAKIMA	09.0N 22.0E 18		1	WELL
Sunnyside WA*	37	YAKIMA	09.0N 22.0E 21		2	UNNAMED SOURCE
Sunnyside WA*	37	YAKIMA	09.0N 22.0E 21		1	YAKIMA RIVER
Sunnyside WA*	37	YAKIMA	09.0N 22.0E 22		2	GIFFIN LAKE
Sunnyside WA*	37	YAKIMA	09.0N 22.0E 22	SW/NW	1	YAKIMA RIVER
Sunnyside WA*	37	YAKIMA	09.0N 22.0E 26	NW/NW	1	GRIFFIN LK

WATER RIGHTS SUMMARY INFORMATION
FOR THE
SUNNYSIDE WILDLIFE AREA

Byron: Parcel number 230810-13001 is a 40-acre assessment that is a collection of water consolidated into one turnout, which is used to irrigate the 24.8 acres in the SW corner (around the old HQ). The assessment sheet shows a total of 26 acres.

Parcel number 230811-11400 is a long standing, but vague, agreement that allows WDFW to impound water behind a stop log structure within the reserve portion of Byron. The referee's judgment of that water right was that it should not be valid because the legal description of the impoundment was incorrect. However, since it is water under the authority of SVID, the standard water right issue does not apply. Still, the actual amount of water WDFW can impound is not clear. The assessment slip for this site shows a total of 15.47 acres.

Ferry Road/Vance: There are two adjoining parcels with totally different histories.

Parcel number 230932-22001 (Ferry Road parcel) has an irrigation diversion and dirt delivery ditch that is no longer used. This parcel is about 40 acres of which only 20 acre is farmed.

The Vance property was purchased with Snake River mitigation funds and has a water right for a well registered with DOE. This site has a well and groundwater right. The Vance property lies adjacent to one of the original land acquisitions (Ferry Road, AKA McCauley) which has an irrigation assessment assigned to it.

Johnson/$40k Field: Based on the 2003 assessment sheet, under parcel number 220925-12001, WDFW has 4 separate deliveries for this unit that total 49.98 acres.

The water for this unit comes from Rocky Ford and travels underground to the NW corner of the $40K field, comes to the surface in a weir, then continues underground, diagonally, to the weir box on the east border. A concrete pipe runs south, through the center of the $40K field, and dumps into the Johnson wetland. The area was irrigated with a wheel line and by flooding historically. Walt Johnson dug the well above the boat launch to augment the irrigation water. It was used for the last time in the 1970's and had the power removed in the late 80's or early 90's. It is unknown whether there is a water right for this well. The irrigation water on this unit cannot be transferred to other units without paying for it one season at a time.

Dwinnell: Parcel number 220924-32001 is for water from the Rocky Ford drain that goes to Dwinnell for 39 acres. This was a rill irrigated field and water has not been applied for several years. This water is also difficult to transfer to other units. Sulphur Creek is the dividing line for water transfers.

HeadQuarters Fields: There are 4 assessment slips, which are described as follows:
220922-24001: 10.6 acres, Beat 06, Lateral SN 10.21E, Delivery 4
220923-32001: 119 (80+39) acres, Beat 06, Lateral SN10.61C, Delivery 4
220922-13001: 10 acres, Beat 06, Lateral SN 10.61, Delivery 10,10A @
220922-11001: 36.73 acres, Beat 06, Lateral SN 10.61, Delivery 10,10A AND

40.00 acres, Beat 06, Lateral SN 10.61B, Delivery 2.

The “Pheasants Forever” field receives water from the 10.61C lateral and used to include 120 acres of water. A formal change was made to reduce it to 40 acres. The remaining 80 now go with the big pivot.

The “Big Pivot” has 80 acres of water from the “Pheasants Forever” field, plus an additional 30 acres from the 10.61B Lateral. The 10.61B Lateral is not used anymore because it runs under a small housing development, kitty corner from the NE corner of the WHIP field at Green Valley and Snipes Pump roads. The current ditch rider, dumps extra water directly into the drain instead and WDFW picks it up from there. The pipe used in delivering this water is only about 4 inches in diameter and cannot deliver the full 30 acres of water. WDFW only gets about 20 acres of actual water.

The 10.61A Lateral delivers 40 acres of water between the common boundary WDFW shares with “Jake” off Green Valley Road. We use it intermittently for various beneficial purposes.

The “Simpson Place” has an old turnout on Green Valley Road at the east boundary of the Snipes unit. It provided about 10 acres of water but WDFW has never used it. In fact, there is little evidence that it even existed.

Snipes Reserve: Originally, a water wheel was placed in the Yakima River to pick up and deliver water to this unit. SVID was organized in 1911 and may have given a water right out of Snipes Drain after it was excavated.

In 1976 Henry Coffin put two pumps in the river, based on DOE specs (vertical screens that have since filled up with silt).

Rupley (upper & lower): According to WDFW records there are 99 acres of SVID water on upper Rupley. There are two delivery pipes that feed the weir box at the pump station. One comes south, along S. Emerald Road and the other comes from the east, through the hop field across the road.

There are 3 well permits on this unit. The only one that was ever used was the one just west of the upper Rupley parking lot. It’s good for about 200 gpm. The second well is in the “well field” on lower Rupley. The third well is on “Satus Point”, about 2/3 of the way between the narrow neck and the pond. The well lies west of the field, just a few yards out from the riparian zone. The latter two wells are shallow and therefore were determined to hold surface water only. DOE would not grant water rights on these wells.

The status of the upper Rupley well is unknown, with regard to legal use. It was abandoned when the existing turbine pump burned up. The power is on “hold”. A solar pump could be hooked up to feed water into the adjacent wetland.

Benton City Public Fishing Area: Historically, part of this site was in irrigated cropland, with water coming from the Kiona Canal. WDFW has never used this irrigation water right.

Windmill Ranch: WDFW's current allotment on the entire ranch is for about 508 acres. The actual number of irrigated acres leased for farming is currently about 422. The only water rights associated with this parcel are for irrigation.

McDonald Road Complex: The McCaw parcel has a ½ mile of river frontage and there is a surface water right on the river. The Cert. Numbers are 411, 816 and 856. There is a well on the property (south side of the river) with water rights. It is Cert Number 5547. That water right is currently being exercised by WDFW,s lessee to grow irrigated crops.

DOMESTIC WELL LOCATIONS
There are several domestic wells scattered around. They are as follows:

Byron: One at old homestead (original HQ of wildlife area)

Pheasants Forever: One by old homestead (in trees)

HQ: The original sand point caved in and was replaced with a standard well in about 99 or 2000. A second well was installed next to the grain bin in 2002 for industrial use.

Snipes: There are 4; one at the lodge, one at the house, one at the corral and a clay well by the old building where irrigation parts are stored.

Upper Rupley: This one is gone now. It was been buried for safety concerns.

Brady: This one is in the parking lot, surrounded by a battered concrete casing.

Rattlesnake Slope, Benton Co. There is a well on the west side of the management unit. The small parcel of land where the well is located actually belongs to the U.S. Dept. of Energy. WDFW has an agreement to use the well for habitat purposes on the Rattlesnake Slope Unit. It was used to irrigate a mitigation project of scattered shrub plantings until the 2000 fire burned all the habitat and irrigation system. Since then, it has been decided that WDFW will not resurrect the shrub project, nor use the well to create artificial watering holes.

Glover: This 50 acre unit was recently assigned to the wildlife area. WDFW just recently filled in an old well casing that was a hazard.

OTHER STANDARD, NON-IRRIGATION DISTRICT, WATER RIGHTS
The standard water rights are described in the old records. Much of the water right info is associated with section 22, around the HQ and Giffen Lake. A DOE-recorded water right exists on the north shore of Giffen Lake for 160 acres. An old steam pump used to be present that pumped from Giffen.

There is a second surface water right for off-season use (Oct. 15-Apr. 15) out of Giffen Lake for watering the rice paddies.

There are 2 water certificates for the pump above the crossing where the handicapped blind used to be, and, for the pump that sits in Giffen Lake near the NE corner of the 90 acre field. These pumps

used to send water down a series of dirt ditches to flood irrigate the 90 acre field and surrounding farmland.

APPENDIX 5. Management Plan Comments & Responses

Washington State Department of Fish and Wildlife, March 2007

The following individuals commented during the management plans public comment period. Paul Kison provided all comments with the one exception of Don Larsen's comment on bird feeders. No other CAG team member provided comments after 2 requests.

Comment Author	Organization	Location
Paul Kison	**Richland Rod & Gun Club, CAG Team**	**Pasco**

Abbreviations: USFWS-United States Fish and Wildlife Services, etc.

Comments received on the Sunnyside/Snake River Wildlife Area Plan are presented below. A response for each comment is included. Where appropriate, changes will be incorporated into the management plan to address public comments.

Commenter	Comment	Response
	General Support	
Paul Kison	**The process used for the public to make comments was not intuitive and difficult to use. I gave up on the electronic process and printed the appropriate pages with noted comments.**	**The last draft of the wildlife area plan, when forwarded to Olympia, was fraught with formatting problems. Mark Quinn, Lands Division Manager, expressed dissatisfaction with the format at the time and advised it was being re-formatted.**
	Pages 1&2: Objectives are misnumbered	**Noted**
	Page 47: The Glover Unit is mentioned here for the first time and is not listed elsewhere in the document.	**Will insert information on this management unit in the appropriate place(s)**
	Page 89: Two examples of Strategy not being italicized, plus one additional typo.	**Noted. Will correct for final draft**
	Page 93: typo	**Noted. Will incorporate changes**
	Page 103: The concept of PILT is confusing. Please clarify this issue with different language in the plan.	**The WDFW is not exempt from land taxes as many people believe. We pay taxes in one of two ways, and each county has a choice of how they receive**

		those funds. The first choice is Payment in Lieu of Taxes or PILT. This is a bit of a misnomer, because it's actually a form of property tax, only it is calculated differently. It is paid directly to the county but sometimes does not filter down to the junior taxing districts and that is one reason why some people perceive that we do not pay taxes. The county has a second option and that is to receive a percentage of the fines and forfeitures that are generated by fish & wildlife citations that are issued in the county. We'll try to clarify the language in the final draft.
	Public Access	
	Page 98: What is ADA?	**Americans with Disabilities Act. We try to incorporate additional public access where we can to accommodate persons with disabilities. This will be clarified in the final draft**
	Fish, Wildlife and Habitat	
	Page 88: Two guzzlers have now been replaced on Rattlesnake Slope.	**Noted. WA Plan update will include this change.**
	Page 94: What will be done, or what is proposed to improve the fisheries in Worth Lake, Windmill Lake and Powerline Lake on the Windmill Ranch?	**If black crappie can be obtained, they may be planted in Powerline Lake as an additional food source for largemouth bass. A hook and line survey may be conducted to determine angler success before internal discussions are conducted to determine the future of this lake. Eventually, a public meeting may be held as part of future management direction. A follow up survey will be performed in Worth Lake to determine the effectiveness of the carp removal project in 2006. We will continue discussions with the South Columbia Irrigation District on the option of dredging some of the silt out of segments of the lake. Windmill Lake is very shallow and infested with aquatic weeds. Fishing opportunity is limited to early spring and no immediate plans are in the works for improved fishing opportunities. Ultimately, the Fish**

		Management Program will take the lead in managing fish resources on the Wildlife Area.
	Page 101: Three strategies were listed for implementation on the Thornton Unit in 2006: install and monitor mineral stations, improve existing water sources and burn/fertilize CRP grasses to draw elk off private lands & reduce crop damage. Were these done?	**Neither the mineral stations nor CRP grass burning were conducted due to lack of staff time. Several water improvement projects were implemented in the Fall of 2006 but illegal 4X4 traffic in the late winter of 2007 have destroyed much of this work. An investigation is pending.**
	Hunting/Fishing	
	Page 100: Weapons restrictions and hunting opportunities don't seem to be compatible. Give better definition of restrictions and what species are providing hunting opportunities	**This question refers to the weapon restriction that is in place on all of the Walla Walla river sites. The initial acquisitions were lands bordered by several homes and in a public meeting, the acquisitions were strongly opposed unless we limited hunting. We created safety zones immediately adjacent to homes, and limited weapons to shotgun and archery on the remaining lands. Use of high-powered rifles in these areas is a safety concern. Typical hunted species are upland birds, waterfowl, deer and turkeys. Hunters must also share these areas with fishermen.**
	Weeds	
Paul Kison	**Page 90: Noxious weed control on WDFW lands is very costly and will be a wasted effort if neighboring landowners do not control their weeds as well.**	**True enough, but existing staff is inadequate to fully control noxious weeds on the Wildlife Area, which is a higher priority than negotiating control measures on surrounding private lands. The local weed boards are notified when a substantial problem exists.**
	Page 91: Aerial application of herbicides is expensive and risky, depending on chemical used and weather conditions. Bio controls are limited and expensive and generally target one species, whereas chemicals control a larger variety of noxious weeds in a single area.	**Sometimes aerial control is the only option available due to inaccessible topography or lack of adequate equipment. All rules and regulations are adhered to when applying herbicides aerially. Bio controls are used as part of an Integrated Pest Management program (IPM), where efforts are being made to establish populations of plant specific controls for long-term reduction in noxious weeds.**

		Purple loosestrife is one of the best examples of how successful bio controls can work.
	Page 117: There is no footnote for Class C weeds.	**Class C weeds are non-native weeds found in Washington. Many of these species are widespread in the state. Long-term programs of suppression and control are a County option, depending upon local threats and the feasibility of control in local areas.**
	Page 166: The 4th paragraph needs a duplicate sentence deleted.	**Noted. A correction will be made to the final draft.**
	Funding	
	Page 109: #6…More words should be added to further delineate the magnitude of the problem. Six lines does not begin to explain the issues. Too little funding should also be noted based on the multiplicity of requirements being imposed on all unit managers. The state is like the US gov't.—you need to do "X" but they provide <u>NO</u> funding to complete the new mandates.	**Historically, many more words have been spoken on this issue, to no avail. The underlined (unfunded) strategies may help clarify the issue.**
	Page 112: Are the last three pages intended to be performance criteria? If you are being graded against them…you are <u>failing</u>; but not at fault. With the small staff available, you can't possibly get all the criteria completed in a short time frame.	**Duly noted.**
	Partnerships	
	Page 104: Delete the underline of Strategy A unless it is for emphasis.	**Underlined Strategies in the wildlife area plan are indicators that the strategy cannot be performed with existing funding and staff. This is one of many examples.**

APPENDIX 6. WINDMILL RANCH GRAZING PLAN

Windmill Ranch

Acres: Acreage runs concurrently with acreage planted to field corn (approx. 422 acres in 2005). In addition, a temporary, short term grazing permit was issued in 2006 on a 30-40 acre strip of rangeland under the BPA transmission lines on the north end of the property. This is to control cheatgrass, reduce fuel and frequency of wildfire and enhance the range condition by releasing native plant species.

Fence condition: Temporary 1 or 2 strand electric fence, erected and dismantled annually.

Grazing specifications: Grazing is limited to crop residue (field corn stubble), beginning after the general waterfowl season ends and terminating no later than April 1. Rangeland grazing begins when the cheatgrass is in the boot stage and continues until cheatgrass in the surrounding area begins to cure. Generally, this will result in grazing during a month long period with 30-40 cow/calf pairs.

Grass species/condition: Does not apply to corn stalk residue. Cattle will be pulled from the rangeland when cheatgrass has cured and before native bunchgrasses are overutilized.

Water: Water must be hauled to the individual fields or pumped from irrigation ponds into stock tanks. Grazing is not allowed in wetland/riparian zones

Special considerations:

1) This lease is designed to remove crop residue to expose grain to waterfowl and migrating sandhill cranes. It also results in less tillage of the soil.
2) Grazing may be allowed before hunting season ends if heavy snow covers the ground and spilled grain from normal harvest operations is covered and unavailable to migrating waterfowl.
3) Rangeland grazing will be closely monitored for desired effect and modified as needed.

APPENDIX 7. AGRICULTURAL LEASE PLAN

Agricultural leases are in place on 7 of the management units. Details of those agreements are as follows:

Sunnyside Headquarters Unit
Acreage: 344 irrigated (wheel line & center pivot); 124 dryland; Total = 344 farmed acres
Crops: wheat, barley, corn with alfalfa hay rotation
Agreement Type: Sharecrop, with WDFW's share @ 25% of grain crops and 30% of alfalfa
Status: Expired; renewal pending
Lessee: Loyd Sak
Issues: Alfalfa has low benefits to wildlife. State's share of hay is tedious to market if it's not used for winter elk/deer feed. Future farming activities should incorporate more small grains but profit margin is minimal to nothing and may require subsidization. Grain crops left standing provide important benefits to wintering waterfowl and resident upland wildlife. Biosolids from the City of Grandview's water treatment facility are being used as fertilizer on selected fields, by permit. May consider a cash rent agreement in the future.

Vance & Ferry Road Units
Acreage: 97.7, more or less, all irrigated under wheel line
Crops: Wheat, barley with alfalfa hay rotation
Agreement Type: Sharecrop, with WDFW's share @ 25% of grain crops and 30% of alfalfa
Status: Expired; renewal pending
Lessee: Warren Vance Jr. and Shirley Vance
Issues: Alfalfa has low benefits to wildlife. State's share of hay is tedous to market if it's not used for winter elk/deer feed. Future farming activities should incorporate more small grains. Small grains have minimal return on investment. Grain crops left standing provide important benefits to wintering waterfowl and resident upland wildlife. May consider a cash rent agreement in the future.

Byron Unit
Acreage: 24.8, more or less, all rill-irrigated from a gated mainline.
Crops: Wheat, barley, corn with alfalfa hay rotation
Agreement Type: Sharecrop, with WDFW's share @ 25% of grain crops and 30% of alfalfa
Status: Expired; renewal pending
Lessee: Warren Vance Jr. and Shirley Vance
Issues: Alfalfa has low benefits to wildlife. State's share of hay is tedious to market if it's not used for winter feed. Future farming activities should incorporate more small grains. Small grains have minimal return on investment. Grain crops left standing provide important benefits to wintering waterfowl and resident upland wildlife. May consider a cash rent agreement in the future.

Thornton Unit
Acreage: 1,275.8, more or less, all dryland
Crops: Currently is all enrolled in CRP and planted to native grasses
Agreement Type: Cash rental, at $18.21 per acre + Leasehold Excise Tax
Status: Active, terminates on Dec. 31, 2008, but needs to be amended to reflect re-enrollment into CRP.

Lessees: Evan (Bud) Hamilton, Flora (Tynee) Hamilton, Devin Hamilton, Brandon Hamilton
Issues: Grass stands need to be interseeded to multiple mix of shrub steppe species. CRP contracts were signed up at 2 different times so the dates on a single agricultural lease do not match up with termination dates of the CRP contracts. Part of the fields were signed up for re-enrollment into CRP in 2006. Status of acceptance is pending.

Windmill Ranch Unit
Acreage: 432, more or less, all irrigated under center pivot systems
Crops: Mostly field corn, with occasional rotational crops of wheat, buckwheat, potatoes (in limited amounts).
Agreement type: Cash rental @ $55.40 per acre + Leasehold Excise Tax + Lessee pays power and water assessments.
Status: Active, terminates on Dec. 31, 2006
Lessee: Jed Pauley
Issues: Cornstalk residue is grazed after the hunting season ends. Problem weeds such as bristly foxtail, punctureVine and sandbur are becoming an increasing problem. Deep rutting is becoming a problem under some pivot towers. Unharvested grain provides important wintering food source for waterfowl and results in high quality hunting recreation. Corn also attracts large numbers of migrating sandhill cranes in March and April.

Hope Valley Unit
Acreage: 29, more or less, under wheel line irrigation
Crops: Small grains with alfalfa hay rotation
Agreement type: Cash rental @ $44.25 per acre + Leasehold Excise Tax + Lessee pays power and water assessments.
Status: Active, terminates on Dec. 31, 2010
Lessee: Clint Didier
Issues: Alfalfa hay has a low value to upland wildlife, which was the purpose of the acquisition. Consider renegotiating lease, possibly at a lower rate, to assure small grains are produced here. Ownership of the irrigation system is currently being investigated by the Real Estate Division. In-kind services are often used in place of receiving the rental payment, to help offset WDFW labor on habitat projects.

McDonald Bridge Unit
Acreage: 34, more or less
Crops: Spring wheat historically, but a portion of the cropland will be planted to soybeans in 2006.
Agreement type: Cash rental @ $60.00 per acre per year + Leasehold Excise Tax + electrical assessments.
Status: Active, terminates on Dec. 31, 2007.
Lessee: Randy DeRuwe
Issues: Electricity is very expensive on this site. Weeds have been a historic problem and repetitive wheat production has been used to get them under control, but the financial margin on wheat is very low. May try to work toward seed alfalfa as an alternative crop if pesticides can be limited during critical brood rearing times for upland wildlife.

APPENDIX 8. PLANT AND WILDLIFE SPECIES FOUND IN THE REGION

Threatened, Endangered, and Wildlife Species of Concern found in the Yakima Subbasin

Status
FC = Federal Candidate; FT = Federally Threatened; FE = Federally Endangered;
SC = Species of Concern; ST = WA State Threatened; SE = WA State Endangered.

FEDERAL LIST

Common Name	*Status*	*Common Name*	*Status*
Oregon Spotted Frog	FC	Horned Lark	FC
Bald Eagle	FT	Washington Ground Squirrel	FC
Yellow-billed Cuckoo	FC		

WASHINGTON STATE LIST

Common Name	*Status*	*Common Name*	*Status*
Western Toad	SC	Vaux's Swift	SC
Oregon Spotted Frog	SE	Lewis's Woodpecker	SC
Columbia Spotted Frog	SC	White-headed Woodpecker	SC
Northern Leopard Frog	SE	Black-backed Woodpecker	SC
Striped Whipsnake	SC	Pileated Woodpecker	SC
Common Loon	SS	Loggerhead Shrike	SC
Western Grebe	SC	Horned Lark	SC
American White Pelican	SE	White-breasted Nuthatch	SC
Bald Eagle	ST	Sage Thrasher	SC
Northern Goshawk	SC	Vesper Sparrow	SC
Ferruginous Hawk	ST	Sage Sparrow	SC
Golden Eagle	SC	Merriam's Shrew	SC
Merlin	SC	Townsend's Big-eared Bat	SC
Peregrine Falcon	SS	White-tailed Jackrabbit	SC
Sandhill Crane	SE	Black-tailed Jackrabbit	SC
Upland Sandpiper-Historic	SE	Washington Ground Squirrel	SC
Yellow-billed Cuckoo	SC	Northern Pocket Gopher	SC
Flammulated Owl	SC	Wolverine	SC
Burrowing Owl	SC	Lynx	ST

APPENDIX 9. BPA PROJECT OBLIGATIONS

The Bonneville Power Administration is obligated to fund reasonable operation and maintenance and habitat enhancement on the SSWA, in return for mitigation credits toward their overall goal. A baseline HEP was performed to measure existing habitat values at the time BPA funding was first received. Periodic follow up HEP evaluations will be performed to determine mitigation progress and will be reported in this section when the results are available.

APPENDIX 10. YAKIMA SUBBASIN PLAN PRIORITY SPECIES LIST

Focal species selection matrix for the Yakima Subbasin

Common Name	Focal Habitat	Status[1]		Native Species	PHS	Partners in Flight	Game Species
		Federal	State				
Western Toad	Montane Coniferous Wetlands	n/a	SC	Yes	Yes	No	No
Greater Sandhill Crane		n/a	SE	Yes	Yes	No	No
White-headed Woodpecker	Ponderosa Pine / Oregon White Oak	n/a	SC	Yes	Yes	Yes	No
Lewis' Woodpecker		n/a	SC	Yes	Yes	Yes	No
Western Gray Squirrel		n/a	ST	Yes	Yes	No	No
Mule Deer	Shrub Steppe / Interior Grasslands	n/a	n/a	Yes	Yes	No	Yes
Brewer's Sparrow		n/a	n/a	Yes	No	Yes	No
Greater Sage Grouse		C	T	Yes	Yes	No	No
Yellow Warbler	Interior Riparian Wetlands	n/a	n/a	Yes	No	No	No
Mallard		n/a	n/a	Yes	No	No	Yes
American Beaver		n/a	n/a	Yes	No	No	Yes

[1] C = Candidate; SC = Species of Concern; T = Threatened; E = Endangered

APPENDIX 11. PLANNING DOCUMENTS AND SPECIES ACCOUNTS GUIDING MANAGEMENT

Status Reports

Bald eagle, 2001
Burrowing owl, draft 2004
Sage grouse, 1998
Washington ground squirrel, draft 2004
Northern leopard frog, 1999
Oregon spotted frog, 1997
Streaked horned lark, draft 2004

Recovery/Management Plans

Bald eagle, 1990, (federal 1986)
Deer, 1997
Oregon spotted frog, 1998
Sage grouse, 2004
Furbearers, 1987-93
Cougar, 1997
Elk, 1997
Ferruginous hawk, 1996
Waterfowl, 1997
Upland birds, 1997

Volume III – Amphibians and Reptiles, 1997

Columbia spotted frog
Oregon spotted frog
Northern leopard frog
Striped whipsnake

Volume IV – Birds, 2003

American white pelican
Bald eagle
Black-backed woodpecker
Blue grouse
Burrowing owl
Cavity-nesting ducks
Chukar
Common loon
Flammulated owl
Golden eagle
Great blue heron
Harlequin duck
Lewis' woodpecker
Loggerhead shrike
Mountain quail
Northern goshawk
Peregrine falcon
Pileated woodpecker
Prairie falcon
Ring-necked pheasant
Sage sparrow
Sage thrasher
Sharp-tailed grouse
Shorebirds
Vaux's swift
Wild turkey
White-headed woodpecker

Volume V – Mammals

(Currently in development)

Management Recommendations for Washington's Priority Habitats and Species

May 1991

Bighorn sheep, Elk, Deer, Cougar, Waterfowl, Yellow-billed cuckoo, Migratory Birds (e.g., Mourning Dove), Wild Turkey, Osprey, Pygmy shrew, Rocky Mountain mule deer, Upland Game Birds, Townsend's big-eared bat, Small game (e.g., rabbits), Furbearers (e.g., beaver), White-tailed deer, Unclassified Species (e.g. coyote).

Washington State Elk Herd Plan, 1997
Washington state elk herd plans summarize historic and current distribution and abundance. The Department recognizes ten, distinct elk herds in the state. Five of the ten elk herd management plans have been completed. The plans address the major factors affecting abundance and persistence. Population management objectives, spending priorities, and management strategies are spelled out. Priorities for habitat enhancement are identified.

Washington State Elk Herd Plan, Yakima Elk Herd, December 2002

Washington Department of Fish and Wildlife, Game Management Plan, July 2003 - June 2009

Interagency waterfowl management plans
Washington Department of Fish and Wildlife (WDFW) is a member of the Pacific Flyway Council, an organization of 11 western states that develops management recommendations for migratory waterfowl. Management plans developed by the Council include population objectives, harvest strategies, habitat recommendations, and basic biological information. The Council also participates in the development of nationwide management plans for waterfowl. The following is a list of interagency plans that deal with Washington's waterfowl resources:

Canada Geese
Western Tundra Swan
Pacific Coast Band-tailed Pigeons
Mourning Doves

Related Plans
North American Waterfowl Management Plan
National Mourning Dove Plan

Joint Venture habitat plans
WDFW is an active participant in two joint ventures under the North American Waterfowl Management Plan, the Pacific Coast Joint Venture and the Intermountain West Joint Venture. The joint ventures include representatives of agencies from all levels of government and nonprofit organizations, who are interested in conservation and enhancement of habitat for migratory birds and related fish and wildlife resources. The joint ventures have developed strategic plans to guide conservation efforts of all the partners:

Pacific Coast Joint Venture Strategic Plan

Intermountain West Joint Venture Strategic Plan

HB 1309 Ecosystem Standards For State-Owned Agricultural and Grazing Land. Washington State Conservation Commission. December 1994.

APPENDIX 12. ANADROMOUS FISH SUMMARY

Spring Chinook are differentiated from other chinook runs (or races) by the timing of their return to freshwater as adults. Adult spring chinook destined for areas upstream of Bonneville Dam (upriver runs) enter the Columbia River beginning in March and reach peak abundance (in the lower river) in April and early May (WDF and ODFW 1994). Chinook salmon may be further classified by the length of time young fish reside in streams prior to migration to the ocean environment. The two dominant behavioral patterns are generally characterized as stream-type or ocean-type (Gilbert 1913). Stream-type chinook spend usually one year (sometimes more) in freshwater as fry or parr before entry into the ocean, whereas ocean-type chinook generally migrate to the ocean in their first year of life (Healy 1991). Spring chinook in the Yakima Subbasin exhibit the stream-type life history form that is typical of northern populations and more southern populations that inhabit headwater tributaries. Occasionally, males mature in freshwater without ever migrating to the sea (Robertson 1957; Burck 1965; Mullan et al.1992).

Spring chinook salmon were widely distributed in the Yakima Subbasin prior to Euro-American settlement (Figure 2-38). The historic abundance of spring chinook in the Yakima Subbasin is poorly known due to the paucity of quantitative data. Therefore estimates of abundance rely on indirect methods rather than capture and release data. Consequently, estimates of spring chinook abundance may vary with methodology and information source. Bryant and Parkhurst (1950) and Davidson (1953) concluded that the Yakima Subbasin could support as many as 500,000 spawning adults. These estimates were based on the quantity of gravel in the subbasin that was of sufficient size for spring chinook spawning. The Northwest Power Planning Council (NPPC, 1989) estimated that returning adult spring chinook could number as high as 200,000 individuals.

While considerable uncertainty exists for estimates of historical abundance, it is clear that populations decreased markedly throughout the upper Columbia Basin as a whole with the construction of mainstem dams. For example, the number of adult spring chinook that entered the Columbia River averaged less than 102,000 in the first eight years after construction of the Bonneville Dam (1938) a considerable decline from previous years.

Spring Chinook use the Walla Walla River management units as a pass through area during upstream migration in the mainstem Walla Walla River and into Mill Creek. These runs are a result of a reintroduction effort by the Umatilla Tribe. Up until 2004, this was an adult outplant program only. In 2005, 250,000 smolts were released for the first time.

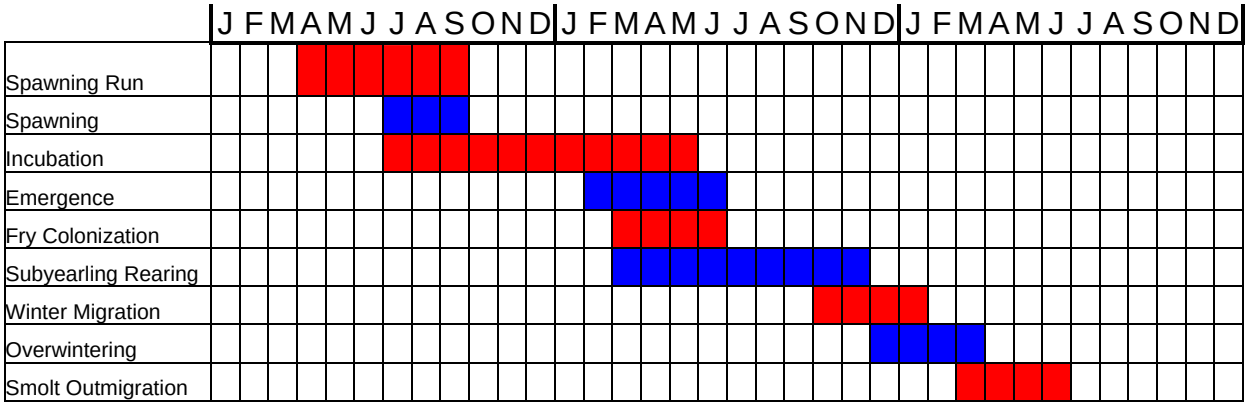

Table 2. Mean timing of successive freshwater life stages of Yakima Subbasin spring chinook

Fall Chinook

Fall chinook return to natal streams in the fall, shortly before spawning. Juveniles migrate to the ocean in their first year of life. This life history type is also referred to as Ocean Type. In the Yakima Subbasin, the timing of the adult spawning run occurs during the September-November time frame, with actual spawning taking place in October and November. Incubation extends throughout the winter and spring and is followed by emergence/fry growth/out-migration in the February-July period.

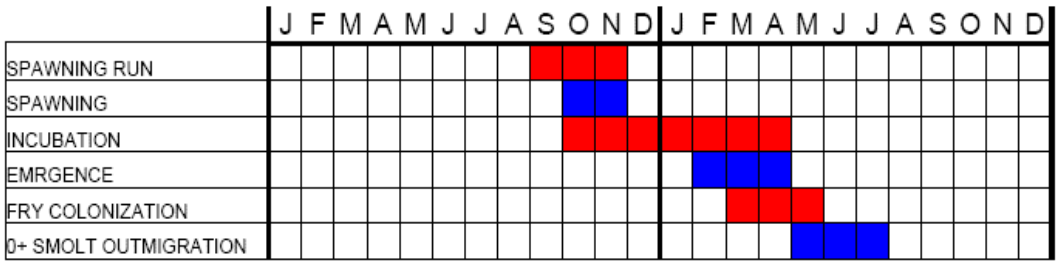

Table 3. Mean timing of successive life stages of Yakima Subbasin fall chinook

Historical Distribution and Abundance

As noted in the Yakima Subbasin Summary (YSS, 2001), "Little is known about the historical distribution of fall chinook, although [fisheries] managers generally believe the primary production area was the same as it is today: the lower half of the Yakima mainstem, from the current site of the Sunnyside Dam to the Columbia confluence." The YSS (NPPC 2001) goes on to speculate that the historic distribution may have been somewhat broader, with more successful utilization of the upper portions of the range.

Current Distribution and Abundance

There are two genetically distinct stocks of fall chinook recognized in the Yakima Subbasin. The mainstem stock is found throughout the lower mainstem (roughly the lower 100 miles), and the Marion Drain stock is endemic to the Marion Drain. Marion Drain is a unique, man-made feature of the watershed, consisting of a 19-mile-long drainage ditch for the Wapato Irrigation Project (WIP). The original ditch was dug early in the 20th century to drain wetlands and was enlarged over the years to convey irrigation return flow to other areas of the Project. It discharges into the Yakima River at RM 82.6, 2.2 miles upstream of the mouth of Toppenish Creek.

Important stock characteristics

Yakima Subbasin fall chinook have been supplemented with hatchery production since 1984, both above and below Prosser Dam. Since 1996, broodstock has been taken from returns to Prosser Dam (also see below). Yakima River mainstem fall chinook are not considered a distinct stock in comparison to Hanford Reach Fall Chinook. The likelihood of genetic introgression or damage to the Hanford Reach Fall Chinook or Lower Yakima Fall chinook from Prosser hatchery releases is low due to the small proportion of this combined stock that is currently of hatchery origin**.**

Rearing
Fall chinook rear a very short time in freshwater. Juveniles begin a gradual downstream migration almost immediately after colonizing rearing areas. This brief freshwater residence is critical to the survival of the population, even though rearing in the Yakima Subbasin is generally less than two months.

Smolt Out-migration
One important life history difference between present-day and historical fall chinook populations is known: smolt out-migration timing. In intact habitats, many populations of ocean-type chinook begin their smolt out-migration in May, reach a peak in June or July, and continue migrating through September (Groot and Margolis, 1991). Just such an out-migration of sub-yearling chinook was observed in the Yakima in 1928, 1929 and 1930 (Lichatowich, 1992). This timing contrasts sharply with the current out-migration, which typically ends in early July as stream temperatures in the lower reaches of the Yakima approach lethal levels. This truncation of the out-migration "window" has likely diminished the suitability of the entire lower Yakima River for natural production of fall chinook.

As noted in the run timing discussion above, there is significant variation in the timing of out-migration. The YSS (NPPC 2001) suggests that, "It is possible that much of this variability is due to temperature – to a temporary "stalling" of the out-migration by a short period of high temperatures, or to a premature truncation of the entire run by a prolonged period of high temperatures which directly or indirectly kills the later portion of the out-migration. This hypothesis is supported by two observations. One observation is the strong inverse relationship between the date of 90 percent passage and the mean Chandler water temperature from June 15 – July 15 [Figure 8 of the YSS (NPPC 2001)]. These data show that the out-migration ends considerably earlier during hot years, and that an increase of 10^0 F in late spring water temperatures usually means the out-migration will end nearly a month earlier."

"The other observation is the disparity between simultaneous passage estimates at Chandler and in a screw trap fished near Richland in the lower Yakima (RM 8) in the spring of 1992. The estimated passage of fall chinook smolts at Chandler and at the Richland screw trap were lagged three days to adjust for travel time. Between May 26 and June 10, passage at Chandler averaged 10,538 fish per day, and totaled 174,624 fish. Comparable figures for the trap at Richland, 40 miles downstream, were 1,246 and 19,929[1], respectively. This loss of fish is all the more remarkable in light of the fact about 70 percent of Yakima fall chinook spawn below Chandler. During this period, mean daily water temperatures at Richland averaged 76^0 F, and ranged from 72 to 81^0 F. Temperatures at Chandler averaged 71^0 F, ranging from 69 to 73^0 F. Evidently the smolts were able to cope with the temperatures at Chandler, but not those further downstream."

Restoration Key Findings for Fall Chinook:
1) By any estimation, the abundance of fall chinook has been significantly reduced from historic levels.
2) Yakima River Mainstem fall chinook are not a distinct stock from the Hanford Reach fall chinook. The likelihood of genetic introgression or damage to the Hanford Reach fall chinook or Lower Yakima fall chinook from Prosser hatchery releases is low due to the small proportion of this combined stock that is currently of hatchery origin.

[1] Note that the figures for the Richland screw trap are estimates of *passage*, not raw catch. They were generated by dividing daily catches by 0.045, the mean entrainment rate estimated from the recapture of marked fish.

3) According to the Ecosystem Diagonistic and Treatment (EDT) model, restoration efforts focusing on water quality parameters from the delta to Wanawish Dam (Horn Rapids) would potentially double the abundance of the lower Yakima fall chinook population. (See the restoration key findings in the Lower Yakima Assessment Unit (AU) for specific water quality parameter key findings.)
4) The out-migration period for fall chinook smolts is cut off in early summer by high temperature and poor water quality in the lower Yakima River.

There are a few fall chinook salmon that show up in the Walla Walla River and may occasionally spawn up to WDFW property. However, most spawning occurs several miles downstream. A few Coho adults and juveniles have also been sampled in this area. Both the Fall Chinook and Coho are assumed to have wandered into this river system from stocking programs on the Umatilla River. During low flows in the Umatilla, fish naturally seek rivers with better flows and on those years may show up in the Walla Walla and Snake rivers. The Umatilla Tribe only marks a small portion of the fish they release. Since the sample size of fish actually found in the Walla Walla River system is small, it's been difficult to determine their origin.

Steelhead
Steelhead, unlike Pacific salmon, do not all die after spawning. A small proportion of spawners (known as kelts) may return to the ocean for a short period and repeat the spawning migration. Spawning adults typically range between three and seven years of age.
Young steelhead typically rear in streams for some time prior to migrating to the ocean as smolts. Steelhead smolts have been shown to migrate at ages ranging from 1-5 years, with most populations smolting at ages 2 or 3 (Shapovalov and Taft 1954; Withler; 1966; Loch et al. 1988). Steelhead grow rapidly after reaching the ocean, where they feed on crustaceans, squid, herring, and other fishes (Wydoski and Whitney 2003; Pauley et al. 1986). The majority of steelhead spend 2 years in the ocean (range 1 - 4) before migrating back to their natal stream (Shapovalov and Taft 1954; Narver 1969; Ward and Slaney 1988). Once in the river, steelhead apparently rarely eat and grow little if at all (Maher and Larkin 1954). These various behaviors produce fish that range between three and seven years of age at the time of spawning.

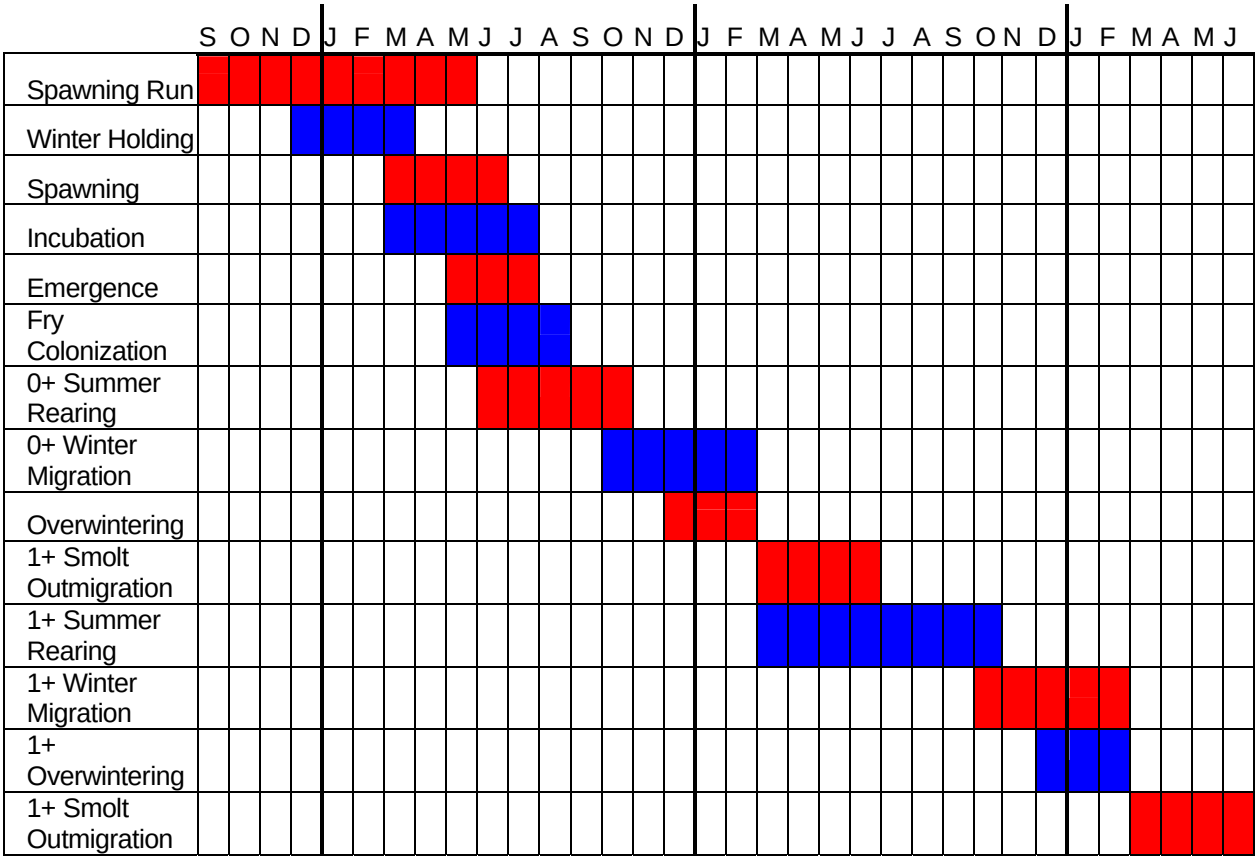

Figure 19. General duration of successive life stages in for Yakima Subbasin summer steelhead (all stocks)

Historical Distribution and Abundance

Steelhead trout are believed to have been widely distributed in the Yakima Subbasin prior to 1850 and were known to utilize virtually all of the major streams and tributaries for some aspect of their life history. It is probable that the historical spawning distribution of summer steelhead included virtually all accessible portions of Yakima Subbasin, with highest spawning densities occurring in complex, multi-channel reaches of the mainstem Yakima and Naches, and in third and fourth order tributaries with moderate (1-4 percent) gradients (YSS, 2001). The historic abundance of steelhead trout is poorly known. Howell et al., (1985) estimated that over 80,000 adult steelhead trout might have returned to spawn in the Yakima Subbasin.

Current Distribution and Abundance

The current range of the steelhead/rainbow trout complex in the Yakima Subbasin is slightly smaller than under historic conditions. However, the range of anadromous steelhead is significantly reduced from 1850. Fewer tributaries are utilized for spawning and rearing than were used historically. Relevant examples include Tieton River, the Wilson/Naneum creek system and Wenas Creek. Sections of many streams thought to formerly support spawning and rearing are now utilized only as migration corridors due to habitat degradation.

When compared to other river systems with similar elevations, the proportion of the steelhead/rainbow trout population that exhibits anadromy in the Yakima Subbasin has been significantly reduced during the last century. Additionally, there are lower numbers of the resident upper Yakima basin steelhead population than red-bands in the Deschutes and rainbow trout in

rivers of southwestern Montana. The potential for anadromous steelhead to interbreed with introduced resident resident rainbow (Campton and Johnston 1985, Pearsons et al. 1998), loss of anadromy due to reduced access caused by early operations of Roza Dam (Karp et al. 2003), as well as biotic and abiotic general conditions favoring residency are potential mechanisms that could have reduced the abundance of anadromous steelehead in the Yakima Subbasin.

Over three million hatchery trout (primarily South Tacoma and Goldendale stocks) have been planted in the Upper Yakima and Naches since 1950, and 1.6 million steelhead (primarily Skamania stock) have been planted in those same areas since 1961. There are no current hatchery programs for rainbow or steelhead in the subbasin. Hatchery rainbow trout have never been released in the Satus or Toppenish systems except for one release of 25,000 hatchery-reared Yakima stock smolts in 1989.

In the period between 1986 and 2004 between 436 and 4,525 steelhead were observed in the Yakima Subbasin. Between 135 and 216 adults passed Roza Dam from 2001 to 2003 (Table 2-19). According to 2002 WDFW data, current steelhead stock abundance in the Yakima River subbasin is believed to be less than 5 percent of its historical level in most years and as low as 1 percent in some years.

The Toppenish and Satus Creek populations are relatively healthy, and abundance of steelhead in the Yakima Subbasin is weighted heavily toward those stocks. Improved population performance and distribution of other stocks in the subbasin will increase the stability and resiliency of steelhead populations within the subbasin as a whole. Within the subbasin, there are several areas where existing data suggest low summer and fall flows are a significant depressing factor on steelhead productivity. This is due in part to the fact that the majority of production under current conditions is restricted to Satus and Toppenish creeks, which obviously have a limited juvenile carrying capacity at base flow. In some years, the relatively healthy Toppenish and Satus steelhead populations are habitat-limited. Excess adults and reconditioned kelts could provide a source of broodstock for supplementation or reintroduction with minimal effect on population viability. There are several streams in the subbasin, notably Ahtanum, Cowiche, Manastash, Wilson/Naneum, Taneum creeks, and others with suitable habitat but with extremely low population levels of anadromous fish due to blockages either rectified already or soon to be removed. Current low abundance and low observed straying rates, especially to tributaries upstream from Roza Dam, indicate that natural colonization of suitable habitats (after removal of obstructions to passage) would be very slow. Reintroduction could be accomplished more rapidly above Roza Dam through the use of hatchery broodstock, adult collection and involuntary spawning or other means.

The Walla Walla River and Mill Creek both contain the Mid-Columbia strain of steelhead, which are ESA listed as threatened. The stream sections within WDFW ownership are mostly a pass through area for these fish but there is some spawning and rearing that occurs as far downstream as the McDonald Road unit. Habitat conditions and water temperatures are the limiting factors in this area. This run is relatively strong in the upper Walla Walla River, with about 500 adults returning on an average year. The runs are more sporadic in Mill Creek due to passage issues around Bennington Dam. Managing entities are working with the Corps of Engineers to improve passage in this area.

Margined Sculpin

Margined sculpins, listed as State-sensitive, are found in the Walla Walla and Touchet Rivers in the vicinity of the Swegle/McDonald Road management units. Margined sculpins inhabit pools and slow-moving glides at all seasons where water temperatures normally are less than 66 degrees F. Adults are generally found in deeper and faster moving waters than juveniles. The margined sculpin is defined as being vulnerable or declining so that it is likely to become endangered or threatened in a significant part of its range without management or removal of threats. Its habitat has been degraded through agriculture, grazing, logging, and channalization (Wydoski and Whitney, 2003). Umatilla and Leopard dace are both species of interest and may be in the same area because of their presumed historic range and the current habitat that is present. No studies have been done to verify population status.

APPENDIX 13. BENTON COUNTY MOSQUITO CONTROL SUMMARY

Mission Statement
Benton County Mosquito Control is dedicated to responsibly improving the quality of life and increasing public mosquito education in our area. The District accomplishes this by utilizing Integrated Pest Management strategies, which are designed to be cost-effective control measures, intended to reduce mosquito populations and the diseases they potentially carry.

In an effort to aid in the reduction of mosquito-borne illness and nuisance, Benton County Mosquito Control relies on communication and cooperation with property owners, residents and other governmental agencies.

Benton County Mosquito Control District #1 was formed in 1957, but funding and operations did not begin until 1970. The formation of this district was brought about due to a concern for repeated epidemics of encephalitis like those seen in the Yakima Valley during the 1940s and to a lesser extent, the 1950s.

Benton County is believed to have approximately 19 different species of mosquitoes. Some of these species are vectors for diseases, like West Nile virus, St. Louis Encephalitis and Western Equine Encephalitis. Mosquito Control districts in Washington acquire their powers from RCW 17.28, which provides a framework for the formation, operation, powers and mandates of the mosquito control district.

In an effort to control mosquitoes an important component is to understand the life cycle and habitat of the mosquito. There are four separate and distinct stages: Egg, Larva, Pupa and Adult. This is known as a complete metamorphosis life cycle and each of these stages can be recognized easily by its special appearance.

Mosquitoes deposit eggs in varying ways. Some species will lay their eggs directly on the water, either singly or in "rafts" consisting of many eggs stuck together. These eggs float on the water's surface until they hatch. Other species lay their eggs singly, in damp soil or on the sides of containers in the expectation that water levels will rise and thus induce hatching. These species have eggs that lie dormant (not submersed in water) for many years until a flood event occurs at which time multiple broods will hatch and a spike in the mosquito population is observed. It is important to remember the full life cycle only needs 5 days of relatively hot weather to produce biting mosquitoes otherwise the cycle is extended due to colder water temperatures.

Larvae live in the water but are required to break the water's surface to breathe. Most species have specialized breathing siphons at the "tail" end of their bodies. Many hang upside down breathing and filtering food with their specialized mouthparts while others attach to aquatic plants and breathe through the plant's stalk. Some species lack an elongated siphon tube and will lay horizontal on the surface of the water in order to breathe. During the growth process a larvae will molt 4 times. Each molt is known as an instar and after the 4^{th} instar a larva will morph into a pupa.

Pupae (plural of pupa) also develop aquatically and most often resemble a comma. They use two siphon tubes located on the back of the "head" to breathe. Pupa do not eat or go through a molting

process during this phase and will normally hatch into an adult mosquito within 24 hours. Because of this, the pupal stage is one of the hardest to control due to the lack of ingestion or intake of larval hormones.

After breaking free of the pupal skin, the adult will rest on the water's surface for a brief period to allow its body and wings ample time to dry and harden. The adults do not require water except to lay eggs. Different species have differing strategies, characteristics and behaviors when it comes time to find a blood host, deposit eggs and continue the cycle (e.g., daytime or nighttime biters, how far they fly from their hatching source, what types of animals they "prefer" such as birds or mammals).

For mosquito abatement, Benton County Mosquito Control (BCMC) uses an IPM approach such as Education, Source Reduction, Biological Controls, Larviciding and Adulticiding.

Education is especially important in a mosquito IPM program. Citizens and organizations can make an impact upon their immediate surroundings, which may not only benefit them but also their neighbors. Proper watering practices, wearing repellent, source reduction and other steps can all reduce the impact mosquitoes have in a given area.
It is important to note that some species lay their eggs on moist soil in flood plains where the eggs can lay dormant for years awaiting a flood. Large broods of mosquitoes can develop in as little as 5 days depending on the frequency and time since the last flood. Proper watering practices that rotate water and not let it stagnate will help in mosquito control efforts.

Source Reduction is simply removing or making breeding sites inhospitable for mosquitoes. This can be as simple as changing out water in a birdbath every 5-7 days, or can entail extensive drainage practices to reduce the amount of stagnant water available to mosquitoes. Flooded crops, pasture lands or areas with high organic matter can be some of the worst areas in which mosquitoes breed.

Biological Controls consist of natural predators which help assist in keeping the population numbers lower. Unfortunately there are not many natural predators available that work in mosquito control. Dragonflies appear to help in reducing numbers, but the extent to which dragonflies are present is limited as compared to the mass broods of mosquitoes. Mosquito fish or *Gambusia affinis*, are small, darkish, guppy-looking fish native to areas from New Jersey to Florida. They have voracious appetites for the larvae of mosquitoes. In certain areas they can be effective at controlling larval population, but they are not 100% reliable and not all habitats are suited for introduction of this non-native species. Animals such as bats or small birds, like purple Martins, are believed to eat large amounts of mosquitoes, but studies indicate that mosquitoes make up a very small portion of their diets.

Larvicide
Larviciding is the process of controlling mosquitoes when they are in the larval or pupal form. Controlling mosquitoes when they are in the water is an effective approach because the mosquito is isolated in known-breeding sites, which are recorded and routinely monitored. For many districts, this is the bulk of their operations: finding, monitoring and controlling mosquitoes in the larval form before they disperse into biting adults. There are a few products available for abatement

practices. Often times, one product will be better suited for a particular situation due to species, habitat, environmental conditions, larval stage, etc.

Bti
Bacillus thuringiensis israelensis (Bti) is a naturally occurring soil microbe used in controlling mosquito larvae. Mosquito larvae of susceptible species ingest a dose of Bti protein crystals that travels through the digestive tract. These mosquito specific crystals attach to the gut wall and rupture the digestive lining. Larvae become sluggish and die within 24 hours.

B.s
Bacillus sphaericus works very similar to Bti. Mosquito larvae of susceptible species ingest a lethal dose of B.s a protein toxin. Toxins are released in the larval midgut, paralyzing and damaging the digestive system. The larvae undergo tremors, become sluggish and die with 48 hours. The cadavers of the dead larvae regenerate the spores making it available up to 21days.

Methoprene
Methoprene is an insect growth regulator (IGR) that interferes with normal mosquito development. Methoprene is absorbed through the skin of the larvae and disrupts the normal developmental cycle resulting in the inability to complete their metamorphosis.

Monomolecular Film
A Monomolecular Film (MMF) is made up of a special alcohol ethoxylate that spreads rapidly over the surface of the waters. The ethoxylate is a surfactant that reduces the surface tension of the water and makes it difficult for the larvae and pupae to attach to the water's surface. The film also blocks their breathing tubes and the larvae and pupae drown.

Larviciding Oil
Larviciding oils are petroleum hydrocarbons that act as surfactants to prevent larvae and pupae from breaking through the water's surface tension, blocking their breathing tubes so that they eventually drown.

Adulticide
Adulticiding is the process of controlling mosquitoes when they are adults. Adult female mosquitoes require a blood meal in order to develop their eggs. It is during this meal that disease is transmitted so ultimately they provide the largest threat to the public welfare. Adulticiding becomes necessary when large adult populations are observed, larviciding is not effective or unknown sites are found. Also, there are areas that cannot be treated due to topography and subsequently mosquito populations continually develop without interference. Adulticiding can provide temporary control of mosquitoes in a given area, but is not practical as the only method of control.

At Benton County Mosquito Control we currently use two products for the reduction of adult mosquito populations; Pyrocide and Anvil 2 + 2.

Pyrocide
Pyrocide is an insecticide that contains pyrethrins. Pyrethrins are derived from the naturally occurring extract of chrysanthemum flowers and are widely used for control of various insects. Pyrethrins are one of the least poisonous insecticides to mammals. Pyrethrins are low in toxicity to

mammals because they are quickly broken down into inactive forms and pass from the body in the urine and feces. They also have an extremely low pesticide movement rating because they bind tightly to the soil and rapidly degrade in sunlight.

Anvil 2 + 2
Anvil 2 + 2 is an insecticide that contains synthetic pyrethroids, which emulate pyrethrins, found in chrysanthemum flowers. This substance, called d-Phenothrin (brand name Sumithrin), kills mosquitoes effectively, yet biodegrades rapidly in the presence of sunlight and/or microorganisms.

BCMC utilizes monitoring and testing of mosquito populations as an early indicator to disease transmission.

Sentinel Flocks
Sentinel flocks are placed throughout the District in locations that have a history of producing mosquito species that are competent vectors. The sentinels are fed, watered and monitored for the presence of mosquito borne virus. A small blood sample, of 3-5 drops, is taken from the comb of the chicken every two weeks. This sample is then tested for West Nile virus (WNv), St. Louis Encephalitis (SLE) and Western Equine Encephalitis (WEE).

C02 Traps
For the collection of adult female mosquitoes (males do not "bite") BCMC uses dry ice CO2 traps. These traps are based upon a CDC (Centers for Disease Control) designed CO2 (carbon dioxide) trap that employ a 1-gallon cooler with holes poked in the bottom. Approximately 5 lbs of dry ice is placed into the cooler and as the ice sublimates carbon dioxide is released. There is a battery-powered fan hanging beneath the cooler that pulls the female mosquitoes following the CO2 trail into a catch bag. The mosquitoes are collected the following morning where they are taken back to the lab to be identified and counted.

Adult female mosquitoes are either tested "in-house" for WNv or "pooled" into samples of 20-50 and sent to a lab where they are tested for the presence of WNv, SLE and WEE antibodies.

Larval Collections
Control Operators (i.e., field personnel) will routinely collect larval samples and bring them to the lab so that genus and abundance information can be collected. Larval collections are used to determine potential populations and what types of mosquitoes are being produced but they are not tested for the presence of mosquito-borne illness.

Testing
BCMC has two main options for detecting the presence of virus within the District. Samples can either be performed in-house or sent off to a state accredited lab. In-house testing uses the RAMP (Rapid Analyte Measurement Platform) West Nile virus test. The RAMP is a highly accurate (though not to the level of the state accredited labs) device that can provide relatively quick results on samples of either mosquito pools or cloacal swabs of dead birds. This system, however, only tests for the presence of WNv antibodies and if a positive is detected it is sent to a state accredited lab for confirmation.

Mosquito pools, sentinel flock samples and dead birds are sent to state accredited labs. BCMC utilizes the Oregon State Public Health Laboratory to test its samples for the presence of antibodies for WNv, SLE and WEE in both mosquito pools and sentinel flock samples. Dead birds are sent to WADDLE (Washington Animal Disease Diagnostic Laboratory) and are tested for WNv only.

Species found in the Byron Pond Area

Aedes *vexans*: A common floodwater mosquito usually found in irrigated and floodwater areas. Aedes *vexans* aggressively feed on man and large domestic animals.

Anopholes *freeborni*: Commonly found in roadside ditches or seepage with grassy margins. Anopheles is also a vector for Malaria. They primarily feed on large animals.

Culiseta *inornata*: This species is commonly associated with duck ponds, ditches, canals, and woodland pools but is also found in stagnant water including artificial containers. Culiseta *inornata* commonly feed on large domestic animals.

Culex *pipiens*: Commonly known as the house mosquito. This mosquito is a very competent vector for West Nile virus. They breed in catch basis, stormwater ponds, ditches, animal waste lagoons, and other waters rich in organic matter. Culex *pipiens* utilize birds as their source of blood meals, but will also feed on mammals.

Culex *tarsalis*: A very competent vector for West Nile virus, tarsalis breed in many types of permanent and semi-permanent waters such as stormwater ponds, ditches and marches. Breeds in a wide range of permanent water conditions along with tires and ornamental ponds. Culex *tarsalis* prefer to feed on domestic and wild birds but will also bite man, livestock, and other animals.

Ochlerotatus *melanimon*: A floodwater mosquito, usually found in irrigated or floodwater areas. They feed readily on man but will also feed on other mammals such as cattle, horses, dogs and rabbits.

According to the Centers for Disease Control all of these species are potential vectors for West Nile virus.

APPENDIX 14. LITERATURE CITED

Askam, L. 1994. Franklin, Richardson, Columbian, Washington, and Townsend Ground Squirrels. In: S.E. Hygnstrom, R.M. Timm, G.E. Larson, eds. Prevention and Control of Wildlife Damage. Univ. of Nebraska.

Bell, G., J.P.Kunz, S. Cierebiej-Kanzler, M. Barber and Paul Sekulich. 2002. Sunnyside Wildlife Area Fish Retrofit. Washington Department of Fish and Wildlife. Olympia, Washington, USA.

Bicak, T.K., R.L. Redmond, and D.A. Jenni. 1982. Effects of grazing on long-billed curlew breeding behavior and ecology. Pages 74-85 *in* J.M. Peek and P.D. Dalke, eds. Wildlife-livestock relationships symposium: proceedings 10, University of Idaho, Moscow, Idaho, USA.

Bolding, B., S.A. Bonar, M. Divens and E. Anderson. 1997. Stocking Walleye to Improve Growth and Reduce Abundance of Overcrowded Panfish in a Small Impoundment. Washington Dept. of Fish and Wildlife. Olympia, Washington, USA.

Braatne, J.H. and R. Jamieson. 2001. Impacts of flow regulation on riparian cottonwood forests along the Kootenai and Yakima Rivers. Prepared for the Bonnivelle Power Administration, Portland OR.

Braun, C.E., M.F. Baker, R.L. Eng, J.S. Gashwiler, and M.H. Schroeder. 1976. Conservation committee report on effects of alteration of sagebrush communitites on the associated avifauna. Wilson Bull. 88:165-171.

Bryant, F.G., and Z.E. Parkhurst. 1950. Survey of the Columbia River and its tributaries – Part IV. Area III. Washington streams from the Klickitat and Snake Rivers to Grand Coulee Dam, with notes on the Columbia and its tributaries above Grand Coulee Dam. U.S. Fish and Wildlife Service, Special Scientific Report Fisheries No. 37.

Burke, W.A. 1965. Ecology of spring chinook salmon. Fish Comm. of Oregon. Annual progress report. 11/1/63-12/31/64. Portland, OR.

Buss, I.O. 1965. Wildlife ecology. Washington State University. Pullman, WA.

Campton, D.E. and J.M. Johnston. 1985. Electrophoretic Evidence for a gentetic admixture of native and nonnative rainbow torut in the Yakima River, Washington. Transactions of the American Fisheries Societry Vol. 114. No.6

Conway, C.J., Garcia, V., Smith, M.D., Ellis, L. 2002. Population Ecology and Habitat Use of Burrowing Owls in Eastern Washington. Annual Report to: U.S. Bureau of Land Management, U.S. Fish and Wildlife Service & Washington Department of Fish and Wildlife.

Corkran, C.C. and C. Thoms. 1996. Amphibians of Oregon, Washington and British Columbia. Lone Pine, Redmond, WA. 175 pp.

Davidson, F.A. 1953. The development of the Yakima River Basin for irrigation and its effect on the migratory fish populations in the river. Unpublished manuscript.

Decant, J.A., M.L. Sondreal, D.H. Johnson, L.D. Igl, C.M. Goldale, P.A. Rabie, and B.R. Euliss. 1999. Effects of management practices on grassland birds: Burrowing owl. Northern Prairie Wildlife Research Center, Jamestown, North Dakota, USA.

Divens & Phillips, 2000. 1998 Warmwater Fisheries Survey of Powerline Lake (Franklin County) Washington Dept. of Fish and Wildlife. Olympia, Washington, USA.
Divens, M.J., H. Woller, and R. Osborne. 2003. Warmwater Fisheries Surveys pf the I-82 Ponds (Yakima County) 2000 & 2001. Washington Dept. of Fish and Wildlife. Olympia, Washington, USA.

Dobler, F.C., J. Elby, C. Perry, S. Richardson, and M. Vander Haegen. 1996. Status of Washington's shrubsteppe ecosystem: extent, ownership, and wildlife/vegetation relationships. Washington Department of Fish and Wildlife, Wildlife Management Program, Olympia, WA. 39 pp.

Ellis, E. and T. Dewey. 2003. *Lontra canadensis.* Animal Diversity Website. http:// Animal diversity.ummz.umich.edu/site/accounts/information/Lontra_canadensis.html.

Eitemiller, D.J., M.L. Uebelacker, D.A. Pluma, E.P. Arango and K.L. Clark. 2000. Anthropogenic alteration to an alluvial flood plain within the Yakima basin, Washington. Pp. 239-244. IN P.J. Wigington, Jr. and R.L. Bescheta (eds.). *Proceedings of the AWRA* 2000 Summer International Specialty Conference on Riparian Ecology and Management in Multi-Land Use Watersheds.

Game Management Plan. July 2003-June 2009. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

Gilbert, C.H. 1913. Age at maturity of the Pacific coast salmon of the genus Oncorhynchus Bullus Bur. Fish. 32(1912): 1-22.

Groot, C. and Margolis, L. (Editors) 1991. Pacific salmon life histories. UBC Press,Vancouver. 564 p.

Hauer, F.R., C.N. Dahm, G.A. Lamberti and J.A. Stanford. 2002. Landscapes and ecological variability of rivers in North America: factors affecting restoration strategies. IN: Wissmar, R. C. and P. A. Bisson (eds.), Strategies for Restoring River Ecosystems: Sources of Variability and Uncertainty in Natural and Managed Systems. Special Publication of Am. Fish. Soc. In press.

Hays, M.P. and M.R. Jennings. 1986. Decline of Ranid frog species in western North America: are bullfrogs (*Rana catesbeiana*) responsible? J. Herpetol. Rev.13.

Healy, M.C. 1991. The life history of chinook salmon (Oncorhynchus tshawytscha). P. 311-393, In: C. Groot and L. Margolis [Eds.]. Life history of Pacific salmon. University of B.C. Press, Vancouver, B.C., Canada.

Hill, D.P. 1998. Status of the Long-billed Curlew (Numenius americanus) in Alberta. Alberta Environment, Fisheries & Wildlife Management Division, and Alberta Conservation Association, Wildlife Status Report No. 16, Edmonton, AB. 20 pp.

Howell, P., K. Jones, D. Scarnecchia, L. LaVoy, W. Kendra, and D. Ortmann. 1985. Stock assessment of Columbia River anadromous salmonids. Volume I: chinook, coho, chum and sockeye salmon stock summaries. Report to Bonneville Power Administration, Proj. No. 83-335, Contract No. DE-AI79-84BP12737.

Hygnstrom, S.E., R.M. Timm, G.E. Larson (Ed.). 1994. Prevention and Control of Wildlife Damage. Vol 1. University of Nebraska – Lincoln, Nebraska & United States Department of Agriculture.

Ingals, L.G. 1965. Mammals of the Pacific States, California, Oregon, Washington. Stanford University Press, Stanford, California.

Karp, C., W. Larrick, M Johnston and T. Dick. 2003. Summary of Upper Yakima River steelhead movements, winter 2002/2003. U.S. Department of Interior, Bureau of Reclamation.

Knutson, K.L. and V.L. Naef. 1997. Management recommendations for Washington's priority habitats: riparian. Wash. Dept. Fish and Wildl., Olympia. 181 pp.

Larsen, D.T. 1999. Duck nesting, and brood habitat use and survival within the Wapato Irrigation Project. *Prepared for:* U. S. Bureau Reclam., Yakima, WA. 24pp.

Larsen, E.M. 1997. Management Recommendations for Washington's Priority Species, Vol 3: Amphibians and Reptiles. Washington Dept. of Fish and Wildlife. Olympia, Wash.

Lenfesty, C.D. and T.E. Reedy. 1985. Soil Survey of Yakima County Area, Washington. United States Department of Agriculture, Soil Conservation Service. Washington D.C.

Leonard, W.P., Brown, H.A., Jones, L.C., McAllister, K.R. and R.M. Storm, (1993) *Amphibians of Washington and Oregon.* Seattle Audubon Society. Seattle, WA.

Leonard, W.P. and K.R. McAllister. 1996. Past distribution and current status of the northern leopard frog (*Rana pipiens*) in Washington. Wash. Dept. Fish and Wilflife. Olympia, Wa.

Lichatowich, J. 1992. Management for sustainable fisheries: some social, economic, and ethical questions. Pages 11-18 in G. H. Reeves, D. L. Bottom, and M. H. Brookes. Ethical questions for resource managers. U.S. Forest Service, Pacific Northwest Research Station, Portland, Oregon.

Loch, J.J., S.A. Leider, M.W. Chilcote, R. Cooper, and T.H. Johnson. 1988. Differences in yield, emigration timing, size, and age structure of juvenile steelhead from two small western Washington streams. Calif. Fish and Game 74: 106-118.

Maher, F.P. and P.A. Larkin. 1954. Life history of steelhead trout of the Chilliwack River, British Columbia. Trans. Amer. Fish. Soc. 84: 27-38.

Mullan, J.W., A. Rockhold, and C.R. Chrisman. 1992CPb. Life histories and precocity of chinook salmon in the mid-Columbia River. Progressive Fish Cult. 54:25-28.

Narver, D.W. 1969. Age and size of steelhead trout in the Babine River, British Columbia. J. Fish. Res. Bd. Can. 26: 2754-2760.

National Wildfire Coordinating Group. 1981. Fire behavior. Boise, Idaho, USA.
Northwest Habitat Institute. 2003. Interactive Biodiversity Information System (IBIS) database. Northwest Habitat Institute, Corvallis, Oregon, USA.

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. U.S. Department of the Interior, National Biological Service, Washington D.C. 58 pp.

NPPC. (Northwest Power Planning Council). 2001. Walla Walla Subbasin Summary. Portland,

OR.

Nussbaum, R. A., E. D. Brodie, and R. M. Storm. 1983. Amphibians and reptiles of the Pacific Northwest. Univ. Press of Idaho, Moscow, ID.

Pauley, G.B., B.M. Bortz, and M.F. Shepard. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Northwest) -- steelhead trout. US. Fish Wildl. Serv. Biol. Rep. 82 (11.62). Army Corps of Engineers, TR EL-82-4. 24 pps.

Pearsons, T. N., G. A. McMichael, S. W. Martin, E. L. Bartrand, J. A. Long, and S. A. Leider. 1996. Yakima River Species Interactions Studies. Annual Report FY 1994. Submitted to Bonneville Power Administration, Portland, Oregon. DOE/BP-99852-3. 150 pp.

Pearsons, T.N., K.D. Ham, G.A. McMichael, E.L. Bartrand, A.L. Fritts, C.W. Hopley, and J. Dunnigan. 1998. Yakima River Species Interactions Studies Annual Report. Washington Department of Fish and Wildife, Olympia, Washington.

O'Conner, G., and W. Rickard. 2003. A History of the Fitzner/Eberhardt. Arid Lands Ecology Reserve; Four Decades of Environmental Research. Pacific Northwest National Laboratories. Richland, Washington, USA.

Quigley, T.M., and S.J. Arbelbide, technical editors. 1997. An assessment of ecosystem components in the interior Columbia basin and portions of the Klamath and Great Basins. Volume 2. U.S. Forest Service General Technical Report PNW-GTR-405.

Rickart, E.A. 1987. Mammalian Species. *Spermophilus townsendii*. The American Society of Mammalogists.

Ring, T.E. and B.Watson. 1999. Effects of geologic and hydrologic factors and watershed change on aquatic habitat in the Yakima River Basin, Washington; *in* R. Sakrison and P. Sturtevant, eds. Watershed management to protect declining species. TPS-99-4. Amer. Water Resour. Assoc., Middleberg, VA.

Robertson, C.H. 1957. Survival of precociously maturing salmon male parr. (Onchorhynchus tshawytscha) after spawning. Calif. Fish and Game 43:119-129.

Rood, S.B., and J.M. Mahoney. 1990. Collapse of riparian poplar forests downstream from dams in western prairies: probable causes and prospects for mitigation. Environ. Manage. 14:451-464.

Saab, V.A., and T.D. Rich. 1997. Large-scale conservation assessment for Neotropical migratory land birds in the interior Columbia River basin. Gen. Tech. Rep. PNW-GTR-399. Portland, OR.

Schroeder, M. A., D.W. Hays, M.F. Livingston, L.E. Stream, J.E. Jacobson, and D.J. Pierce. 2000. Changes in the distribution and abundance of sage grouse in Washington. Northwestern Nat. 81:104-112.

Shapovalov, L. and A.C. Taft. 1954. The life histories of the steelhead rainbow trout (Salmo gairdneri gairdneri) and silver salmon (Oncorhynchus kisutch) with special reference to Waddell Creek, California, and recommendations regarding their management. California Dept. of Fish and Game, Fish. Bull. No. 98. 375 pps.

Stebbins, R.C. 1951. Amphibians of North America. Univ. Calif. Press, Berkeley.

Shaw, C.E. and S. Campbell. 1974. Snakes of the American west. Alfred Knopf, New York, N.Y.

Storm,R.M. and W.P. Leonard. 1995. Reptiles of Washington and Oregon. Seattle Audubon Soc., Seattle, Wash.

The Nature Conservancy. 1999. Identification and preservation of biodiversity in the shrub steppe on a regional scale: The role of the Yakima Training Center in conserving biodiversity in the shrub steppe of Washington. Prepared for the U.S. Army Fort Lewis and the Yakima Training Center. 241 pp.

Thomas, J. W. (ed.). 1979. Wildlife habitats in managed forests: the Blue Mountains of Oregon and Washington. Agric. Handbook 553. Washington D.C., U.S. Dept. Agric., For. Serv.

U.S. Department of Energy. 1988. Consultation draft site characterization plan. DOE/RW-0164. 9v. Hanford Site, Richland, Washington, USA.

Vander Haegen, M.W., M.A. Schroeder, and R.M. Degraaf. 2002. Predation on real and artificial nests in shrubsteppe landscapes fragmented by agriculture. The Condor 104:3

Ward, B.R and P.A Slaney. 1988. Life history and smolt-to-adult survival of Keogh River steelhead trout (Salmo gairdneri). Can. J. Fish. Aquat. Sci. 45: 1110-1122.

Washington Department of Fish and Wildlife. 2005. Wildlife Area Facility Inventory – Region 3. Field Survey-Utilization Report. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

Washington Department of Fish and Wildlife. 1997. Salmonid Stock Inventory: Bull Trout and Dolly Varden Appendix. Olympia, Washington, USA.

Watershed Management Plan, Yakima River Basin. Yakima River Basin Watershed Planning Unit and Tri-County Water Resource Agency. 2003. Prepared by Economic and Engineering Services, Inc. in Associatrion with Montgomery Water Greoup, Inc. R.C. Bain & Associates and McKenzie Consulting.

Watson, J. 2002. Ferruginous Hawk Surveys. WDFW Email summary.

Watson, J.W. 2003. Migration and Winter Ranges of Ferruginous Hawks From Washington. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

Withler, I.L.. 1966. Variability in life history characteristics of steelhead trout (Salmo gairdneri) along the Pacific coast of North America. J. Fish. Res. Bd. Can. 23: 365-392.

Wydoski, R.S. and R.R. Whitney. 2003. Inland Fishes of Washington Second Edition, Revised and Expanded. American Fisheries Society in association with University of Washington Press.

Yakima Subbasin Fish and Wildlife Planning Board. 2004. Yakima Subbasin Plan. Prepared for the: Northwest Power and Conservation Council.

Personal Communications:

Eric Anderson, District Fish Biologist, WDFW, Yakima, Washington
Jim Cummins, District Fish Biologist, WDFW, Yakima, Washington
Tracy Hames, Wildlife Biologist, Yakama Nation, Toppenish, Washington

Loy Sak, Agricultural Lessee, Sunnyside Wildlife Area, Sunnyside, Washington
Leray Stream, Retired Regional Wildlife Program Manager, Yakima, Washington