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**ROCKY REACH ~~COMPREHENSIVE~~  
WILDLIFE MANAGEMENT PLAN**

**Final Draft**

**ROCKY REACH HYDROELECTRIC PROJECT  
FERC Project No. 2145**

**February 24 July 28, 2005**



*Prepared by*  
**Public Utility District No. 1 of Chelan County  
Wenatchee, Washington**

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## EXECUTIVE SUMMARY

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Under the direction of the Natural Resources Working Group ([NRWG](#)), numerous studies were conducted during the Rocky Reach Project (Project) relicensing process, including mapping of rare, threatened, and endangered wildlife and cover-type, a survey of botanical resources, surveys of Canada goose nesting, surveys of bald eagle overwintering abundance, and a study of overwinter mule deer mortality.

The Wildlife Technical Group ([WTG](#)) representatives, after considerable discussion, agreed to disagree regarding the existence of ongoing ~~Rocky Reach~~ Project impacts to wildlife and botanical resources. The ~~Wildlife Technical Group~~ also agreed that discussing and attempting to determine which measures could be categorized as either protection, mitigation or enhancement measures would be counterproductive. Consequently, the ~~Wildlife Technical Group~~ representatives developed the measures included in this Rocky Reach ~~Comprehensive~~ Wildlife Management Plan ([WMP](#)) to provide benefit to local wildlife and botanical resources.

The goal of the ~~Wildlife MP Technical Group~~ is to protect and enhance wildlife populations and habitat in the [vicinity of](#) Rocky Reach Project ~~area~~ by mitigating any specific adverse impacts demonstrated to be caused by ongoing operation of the Project. Chelan PUD has agreed to implement several Protection, Mitigation, and Enhancement (~~PME~~)—measures ([PMEs](#)) for wildlife as part of the Rocky Reach [Comprehensive](#) Settlement Agreement. The objectives of these PME are to: 1) restore, maintain, or improve ecological quality and diversity; 2) restore, maintain, improve, or increase habitat for key indicator wildlife species; and 3) provide for public use compatible with the ecological quality, diversity, and carrying capacity for key wildlife species goals including aesthetics and open space values.

The specific ~~PME~~—measures to be implemented by Chelan PUD during the term of the New License and any subsequent annual licenses to meet these goals and objectives are described in [Section 4](#) of the ~~Rocky Reach Comprehensive Wildlife Management Plan~~. They include the following:

- [1](#)) funding to operate, maintain, and protect [the](#) Chelan Wildlife ~~Management~~—Areas ([CWA](#));

~~Chelan PUD shall make available to the Washington Department of Fish and Wildlife (WDFW) \$74,000 annually, for the term of the New License and any subsequent annual licenses, for the operation, maintenance and protection of Chelan Wildlife Management Areas, including vegetation management, improving infrastructure (e.g., parking areas, gates fencing, signs, road maintenance, etc.), funding to support a manager, assistant manager, or other personnel, office space and storage area, and other tasks.~~

- [2](#)) funding for habitat restoration for WDFW;

- [a.](#) ~~Chelan PUD shall make available to WDFW \$36,000 annually, for the term of the New License and any subsequent annual licenses, to restore 1300-1400 acres in the Chelan Wildlife Management Areas previously under cultivation or in need of~~

~~restoration to self maintaining shrub steppe habitat vegetated by bunchgrasses and shrubs such as snowy eriogonum, lupine, balsamroot, big sage, bitterbrush, serviceberry, elderberry.~~

—3) funding for habitat restoration for US Bureau of Land Management (BLM);

~~Chelan PUD shall make available to the BLM \$20,000 annually and up to \$20,000 annually on a 50/50 matching basis, for the term of the New License and any subsequent annual licenses, to manage intermixed BLM lands within the Rocky Reach Wildlife Area. Funding in this section may be used for native shrub steppe habitat rehabilitation, noxious weed control, native forbe replanting, water development projects, etc., on BLM lands within the Rocky Reach Wildlife Area.~~

—4) funding for habitat restoration for USDA Forest Service (USDA-FS);

~~Chelan PUD shall make available to the USDA FS \$5,000 annually and up to \$5,000 annually on a 50/50 matching basis, for the term of the New License and any subsequent annual licenses, to manage USDA FS administered lands within the Rocky Reach Wildlife Area. Funding in this section may be used for native shrub steppe habitat rehabilitation, noxious weed control, native forb replanting, and prescribed fire ecosystem processes, etc., on USDA FS administered lands within the Rocky Reach Wildlife Area.~~

—5) providing a conservation easement on Chelan PUD Sun Cove property;

~~Chelan PUD shall enter into a contract with the Chelan Douglas Land Trust, or other appropriate entity, to pursue and fund acquisition of a conservation easement and limited access to Rocky Reach reservoir on Chelan PUD property near Sun Cove for protection of the shoreline riparian area.~~

—6) funding for an integrated noxious weed control program (outstanding issue: definition of noxious weeds);

~~Chelan PUD, in coordination with the Rocky Reach Wildlife Forum (RRWF), shall make available \$10,000 per year, for the term of the New License and any subsequent annual licenses, for implementation of an integrated noxious weed control program in the Rocky Reach Wildlife Area. Implementation of the program described in this subsection will be conducted by Chelan PUD personnel or other qualified personnel selected by the RRWF.~~

—7) funding for noxious weed control, specifically for rare, threatened and endangered botanical species;

~~Chelan PUD, in coordination with the RRWF, shall make available \$5,000 per year, for the term of the New License and any subsequent annual licenses, for implementation of a noxious weed control for *Spiranthes* or other rare, threatened and endangered species of concern or future listed species where *Spiranthes* needs are satisfied in the Rocky Reach Wildlife Area. Implementation of the program described in this subsection will be conducted by Chelan PUD personnel or other qualified personnel selected by the RRWF.~~

- 8) funding for rare, threatened and endangered botanical species monitoring;  
~~Chelan PUD shall make available \$3,000 per year to qualified personnel selected by the RRWF, for the term of the New License and any subsequent annual licenses, for implementation of an annual *Spiranthes* monitoring program, or other species should *Spiranthes* “requirements” be met. Funds may accumulate, if surveys are not conducted in any given year, to a maximum of \$15,000.~~
  
- 9) conducting wildlife surveys; and  
~~Chelan PUD, in coordination with the RRWF, shall continue to conduct wildlife surveys similar to those conducted during the first Federal Energy Regulatory Commission (FERC) license for the Project and/or habitat improvement projects for a cost not to exceed \$10,500 or equivalent staff days per year during the term of the New License and any subsequent annual licenses.~~
  
- 10) funding for a conservation easement for rare, threatened and endangered botanical species protection;  
~~Chelan PUD shall enter into a contract with the Chelan Douglas Land Trust, or other appropriate entity, to pursue acquisition of conservation easements on private lands to protect *Spiranthes* sites. The total cost to Chelan PUD of acquiring conservation easements under this subsection is not to exceed \$ XXX. (Chelan PUD to determine value.)~~



## ~~SECTION 2:~~SECTION 1: INTRODUCTION

The relicensing process for the Rocky Reach Hydroelectric Project (Project) brought fisheries, wildlife, and botanical resource agencies, tribes, and interested parties together in a Natural Resources Working Group ([NRWG](#)) that provided an opportunity for comprehensive review of current and future management priorities for fish, wildlife, and botanical resources potentially impacted by [ongoing](#) Project operations. The ~~Natural Resources Working Group~~ was established to identify issues, develop study plans, review study reports, and develop long-term management plans for fish and wildlife species. The ~~Natural Resources Working Group~~ consisted of representatives from the USDA Forest Service (USDA-FS), US Fish and Wildlife Service (USFWS), NOAA Fisheries (NOAA), Washington Department of Ecology (WDOE), Washington Department of Fish and Wildlife (WDFW), the US Bureau of Land Management (BLM), the Colville Confederated Tribes (CCT), the Yakama Nation (YN), [Columbia River Inter-Tribal Fish Commission \(CRITFC\)](#), and other interested parties. ~~A subgroup of the Natural Resources Working Group, the Wildlife Technical Group, completed the Rocky Reach Comprehensive Wildlife Management Plan that follows.~~

Technical groups were formed for each comprehensive plan e.g., resident fish, white sturgeon, bull trout, Pacific lamprey, and wildlife due to the complexity of issues surrounding each species and so that agency experts could focus on meetings pertaining to their specific expertise. [A subgroup of the NRWG, the Wildlife Technical Group \(WTG\), comprised of the USDAFS, USFWS, WDOE, WDFW, and Chelan PUD, completed this Wildlife Management Plan \(WMP\).](#) ~~The Wildlife Technical Group was comprised of the same parties as the Natural Resources Working Group. The Natural Resources Working Group will continue to function as the Rocky Reach Wildlife Forum (RRWF) following the effective date of the New License, and any subsequent annual licenses, as provided in section XX of the Settlement Agreement. The Rocky Reach Wildlife Forum (RRWF) RRWF will assume responsibility for meeting annually to share information, coordinate efforts, and make recommendations regarding the implementation of the~~ [WMP](#) ~~Rocky Reach Comprehensive Wildlife Management Plan.~~

State lands included in the [Chelan Wildlife Area \(CWA\)](#) are those of the WDFW, and the Washington Department of Natural Resources (DNR). Federal lands in the ~~Wildlife Area~~ [CWA](#) include those of the USDA Forest Service, BLM, and USFWS lands adjacent to their hatchery ([Figure 1](#)). The primary areas of concern include: 1) the Rocky Reach Wildlife Area [\(I hesitate to “acronym” this one \[RRWA\] even though it is used frequently throughout the document for fear of confusing the reader with the Rocky Reach Wildlife Forum \(RRWF\). However, if others prefer the RRWA, I can change it easily in the document\)](#), defined as public lands in Chelan County and Douglas County within approximately a 6-mile corridor of the Rocky Reach Reservoir ([Reservoir](#)); 2) lands purchased for mitigation under the original license that are now referred to as the Swakane, Entiat, and Chelan Butte Wildlife ~~Management Areas~~ [Units](#), subsequently referred to in this document as the Chelan Wildlife ~~Management Areas~~ [\(CWA\)](#); and 3) Chelan PUD lands. The RRWF will have the flexibility to recommend undertaking projects beyond these boundaries when it is demonstrated that there is an important wildlife/habitat link to primary areas (e.g., migration corridor, limiting factors).

The ~~Wildlife-Technical-Group~~ representatives, after considerable discussion, agreed to disagree regarding the existence of ongoing ~~Rocky Reach~~ Project impacts to wildlife and botanical resources. The ~~Wildlife-Technical-Group~~ also agreed that discussing and attempting to determine which measures could be categorized as either protection, mitigation or enhancement measures would be counterproductive. Consequently, the ~~Wildlife-Technical-Group~~ representatives developed the measures included in this ~~Rocky Reach Comprehensive Wildlife Management Plan~~ to provide benefit to local wildlife and botanical resources.

This ~~Rocky Reach Comprehensive Wildlife Management Plan~~ contains sections highlighting the background of wildlife species (~~S~~section 2), relicensing and other studies conducted to determine ~~ongoing p~~Project-related impacts, if any, on wildlife, and potential wildlife enhancement measures (~~S~~section 3), goals and objectives of the management plan (~~S~~section 4), and Protection, Mitigation, and Enhancement (~~PME~~)-measures (~~PMEs~~) for wildlife that Chelan PUD is to implement through the term of the New License, and any subsequent annual licenses, for the ~~Rocky Reach~~ Project (~~S~~section 4).

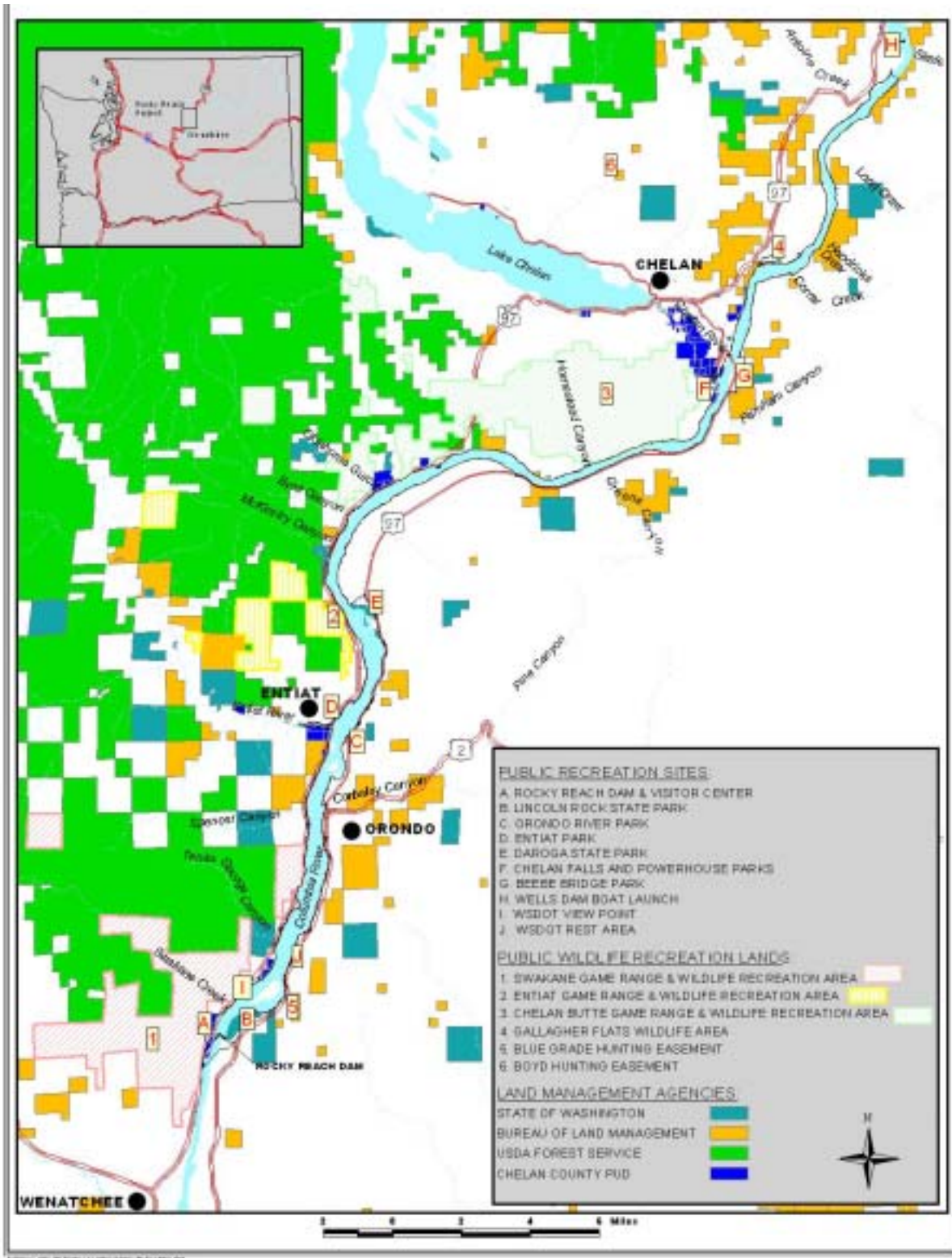


Figure 1: Rocky Reach Project Area

## ~~SECTION 3:~~SECTION 2: BACKGROUND

Before European settlement, the vegetation of the area surrounding the ~~Rocky Reach Hydroelectric Project (Project)~~ was largely shrub-steppe, which was maintained by frequent wildfires. A number of factors have altered the historic vegetation in the vicinity of the Project ~~area~~. Before the Project was constructed in 1961, the area had already been altered to some extent by grazing, fires and fire suppression, farming, residential development and exotic weed invasion. These factors continue to affect current conditions.

Existing botanical resources closely resemble the historical botanical resources in the vicinity of the Project ~~area~~, consisting mainly of shrub-steppe communities. Subsequent to inundation of the reservoir, new riparian and aquatic plant communities have developed on the present day shoreline. There are also some areas of riparian vegetation along streams or rivers and some wetland communities within the Project ~~area~~Boundary. In addition, there are some habitats with distinct vegetation communities; these include areas with gravelly or sandy soils, shallow and/or stony sites; and sand dunes near the Columbia River (Franklin and Dyrness, 1973).

Much of the area surrounding the Project has been cultivated with a variety of crops or is grazed by livestock. Irrigated cropland and orchards dominate the river corridor lands around the Project and ~~r~~Reservoir.

In the mid-1960s, as part of the original license, Chelan PUD provided funds to the Washington Department of Game (now the WDFW) for the purchase of 20,397 acres of land along the Columbia River between Swakane Canyon and Chelan Butte, collectively referred to as ~~Chelan Wildlife Management Area~~ lands. These lands were purchased to mitigate the loss of the wildlife habitat that was inundated by original Project construction. These lands are important mule deer winter range within Chelan County. In addition ~~the~~o WDFW lands, the ~~Chelan Wildlife Management Area~~ is intermingled with lands administered by the BLM, USDA-FS, and DNR, along with some private land in-holdings. These lands provide additional benefit to wildlife resources.

Mule deer (*Odocoileus virginianus*) bighorn sheep (*Ovis canadensis*), cougar (*Felis concolor*), bobcat (*Lynx rufus*) and coyotes (*Canis latrans*) inhabit range in the mid-Columbia region. These species are present near the ~~Project r~~Reservoir, and have been recorded occasionally within the Project ~~area~~Boundary. Upland game birds that use the ~~Project Reservoir area~~shorelines and Wildlife ~~Management~~Area lands include ring-necked pheasants (*Phasianus colchicus*), California quail (*Lagopus californicus*), chukars (*Alectoris chukar*) and mourning doves (*Zenaidura macroura*).

An important component of the ~~Rocky Reach Comprehensive Wildlife Management Plan~~ is to convert the existing 1,300-1,400 acres of agricultural lands on ~~Chelan Wildlife Management Area~~ lands into self-maintaining shrub steppe-habitat vegetated by bunchgrasses and shrubs such as snowy eriogonum, lupine, balsamroot, big sage, bitterbrush, serviceberry, elderberry. Additional portions of that objective would be to maintain strips of forage crops within the larger

expanses of restored shrub steppe. These strips would provide annual, high quality forage and would serve as firebreaks. Noxious weed control would also be an important part of management of these lands, as would sign and road maintenance.

## **SECTION 4: SECTION 3: STUDIES AND EVALUATION OF PROJECT EFFECTS**

Under the direction of the ~~Natural Resources Working Group~~, numerous studies were conducted during the Rocky Reach ~~Project (Project)~~-relicensing process, including the Rare Plant Survey of the Rocky Reach Reservoir (Calypso Consulting, 2000), the Rare, Threatened, and Endangered Wildlife and Cover-Type Mapping Study (DES, 2000), historic and ongoing Chelan PUD monitoring studies, and the Mule Deer Mortality Study (Myers, 2003).

### **4.13.1 Relicensing Studies**

#### **4.1.13.1.1 RTE Wildlife and Cover-type Mapping**

The Rare, Threatened, and Endangered Wildlife and Cover Type Mapping report assessed 13 cover types in the vicinity of the Rocky Reach Project area (DES, 2000). The study determined that approximately 57 percent of lands near the Project area are comprised of disturbed/developed/modified cover-types. Of all cover-types within the Project study area, orchards occupy the largest area (25.2 percent), shrub-steppe is the second largest (22.3 percent), and residential/industrial is the third largest area (15.6 percent). The residential/industrial cover-type increased more than any cover-type from 1991 to 1999 (approximately 230 acres), followed by the recreational cover-type (increase of approximately 59 acres). Residential and industrial development results in the conversion and permanent loss of native wildlife habitats. Collectively riparian and shoreline wetland habitats constitute a small portion of all habitats in the area (9.2 percent).

The primary conclusion of the report was that "...suitability of wildlife habitats within the Rocky Reach study area are influenced by current human activities, past land-use practices, and physical landform characteristics." One significant habitat feature identified by this study and the Rare Plant Survey (Calypso Consulting, 2000) was the dramatic increase in riparian vegetation within the Project area Boundary, and the associated increase in wildlife species diversity.

#### **4.1.23.1.2 Botanical Resources Survey**

During a rare plant survey in 1999–2000 (Calypso Consulting, 2000), botanists located 14 populations of six rare plant species within the Rocky Reach Hydroelectric Project area Boundary, including four currently state-listed species: porcupine sedge (*Carex hystericina*), giant helleborine (*Epipactis gigantea*), adder's-tongue (*Ophioglossum pusillum*) and Ute ladies'-tresses (*Spiranthes diluvialis*). One of these, the Ute ladies'-tresses, is also federally listed as a threatened species. Due to their rarity in the state, two other species that were located during the course of surveys can be expected to be added to the Washington National Heritage Program list and tracked in the future. These species are little bluestem (*Schizachyrium scoparium*) and blue-eyed grass (*Sisyrinchium montanum*).

Noxious weeds such as purple loosestrife (*Lythrum salicaria*), diffuse knapweed (*Centaurea diffusa*), Russian knapweed (*Acroptilon repens*), perennial pepperweed (*Lepidium latifolium*), Dalmatian toadflax (*Linaria dalmatica*), Yellow Starthistle (*Centaurea solstitialis*), Common

Mullein (*Verbascum thapsus*), Camelthorn (*Alhagi maurorum*), Canada thistle (*Cirsium arvense*), common St. John's-wort (*Hypericum perforatum*), and hoarycress (whitetop) (*Cardaria draba*) pose a particular risk to native and rare plant populations in the [vicinity of the Project area](#). Other weeds such as Japanese knotweed (*Polygonum cuspidatum*), yellow flag (*Iris pseudacorus*) and reed canary-grass (*Phalaris arundinacea*) may also be problematic ~~in the Project area~~.

Besides direct destruction of habitat, increases in weedy plant species probably poses the highest threat to rare plant populations and native plant communities (Calypso Consulting, 2000). The higher the level of disturbance within a habitat, the greater the probability that non-native weedy plant species will become established and potentially out-compete native and rare plant species.

Similar to noxious weed invasion, populations of giant helleborine (*Epipactus gigantea*) and porcupine sedge (*Carex hystericina*) have increased dramatically since 1990 (Calypso Consulting, 1990, 2000). The increase in populations of these species indicates that current Project operations result in maintaining riparian vegetation through [providing](#) a stable reservoir elevation and by reducing flood scour.

#### [4.1.33.1.3](#) ***Mule Deer Overwinter Mortality Study***

This study, conducted by WDFW, was designed to provide baseline information concerning the most effective and efficient use of funds to enhance mule deer habitats (Myers 2003). Chelan PUD provided partial funding for this project, with an objective to determine the habitat quality on the existing wildlife lands in the Swakane, Entiat, and Chelan Butte wildlife ~~areas~~[units](#).

Bitterbrush (*Purshia tridentata*), the preferred winter forage species by mule deer when present, was reduced dramatically during the 1988 and 1994 fires. The loss of this important winter forage species very likely had severe impacts to deer numbers, since the quality of digestible winter forage affects survival. The logical step for enhancing mule deer winter ranges in Chelan County would start with restoring bitterbrush stands to a level that could help the mule deer population recover from a combination of severe winters and wildfires. Determining areas with consistent mule deer use will focus restoration of bitterbrush stands to areas important for mule deer. Given these considerations, the goal of this study was to provide deer managers in Chelan County with information on winter habitat use by mule deer so that ~~winter use~~[those](#) areas can be enhanced.

As determined by this study, the primary casual agent to mule deer population decline is loss of winter habitat due to fire. The information gathered regarding habitat quality on existing wildlife areas will be valuable in determining where habitat enhancement efforts will likely be the most successful in terms of benefiting mule deer, and other wildlife species associated with mule deer habitat.

#### [4.23.2](#) ***Ongoing Studies***

##### [4.2.13.2.1](#) ***Canada Goose Nesting Surveys***

Canada goose surveys have been conducted by Chelan PUD on ~~Rocky Reach~~[the](#) Reservoir since 1983 (Fielder 2003). These surveys have been used by WDFW to assess Canada goose

abundance and set harvest regulations. The ~~Project~~ Reservoir provides limited habitat for breeding waterfowl. Canada geese (*Branta canadensis*), mallards (*Anas platyrhynchos*) and common mergansers (*Mergus merganser*) are probably the most common breeding waterfowl, although wood ducks (*Aix sponsa*) occasionally use the nesting boxes dotted along the Reservoir. Backwater areas probably also support a few nesting pairs of pied-billed grebes (*Podilymbus podiceps*) and coots (*Fulica atra*).

Since 1983, 30 to 80 pairs of geese have nested annually along the ~~Rocky Reach Project~~ Reservoir. Currently, Chelan PUD maintains 31 artificial nest structures for geese along the Reservoir. Each year about two-thirds of the nests are successful in producing approximately 200 goslings.

#### 4.2.23.2.2 Bald Eagle Overwinter Abundance Surveys

Bald eagle overwinter abundance surveys have been conducted by Chelan PUD on ~~Rocky Reach~~ the Reservoir since 1982. Several adult bald eagles (*Haliaeetus leucocephalus*) were observed in the vicinity of the ~~Project area~~ during the wildlife survey in 2002 (DES, 2000). Eagles were seen during the summer season, but no evidence of nesting was documented. In addition, Chelan PUD estimates that between 20 and 56 bald eagles overwinter along the ~~Rocky Reach Project~~ Reservoir, feeding on the abundant overwintering waterfowl and deer carrion (Fielder, 1982). Bald eagles are not known to breed within the ~~Project area~~ Boundary.

Chelan PUD and the wildlife management agencies (WDFW, USDA Forest Service, BLM, and USFWS) that participated in development of this plan anticipate that habitat and wildlife enhancement activities and projects could include some of the general management recommendations provided in this section. Several of these items were addressed through the Lake Chelan Project relicensing proceeding, while others may be funded by Chelan PUD, USDA-FS, BLM, and WDFW. The ~~Wildlife Technical Group~~ has developed the following potential activities and projects for lands in the ~~Chelan and Rocky Reach~~ Wildlife ~~Area~~ areas:

#### 4.3.3.3 Potential PME Measures for Wildlife Lands

##### 4.3.13.3.1 Habitat

- Identify the needs and habitat types that address the biology of each of the indicator or key species.
- Use existing habitat inventories, to the extent possible, to guide habitat management on public lands in Chelan and Douglas counties adjacent to the Reservoir.
- Re-establish shrub steppe habitat and/or herbaceous cover in present agricultural fields and other suitable sites.
- Monitor and control noxious weeds, and re-establish competitive permanent, native vegetative cover.
- Plant shrubs in steppe habitat.
- Develop additional deer winter range using native and fire resistant browse species.
- Apply fertilizer, prune, and/or use controlled burns to maximize forage production and palatability.

#### **4.3.23.3.2 Agronomy**

- Establish annual and perennial irrigated wildlife plantings where appropriate in Swakane Canyon.
- Establish dry-land wildlife/cover plots in suitable areas.

#### **4.3.33.3.3 Tree and Shrub Plantings**

- Plant shrub and trees to develop riparian strips, wetland areas, shorelines, and lands in irrigated and sub-irrigated areas.
- Establish corridors of evergreen trees to provide large mammal travel lanes and thermal cover.

#### **4.3.43.3.4 Erosion Control**

- Construct a series of erosion control structures in selected canyons.
- Plant herbaceous and woody vegetation in sediment basins and sub-irrigated areas associated with these structures.

#### **4.3.53.3.5 Water Developments**

- Optimize availability of water from springs and streams, improve developed springs, and develop new springs.
- Install water guzzlers where needed.
- Replace livestock tanks with wildlife watering basins.
- Maximize pond construction and water storage throughout the area to create wetlands, riparian habitat, and provide water for wildlife use, fire fighting, irrigation, and noxious weed control at strategic locations.
- Provide water for butterfly populations.

#### **4.3.63.3.6 Irrigation**

- Improve efficiencies and optimize water used by improving existing irrigation system.
- Develop irrigation systems at other locations where appropriate.

#### **4.3.73.3.7 Nesting and Raptor Perching Structures**

- Provide artificial nesting structures throughout the area, as needed as an interim project until planted trees grow to functional size.
- Provide brush piles to offer dense escape cover as an interim project until planted riparian habitat grows to functional habitat.
- Preserve crucial perching habitats for bald eagles that migrate through the **Chelan Wildlife Management Area**.

#### **4.3.83.3.8 Wildlife Re-establishment**

- Re-introduce native wildlife that no longer exist in area vicinity or exist in low numbers (e.g., sharp-tailed grouse, bighorn sheep).
- Transplant wildlife within an area as determined desirable.

**4.3.93.3.9 Habitat Connectivity**

- Restore, enhance, maintain, or protect habitat or key species corridors that provide landscape linkages, especially migration corridors.

**4.3.103.3.10 Ecosystem Processes**

- Provide for various ecological processes (fire, riparian large woody debris jams, cavities, [etc.](#)) that provide various “renewal” age classes, site condition changes, or development of natural features beneficial to wildlife.

**4.3.113.3.11 Habitat Protection**

- Enforcement to protect investment of wildlife enhancement areas.
- Education.
- Maintenance.

**4.3.123.3.12 Public Use Management**

- Ensure that public use does not impact resource or habitat.
- Construct interpretive facilities and wildlife viewing sites.
- Coordinate efforts with recreation planning.
- Ensure overlap and coordination with habitat protection efforts (see 3.12).
- Include elements of education, interpretation, control, and enforcement.

**4.3.133.3.13 Comprehensive Property Management**

- Manage ~~Chelan-Wildlife-Management-Area~~ and intermixed properties to maximize resource protection and land stewardship.
- Optimize compatible recreation use of public lands within a six-mile corridor.
- Provide office space and storage area for ~~Chelan-Wildlife-Management-Area~~ staff and equipment.
- Funding to contract for fire protection on ~~Chelan-Wildlife-Management-Area~~.
- Equipment and supplies for maintenance of basic infrastructure, including signs, fences, roads, public facilities, and irrigation.

## **SECTION 5: SECTION 4: ACHIEVEMENT OF OBJECTIVES AND IMPLEMENTATION**

The ~~Wildlife Technical Group~~ representatives, after considerable discussion, agreed to disagree regarding the existence of ongoing ~~Rocky Reach~~ Project impacts to wildlife and botanical resources. The ~~Wildlife Technical Group~~ also agreed that discussing and attempting to determine which measures could be categorized as either protection, mitigation or enhancement measures would be counterproductive. Consequently, the ~~Wildlife Technical Group~~ representatives developed the measures included in this ~~Rocky Reach Comprehensive Wildlife Management Plan~~ to provide benefit to local wildlife and botanical resources.

The goal of the ~~Rocky Reach Comprehensive Wildlife Management Plan~~ is to protect and enhance wildlife populations and habitat in the Rocky Reach ~~Project Wildlife a~~Area by mitigating any specific adverse impacts demonstrated to be caused by ongoing operation of the Project. Chelan PUD has agreed to implement the following wildlife and botanical protection, mitigation and enhancement (PME) measures as part of the Rocky Reach Comprehensive Settlement Agreement to meet the following objectives:

Objective 1: restore, maintain, or improve ecological quality and diversity;

Objective 2: restore, maintain, improve, or increase habitat for key indicator wildlife species; and

Objective 3: provide for public use compatible with the ecological quality, diversity, and carrying capacity for key wildlife species goals including aesthetics and open space values.

Wildlife key indicator species for purposes of the ~~Rocky Reach Wildlife Management Plan~~ include mule deer and bighorn sheep, rare, threatened, endangered, and sensitive species, species of concern, or priority species.

To ensure better comprehensive assessment of short and long term wildlife habitat activities and needs, the ~~Rocky Reach Wildlife Forum (RRWF)~~ will meet at least annually to coordinate efforts, and to make recommendations regarding the expenditure of funds and other resources. It is anticipated that in some years agencies could pool resources for mutually beneficial projects. All funding identified in ~~S~~section 4 is available to be used for application for matching funds.

### **5.14.1 Objective 1: Restore, Maintain, or Improve Ecological Quality and Diversity**

An analysis of potential projects and costs to restore, manage and maintain ~~Chelan Wildlife Management Area~~ lands, focusing primarily on WDFW lands, was conducted by wildlife biologists Marc Hallet (WDFW) and Paul Fielder (Chelan PUD) (Appendix A). The Hallet/Fielder analysis identified habitat restoration projects and areas within the ~~Chelan Wildlife Management Area~~, and equipment, seeds, chemicals, etc. necessary to implement and maintain such projects. A similar analysis within the Rocky Reach Wildlife Area was conducted for BLM

lands by John Musser (BLM), Neil Hedges (BLM), and David St. George (BLM) (Appendix B). The Hallet/Fielder and Musser/Hedges/St. George analyses were used by the ~~Wildlife Technical Group~~ as guidance for some of the recommended actions that follow in this section. It is not intended that future projects be limited to those mentioned in the analyses above.

**5.1.14.1.1 Protection, Mitigation, and Enhancement (PME) Measure: Rocky Reach Comprehensive Wildlife Management Plan**

Develop and implement a ~~Rocky Reach Comprehensive Wildlife Management Plan~~, in ~~collaboration~~ consultation with the ~~wildlife caucus~~ RRWF, to be included in the Rocky Reach Comprehensive Settlement Agreement.

**5.1.24.1.2 PME Measure: Operate, Maintain, and Protect Chelan Wildlife Management Area**

Chelan PUD shall make available to WDFW \$74,000 annually, for the term of the New License and any subsequent annual licenses, for the operation, maintenance and protection of ~~Chelan Wildlife Management Area~~ lands, including vegetation management, improving infrastructure (e.g., parking areas, gates fencing, signs, road maintenance, etc.), funding to support a manager, assistant manager, or other personnel, office space and storage area, and other tasks.

**5.2.4.2 Objective 2: Restore, Maintain, Improve, or Increase Habitat for Key Indicator Wildlife Species**

**5.2.14.2.1 PME Measure: Habitat Restoration (WDFW)**

Chelan PUD shall make available the following funding to WDFW, for the term of the New License and any subsequent annual licenses, to restore 1300-1400 acres in the ~~Chelan Wildlife Management Areas~~ previously under cultivation or in need of restoration, as identified in ~~Rocky Reach the Wildlife M~~ Habitat Plan, section 4.1.1, to self maintaining shrub-steppe habitat vegetated by bunchgrasses and shrubs such as snowy eriogonum, lupine, balsamroot, big sage, bitterbrush, serviceberry, elderberry. Additional portions of that objective would be to maintain strips of forage crops within the larger expanses of restored shrub-steppe. These strips would provide annual, high quality forage and would serve as firebreaks (Appendix A).

- a. Criteria for success to be jointly established and identified in the ~~Rocky Reach Wildlife M~~ Habitat Plan, section 4.1.1;
- b. Target for completion 6 years at \$67,000 per year for first 6 years (Appendix A); and
- c. "Front end" funding need for equipment \$286,000 in year 1, and a total of \$457,000 for years 10-50).

It is the understanding of the RRWF participants that WDFW equipment may be used anywhere within the Rocky Reach Wildlife Area, per the recommendation of the RRWF.

**5.2.24.2.2 PME Measure: Habitat Restoration (BLM)**

Chelan PUD shall make available to the BLM \$20,000 annually and up to \$20,000 annually on a 50/50 matching basis, for the term of the New License and any subsequent annual licenses, to manage intermixed BLM lands within the Rocky Reach Wildlife Area. Funding in this section may be used for native shrub-steppe habitat rehabilitation, noxious weed control, native forbe

replanting, water development projects, etc., on BLM lands within the Rocky Reach Wildlife Area (Appendix B).

**5.2.34.2.3 PME Measure: Habitat Restoration (USDA-FS)**

Chelan PUD shall make available to the USDA-FS \$5,000 annually, and up to \$5,000 annually on a 50/50 matching basis, for the term of the New License and any subsequent annual licenses, to manage USDA-FS administered lands within the Rocky Reach Wildlife Area. Funding in this section may be used for native shrub-steppe habitat rehabilitation, noxious weed control, native forb replanting, and prescribed fire ecosystem processes, etc., on USDA-FS administered lands within the Rocky Reach Wildlife Area.

**5.2.44.2.4 PME Measure: Sun Cove Property Conservation Easement**

Chelan PUD shall enter into a contract with the Chelan-Douglas Land Trust, or other appropriate entity, to pursue and fund acquisition of a conservation easement and limited access to ~~Rocky Reach~~ ~~the~~ ~~R~~Reservoir on Chelan PUD property near Sun Cove for protection of the shoreline riparian area. The easement will also allow the remaining portions of the properties to be managed or sold by Chelan PUD at its discretion.

**5.2.54.2.5 PME Measure: Integrated Noxious Weed Control Program**

Chelan PUD, in coordination with the RRWF, shall make available \$10,000 per year, for the term of the New License and any subsequent annual licenses, for implementation of an integrated noxious weed control program in the Rocky Reach Wildlife Area. Implementation of the program described in this subsection will be conducted by Chelan PUD personnel or other qualified personnel selected by the RRWF.

Assumptions:

- does not include aquatic weeds (outstanding issue: definition of noxious weeds); and
- there will be ample opportunities for efficiencies through inter-agency cooperation and coordination. Propose is to develop area-wide noxious weed control strategy.

**5.2.64.2.6 PME Measure: Noxious Weed Control for *Spiranthes Diluvialis***

Chelan PUD, in coordination with the RRWF, shall make available \$5,000 per year, for the term of the New License and any subsequent annual licenses, for implementation of a noxious weed control program for *Spiranthes*, other species of concern, or future listed species where *Spiranthes* needs are satisfied in the Rocky Reach Wildlife Area. Implementation of the program described in this subsection will be conducted by Chelan PUD personnel or other qualified personnel selected by the RRWF.

**5.2.74.2.7 PME Measure: *Spiranthes* Monitoring**

Chelan PUD shall make available \$3,000 per year to qualified personnel selected by the RRWF, for the term of the New License and any subsequent annual licenses, for implementation of an annual *Spiranthes* (or other species should *Spiranthes* “requirements” be met) monitoring program. Funds may accumulate, if surveys are not conducted in any given year, to a maximum of \$15,000. The Ute Ladies’ Tresses *Spiranthes diluvialis* Along Rocky Reach Reservoir Management Plan will be used as a guideline for implementing the *Spiranthes* monitoring program (Appendix C).

**5.2.84.2.8 PME Measure: Wildlife Surveys**

Chelan PUD, in coordination with the RRWF, shall continue to conduct wildlife surveys similar to those conducted during the first FERC license for the ~~Rocky Reach~~ Project and/or habitat improvement projects for a cost not to exceed \$10,500 or equivalent staff-days per year during the term of the New License and any subsequent annual licenses. The intent of this funding is to survey and monitor threatened, endangered and sensitive species on a periodic schedule as directed by the RRWF. Survey techniques and schedule will be developed in coordination with the RRWF. Surveys should be conducted on an annual basis and address priority species. Chelan PUD shall provide an annual report of survey results to the RRWF.

**5.2.94.2.9 PME Measure: Conservation Easement**

Chelan PUD shall enter into a contract with the Chelan-Douglas Land Trust, or other appropriate entity, to pursue acquisition of conservation easements on private lands to protect *Spiranthes* sites. The total cost to Chelan PUD of acquiring conservation easements under this subsection is not to exceed \$ XXX. (Chelan PUD to determine value.)

**5.34.3 Objective 3: Provide for Public Use Compatible with the Ecological Quality, Diversity, and Carrying Capacity for Key Wildlife Species Goals Including Aesthetics and Open Space Values**

**5.3.14.3.1 PME Measure: Provide for Compatible Public Use**

Develop sites as identified in the wildlife habitat plan for compatible interpretive and recreational development and maintain sites through life of the license. If expansion of compatible recreation on Chelan Wildlife ~~Management~~ Area is desired, funding is available. As identified in sections 4.1.2, 4.2.1, 4.2.2, 4.2.3, projects identified under this subsection will be eligible to apply to the Recreation Enhancement Fund for funding.

**5.44.4 Other Measures**

Additional measures were identified by the ~~Wildlife Technical Group~~, some of which are identified in Section 3.3, during development of the ~~Rocky Reach Comprehensive Wildlife Management Plan~~. These additional measures are eligible for funding provided by Chelan PUD in sections 4.1 and 4.2 and do not have funding levels specified in the ~~Rocky Reach Comprehensive Wildlife Management Plan~~. Implementation of these measures and projects is discretionary, based on decisions of the resource management agencies with authority over the lands where the projects may occur.

**4.4.1 Measure: Monitoring Program**

Monitor and evaluate the effectiveness of PME measures on Rocky Reach Wildlife Area lands. This new, and existing, information will be used to document results and adjust PMEs for future implementation. This program is eligible for funding identified in sections 4.1.2, 4.2.1, 4.2.2, and 4.2.3.

**4.4.2 Measure: Increased Enforcement**

Protection of Rocky Reach Wildlife Area lands through increased enforcement presence was identified in ~~Wildlife Technical Group~~ discussions. This is a critical need that could address cross agency needs by funding for an enforcement officer to do emphasis patrols on resource

protection and recreation management as identified by the ~~Rocky Reach Wildlife Forum (RRWF)~~. These costs are eligible for funding identified in sections 4.1.2, 4.2.1, and 4.2.2.

An objective is to increase the presence of enforcement officers to provide better public safety and protect resources.

The RRWF will work together with other law enforcement agencies to develop and implement a coordinated enforcement program to deal with new challenges to the investment in wildlife habitat such as the rapidly growing population in the Chelan County area, number of visitors, and the current and increasingly evolving ways they enjoy the outdoors.

#### ***4.4.3 Measure: Consolidation of Land Units***

Funding to consolidate land units through agreements, memorandums of understanding, easements, land trades and/or acquisition will be made through recommendations by the RRWF. The Rocky Reach Wildlife Area contains isolated parcels, private in-holdings, and complex boundaries. Land management can be made more efficient by clustering ownerships. Such land transactions have costs associated with appraisal fees, real-estate work and administrative costs. This item is eligible for funding identified in sections 4.1.2, 4.2.1, 4.2.2, and 4.2.3.

#### ***4.4.4 Measure: Water Developments***

Upgrade, develop and construct water developments including Swakane irrigation system, reservoirs, wetlands and spring developments. This project is needed to optimize the Swakane ~~Management-Wildlife Area-Unit~~ for mule deer and big horn sheep habitat, and wildlife recreation. Water development projects are eligible for funding identified in sections 4.1.2, 4.2.1, 4.2.2, and 4.2.3.

#### ***4.4.5 Measure: Lands Cleanup***

Conduct major cleanup on Rocky Reach Wildlife Area lands (e.g. remove debris and dilapidated buildings). This project is needed to improve aesthetics and provide adequate stewardship of the Rocky Reach Wildlife Area. This project is eligible for funding identified in sections 4.1.2, 4.2.1, 4.2.2, and 4.2.3.

## **~~SECTION 6:~~ ~~SECTION 5:~~ CONCLUSION**

Adaptive management is a key component of implementing the ~~Rocky Reach Comprehensive Wildlife Management Plan~~ successfully during the term of the New License and any subsequent annual licenses for the ~~Rocky Reach Hydroelectric~~ Project. Therefore, the ~~Wildlife Technical Group~~ recommends that members of the ~~Rocky Reach Wildlife Forum (RRWF)~~ with funding and management responsibilities described in this plan, provide to the RRWF an annual report documenting actions taken and funded during the year, accomplishments, monitoring and evaluation results of such actions, and recommendations for future actions.

~~SECTION 7:~~SECTION 6: LITERATURE CITED

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- Fielder, P. C. 1982. Food habits of bald eagles along the mid-Columbia River, Washington. Murrelet 63:46-50.
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## **APPENDIX A: MARC HALLET/PAUL FIELDER ANALYSIS**

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30 January 2004 (revised 3 February 2004, and final revision 6 February 2004)

Memo Regarding: Summary of meeting discussion by Paul Fielder and Marc Hallet to discuss Rocky Reach Dam mitigation funding needs to realistically achieve most basic WDF&W land management objectives for the Chelan wildlife lands.

From Paul C. Fielder

On Wednesday afternoon, 28 January 2004, I met with Marc Hallet at his office in Brewster, WA. Marc is the Wildlife Area Manager for the Washington Department of Fish and Wildlife (WDF&W) lands in the Bridgeport-Brewster area and also manages the lands in Chelan County that WDF&W purchased with Rocky Reach Dam wildlife mitigation funds. Marc and I met because at a November 2003 Rocky Reach re-licensing meeting it was decided that Marc and I should be two people that, based upon our 47+ years of experience with wildlife and habitat in this area, might best determine what would be a good management strategy for the Chelan County wildlife mitigation lands (Chelan wildlife lands) that would provide the best long-term benefits for wildlife by getting the most "bang for the buck" from a Chelan County PUD mitigation funding source intended to address wildlife issues.

Marc and I had this discussion with the understanding that neither of us was negotiating for our agencies and neither of us was making a binding commitments for our agencies. We also had our discussion with the understanding that other people within our agencies would likely make decisions that were above or below our level of realistic estimates. We were just talking realistically about what would be the needed basics to accomplish the long-term objectives for the land. The discussion was also centered around Chelan PUD's PME proposal that would provide \$60,000 annually to WDF&W for O&M of the Chelan wildlife lands. WDF&W currently budgets \$50,000 for annual O&M of these lands. Marc felt that \$60,000 annually would be inadequate O&M funding for these lands. WDF&W had indicated earlier that they would prefer the Chelan wildlife lands be a fully funded independent wildlife area with a manager and staff (an assistant manager for the area alone would cost \$54,000 annually). Paul was under the assumption that if Chelan PUD provided \$60,000 annually and WDF&W continued to provide \$50,000 annually, the total O&M funds available for these lands would be \$110,000 annually.

The long-term objective for the Chelan wildlife lands would primarily be to convert the existing 1,300-1,400 acres of agricultural lands to self maintaining shrub steppe habitat vegetated by bunchgrasses and shrubs such as snowy eriogonum, lupine, balsamroot, big sage, bitterbrush, serviceberry, elderberry. Additional portions of that objective would be to maintain strips of forage crops within the larger expanses of restored shrub steppe. These strips would provide annual, high quality forage and would serve as firebreaks. Noxious weed control would also be an important part of management of these lands, as would sign and road maintenance. The highest priority lands identified for restoration were the Chelan Butte area followed by the Swakane. Lands in the Navarre Coulee, Knapp Coulee, Oklahoma Gulch, and Entiat areas would be addressed at a lower priority than would the Chelan Butte and Swakane areas.

In its Rocky Reach PME's, Chelan County PUD proposed a payment of \$60,000 annually to WDF&W for O&M of the Chelan wildlife lands. Marc felt that such an amount might likely address weed control needs on those lands but could not all restore lands to shrub steppe habitat. Restoration of shrub steppe lands would facilitate long term weed control by providing vegetation competitive with noxious weeds while also providing wildlife habitat needs. It was suggested that an initial expenditure to allow conversion to shrub steppe followed by the suggested O&M budget would best accomplish the long term goal for the Chelan wildlife lands. It was determined that restoration of 1,400 acres of shrub steppe on the Chelan wildlife lands could be accomplished over 6 years with a total funding of \$400,000 during that 6-year span( an average of \$67,000 per year for years 1-6. The \$400,000 restoration funding for years 1-6 would not include the costs of equipment purchase. During the first year, much time would be spent setting up the office and shop, buying equipment and supplies, and planning restoration work. In addition, during years

1-50, Chelan PUD would provide \$60,000 toward the O&M budget for weed control, fence and road maintenance, and other tasks during the restoration period and to maintain those lands at their reconvered carrying capacity after the restoration period. Considering that we were talking about a 50 year FERC license, Marc and I agreed that funding would need to be tied to an annual cost of inflation and that our estimates were made in 2004-year dollars. Marc stressed that \$60,000 is inadequate for the O&M of these lands and it is therefore intended that the Chelan PUD contribution of \$60,000 annually would be combined with the WDF&W present funding of \$50,000 annually for a total O&M budget of \$110,000 for these lands.

The estimate of \$400,000 for initial start-up during the year 1-6 period (in addition to the \$60,000 for basic O&M) to restore 1,400 acres of shrub steppe lands was based primarily on the cost of seed mixtures, chemical control of existing noxious weeds, and cultivation. The cost also included rental of some large pieces of agricultural/farm equipment for working the land rather than buying that equipment. In addition to the 6-years cost of conversion and the following 44 years cost of O&M, a centrally located office/shop area would be needed from which to work and store equipment and materials. Considering that a 50 year land management commitment is being proposed, certain basic land management equipment would be needed (and sometimes replace over the 50-years) to manage the land. That equipment and its likely replace interval (total number of equipment pieces needed over 50 years are listed below). An estimated cost for equipment is provided to present a "ball park idea" of what equipment costs might be, although these estimates are based upon dated information and are therefore likely conservative.

Pickup truck, 1-ton, 4WD flatbed with dual tires (\$28K) replace at 10 yrs = 5 pickups in 50 years  
Pickup truck mountable spray boom and tank (3K) replace at 17 years = 3 truck sprayers  
Truck, 2-ton with trailer (\$65,000) replace at 17 years = three 2-ton trucks  
4WD ATV with sprayer and trailer (\$10,000) replace at 10 years = 5 ATV sprayers  
Tractor, 100 HP (\$75,000) replace at 25 years = 2=100 hp tractors  
Tractor, 60 HP (\$30,000) replace at 25 years = 2-60hp tractors  
3-Point sprayer (\$2,000) replace at 17 years = 3 3-point sprayers  
Shrub planter (\$35,000) replace at 25 years = 2 shrub planters  
Disc (\$6,000) replace at 25 years = 2 discs  
Drill (\$6,000) replace at 25 years = 2 seed drills  
Harrow ((\$3,000) replace at 25 years = 2 harrows  
Cultivator/Rotovator (\$5,000) replace at 17 years = 3 cultivator/rotovators  
Office equipment& furniture  
Tools and basic shop equipment

We felt that it might be mutually beneficial if Chelan PUD CM and Fleet Services could aid in unanticipated repair that might be needed to keep equipment running (e.g., welding, automotive repair, maintenance). However, it will often not be cost effective to take equipment from remote areas to the PUD CM for repairs. A relatively well equipped shop and set of tools is needed for work such as field repairs, repair and maintenance of development projects, and fence construction and repairs.

We also felt that some existing Chelan PUD land in the city of Entiat would be centrally located to the work area and might be available to use as a WDF&W office/shop/storage area for the WDF&W management of the Chelan wildlife lands.

The desired "outcome" (based upon "outcome based management") that Marc and I discussed to for the management of the Chelan Wildlife Lands is a restoration of the agricultural lands to the desired shrub steppe habitat with strip rows of forage corps, and weed control, and road and sign maintenance would be. Our estimated cost, and likely a conservative estimate to reach that outcome is projected below.

\$ 400,000 (total provided during years 1-6) for restoration of 1,400 acres of shrub steppe habitat  
3,000,000 (\$60,000 for years 1-50) for O&M of about 20,000 acres of Chelan wildlife lands  
268,000 (Year 1 purchase of vehicles, tractors, & equipment for restoration & O&M plus  
provision of a headquarters office, shop, fencing, etc.)  
457,000 (total year 11-50 replacement cost of vehicles, tractors, & equipment)  
\$4,125,000

This represents a total 50-year estimated funding from Chelan PUD to provide the basics to reconvert the Chelan Wildlife lands to shrub steppe habitat with forage strips, and provide O&M for the lands, weed control, and maintenance of roads, signs, etc. (\$82,500/year for a 50-year license).

Chelan PUD would not be offering to totally fund the WDF&W Chelan wildlife lands, but would offer to share in the cost of managing the WDF&W lands and would assume that WDF&W would also provide O&M funding for these lands at least equal to their present \$50,000 annual budget.



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## **APPENDIX B: MUSSER, HEDGES, ST. GEORGE ANALYSIS**

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### **Habitat Enhancement Considerations Related to Rocky Reach Re-License**

**John Musser, Neal Hedges, David St. George**

The Bureau of Land Management (BLM) is responsible for managing approximately 12,000 acres within 6 miles of the Columbia River in Chelan County upstream from the Wenatchee River confluence. These lands are relatively low elevation ranging from 750 – 3200 feet. Shrub-steppe habitat with an over-story of sagebrush or bitterbrush and an under-story of various grasses and forbs are most common on these lands. Some mesic sites, which are often found at higher elevation or on north exposures, support conifers. Riparian areas support a mixture of deciduous shrubs and trees as well as conifers. Much of the area has burned during the past 15 years. In most cases, these recently burned areas support fewer trees and shrubs and more grasses and forbs. About ½ of the BLM lands in this area are considered part of the Swakane, Entiat or Chelan Butte Wildlife Areas.

BLM's Chelan County lands include priority habitats and support several priority wildlife species as defined by Washington Department of Fish and Wildlife. Cliffs, talus, and shrub-steppe are found throughout the area and are considered priority habitats. Most of the area is used by mule deer during winter. Bighorn sheep utilize much of the area year round. The area includes several nesting territories for bald eagles and golden eagles. Perennial as well as intermittent streams support riparian habitat, a priority habitat. The Entiat and Columbia River support several federally listed fish species. Western gray squirrel, (state endangered) is found in the northern areas and historically was found through the entire area.

For purposes of enhancement evaluation, we divided these BLM managed lands into 3 areas: Azwell, from the Okanogan County line south to Chelan; Chelan Butte, from Chelan to Entiat; and Swakane from Entiat south to the Wenatchee River. Maps of the units are at the end of the report.

#### **Azwell**

This area includes about 4500 acres of BLM land. BLM lands within this area are not within the boundaries of a wildlife area. However, the area contains cliffs, talus, shrub steppe and riparian habitats which are considered priority habitats. Most of the area is mule deer winter range. Bighorn sheep have recently been reintroduced to the area and are expected to utilize the steep, rocky terrain within the area year around. There are several bald and golden eagle nest territories and western gray squirrel is found throughout the area.

Most of the BLM lands within the Azwell area have burned during the last 10 years, resulting in reduced shrub and tree over-story and increased herbaceous cover. Fire and resulting habitat changes have improved habitat for bighorn but reduced value for wintering mule deer. Fire has also reduced ponderosa pine and big-leaf and Douglas maple. The pine - maple association, usually found at relatively low elevation riparian habitat, is important to western gray squirrel.

Knapweed, Canada thistle and Dalmatian toadflax are present throughout the area, but most common along highways and road and power line rights-of-way. These noxious weeds are invading surrounding habitat and reducing habitat values for priority species.

Within the Azwell area, enhancement opportunities include:

- Planting containerized bitterbrush (100 plants/acres) and blue elderberry (25 plants/acre) in 5 units totaling 473 acres.
- Develop a spring to provide water for mule deer and bighorn south of Deer Mountain in section 8.
- Control of noxious weeds along roadways.

### **Chelan Butte**

This area includes 3380 acres of BLM land that lie within the boundaries of the Chelan Butte and Entiat wildlife areas. The area contains cliffs, talus, shrub steppe and riparian habitats. Lower elevation BLM lands south and west of Chelan Butte and within the Entiat Wildlife Area are important for wintering mule deer. Bighorn sheep were reintroduced to Chelan Butte in January 2004 and are expected to utilize its steep, rocky terrain year around. There are several bald and golden eagle nesting territories and wintering bald eagles are common along the river from November through March.

The Tye fire of 1994 burned most of the BLM lands within the Chelan Butte area, which reduced shrub and tree over-story and increased herbaceous cover. This has improved habitat for bighorn but reduced value for wintering mule deer. Fire killed many ponderosa pine and Douglas-fir trees in the uplands but deciduous trees and shrubs in riparian zones have recovered. Bunch grasses and forbs on north-facing slopes, especially at higher elevations on Chelan Butte, are in good condition. Threetip sagebrush has returned to these plant communities but big sagebrush, which was eliminated from some areas, has not fully returned. Plant communities on south-facing slopes contain fewer native perennial plants and more early seral and exotic species. Agricultural lands on Chelan Butte are currently in early stages of restoration to native shrub-steppe or remain in wheat fallow. Diffuse knapweed, Dalmatian toadflax, and other exotic weeds such as kochia and Russian thistle are present throughout the area.

Within the Chelan Butte area, enhancement opportunities include:

- Restoring native shrub-steppe plant communities on 24 acres of agricultural land on Chelan Butte.
- Controlling noxious weeds along roadways.
- Potentially planting bitterbrush and other native browse species on 244 acres.

### **Swakane**

The Swakane assessment unit extends from the northern edge of the Wenatchee River Valley to Entiat. It includes 5772 acres of public land that lie within the Entiat and Swakane Wildlife Areas. Fires within the past 15 years killed shrubs and many ponderosa pine and Douglas-fir trees. The area is important for wintering mule deer, bighorn sheep, and upland birds such as chukar and quail. Golden eagles use the area year round, bald eagles are present during the winter, and prairie falcons may be nesting on cliffs along the Columbia River. North-facing slopes and higher elevations have the best native plant communities and southeast slopes, especially at lower elevations have fewer natives and a greater proportion of exotic species.

Within the Swakane area, enhancement opportunities include:

- Restoring native shrub-steppe plant communities on up to 2000 acres of degraded shrub-steppe land on Burch Mountain (needs further site assessment).
- Developing a spring near Tenas George Canyon and Swakane Creek to provide water for mule deer and bighorn sheep.
- Developing an effective road management system to reduce impacts to wildlife and wildlife habitat, reduce erosion and fire ignition hazard, and control the spread of noxious weeds.
- Controlling noxious weeds along roadways.

### Planting Bitterbrush and Blue Elderberry

Within the Azwell area, recent wild fires have dramatically reduced browse species utilized by mule deer during winter. While useful winter forbs such as lupine, arrow-leaf balsamroot and snowy buckwheat increase in frequency as a result of fire, important browse species (which are available above deep snow) such as bitterbrush and blue elderberry are greatly reduced and slow to re-colonize.

Five units totaling 473 acres have been identified where planting of containerized bitterbrush and blue elderberry would increase available winter forage for mule deer. Our strategy for accomplishing this work includes using locally collected seed, available from Chelan PUD, grown to 10 inch planting stage at Plants of the Wild. We propose planting 100 bitterbrush and 25 blue elderberry plants per acre and accomplishing the work over a 5 year period. We would utilize volunteers from Mule Deer Foundation, Wenatchee Sportsmen's Association and Chelan Sportsmen's Association for planting crews supervised by BLM staff.

The selected units are not expected to receive significant bighorn use (low gradient slopes), so the increased cover from planted shrubs and associated decreased horizontal visibility are not expected to negatively effect bighorn habitat.

Unit 1 is located in sections 15, 21 and 22 (T28N, R23E) and totals 46 acres. Elevation ranges from 2200 – 2500 feet and the unit has a northwest exposure. The area recently burned, but has scattered surviving ponderosa pine. Most of the shrub cover within this unit was bitterbrush before the fire. Shrub overstory is greatly reduced since the fire. However, wax current, Oregon grape, evergreen ceanothus, and service berry have re-sprouted to some degree since the fire. Bluebunch wheatgrass is the predominant grass in the unit. Predominate forbs include lupine, arrow-leaf balsamroot, and snowy buckwheat.



Azwell Area Unit 2.

Unit 2 is located in section 21 (T28N, R23E) and totals 21 acres. This unit is relatively flat and located along the two-track road. Elevation is 2000 feet. Vegetation is similar to Unit 1. Because some browse species are beginning to re-sprout since the fire in Units 1 and 2, these units are lower priority for planting than other identified units.

Unit 3 totals 214 acres, the largest of the identified planting areas. Unit 3 is located in sections 20, 28, and 29 (T28N, R23E). This unit has varied topography and exposure. Elevations vary from 1800 to 2400 feet. Most of the bitterbrush in this unit was killed in the



Azwell Area Unit 3: NE 1/4 Sec 29



Azwell Area Unit 3 NW 1/4 Sec 28

recent fire and shows no sign of re-sprouting. There are scattered ponderosa pine in the unit with an understory of bluebunch wheatgrass. Wax current is the most abundant of the shrubs currently found in the unit. However, overall shrubs have recovered little in this unit since the fire. Most of this unit is free of cheatgrass which increases expected survival of planted shrubs. Because this unit lacks winter browse species and offers good conditions for planted shrub survival, it is the highest priority unit for browse planting.

Units 4 and 5 are located west of the Chelan Municipal Airport in sections 4 and 5 (T27N R23E) and section 33 (T28N R23E). These units total 72 and 120 acres. These units have mostly south exposures and elevations between 1600 and 2000 feet. Vegetation in these units is similar to other units, however



Unit 5, Section 4 in background

there is more cheatgrass and snowy buckwheat in the under-story than other units.

These low elevation south exposure units are important to wintering mule deer. However cheat grass and shallow soils are expected to reduce survival of planted shrubs. Snowy buckwheat provides good winter forage for mule deer, although it is not as readily available in deep snow as bitterbrush or elderberry. Because the expected benefit per unit of effort is lower than Unit 3, priority for these units is somewhat lower.

The Chelan Butte Assessment area has 244 acres that could be considered for shrub planting. Steep slopes, however, would make planting in these areas difficult. Steep south-facing slopes can support bitterbrush but seedling survival would be lower in most years. North-facing slopes are typically more mesic and chances of survival would be greater. Unit 2 includes Knapp Coulee (Section 31, T27N, R22E) along the western edge of the Chelan Butte Wildlife Area. Up to 74 acres of northwest-facing slopes could be replanted with bitterbrush and blue elderberry. Unit 3 includes Oklahoma Gulch (Section 9, T26N, R21E) and lands between Ribbon Cliffs and Dick Mesa. 170 acres in Unit 3 could be planted with shrubs. These sites need further evaluation, however, to check current plant composition and



Chelan Butte Unit 2, Section 31, north-facing slope.



Chelan Butte Unit 2, Section 31, north-facing slope on right.

condition of shrubs that survived the fires. Planting shrubs that attract deer may also affect traffic safety, especially in Unit 2, and this needs to be discussed with the Washington Department of Transportation and Washington Department of Fish and Wildlife. Browse plants could attract deer away from roads or concentrate them along the highway. The planting would have little effect on bighorn sheep.

### Shrub-Steppe Restoration

Shrub-steppe habitats on Chelan Butte burned in the 1994 Tye Fire. Shrub-steppe communities on north-facing slopes have recovered well and many are in late seral condition. Shrubs such as big sagebrush, treetip sagebrush, and buckwheat species are well developed in some areas but are still absent in others. Sagebrush planting could be considered where no seed source is present within 200 yards but



Unit 1. Threetip sagebrush recovery on north slope



Unit 1. Big sagebrush has not recovered on much of this slope.

Future site evaluations should be conducted first. Overplanting sagebrush would not benefit the quality of shrub-steppe communities.

The greatest opportunity to restore shrub-steppe is on agricultural fields on Chelan Butte (Section 33, 34 T27N, R22E, Section 2 T26N, R22E). Approximately 24 acres lie on BLM lands and these should be planted in cooperation with WDFW which owns the majority of agricultural lands. Restoring these fields would provide habitat for mule deer and shrub-steppe wildlife. Bighorn sheep would benefit where agricultural lands lie close to suitable escape terrain.

Fires and historical grazing have reduced the quality of shrubs-steppe in the Swakane Unit 3. As many as 2000 acres could potentially be treated to increase the abundance of native species that have been reduced or eliminated from the area. Further site assessment would be needed, however, before this proposal is considered.

### Spring Development

Developing and maintaining a spring to provide water for mule deer, bighorn sheep and other wildlife would be beneficial in Azwell, NE ¼ of Section 8 (T27N, R23E). Mule deer cross US highway 97 Alt. directly below the identified spring area. Newly reintroduced bighorn are also expected to cross the highway in this area. Developing a year around water source west of the highway may reduce wildlife crossing the highway and associated wildlife – vehicle accidents.



Proposed spring development area, Azwell

A spring in Swakane, NW ¼ of Section 24 (T24N, R20E) could also be developed to benefit bighorn sheep and mule deer. Local sportsmen have previously cleared brush in this draw to improve access for wildlife.

Further developing this spring could also reduce wildlife crossings of Highway 97A.

### Weed Control

Noxious weeds including diffuse knapweed, Canada thistle and Dalmatian toadflax are found throughout the assessment areas, but they are most common along roads. Weeds along roads colonize adjacent areas and reduce habitat values.

Chemical and bio-control products are available that can reduce spread of these noxious weeds. These products could be used along Apple Acres Road near Green Lake as well as two-track roads in Azwell sections 21 and 28 (T28N, R23E). Shrub-steppe restoration on Chelan Butte will require at least 1 year of broad-leaf herbicide application to help establish grass. Approximately 2.1 miles of secondary roads in the Azwell area, 3.1 miles in the Chelan Butte area, and 5.3 miles in the Swakane area could be treated. Areas needing treatment for noxious weeds total about 75 acres.



Green Lake

**Road Management**

Vehicles contribute to the spread of noxious weeds, create ruts that channel water and increase erosion, increase risk of wildfire, and can disturb and displace wildlife. Vandalism and garbage dumping are also frequently associated with roads. Secondary roads on Chelan Butte and Burch Mountain are in greatest need of improved management. Weeds growing on Chelan Butte roads facilitate spread of noxious weeds and increase fire danger.



Chelan Butte Unit 2, Section 31,  
weeds and fire danger.



Chelan Butte Unit 2, Section 31,  
weeds in roadway.

The Burch Mountain Road is a popular OHV area. Old firebreaks along the road have become OHV routes that have become deeply incised by repeated vehicle use when soils are wet. These rutted tracks channel and accelerate erosion and have decreased wildlife habitat values. Developing a road management plan in cooperation with the PUD, Chelan County, and WDFW including reclaiming the OHV trails would address some of the conflicts on Burch Mountain and reduce their effects on wildlife and habitat.

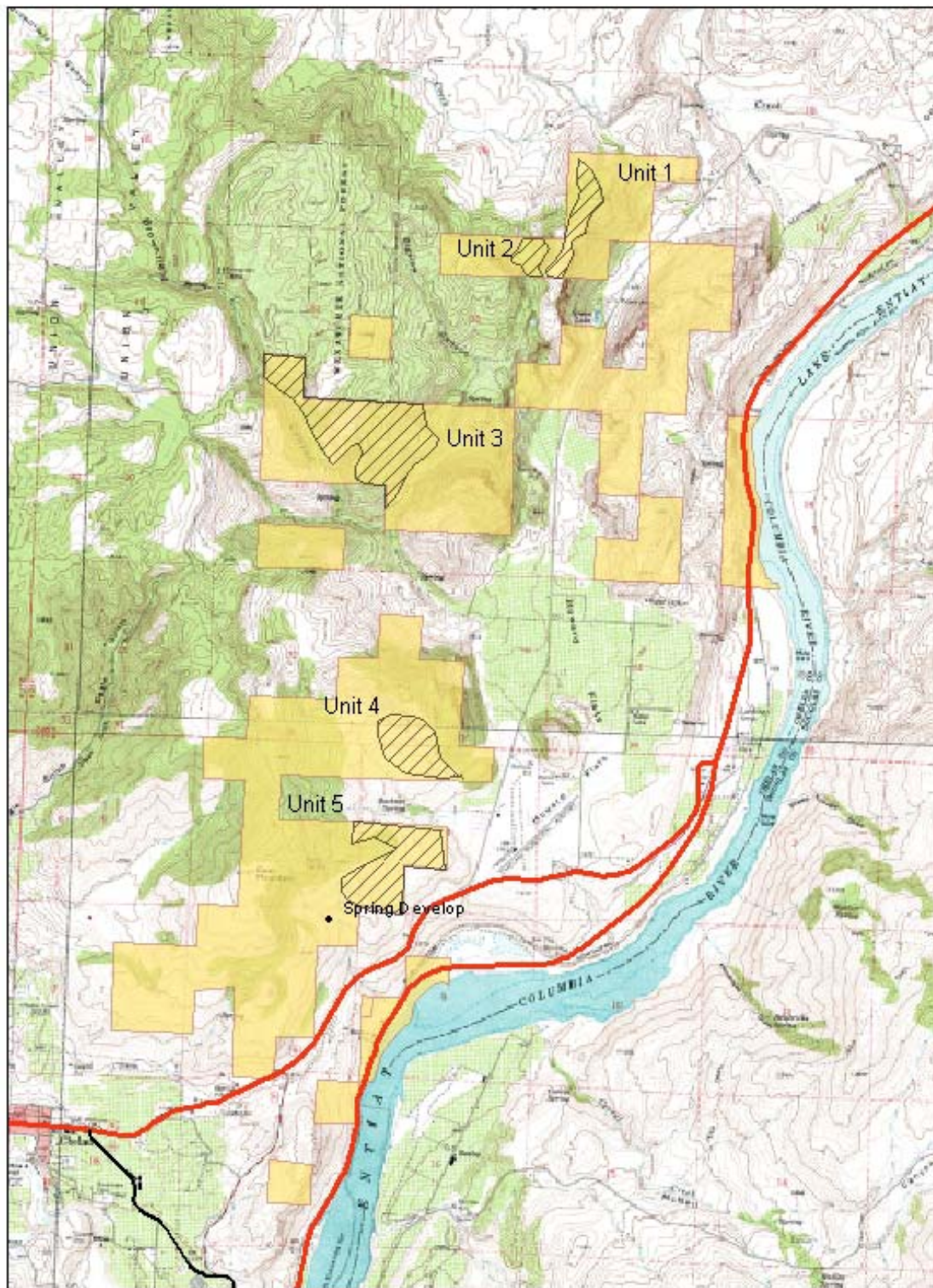
**Cost of Proposed Habitat Treatments**

The estimated costs of the proposed treatments are shown in Table 1 below.

Table 1. Estimated costs of proposed treatments



Treatment	Area Description	Size of Treatment	Cost per Unit	Cost per Unit
Plant bitterbrush and elderberry	Azwell Area: Units 1 (priority 3)	46 Acres 5750 plants 10 man days	\$1.00/plant \$120/day	\$5,750. \$1,200.
Plant bitterbrush and elderberry	Azwell Area: Unit 2 (priority 5)	21 Acres 2625 plants 5 man days	\$1.00/plant \$120/day	\$2,625 \$600
Plant bitterbrush and elderberry	Azwell Area: Unit 3 (priority 1)	214 Acres 26,750 plants 50 man days	\$1.00/plant \$120/day	\$26,750 \$6,000
Plant bitterbrush and elderberry	Azwell Area Unit 4 (priority 4)	72 Acres 9,000 plants 14 man days	\$1.00/plant \$120/day	\$9,000 \$1,600
Plant bitterbrush and elderberry	Azwell Area Unit 5 (priority 2)	120 Acres 15,000 plants 24 man days	\$1.00/plant \$120/day	\$15,000 \$2,880.
Shrub steppe restoration	Chelan Butte Area Unit 1	24 Acres	\$275/acre (with WDFW)	\$6,600
Spring Development	Azwell Area: T27N R23E S8	1 development & maintenance for 50 years.	\$1000 development + \$300 / year	\$16,000.
Spring Development	Swakane Area: T24N R20E S24	1 development & maintenance for 50 years.	\$1000 development + \$300 / year	\$16,000.
Noxious Weed Control	Vicinity of Highway and Unimproved roads	75 acres	\$100 / acre	\$7,500

# Azwell BLM Enhancements



0 0.5 1 2 3 Miles

## Shrub Planting Units

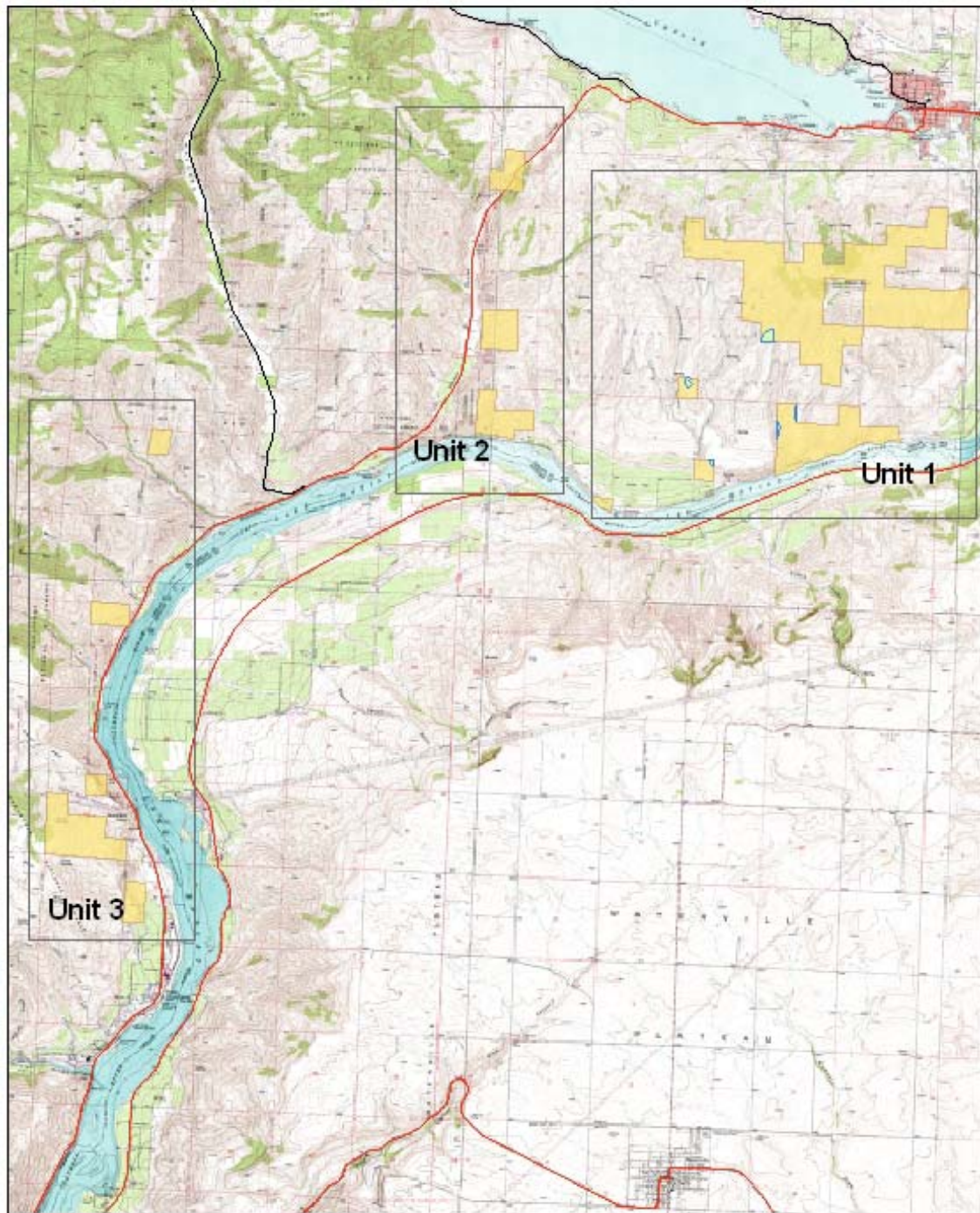
-  blm
-  habitat\_treatment



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# Chelan Butte Enhancements



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## Legend

-  blm
-  shrub-steppe restoration units

**APPENDIX C: UTE LADIES'-TRESSES SPIRANTHES DILUVIALIS  
ALONG ROCKY REACH RESERVOIR MANAGEMENT PLAN**

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**UTE LADIES TRESSES SPIRANTHES  
DILUVIALIS ALONG ROCKY REACH  
RESERVOIR MANAGEMENT PLAN**

**First Draft**

**ROCKY REACH HYDROELECTRIC PROJECT  
FERC Project No. 2145**

**June 11, 2004**



**Public Utility District No. 1 of Chelan County  
Wenatchee, Washington**

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## ***SECTION 1: INTRODUCTION***

Three populations of Ute ladies' tresses (*Spiranthes diluvialis*) were discovered along the upstream Chelan County shoreline of Rocky Reach Reservoir in August 2000. The plants were discovered during rare and sensitive plant surveys (Calypso 2000) conducted by botanists under contract to Public Utility District No. 1 of Chelan County (Chelan County PUD). Since their discovery, Chelan County PUD has monitored these populations annually to track the number of individual plants and identify changes in their distribution.

One of the populations of Ute ladies' tresses along Rocky Reach Reservoir is located on Chelan County PUD property. A second population is located on Washington Department of Transportation property. The third population is located on private property.

The purpose of this plan is to identify measures that can be implemented to ensure the continued existence of the identified populations and if possible enhance the distribution of these populations. Aspects of this plan include:

- 1) a noxious weed control program;
- 2) avoidance of these populations during land altering activities (e.g., construction, excavation);
- 3) examination of water fluctuation impacts on the existing populations;
- 4) possible acquisition of conservation easements on private lands; and
- 5) periodic population monitoring.



## **SECTION 2: BIOLOGY AND ENHANCEMENT HISTORY**

### **2.1 Biology of the Plant**

Ute ladies' tresses is a member of the orchid family. It was first described in 1984. At that time, it was only known from Utah and Colorado. Since its listing in 1992, additional populations have been found in Utah, Colorado, Wyoming, Montana, Nevada, and Idaho. Most populations found in Idaho have been along the Snake River and its tributaries. In 1997, a population of less than 20 plants was found in north central Okanogan County in Washington. In 2000, the three populations along Rocky Reach Reservoir were found. The total number of known populations of Ute ladies' tresses in Washington is four, as of May 2004.

*Spiranthes diluvialis* is endemic to mesic or wet meadows, river meanders, floodplains, and riparian/wetland habitats near springs, seeps, lakes, or perennial streams. The soils in which it grows may be inundated or saturated early in the growing season and become drier as the season progresses, but still retain sub-surface soil moisture. This plant seems to have an association with floodplain areas where the water table is close to the surface throughout the growing season. This plant grows where the over-story vegetation is relatively open and not dense or overgrown. Populations decline where trees and shrubs invade the habitat. They do not compete well with invasive species such as Reeds' canarygrass or purple loosestrife. They do colonize early successional riparian habitats such as point bars, sand bars, and low lying gravelly, sandy, or cobble edges.

Ute ladies' tresses along Rocky Reach Reservoir blooms in late summer (late June - early August, varying with seasonal weather conditions). Individual plants can remain dormant for several growing seasons, or produce only vegetative shoots and no blossoms. The lack of bloom makes annual inventory or population assessment difficult. It is thought that this orchid may have a symbiotic association with mycorrhizal fungi for germination and also require pollinators to set seed. Ute ladies' tresses appear to have a relatively low reproductive rate.

### **2.2 Rocky Reach Reservoir Populations**

The downstream *Spiranthes diluvialis* population is associated with a small pond. The pond appears to be hydrologically linked to the reservoir by groundwater flow through the sandy/cobble substrate. Plants at this site grow at both ends of the pond and also along the Columbia River shoreline. This site is owned by Chelan County PUD. Purple loosestrife (*Lythrum salicaria*), diffuse knapweed (*Centaurea diffusa*), Dalmatian toadflax (*Linaria dalatica*), and yellow flag (*Iris pseudoacorus*) are noxious weeds that occur within or near the *Spiranthes* plants.

The middle population of *Spiranthes* occurs on a low-lying, grassy backwater wetland adjacent to the Columbia River. This site is owned by the Washington Department of Transportation. This population of *Spiranthes diluvialis* seemed to be mixed with a population of common ladies' tresses (*S. romanzoffiana*). Purple loosestrife (*Lythrum salicaria*), Himalayan blackberry (*Rosa discolor*), and other invasive weed species occur within the population.

The upstream population of *Spiranthes diluvialis* is located along a moist mud/gravel bar along the Columbia River. A backwater wetland exists at the northern end of this bar. This site is on private property. The site also includes some common ladies' tresses plants. Purple loosestrife is the primary noxious weed invader here. This area had been grazed by cattle, but since cattle have been removed from the area, encroachment by white sweet clover (*Melilotus alba*), willow (*Salix* spp.), alders (*Alnus* spp), and other shrubby vegetation has invaded the site.

## ***SECTION 3: CRITICAL UNCERTAINTIES***

### **3.1 Justification**

Ute ladies' tresses is listed under the Endangered Species Act (ESA) as a federally Threatened orchid species. It was listed by the U.S. Fish and Wildlife Service in 1992 because of factors that include habitat loss or modification and hydrological modifications of existing and potential habitat areas. This plant's status in Washington is Threatened. There are four populations of this plant in Washington: three along Rocky Reach Reservoir and one in north-central Okanogan County.

At least some portion of all three populations of Ute ladies' tresses that grow along Rocky Reach Reservoir are subject to occasional inundation by river levels. The effect of project operations on these three plant populations is unknown. We do know that individuals of these populations grow and bloom at locations that are sometimes under water. Aerial photos taken in 1930, before the creation of Rocky Reach Reservoir, indicate that the habitat that existed then on the sites where *Spiranthes* exists now was not typical of sites that would be expected to support *Spiranthes diluvialis*.

### **3.2 Restriction on Land Altering Activities**

The three *Spiranthes* sites are located adjacent to the Columbia River and receive a measure of protection from many construction-type activities by shoreline protection and hydraulic permit application procedures. Activities that are expected to impact shorelines must undergo review procedures to acquire necessary state and or federal permits. These procedures allow for review of the proposed activity by environmental agencies and input from those agencies to mitigate project impacts.

A first step in allowing these agencies to protect the *Spiranthes* sites is to ensure that the appropriate agencies know the locations of the sites. This has been accomplished through the Washington Natural Heritage Program database. To enhance the effectiveness of the review process, accurate information must be maintained in the database concerning the locations of the existing and new *Spiranthes* populations so that land managers have access to the most up-to-date accurate information.

### **3.3 Monitor the Water Fluctuation Effects on *Spiranthes* Populations**

The biology of *Spiranthes diluvialis* is not well understood. The plant does not emerge and bloom each year, which makes surveying population changes difficult on an annual basis. The potential link to a mycorrhizal fungi which enables *Spiranthes diluvialis* to complete its life functions would be a difficult habitat association to incorporate into management models. Associations with water fluctuations and ground water levels are other habitat associations that may be difficult to understand.

This plant does seem to "like having its feet wet." Receding water levels and retention of sub-surface ground waters allow *Spiranthes* plants to grow in moist soil, while dry-land plants (e.g., bunchgrass, sage, and bitterbrush) may be growing nearby. How much water is enough and how

much is too much are questions that likely vary between the three sites along Rocky Reach Reservoir. Soil types and structure are likely influencing factors. We do know that the individuals of these three populations grow, bloom, and maintain themselves within 1-2 feet of the current water levels at the time during which they bloom. These populations have persisted, possibly even developed, during the water level regime associated with the Rocky Reach and Wells hydroelectric projects. The habitat conditions prior to these projects would likely have precluded occupation of the present sites by *Spiranthes diluvialis*.

Future changes in the present river level as a result of changes at hydroelectric projects should be evaluated to anticipate their effects on the known populations of *Spiranthes diluvialis* along the Columbia River. Potential river levels that would inundate existing populations during the bloom period may have negative effects on the population if those water levels persisted throughout the bloom period or for several years. *Spiranthes* does seem adaptable with its bloom period depending on varying moisture conditions from year to year (i.e., sometimes it blooms early and sometimes it blooms later in the summer). Evaluation of the effects of present water fluctuation conditions on the existing populations could be accomplished with long term monitoring of the populations to track plant numbers, distribution changes, and bloom timing correlated with soil moisture and Columbia River elevations. However, other environmental factors (e.g., temperature, precipitation, vegetative associations, noxious weed invasion, and availability of pollinators would complicate any analysis of water fluctuations and plant response).

## **SECTION 4: PROTECTION, MITIGATION AND ENHANCEMENT MEASURES**

### **4.1 Noxious Weed Control**

An integrated noxious weed control program can be implemented in the vicinity of the *Spiranthes* populations. Chelan County PUD maintained a purple loosestrife control program along Rocky Reach Reservoir which included pesticide application by a licensed applicator. When the three *Spiranthes* populations were found, Chelan PUD (at the request of botanists) stopped spraying purple loosestrife along the Chelan County shoreline upstream from Beebe Bridge to avoid harm to the *Spiranthes* populations.

An integrated noxious weed program in these areas can be implemented which will not likely harm *Spiranthes* plants. An integrated noxious weed control program uses several means of weed control such as different types of chemical application methods, use of biological control agents which are the natural enemies/pests of the weed species, mechanical control of the weeds, and vegetative control of desirable plants in the areas to provide competition with noxious weeds.

Biocontrol agents (insects) can be introduced that are USDA approved for relocation specifically to control target noxious weeds. For the *Spiranthes* sites along Rocky Reach Reservoir, the recommended biocontrol agents for controlling the following noxious weeds would be:

- Purple loosestrife - *Galerucella californiensis* (defoliating beetle)
- Diffuse knapweed - *Larinus minutus* (seed eating beetle)
- Sphenoptera jugoslavica* (root-mining beetle)
- Cyphoceleonus achates* (root mining beetle)
- Agapeta zoegana* (root-mining butterfly larvae)
- Dalmatian toadflax- *Mecinus janthinus* (leaf-eating and stem boring weevil)
- Brachyperolus pulicarius* (flower-feeding weevil)
- Gymnetron antirrhini* (stem-boring weevil)

Herbicides could harm the *Spiranthes* plants if they were broadcast sprayed as is typical of treating large infestations of noxious weeds. However, other herbicide application methods would provide tight control over herbicide drift or exposure of non-target plants. Herbicides can be applied with wicks or daubers that apply product directly to individual weed plants. This method is expensive but could be justified as part of an integrated noxious weed plan associated with extremely environmentally sensitive sites. Another option could include using a contact herbicide (which does not leave a residual effect) to control noxious weeds during a time of year when the weeds would be present and susceptible to the herbicide but the *Spiranthes* plants would not be in emergent form. The three *Spiranthes* sites along Rocky Reach Reservoir are all in proximity to open waters, which restricts the use of many herbicides. "Rodeo," which is USDA licensed for use near water, would be a likely herbicide of preference.

Mechanical means of controlling noxious weeds can be as simple as hand-pulling or digging out individual noxious weeds. Although this method often leaves too much root from the weed in the ground to achieve satisfactory weed control, it can have a place in an integrated noxious weed control plan. Pulling annual and biennial weeds before they set seeds can reduce the weed seed base in the treatment area and make other aspects of an integrated noxious weed control program (e.g., biological and chemical controls) more effective and cost efficient.

Noxious weeds invade disturbed areas where natural vegetation has been removed or diminished, usually because of some man-related activity. Encouragement of a native ground cover or vegetation is the desired end-result of most integrated noxious weed control programs. If a desired ground cover or vegetation occupies the soil surface, there is less space for noxious weeds to re-invade and re-establish a foothold. Often, native vegetation re-establishes itself on areas where noxious weeds have been reduced. This process could be encouraged at the *Spiranthes* sites by the planting and seeding of desirable native species to fill the niches left behind by the effect of other weed control practices.

#### **4.2 Possible Acquisition of Conservation Easement on Private Land with *Spiranthes***

Two of the three populations of *Spiranthes diluvialis* that occur along Rocky Reach Reservoir occur on public land (Chelan County PUD and Washington Department of Transportation). These agencies have the means and legal requirements to adequately protect these sites. The upstream population of *Spiranthes diluvialis* occurs on private property. A conservation easement may be obtained from the landowner to ensure protection for this population.

Such a conservation easement would compensate the landowner in return for an agreement that the landowner would conduct or not conduct various land management practices on the site where the *Spiranthes* occurs. A land management practice that may be preferred could include grazing cattle during some months but not other months to reduce competition from encroaching vegetation but avoid the trampling of blooming *Spiranthes* plants. Noxious weed control methods may be a practice included in a conservation easement. Restrictions on construction or development of the *Spiranthes* site would be a likely inclusion in any conservation easement for this site. Other land use restrictions may be recommended by regulatory agencies or botanists.

#### **4.3 Periodic *Spiranthes* Population Monitoring**

A key to tracking changes in the existing *Spiranthes* populations would be a periodic population and distribution monitoring program. Existing populations could be monitored annually to track numbers of blooming *Spiranthes diluvialis* plants and their distribution within the three known sites. Distribution could be documented with the use of detailed site maps, GPS coordinates, photo documentation, and physical markers (e.g., landscape plastic flagging markers or stakes). This would lay a baseline of existing population and distribution data to which future changes can be compared and tracked.

Periodic future rare and sensitive plant surveys could also be conducted at intervals (e.g., five or ten year intervals) to examine likely habitats where *Spiranthes diluvialis* plants might potentially occur or establish in the future. The present *Spiranthes* populations along Rocky Reach Reservoir were found during rare and sensitive plant surveys conducted by Chelan PUD in 2000. Similar surveys conducted by Chelan PUD in 1990 found no *Spiranthes diluvialis* plants. It is

possible that this plant has pioneered into its present sites from some upstream seed source because habitat and hydraulic conditions were favorable. It is probable that future, periodic surveys could find new populations of this plant if habitat and water level conditions continue to be favorable for its establishment and existence.