BOX CANYON HYDROELECTRIC PROJECT
(FERC No. 2042)

COMPREHENSIVE
WILDLIFE MANAGEMENT PLAN

LICENSE ARTICLE 407

FOREST SERVICE CONDITIONS 12, 13, AND 14

DEPARTMENT OF INTERIOR CONDITION 7

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INTRODUCTION

The following document is the Comprehensive Wildlife Management Plan (CWMP), to be implemented by the Public Utility District No.1 of Pend Oreille County (District) in compliance with its license[1] for the Box Canyon Hydroelectric Project (Project), FERC No. 2042. The CWMP is a comprehensive plan that addresses the management of the District-owned Tacoma Creek and Everett Island Wildlife Management Areas, as well as describing other measures to improve wildlife habitat that will occur on District, USDA Forest Service, and Kalispel Reservation lands outside those defined areas.

For compliance tracking purposes, the CWMP is organized into sections that reflect the requirements of the FERC license Article 407; the USDA Forest Service 4(e) Conditions No. 12, and 13; and the Department of the Interior 4(e) Condition No.7.

[1] 112 FERC 61,055 issued July 11, 2005, Article 407; USDA Forest Service (USFS) 4(e) Condition No. 12, 13 (Appendix B); and DOI 4(e) Condition (Appendix A).

FERC LICENSE ARTICLE 407
COMPREHENSIVE WILDLIFE MANAGEMENT PLAN

The CWMP addresses measures that will be undertaken on District-owned lands within the Project Boundary, as well as educational and cooperative management provisions that will apply to other lands, including lands outside of the Project boundary. Although FERC does not dictate which District-owned properties should be used to fulfill certain conditions, most of these conditions will be best addressed on the Tacoma Creek Wildlife Management Area (WMA) and Everett Island WMA. The few other District-owned properties inside the Project boundary are more or less unsuitable because of conflicting, necessary Project uses (i.e., Box Canyon Dam property), or other site characteristics (e.g., elevations that will not support an intended habitat enhancement).

The following license requirements are addressed by the CWMP, each representing a part of the plan:

1. Management of the Tacoma Creek WMA and Everett Island WMA, including provisions for enhancement, monitoring, and evaluation. Wetland creation and enhancement measures on the WMAs[2], and measures to construct and install waterfowl nesting structures within the wildlife management areas are also included in this chapter;
2. Cottonwood enhancement outside of the WMAs, including provisions to investigate cottonwood recruitment and assistance to private landowners seeking to enhance cottonwood habitats;
3. Elimination of livestock grazing on all District-owned lands within the Project Boundary;
4. Waterfowl habitat protection and enhancement on District-owned lands within the Project Boundary and supporting the efforts of local groups or landowners to improve waterfowl nesting habitat;
6. Signage and pamphlets at District-owned recreation sites to improve public awareness of grizzly bear issues;
7. Development of cooperative bald eagle management plans for nests and other preferred use sites between Albeni Falls Dam and Box Canyon Dam, coordination with other plans, annual monitoring surveys, tracking population trends, and signage and pamphlets at District-owned recreation sites to improve public awareness of bald eagle protection. The portion of FS Condition 12 that addresses silvicultural treatments to benefit bald eagles and the portion of FS Condition 13 providing for annual nest monitoring are also referenced in this part of the CWMP.
8. Monitoring nesting by other fish-eating birds (osprey, great blue heron, and double-crested cormorant) in the Project area (this provision references FS Condition 13).

Some of the measures described herein will entail ground-disturbance that could potentially affect cultural resource sites. Prior to any ground-disturbing activities, a review will be made as to the location of any known cultural resource sites within the proposed work area. During construction, if any cultural resources are found, work will be halted immediately and the

[2]Incorporates FS condition 14.

District Historic Preservation Coordinator will be contacted. The coordinator will contact the appropriate agencies as per the Historic Preservation Management Plan.

PART 1
MANAGEMENT OF THE WILDLIFE MANAGEMENT AREAS

1.0 INTRODUCTION

The Tacoma Creek and Everett Island WMAs were purchased by the District for the purpose of protecting and enhancing habitats for wildlife. The purchases were completed within the terms of the Settlement Agreement for the 1999 amendment of the previous FERC License for the Box Canyon Hydroelectric Project[3]. Measures have been instituted by the District at each site to protect existing resources and begin the improvement of site conditions. At the Tacoma Creek WMA the District has:

- Purchased the property (Nov. 2000).
- Rebuilt perimeter fences (Nov. 2000 – July 2001).
- Removed thousands of feet of internal barbed wire fences (Oct. 2002 – Oct. 2005).
- Conservation Easement instituted (Sept. 2001).
- Cultural Resources survey conducted by Kalispel Tribe (Sept. 2001).
- Removed derelict vehicles, bailers, barbed wire, and other scrap metal (Apr. – Oct. 2001).
- Burned barn and out-building (Oct. 2002).
- Conducted a noxious weed survey (July 2001).
- Spraying and fertilizing to eliminate noxious weed infestations (July 2002 – present).
- Described and photographed the site from established photo-points (October 2003).
- Erected signs and restricted vehicle access (Oct. 2002 – present).
- Instituted seasonal (spring) public access restriction to protect waterfowl (2001 – present).
- Performed small-scale plantings to test the efficacy of techniques (2002 – present).

At the Everett Island WMA the District has:

- Purchased properties (Apr. – Aug. 2001).
- Rebuilt perimeter fences and removed encroaching cattle (May – Sept. 2001).
- Removed thousands of feet of internal barbed wire fences (Oct. 2002 – Oct. 2005).
- Conservation Easement instituted (Sept. 2001).
- Cultural Resources survey conducted by Kalispel Tribe (Sept. 2001).
- Salvaged, demolished, and burned existing buildings (Oct. 2002 – Jan. 2003).
- Conducted a noxious weed survey (July 2001).
- Spraying and fertilizing to eliminate noxious weed infestations (July 2002 – present).
- Described and photographed the site from established photo-points (October 2003).
- Erected signs and restricted vehicle access (Oct. 2002 – present).
- Performed small-scale plantings to test the efficacy of techniques (2002 – present).

[3] 86 FERC 61,200

Under the terms of the 1999 Settlement Agreement, draft plans for management of the two properties were developed and filed with FERC on June 28, 2001. As required by the new FERC License Article 407, this Comprehensive Wildlife Management Plan includes the general provisions of the 2001 draft plans for enhancement, monitoring, and evaluation on the WMAs, but substantially augments the draft plans in several ways. The current plan reflects field investigations of the properties and examination of other available information (e.g., soil, topographic, and wetland maps) relative to possible enhancements, comparison to off-site high quality habitats (reference sites), and a review of pertinent literature. These efforts were necessary to understand the potential of the WMAs to successfully support various enhancements and to develop designs for enhancement measures that are both reasonable and achievable. The plan also incorporates other specific provisions of Article 407 for wetland enhancement as native amphibian habitats on the WMAs, elimination of livestock grazing, and waterfowl nesting habitat enhancement. Because FERC's provisions for native amphibian habitats are substantially similar to language used in FS Condition 14, the District has incorporated both into this part of the plan. The current plan is comprehensive in scope, and is intended to provide clear guidance for the management of all habitats on the WMAs.

This plan establishes objectives, and provides a conceptual framework for future management of the wildlife habitat at the Project. However, final design of enhancements on the WMA properties will require additional detailed site information; consultation; and the opportunity to learn from the implementation of each phase of enhancement. Therefore, this plan is intended to be amended and updated in the future as needed in cooperation with the Wildlife Subcommittee of the Technical Committee.

2.0 TACOMA CREEK WMA SITE DESCRIPTION

2.1 LOCATION AND MAJOR FEATURES

The Tacoma Creek WMA is situated about 3.5 miles north of Cusick on the west side of the Pend Oreille River (Figure 1). State Highway 20, a major north-south roadway from Newport to the Canadian border, forms the western property boundary, and the mean high water mark of the Pend Oreille River is the eastern boundary (Appendix A). North and south of the property are lands recently purchased by the Kalispel Tribe under the Albeni Falls Mitigation Project. The north dike of Diking District No. 1 of Pend Oreille County forms a portion of the southern boundary of the property. Highway 20 and the Pend Oreille Valley Railroad are also elevated structures; however, each is equipped with a bridge crossing over Tacoma Creek that permits seasonal flooding of the property by Tacoma Creek and the Pend Oreille River. Tacoma Creek meanders in a northeasterly direction through the site before turning south toward the confluence with the Pend Oreille River where it is joined by Trimble Creek. The deep channel of Tacoma Creek east of the railroad creates a peninsula of land on the east side of the WMA which was historically connected by a bridge to the rest of the property, as illustrated in a 1943 aerial photograph of the property (Figure 2). This peninsula is currently accessible only by boat, but land access via the adjacent Tribal property north of the WMA would be desirable.

An unpaved road that has long existed (present in a 1934 U.S. Geological Survey map, Figure 3) runs east-west across the southern half of the property. There are currently no buildings on the property. Buildings that existed on the property when it was purchased were demolished and removed along with numerous abandoned vehicles, appliances, and other debris. A water-supply well associated with the original homestead has been retained.

Photographs of the Tacoma Creek WMA are presented in Appendix B. These photographs were selected to illustrate the site features discussed in the following sections.

2.2 TOPOGRAPHY

Most of the Tacoma Creek WMA lies between about 2034 and 2046 feet elevation above sea level, excluding the permanently flooded channels of Tacoma Creek (Figure 4). The highest points on or immediately adjacent to the property are the dike at the south end of the property (elevation to about 2052 ft), the Pend Oreille River Valley Railroad (to about 2054 ft), the embankment beside Highway 20 (to about 2051 ft), and the extreme northwest corner of the property (to about 2050 ft). About 61 percent of the peninsula area is equal to or above 2040 ft elevation. In contrast, about 63 percent of the property west of the peninsula is below 2040 ft elevation. The complex meanders of Tacoma Creek, including oxbows with no surface connection to Tacoma Creek, present a variety of depths with corresponding hydrologic characteristics, and this is reflected in diverse vegetation patterns. Active channels are deeper than side channels and oxbows (bathymetric data are not available).

Topographic relief is mostly associated with bank and channel characteristics. Banks of Tacoma Creek west of the railroad, including inactive oxbow channels, generally exhibit steep slopes. East of the railroad the lower 0.5 mile of Tacoma Creek is flanked by broad lateral bars at a bend, but is otherwise steeply banked. Along the Pend Oreille River and at the mouth of Tacoma Creek banks are more gently sloping, and unconsolidated shoreline below 2034 ft elevation is periodically exposed.

A rectangular excavation estimated to be about 80 feet maximum width on the west side of the railroad embankment appears to be a borrow pit created during construction of the embankment. Although varying in depth, it runs the length of the property except for one vehicle crossing point and occupies about 4.6 acres. A similar, but smaller borrow pit (20 ft by 90 ft) lies on the east side of the railroad embankment. Another apparent borrow pit on the south side of the property is adjacent to the Diking District dike; it covers about 4 acres. The only other known excavated area on the WMA is a ditch near the highway in the northwest corner of the property.

The field on the peninsula is partially bisected by an old channel that runs north-south. There are also several small depressions that exhibit minor topographic relief. Similar small, shallow depressions also occur in the field west of the railroad embankment. Because portions of this field were historically used for hay production that may have involved tilling the soil, it is reasonable to assume that topographic irregularities have been reduced compared to the pre-agricultural period. However, the topography illustrated on the 1943 aerial photograph is essentially the same as currently exists.

2.3 SOILS

Five soil units have been mapped on the property: Blueslide silty loam, Cusick silty clay loam, Sacheen variant silt loam, Kanisku sandy loam, and Kegel loam (Donaldson et al. 1992) (Figure 5). Each of these soil units may also include unmapped soils including Pywell muck (associated with depressions) and Hoodoo silt loam (a floodplain soil). Cusick silty clay loam exhibits very low permeability and rates of infiltration due to high clay content (Table 1). These characteristics of Cusick silty clay loam, in addition to a seasonally high water table, are favorable for creation of seasonally flooded basins by excavation. The capacity of Cusick silty clay loam to hold water is illustrated by the borrow pit along the west side of the railroad embankment on the WMA and other similar excavations off site, including other borrows along the railroad, the dike at the southern border of the WMA, and dikes on the Flying Goose Ranch. Where these borrow pits are relatively shallow, flooding is seasonal (dry or greatly reduced by late summer), whereas deeper pits are permanently flooded. Some of the other mapped soils are characterized by seasonal high water table but may lack sufficient clay content to hold water beyond this period. However, a seasonally flooded excavation west of the WMA on the Little Pend Oreille National Wildlife Refuge (LPONWR) – Cusick Unit is located in an area mapped for one of these soil types, Kegel loam. The channels and oxbows associated with Tacoma Creek are shown as Sacheen Variant silt loam; relatively high infiltration rates of this soil type suggest that water elevation in oxbows may reflect water elevation in the creek, even where no surface water connection to the creek remains.

A limited number of soil pits were dug on the WMA during a site investigation in October 2005. Soil profiles conformed to those expected for the mapped soil units. A detailed soil investigation sufficient to locate smaller, unmapped areas of other soils that may occur has not been performed.

Table 1. Selected properties of soil units mapped within the Tacoma Creek WMA (source is Donaldson et al. 1992, unless otherwise indicated).

Soil Unit Classification/ Hydrologic Soil Group[1]	**Drainage Class**	**Soil Permeability Class[2]**	**Clay Content**	**Seasonal High Water Table**	**Other Soil Types Found With This Soil Unit**
Blueslide silt loam/ Group B	Somewhat poorly drained	Moderately slow. (0.20 to 0.60 in/hr)	<27%[3]	Yes. Depth 0.5 – 3 feet, Feb. through April.	Cusick silty clay loam, Dalkena fine sandy loam, Hoodoo silt loam, Kegel loam, Pywell muck, and Rathbun very fine sandy loam
Cusick silty clay loam/ Group D	Somewhat poorly drained	Very slow. (<0.06 in/hr)	39-49%	Yes. Within 2 feet Nov. through April	Blueslide silt loam, Dalkena fine sandy loam, Pywell muck, and Sacheen Variant silt loam
Kanisku sandy loam/ Group A	Well drained	Moderate. (0.60 to 2.00 in/hr)	<20%[3]	No.	Bonner silt loam, Dalkena fine sandy loam, Sacheen loamy fine sand, and Scotia fine sandy loam.
Kegel loam/	Somewhat poorly drained	Moderate to depth of 30 inches (0.60 to 2.00 in/hr) and rapid below that depth (6.00 to 20.00 in/hr)	<27%[3, 4]	Yes. Depth 0.5 to 2.0 feet Jan. through June.	Blueslide silt loam, Bonner silt loam, Martella silt loam, Rathdrum very fine sandy loam. Poorly drained soils may also occur.
Sacheen Variant silt loam/ Group B	Somewhat poorly drained	Moderate to depth of 10 inches (0.60 to 2.00 in/hr) and very rapid below 10 in. (>20.00 in/hr)	<27%[3]	Yes. Depth 1-3 feet, March through June.	Blueslide silt loam, Cusick silty clay loam, and Pywell muck.

[1]Classification according to infiltration rates: Group A = >0.30 in/hr; Group B = 0.15 in/hr to 0.30 in/hr; Group D = 0.00 in/hr to 0.05 in/hr. (Pierce 1993).
[2]Pierce 1993.
[3]Based only on soil taxonomy (Pierce 1983); more specific information is not available.
[4]High sand content below the uppermost 10 inches of the horizon.

2.4 HYDROLOGY

Hydrologic influences on the Tacoma Creek WMA include direct precipitation and surface runoff, groundwater, and flooding from Tacoma Creek and the Pend Oreille River. Donaldson et al. (1992) report 27 inches total annual precipitation at Newport, Pend Oreille County, much of it falling as snow or rain in winter. No data are available directly describing precipitation patterns at the WMA.

Site specific information on groundwater and surface runoff are not available. However, field observations in the vicinity of the WMA indicate a seasonally high water table with runoff and seepage from the surrounding hills (see for example, DE&S 2001). One of the predominant soil units on the WMA, Cusick silty clay loam, is described as having a "perched seasonal high water table within a depth of 2 feet from November through April" (Donaldson et al. 1992). Runoff is described as very slow for Blueslide silt loam, Cusick silty clay loam, and Sacheen Variant silt loam; slow for Kegel loam; and medium for Kanisku sandy loam (Donaldson et al. 1992).

Elevation duration curves prepared for Exhibit B of the Application for New License for the Box Canyon Hydroelectric Project indicate that water elevation of the Pend Oreille River exceeds 2040 ft. about 4 percent of the time. In most years the highest flows begin in late May and the river can remain high for several weeks. For example, in two representative high water years, the Pend Oreille River (at Cusick) was at or above 2040 ft for about 23 days in 1991 and 31 days in 1996. In lower flow years, water elevation did not reach 2040 ft: in 1993 the river exceeded 2038 only briefly and in 1994 barely exceeded 2035 ft. In 1997 a major flood event of the Pend Oreille River occurred, with elevated water levels persisting for about six weeks until about July 1. Based on river stage data from Cusick (maximum stage was nearly 2050 ft), most of the WMA was inundated during the flood.

Compared to the other adjacent tributaries on the west side of the Pend Oreille River (Calispell Creek, Trimble Creek, and Gardiner Creek), which are dammed by the railroad embankment, Tacoma Creek has retained its natural flow characteristics and connection to its floodplain, although the floodplain is constricted by the embankments of Highway 20 and the railroad. No information is available regarding seasonal flows or flood characteristics of Tacoma Creek, but flow characteristics can be inferred from hydrology data on Calispell Creek.

Almost the entire WMA is shown as wetlands on the published National Wetlands Inventory map; however, no on-the-ground verifications are known to have been conducted and some of the classifications do not appear to be accurate. According to the map, wetlands surrounding Tacoma Creek are predominantly palustrine emergent seasonally flooded (PEMC), and palustrine shrub-scrub seasonally flooded (PSSC) (Figure 6). Wetlands associated with the Pend Oreille River are mapped as PEMF and PEMC. Most of the rest of the WMA is shown as palustrine emergent temporarily flooded (PEMA). An area shown as palustrine forested temporarily flooded (PFOA) on the west side of the peninsula corresponds to a stand of black cottonwood and black hawthorn. A second black cottonwood stand shown as palustrine forested wetland (seasonally flooded) (PFOC) barely extends from the adjacent property onto the northeast corner of the WMA; the description of this stand as seasonally flooded is probably not

accurate based on elevation. A few small areas shown as upland are concentrated in the northwest corner of the WMA above about 2040 ft. elevation, except for small scattered areas in the southwest quadrant of the WMA.

Observations of hydrologic conditions in October 2005 and March 2006 provide evidence of seasonal to semi-permanent flooding within the borrow pits along the railroad. In contrast, observations of the borrow pit at the south end of the property adjacent to the dike indicate that surface flooding there is of much shorter duration.

2.5 VEGETATION

The following broad cover type categories were identified on the WMA:

Open water – permanent, relatively deep water; because of water depth does not support emergent vegetation.

Emergent – seasonally to permanently flooded at depths ranging from about 3 feet to a few inches; usually occurring in topographic depressions, or on low-lying banks or terraces; supporting herbaceous, mostly graminoid (grass-like) vegetation, including bulrush, sedges, spike-rush, rush, cattail, and grasses.

Grassland – seasonally wet or saturated, temporarily flooded, or not wet; dominated by herbaceous vegetation, usually grasses, but sometimes containing substantial component of forbs (non-graminoid herbs) or sedges, and may include seedling shrubs.

Shrub-land – dominated by shrubs (woody, often multi-stemmed, and ranging in height from about 4 to 18 ft) with a minimum coverage of 10 percent; includes areas in transition from grassland and in transition to woodland; not defined by hydrology, but varies from persistently flooded to dry.

Woodland – dominated by trees with a minimum coverage of 10 percent; includes areas in transition from grassland or shrub-land; not defined by hydrology, but generally not persistently flooded.

Vegetation attributes of the broadly defined cover types were explored during a field investigation in October 2005, and by examining field notes and photographs of the site taken in 1997 and 2003. Although not a comprehensive botanical inventory, these efforts were sufficient to describe a variety of sub-types, which were mapped as a GIS layer and have been used to develop the current draft management plan. The preliminary cover type map is included as Figure 7. A summary account of cover types with acreages is presented as Table 2. The map will be finalized after further field study.

Table 2. Summary of major cover types on the Tacoma Creek WMA, with mapped sub-types, based on preliminary cover type map.

COVER TYPE GROUP	SUB-TYPES	AREA IN ACRES
Emergent	Shallow emergent marsh, shallow emergent marsh (sedge), shallow emergent marsh (excavated), deep emergent marsh.	26.08
Grassland	Grass, grass/forb, grass/mix.	124.75
Woodland	Deciduous (black cottonwood).	3.20
Woodland	Mixed.	3.37
Woodland	Conifer, low density conifer.	5.13
Shrub-land	Black hawthorn, black hawthorn/grass, black hawthorn/mixed shrub, black hawthorn/willows, mixed shrub, willows, willows/hardhack, willows/snowberry, hardhack, hardhack/grass.	61.85
Open Water	Stream channel.	20.98
Shoreline	Unconsolidated.	8.17
Disturbed	Railroad, road, recolonized (low density).	6.19
ALL TYPES		**259.72**

Grassland currently covers about 48 percent of the WMA, reflecting decades of livestock grazing and hay production. Much of this acreage will now predictably develop woody vegetation, although low-lying areas may continue to be dominated by hydrophytic grasses or other graminoids. Some grassland on the WMA may be classifiable as palustrine emergent wetland temporarily flooded (PEMA). Because the property has not been examined by a qualified botanist during the growing season, the composition of grassland cover types can only be inferred from available information. Common pasture grasses (timothy [*Phleum pratense*], fescue [*Festuca* sp.], and bentgrass [*Agrostis* sp.]) are discernable from site photos. In some areas, non-grasses are a significant presence; species that were still detectable in October 2005 included sedges (*Carex* spp.), lupine (*Lupinus* sp.), common tansy (*Tanacetum vulgare*), yarrow (*Achillea millefolium*), and curly dock (*Rumex crispus*). Small shrubs (particularly black hawthorn [*Crataegus douglasii*], hardhack [*Spiraea douglasii*], rose [*Rosa* sp.], and common snowberry [*Symphoricarpos albus*]), also occur in the grassland cover type, and are believed to have increased in some locations since the property was purchased.

The emergent cover type occupies approximately 10 percent of the WMA, with four delineated sub-types: shallow emergent marsh (multi-species), shallow emergent marsh (sedge), shallow emergent marsh (excavated), and deep emergent marsh. Shallow emergent marsh occurs in oxbows, drainage channels, submerged banks, and a few perched topographic depressions. Most areas of this cover type are characterized by dense, rooted vegetation emerging above the water surface. The hydrologic regime in this cover type ranges from permanently flooded (but shallow) to seasonally flooded, and vegetation was comprised of several species. In areas associated with Tacoma Creek, representative species include sedges, spike-rush (*Eleocharis* sp.), three-square bulrush (*Schoenoplectus americanus*), and grasses. Reed canarygrass (*Phalaris arundinacea*) occurs in small patches and is not a dominant species. Cattail (*Typha latifolia*) and softstem bulrush (*Schoenoplectus tabernaemontani* [*Scirpus validus*]) are both uncommon. Shallow emergent marsh – excavated describes seasonally flooded emergent areas within the borrow pits along the railroad; reed canarygrass, cattail, and sedges are dominant

species. Within some shallow oxbow channels a separate sub-type of shallow emergent marsh was differentiated based on apparently exclusive coverage by a single species of sedge. Deep emergent marsh was differentiated to describe more deeply flooded areas that support rooted vegetation; this cover type occurs mostly as a narrow fringe and in a few moderately deep channels of Tacoma Creek.

Shrub-lands occupy about 24 percent of the WMA. The most common shrub-lands on the WMA are dominated by hardhack (*Spiraea douglasii*), a species which exhibits a broad ecological tolerance for seasonal flooding and persistently saturated soils, but also occurs on sites that flood infrequently. Willows (*Salix* spp.) are dominant at fewer locations. The other dominant shrub on the WMA is black hawthorn. This species is associated with moist sites and is tolerant of shallow, but usually not prolonged flooding. Armed with long spines, black hawthorn, once established, is relatively resistant to livestock grazing and may achieve greatest dominance on grazed sites.

Woodlands are currently scarce on the WMA (about 12 acres or 4.6 percent of total area), mostly consisting of small groves. Woodlands were divisible into three sub-types: conifer stands (5.4 acres) (predominantly lodgepole pine [*Pinus contorta*] with fewer ponderosa pine [*P. ponderosa*]); deciduous hardwood stands (composed of black cottonwood [*Populus balsamifera* var. *trichocarpa*], or black cottonwood - quaking aspen [*P. tremuloides*]), and a few areas of mixed woodland, where conifers and black cottonwood (or quaking aspen) occur in the same stand. Woodlands occur on the periphery of the property and the strip of land between the east side of the railroad embankment and Tacoma Creek. There is also a small grove of black cottonwoods just west of the railroad. Root sprouts (suckers) were observed around mature black cottonwoods at various locations on the WMA, suggesting that stands will naturally expand in the absence of livestock grazing. Shrubs and understory trees associated with the deciduous stands include black hawthorn, common snowberry, water birch (*Betula occidentalis*), wood rose (*Rosa woodsii*), red-twig dogwood (*Cornus stolonifera*), service berry (*Amelanchier alnifolia*), mallow ninebark (*Physocarpus malvaceus*), hardhack, and willow.

2.6 WILDLIFE USE

Relatively little information exists concerning wildlife use of the WMA. During Box Canyon Project relicensing the property was an active farm and was generally not the focus of wildlife surveys. The only wildlife observations (from District 2000 and original field notes) were as follows. More than 65 ducks (mostly northern shoveler, but also mallard, bufflehead, redhead, American wigeon, and common merganser), a pair of common loons, and two great blue herons were observed in Tacoma Creek on April 24, 1998. Canada goose, gadwall, American wigeon, common merganser and other waterfowl were observed on several dates during the winter, spring migration, and in the post-breeding period at the mouth of Tacoma Creek. Other incidental observations of birds in flight over the site in 1998 include northern harrier and bald eagle. There were no amphibian observations from the WMA; however, repeated surveys for amphibians were conducted at two sites adjacent to the site: the seasonally flooded borrow pit south of the WMA supports large numbers of larval long-toed salamanders and Pacific treefrogs, and several adult Columbia spotted frogs were also observed at the site. Other wildlife observed at this wetland included cinnamon teal, blue-winged teal, American wigeon, northern shoveler,

mallard, sora, red-winged blackbird, and muskrat. A permanently flooded pit south of the dike was observed to support a large breeding population of bullfrogs as well as fish, and waterfowl were often noted.

Other incidental wildlife observations on the WMA during recent investigations in October 2005 and March 2006 include feeding evidence by muskrat, American beaver, and white-tailed deer; and sightings of ring-necked pheasant, American crow, black-billed magpie, black-capped chickadee, song sparrow, red-winged blackbird, red-tailed hawk, northern harrier, hairy woodpecker, grey fox, muskrat, American beaver, and unidentified voles. There were also several unidentified woodpecker (possibly northern flicker) nest holes. Long-toed salamander egg masses were found in the flooded borrow pit on the west side of the railroad on April 5, 2006.

Wildlife observations to date suggest that the emergent and open water cover types associated with Tacoma Creek represent high quality habitats for a variety of wildlife, including muskrat, waterfowl (foraging, resting, brood rearing, and migrational staging), and great blue heron (foraging). Existing woodlands, although limited in extent, afford habitat for cavity-excavating birds and some of the cottonwoods are nearly as large as trees used for bald eagle nesting elsewhere.

3.0 EVERETT ISLAND WMA SITE DESCRIPTION

3.1 LOCATION AND MAJOR FEATURES

The Everett Island WMA is located on the east side of the Pend Oreille River approximately one mile south-southeast of Usk and 11 miles west-northwest of Newport (Figure 8). Access by ground transportation is by LeClerc Road to Lenora Drive to Munro Drive. The WMA occupies the northern two-thirds of Everett Island, which lies between the main channel of the Pend Oreille River to the west and a shallow secondary channel along the east bank. The southern third of the island is in private ownership. The island is connected by causeways to the east bank; the north causeway provides road access to the WMA. A permanent pond, occupying about 6.5 acres at maximum, is situated in the northern third of the island. This pond is not illustrated on a 1934 topographic map of the site (Figure 9), but it does appear on a 1943 aerial photograph (Figure 10), suggesting that it was excavated, possibly as a stock pond. Approximately 44 acres of the WMA is situated east of the island.

Historically, the site was used for livestock grazing and hay production, and had been heavily grazed prior to acquisition. The 1943 aerial photograph of the property shows many of the current features, including fence-lines and access roads, although buildings evident in the photograph had been removed prior to the current period. Most of the interior fences were removed after the property was acquired by the District, but new perimeter fences have been erected along the southern boundary to prevent trespass by cattle from the adjacent property.

Photographs of the Everett Island WMA are presented in Appendix B. These photographs were selected to illustrate the site features discussed in the following sections.

3.2 TOPOGRAPHY

The topography of Everett Island is dominated by long parallel ridges and swales oriented in a northwest-southeast direction (Figure 11). On the island, the property is generally divisible into two topographic sectors: 1) the secondary channel and adjacent lands on the east side and lands north of the midpoint are below 2040 ft elevation, except for a few higher ridgelines; and 2) the remaining terrain on the west side and south of the midpoint, which is at or above 2040 ft elevation except for a few lower swales. These topographic patterns are also largely reflected in the distribution of soil types (See Section 3.3). Overall, approximately 131.2 acres on the island are at or above 2040 ft elevation. Approximately 31.9 acres are above 2046 ft elevation and the maximum elevation is estimated to be about 2050 ft.

The highest points on the site are east of the island, where most of the terrain is between 2053 and 2062 ft elevation. The topography of this area is intersected by two swales oriented northwest-southeast, and a shallow basin that is seasonally flooded. On the west side of the island and east of the causeway, the shorelines are relatively high and steep. In contrast, the shoreline on the east side of the island is relatively low and more gently sloped.

The pond on the northern part of the island appears to be an excavated feature; there are no ditches or other apparent excavations or topographic modifications. All of the persistently flooded features on the island are connected by surface water to the Pend Oreille River at higher river flows. The pond is connected by a channel to the north when surface water elevation of the river is at about 2037 feet, and the sometimes isolated basin on the southern boundary of the property is connected to a longer slough and the river whenever the river is at or above 2035 feet elevation.

3.3 SOILS

Scotia fine sandy loam and Cusick silty clay loam are the only mapped soil units on the WMA (Donaldson et al. 1992) (Figure 12). Scotia fine sandy loam is a very deep, well drained soil; all of the unmapped soils that may occur within this soil unit are also well drained (Table 3). Cusick silty clay loam is moderately well drained, but exhibits very low permeability and rates of infiltration associated with high clay content, and a seasonally high water table. Unmapped soils that may occur within the Cusick silty clay loam soil unit include Pywell muck (associated with depressions) and Hoodoo silt loam (a floodplain soil). On Everett Island, most of the area mapped as Cusick silty clay loam is located at elevations below 2040 ft; in contrast, most of the area mapped as Scotia fine sandy loam is at elevations at or above 2040 ft. East of the island the only mapped soil type is Cusick silty clay loam.

A limited examination of soil profiles on the WMA in October 2005 indicated conformance to expected mapped soil units. A detailed soil investigation sufficient to locate smaller, unmapped areas of other soils that may occur has not been performed.

Table 3. Selected properties of soil units mapped within the Everett Island WMA (source is Donaldson et al. 1992, unless otherwise indicated).

Soil Unit Classification/ Hydrologic Soil Group[1]	**Drainage Class**	**Soil Permeability Class[2]**	**Clay Content**	**Seasonal High Water Table**	**Other Soil Types Found With This Soil Unit**
Cusick silty clay loam/ Group D	Somewhat poorly drained	Very slow. (<0.06 in/hr)	39-49%	Yes. Within 2 feet Nov. through April	Blueslide silt loam, Dalkena fine sandy loam, Pywell muck, and Sacheen Variant silt loam
Scotia fine sandy loam/ Group A	Well drained	Moderate. (0.60 to 2.00 in/hr)	<20%[3]	No.	Bonner silt loam, Dalkena fine sandy loam, Dufort silt loam, Sacheen loamy fine sand, Scrabblers silt loam, and Rathdrum very fine sandy loam

[1]Classification according to infiltration rates: Group A = >0.30 in/hr; Group D = 0.00 in/hr to 0.05 in/hr.
[2]Pierce 1993.
[3]Based only on soil taxonomy (Pierce 1993); more specific information is not available.

3.4 HYDROLOGY

Hydrologic influences on the Everett Island WMA are presumed to be direct precipitation and surface runoff, groundwater, and flooding from the Pend Oreille River. Donaldson et al. (1992) report 27 inches total annual precipitation at Newport, Pend Oreille Count, much of it falling as snow or rain in winter. No data are available directly describing precipitation patterns at the WMA.

Site specific information on groundwater and surface runoff are not available. One of the two mapped soil units on the WMA, Cusick silty clay loam, is described as having a "perched seasonal high water table within a depth of 2 feet from November through April" and very slow runoff (Donaldson et al. 1992). The other mapped soil unit, Scotia fine sandy loam, is also characterized by very slow runoff, but is well drained and does not exhibit a seasonally high water table.

Elevation duration curves prepared for Exhibit B of the Application for New License for the Box Canyon Hydroelectric Project indicate that water elevation of the Pend Oreille River exceeds 2040 ft. about 4 percent of the time. In most years the highest flows begin in late May and the river can remain high for several weeks. For example, in two representative high water years, the Pend Oreille River (at Cusick) was at or above 2040 ft for about 23 days in 1991 and 31 days in 1996. In lower flow years, water elevation did not reach 2040 ft: in 1993 the river exceeded 2038 only briefly and in 1994 barely exceeded 2035 ft. Based on these data, most of the lands on the east side and northern half of the property on Everett Island are subject to seasonal flooding in a normal year, but flooding is less extensive on the rest of the property, including some areas that virtually never flood. The extreme flood of 1997 may have inundated most of Everett Island based on a maximum recorded stage of nearly 2050 ft at Cusick.

A published National Wetlands Inventory map of the property depicts nearly all of Everett Island as wetlands, but the map is almost certainly inaccurate (Figure 13). According to the map, the predominant wetland type on the island is palustrine emergent temporarily flooded (PEMA), including areas with well-drained soils at elevations almost never exposed to river flooding. The secondary channel is classified as palustrine emergent semi-permanently flooded, impounded (i.e., a reservoir effect) (PEMFh); a more accurate classification should include areas of palustrine emergent permanently flooded, impounded (PEMHh) and possibly palustrine open water permanently flooded, impounded (POWHh). Swales associated with the secondary channel are also shown as PEMFh, whereas swales perched at higher elevations are classified as palustrine emergent seasonally flooded (PEMC). The latter may be better described as PEMCh, because surface flooding from precipitation appears to be minor (based on field observations in March 2006). The pond is mapped as PEMFh (at least part of the pond is probably better described as PEMHh). During field investigations in March 2006 the pond was nearly full (presumably from precipitation and runoff, not from river flooding). East of the island the map shows uplands with several seasonally flooded swales, including palustrine scrub-shrub (PSSC) and palustrine forested (PFOC).

3.5 VEGETATION

The same five broad cover type categories occur as on the Tacoma Creek WMA: open water, emergent, grassland, shrub-land, and woodland. Vegetation attributes of these broadly defined cover types were explored during field investigations in October 2005 and March 2006, and by examining field notes and photographs of the site taken in 1997 and 2003. Although not a comprehensive botanical inventory, these efforts were sufficient to describe a variety of sub-types, which were mapped as a GIS layer and have been used to develop the current draft management plan. The preliminary cover type map is included as Figure 14. A complete account of cover types with acreages is presented as Table 4. The map will be finalized after further field study.

Table 4. Summary of major cover types on the Everett Island WMA, with mapped sub-types, based on preliminary cover type map.

COVER TYPE GROUP	**SUB-TYPES**	**AREA IN ACRES**
Emergent	Shallow emergent marsh, shallow emergent marsh (sedge), deep emergent marsh.	164.03
Grassland	Grass, grass/forb, grass/forb/shrub, grass/mixed.	121.54
Woodland	Deciduous.	0.71
Woodland	Mixed.	34.13
Shrub-land	Black hawthorn, mixed.	17.76
Open Water	River channel, pond.	99.14
Shoreline	Unconsolidated.	1.23
Disturbed	Road.	1.94
ALL TYPES		**440.47**

The open water cover type is a significant element on the WMA, occupying about 99 acres (22.5% of total area). Open water habitats, which appear to be relatively shallow, occur in the secondary channel east of the island, where intermixed with patches of emergent vegetation, in associated sloughs, and in the permanent pond. Causeways (two on the WMA and a third on the adjacent property upstream) span the secondary channel, limiting flows through the channel, except when river water surface elevation exceeds about 2034 ft.

The emergent cover type is the single largest component on the WMA (164 acres, or 37.2% of total area). Limited observations indicate the presence of sedges and grasses, spike-rush, three-square bulrush, and water smartweed; a floristic investigation will be needed to better describe the composition of this cover type.

Grassland occupies about 121.5 acres (27.6% of the WMA) which reflects the historical use of the site for livestock grazing and hay production. In the absence of these influences, most or all of this cover type is likely to undergo succession to shrub or tree dominated cover types. Some grassland on the WMA may be classifiable as palustrine emergent wetland temporarily flooded (PEMA). Because the property has not been examined by a qualified botanist during the growing season, the composition of grassland cover types can only be inferred from available information. Common pasture grasses including timothy, fescue, and bentgrass are discernable from site photos. Non-grasses are generally not a significant presence within the cover type, but

patches of weeds, including common tansy and knapweed, were noted during the October 2005 field investigation. Small shrubs beneath the height of the grasses occur in places (mostly black hawthorn or common snowberry) but at low density.

Cover types representing woody vegetation are scarce; shrub-lands occupy only 17.8 acres (4.0%) and woodlands 34.8 acres (7.9%). Shrub-lands on Everett Island are predominantly comprised of black hawthorn and common snowberry. Hardhack apparently does not occur or is scarce on the island, but is a dominant feature in shrub-lands within seasonally flooded swales east of the island. Most of the woodland acreage was classified as mixed conifer-deciduous because of the presence of quaking aspen in woodlands dominated by ponderosa line and lodgepole. Quaking aspen is particularly common on the edges of the swales and seasonally flooded basin on the mainland portion of the WMA. Saplings and understory trees of this cover type also include Douglas-fir (*Pseudotsuga menziesii*) and grand fir (*Abies grandis*). Deciduous woodland occurs on the island as a stand of black cottonwood and as a small patch of quaking aspen; both of these stands, which occupy a total of about 0.7 acres, are flanked by dense shrub thickets.

3.6 WILDLIFE USE

Little information exists concerning wildlife use of the WMA. During Box Canyon Project relicensing the property was an active farm and upland areas were heavily grazed by livestock. However, the emergent areas and the secondary channel east of the channel were recognized as important habitats for waterfowl resting, foraging, and brood-rearing (Reese and Hall 1991) and were the subject of limited surveys (reported in District 2000). Grazing and loafing by Canada geese was noted during limited surveys of the island in 1997, 1998, and 1999. Partial waterfowl nest surveys of the island on May 18, 1998 revealed 2 Canada goose nests and 1 mallard nests. A single large adult Columbia spotted frog was found on the island on the same date. A bald eagle resident nesting territory is located on the northern half of the island, associated with a stand of black cottonwood (where the nest is currently located) and a single large ponderosa pine (currently used for perching, but formerly the nest tree before one of the two trunks split and fell). WDFW records indicate that this nesting territory has existed since 1989.

Incidental wildlife observations on the WMA during recent investigations in October 2005 and March 2006 include feeding evidence by muskrat and white-tailed deer; and sightings of large numbers of waterfowl (March 2006) (redhead, wigeon, gadwall, mallard, unidentified teal, and Canada goose), bald eagle (resident pair), American crow, black-billed magpie (old nests), black-capped chickadee, red-winged blackbird, northern harrier, muskrat, and unidentified voles.

4.0 MANAGEMENT OBJECTIVES

Management of the WMAs is intended to provide permanently secure habitats for wildlife in the Project area. A variety of habitat protection and enhancement measures are proposed herein, reflecting wildlife priorities identified in the license order, including enhancements for amphibians and waterfowl, increasing the extent of cottonwood stands, eliminating livestock grazing, and controlling noxious weeds. From these general parameters, the application and extent of specific enhancements must be determined. To do so, the following governing principles will be applied to possible enhancements of the WMAs:

- The enhancement must be consistent with site potential (i.e., capability of a location to attain certain characteristics) and be realistically achievable on the WMAs if reasonable measures for management, restoration, or site alteration are undertaken;

- The enhancement must represent an improvement in habitat values compared to current conditions or an exchange in habitat types that will increase the occurrence of the favored habitat type;

- The enhancement must closely correspond to scientifically documented habitat requirements for favored wildlife species, such as native amphibians, waterfowl, cavity-nesting birds, and bald eagle; and

- The enhancement must be based on existing habitats at other comparable sites that are recognized as exhibiting high habitat values (i.e., reference sites).

As stated in Section 1.0, it is premature to propose final design of enhancements on the WMA, including specific target acreages for all habitat enhancements, at this time. The District is committed to providing at least 60 acres of native amphibian habitats on the WMAs if feasible (see Section 8.1) and this plan sets interim targets for development of cottonwood stands (see Section 8.3). Further determination of realistic and achievable target acreages will require additional site specific data as discussed in Section 6.0, consultation with the Wildlife Subcommittee of the Technical Committee to prioritize habitat enhancements; and the opportunity to learn from the implementation of each phase of enhancement.

5.0 SITE POTENTIAL

The capacity of a site to successfully support certain vegetation types, wetlands, or other characteristics is referred to here as "site potential." Consideration of site potential is essential to designing a realistic plan for wildlife habitat management at the project. Factors which may influence site potential include soil types, groundwater hydrology, flood patterns, elevation, topography, landscape position, and existing vegetation. Some of these factors (e.g., topography) can be altered relatively easily, whereas others are inalterable or would require substantial engineering.

Understanding site potential is particularly important for the desired expansion of deciduous woodlands and creation of native amphibian breeding habitats. Decisions for locating new deciduous woodlands should consider existing patterns of woodland occurrence along the Pend Oreille River, as well as the autecology of the key species, black cottonwood. Similarly, determining appropriate locations for new amphibian breeding habitats can be informed by the soil characteristics, hydrology, and landscape position of the many sites in the region where native amphibians breed, including flooded excavations that fill this role, and the ecology of native amphibians.

5.1 ANALYSIS OF SITE POTENTIAL FOR BLACK COTTONWOOD

Patterns of black cottonwood occurrence were explored based on descriptions of more than 40 stands investigated during Box Canyon Project relicensing (Appendix E3.3-2, District 2000) and reference to the existing GIS maps. Analysis of landscape position, mapped soil types (Donaldson et al. 1992), and elevation, using the 1997 digital aerial color imagery, which shows two-foot contours, indicates the following.

Stands of black cottonwood primarily occur on constructed dikes and naturally formed levees, the majority of which are entirely within an elevation range of 2040-2044 ft elevation, but a third of the sites include trees rooted slightly lower (estimated 2039 ft). A high percentage of these sites are located in areas mapped as either Blueslide silt loam or Cusick silty clay loam, both somewhat poorly drained soils with a seasonal high water table. Because these sites are often the highest points on a narrow, elongated land feature, soils may be better drained than in topographic depressions or broad, flat sites of the same soil type.

Fewer stands occur on lower bank terraces of high gradient shorelines (elevation estimated 2039-2042 ft) and on islands, mostly above 2040 ft elevation, but including scrubby growth between 2038-2041 ft on Cook Island and some trees at about 2039 ft elevation on the downstream end of Kelly Island. Soils on the islands are generally well drained alluvium, but some exhibit a seasonal high water table. The lowest elevation for black cottonwood is at the mouth of Lost Creek where trees occur at elevations as low as 2036 ft. Outside of the Pend Oreille River riparian corridor, there are also black cottonwoods growing in a flat, open field on the Little Pend Oreille National Wildlife Refuge – Cusick Unit (Kegel loam soil type) (DE&S 2001). Several large stands (sometimes including quaking aspen) also occur on relatively flat or gently sloping sites that are seasonally wet from hill-slope drainage; these stands are situated at elevations between about 2043 and 2048 ft in areas mapped for Cusick silty clay loam.

These data suggest that site potential for establishing cottonwoods is largely expressed by elevation, but may also be influenced by landscape position. The most likely explanation for this relationship is that sites at lower elevations are not suitable for cottonwoods because of prolonged seasonal flooding and are restricted in occurrence at higher elevation sites by conifers, except where seasonally wet.

5.2 ANALYSIS OF SITE POTENTIAL FOR NATIVE AMPHIBIAN BREEDING HABITAT

Site potential for the creation of new native amphibian breeding habitat should be related to soil and groundwater characteristics, topography, elevation, landscape position, and proximity to other required habitats. Native amphibians breed in topographic depressions that retain surface water for a period adequate to complete the aquatic life stages, but they are most successful where a gradual, seasonal drawdown occurs to limit predators and competitors. The retention of water in topographic depressions is typically related to certain described soil types with a high content of clay or organic matter, the presence of an impermeable soil layer below the surface soil, or other characteristics that elevate ground water levels. In addition, the hydrologic processes affecting these breeding sites usually do not cause sudden fluctuations in water surface elevation once the site has filled.

A total of 54 sites were documented for native amphibian breeding or the presence of adult Columbia spotted frogs during Box Canyon Project relicensing (Appendix E3.2-1, District 2000). Many of the sites are situated in areas mapped for soils exhibiting a seasonal high water table, including Cusick silty clay loam and Blueslide silt loam. Cusick silty clay loam is also characterized by very slow infiltration rates, evidence of high clay content. Sites located in naturally occurring topographic depressions may have developed soils that are more poorly drained than the surrounding soil unit, but breeding sites are also located in excavations (usually borrow-pits associated with construction of dikes and other elevated berms). A few of the sites were created by partial impoundment of small creeks by beaver or inadequately sized culverts.

The landscape position of breeding sites varied, but nearly all were situated where they would not be seasonally exposed to flood waters of the Pend Oreille River and none were in the active channel. Surface elevations generally exceeded about 2042 ft. Most of the sites were proximate to wooded areas, including all of the sites where Columbia spotted frogs bred.

6.0 COLLECTION OF SITE SPECIFIC DATA

A variety of site specific data will be required in order to develop detailed designs for enhancements and management of the WMAs. Site investigations on the WMAs to collect data on topography (accurate to at least 0.5 ft), soils (profiles, presence and depth of impermeable horizon), hydrology (particularly groundwater data), existing wetland boundaries, flora, and current wildlife use will be initiated at the earliest possible date.

7.0 REFERENCE SITES

Reference sites will provide biological benchmarks for development of habitats on the WMAs. To the extent practicable, the various reference sites will be selected on the basis of soil, hydrologic, and topographic characteristics that are similar to or could be replicated on the WMAs; demonstrable habitat value (e.g., relatively undisturbed conditions and wildlife use); and unhindered access for field examination. Reference sites are foreseen for at least the following habitats: seasonally to semi-permanently flooded wetlands used as native amphibian breeding sites; mature black cottonwood woodlands; riparian shrub-lands; shallow seasonally flooded wetlands used by waterfowl; and meadows or grasslands used by nesting waterfowl. The sites will be selected in consultation with the reviewing agencies and Kalispel Tribe, who have already designated reference sites and collected descriptive data on vegetation (species composition and structural attributes from plots and transects), amphibians (larval trapping), birds (point counts), and small mammals (snap trapping) for the Albeni Falls Mitigation Project. Most of these designated reference sites are located in the vicinity of the Box Canyon Project and represent a variety of habitat types (seasonal wetlands, including meadows; cattail marsh; scrub-shrub wetland; deciduous forest; and conifer forest) (see Appendix C).

8.0 MANAGEMENT MEASURES

Management measures to address wildlife priorities on the WMAs include excavation of seasonally to semi-permanently flooded wetlands, tree and shrub planting, vegetation management, and other habitat enhancements. Although listed below as separate items, the

measures will be integrated; final design will reflect the importance of landscape patterns of habitat juxtaposition and interspersion.

8.1 AMPHIBIAN HABITATS

8.1.1 OBJECTIVES

Provision of habitats for native amphibians was an essential component of management of the WMAs in the draft management plan and is addressed in the license order for Article 407 under part 1, Wetland Creation and Enhancement in Wildlife Management Areas. The following measures are specified:

1. Detailed design drawings of the wetland creation and enhancement sites, including topographic information;
2. Hydrologic information and design drawings showing the water control features;
3. Provisions for draw-downs to impair bullfrog production in the ponds;
4. Proposed vegetation plantings in plan view and cross-section; and
5. Provisions to monitor other existing wetland habitats in the Everett and Tacoma Creek Wildlife Management Areas, with the variables described in the draft wildlife management plans.

FS Condition No. 14 (Native Amphibian Habitats) is similar to FERC's license order, but includes additional details as follows:

> *The Licensee shall create or restore at least 60 acres of amphibian habitats on existing wildlife management areas (WMAs) or other Licensee-controlled lands. Created wetlands / ponds shall be designed to incorporate water control devices that allow water levels to be drawn down in the winter, thereby reducing non-native bullfrog populations that compete with and predate native frogs.*
>
> *The Licensee shall consult with the USDA Forest Service to finalize the wetland creation and enhancement measures described in the draft Wildlife Management Plans for the Everett Island and Tacoma Creek WMAs. The sections of these plans dealing with the constructed wetlands shall include detailed topographic maps; hydrologic information and design drawings showing the water control features; the consideration of complete or nearly complete draw downs to impair bullfrog production in the ponds; proposed vegetation plantings in plan view and cross-section; and detailed information about operation, maintenance, monitoring methods, schedules and budgets.*
>
> *The Licensee shall conduct or fund a qualified wildlife biologist to evaluate the habitat in created or restored wetlands / ponds using the pond breeding HSI model. The Licensee shall monitor amphibian populations at the sites using methods such as annual egg mass counts and nighttime call surveys in the spring, and /or summer or late fall funnel trapping. The Licensee shall also monitor the effectiveness of water level draw down in order to determine how best to manage the sites to promote native amphibians.*

The District proposes to fulfill the requirements of both FERC Article 407 and FS Condition 14, as follows. Seasonal draw-down of the amphibian breeding sites is expected to occur annually through natural processes to the point that sites are either dry by late summer or so shallow that they are subject to complete freezing in winter, as discussed below. Therefore, artificial draw-down or draining is not necessary to render sites unsuitable for bullfrogs. Comments submitted by FS representative Mike Borycewicz on May 3, 2006 are in agreement with this conclusion: "The Forest Service is satisfied that water control devices on created wetlands will not be necessary, based on the plans and rationale presented by the District's contractor at the April [2006] Wildlife Technical Committee meeting." In order to ensure that sites do not inadvertently create habitat for bullfrogs, these wetlands will be artificially dewatered by pumping if there are indications that bullfrog tadpoles are present and the wetlands have not dried naturally by September 30.

FERC (2006) cited Doubledee et al. (2003) to justify the need for artificially draining amphibian breeding sites each year to control bullfrog populations. In the cited reference the breeding sites were permanently flooded stock ponds and only by artificially dewatering these sites could bullfrog tadpoles be killed. The proposed design of native amphibian breeding sites presented herein does not include creation of any permanently flooded sites. Rather than relying on an artificial drawdown to eliminate bullfrog tadpoles that have been present and competing with native amphibian larvae throughout the larval period, the preferred approach is to (1) create habitats that are unattractive to bullfrogs; (2) design sites to dry gradually (as do the existing natural habitats), which will kill any bullfrog tadpoles that may be present; and (3) artificially drain sites only as a last resort, if needed.

The other modification relates to the use of the pond-breeding amphibian HSI model (U.S. Army Corps of Engineers 1997) as a habitat evaluation tool. The District believes that application of this model to evaluate effectiveness is not appropriate for several reasons: 1) native amphibians breed in habitats best described as emergent, shrub-scrub, or forested wetlands, but not "permanent ponds;" 2) the model was intended for use in western Washington and Oregon, not northeastern Washington, and addresses a different suite of species than occur in the Project area; 3) the model assigns the highest suitability to surface water duration of 6 to 12 months and permanently flooded areas as much as 35% of total area, despite the fact that permanently flooded sites tend to support fish, bullfrogs, and other well-established predator populations that reduce suitability for native amphibians; and 4) the model assigns highest suitability to slowly flowing water, higher than for sites with no current, despite contradictory empirical evidence. The current plan substitutes use of the HSI model with other empirically based criteria including similarity to high quality reference sites that are used by native amphibians in Pend Oreille County and literature describing the habitat requirements of each of the species. Comments submitted by FS representative Mike Borycewicz on May 3, 2006 are in agreement with this approach: "The Forest Service is satisfied with the District contractor's rationale for not using the pond-breeding HSI model as a tool to evaluate the effectiveness of created / restored amphibian habitats." Instead of using the HSI model, the efficacy of management will be assessed on the basis of evidence of amphibian occurrence and habitat similarity to existing sites in the vicinity of the WMAs that are used by native amphibians.

A total of six amphibian species have been recorded for the Pend Oreille River valley of Pend Oreille County: long-toed salamander (*Ambystoma macrodactylum*), western toad (*Anaxyrus*[1] [*Bufo*] *boreas*), Pacific treefrog (also known as Pacific chorus frog) (*Pseudacris regilla*[2]) (= *Hyla regilla*), Columbia spotted frog (*Rana luteiventris*), northern leopard frog (*Lithobates*[1] [*Rana*] *pipiens*)[3], and bullfrog (*Lithobates*[1] *catesbeianus* [*Rana catesbeiana*]). Some breeding sites in the valley are known to support two or more of these species; however, it is well established that the habitat requirements of these species are not uniform (e.g., Munger et al. 1998, Monello and Wright 1999, Maxell 2000).

A variety of non-breeding habitats associated with foraging, predator-avoidance, aestivation, and hibernation are also essential components to the life history of Pend Oreille County amphibians. The distinct habitats necessary for a species throughout the life of an individual have been termed "complementary" (Semlitsch and Jensen 2001). Complementary habitats are areas of equal importance to a species and the availability of each constitutes a limiting factor for the species.

The objectives for native amphibian habitats include the following:

- Provide breeding and other complementary habitats on the WMAs that will support multiple species of native amphibians;
- Provide a total area of habitat suitable for native amphibians that comprises at least 60 acres; and
- Manage bullfrogs preemptively by not creating habitats that are favorable to bullfrogs, including seasonal draw-downs.

8.1.2 NATIVE AMPHIBIAN BREEDING HABITATS

All of the native amphibian species of the Pend Oreille River Valley complete the larval period in a single season, metamorphosing by late summer or earlier (Jones et al. 2005). Breeding is generally associated with the spring thaw and commences early, well before high flows on the Pend Oreille River cause flooding (District 2000). Western toad may be an exception to the rule,

[1] Recently revised taxonomic nomenclature (see Frost et al. 2006).
[2] Recently revised taxonomic nomenclature (see Recuero et al. 2006).
[3] Recent unverified reports of northern leopard frog in Pend Oreille County (Lori Salzer, WDFW, personal communication) await documenting evidence. Because of the potential significance of a Pend Oreille County population to the recovery of the species in Washington, the District is willing to provide technical assistance to this purpose. Widespread declines and disappearance of northern leopard frog populations occurred west of the Continental Divide beginning in the 1970s (Maxell 2000) and most historically known populations in Washington are not extant (Leonard et al. 1999). Evidence for a disease relationship includes the presence of a virulent disease organism (chytrid fungus) in the tissues of specimens preserved during this period (Milius 2000).

This plan does not address possible reintroduction of northern leopard frog to sites in Pend Oreille County by WDFW, or the potential suitability of the WMAs for this species. Northern leopard frog habitat requirements are broadly similar to those of the other native species: northern leopard frogs frequent open habitat such as meadows, fields, and marshy shores (also wooded areas); they breed in early spring and larvae transform by late summer; permanently flooded sites are not required for breeding (Breckenridge 1944, Walker 1946), but western populations of the species are typically reported as being associated with permanently or semi-permanently flooded sites (Maxell 2000, Jones et al. 2005), perhaps because the frogs often hibernate under water (although apparently hibernating frogs have also been found buried in soil, Jones et al. 2005). There is no obvious reason why northern leopard frogs could not utilize habitats proposed for the WMAs.

reportedly breeding along some large rivers after flood waters recede (Metter 1960). The latter species is also the only one of these native species to often breed successfully in waters where fish occur (Maxell 2000, Jones et al. 2005).

The length of the "hydroperiod" (surface water duration) relative to the length of the larval period, generally dictates whether a site is suitable for breeding. A site where no larvae ever reach metamorphosis will not support a population. Conversely, a site with a prolonged hydroperiod should maintain suitable growing conditions for larvae, but may also be so favorable for predators of amphibian larvae (e.g., dragonfly nymphs) that few larvae survive to metamorphosis (Skelly 1996). At the extreme, permanently flooded sites can support fish, the most efficient predators of amphibian larvae. Ideal conditions typically represent a balance between these factors. This is illustrated by the types of sites where native amphibian species have been documented breeding in the Pend Oreille River Valley (See Appendix E3.2-1 in District 2000). Most of these sites undergo a natural seasonal drawdown and are dry by late summer or reduced to shallow water inhospitable to larvae, as well as their predators. Nearly all of these wetlands were described as seasonally flooded (Cowardin class "C") or semi-permanently flooded (Cowardin class "F"), and most of the semi-permanently flooded sites were substantially reduced by late summer. Few sites were deeper than about 3 feet at maximum. Numerous sites described as predominantly seasonally flooded supported breeding long-toed salamander and Pacific treefrog. Sites more persistently flooded (described as predominantly semi-permanently flooded) were also used by these two species, but fewer sites were used by Pacific treefrog than were used by long-toed salamander.

Columbia spotted frog eggs or larvae were found at three sites described as seasonally flooded and two sites described as semi-permanently flooded. Adult Columbia spotted frogs were observed at additional sites of both types, including seasonal, non-breeding habitats.

Amphibian breeding sites rarely occurred in isolation from other sites. Consistent with the metapopulation concept (Hanski 1998, Alford and Richards 1999, Pope et al. 2000), several or many distinct breeding sites may be used by a species within an area.

Most sites where native amphibians have been documented to breed by the District (2000) contained one or more species of emergent plants such as spike-rush, cattail, sedges, mannagrass (*Glyceria* sp.), reed canarygrass, meadow-foxtail (*Alopecurus* sp.), water-plantain (*Alisma* sp.), water smartweed (*Polygonum amphibium*), water-hemlock (*Cicuta douglasii*), or bur-reed (*Sparganium* sp.). Many of the sites also contained a shrub-scrub element (sometimes the dominant element) and this usually consisted of hardhack, occasionally with associated willows or red-twig dogwood.

8.1.3 MANAGEMENT FOR NATIVE AMPHIBIAN BREEDING HABITAT

Neither WMA has been thoroughly surveyed for amphibians (limited searches for egg masses were made at the Tacoma Creek WMA on April 5, 2006). However, habitats suitable for breeding are currently scarce on both WMAs. On the Tacoma Creek WMA the borrow pit that runs along the west side of the railroad embankment is suitable for native amphibian breeding, but the other borrow pits on the property and oxbow channels of Tacoma Creek do not appear to

be suitable. On the Everett Island WMA the various existing topographic depressions may be limited in suitability for amphibian breeding by flooding that is either permanent or of insufficient duration, or by periodic connection to the Pend Oreille River.

Management of the WMAs will require excavation of additional areas to create seasonal wetlands suitable for native amphibian breeding. The proposed approach is a phased program in which one or two seasonal wetlands will be excavated, contoured, mulched, and planted, and then observed for performance through at least one year. Excavation will parallel the processes that inadvertently created amphibian breeding habitat in other locations off site. These sites are supported by current hydrology (seasonally high water table, run-off, and direct precipitation) and have naturally developed diverse hydrophytic vegetation.

The following parameters will guide the location, design, construction, and planting of new native amphibian breeding habitats:

- Landscape position – Sites should have no surface water connection to the Pend Oreille River or Tacoma Creek nor be located where regularly exposed to river flooding. It is also inadvisable to locate sites where they would be connected by groundwater infiltration to either the river or Tacoma Creek. River flooding, which typically occurs after the native amphibians have spawned and larvae have hatched, would potentially expose larvae to predation by fish, and could cause larvae to move into the river where they would not survive. Hydrologic connection to Tacoma Creek is also undesirable because water level fluctuations are likely to result, which could strand eggs or larvae out of water, expose them to freezing air temperatures, or submerge eggs in deep water, thus retarding embryonic development.

- Landscape setting – Sites should be situated in proximity to areas that are not typically flooded (including subterranean areas above the water table). These areas would constitute complementary habitat for the terrestrial life stages of Pacific treefrog, western toad, and long-toed salamander. At least some of these areas should be wooded. See Section 8.1.4 for detailed discussion of native amphibian terrestrial habitat needs.

- Proximity to other amphibian breeding habitats – A known breeding site for long-toed salamander and Pacific treefrog is located just south of the Tacoma Creek WMA (north of the dike); non-breeding adult Columbia spotted frogs have been observed at the same site (the nearest known breeding site for Columbia spotted frog is less than 0.5 miles west of the WMA on the LPONWR – Cusick Unit). Amphibian surveys have not been conducted on or in the vicinity of the Everett Island WMA; however, a single adult Columbia spotted frog was observed on Everett Island (within the future boundaries of the WMA) on May 16, 1998 during a waterfowl nest survey. New breeding habitats to be created on the Tacoma Creek WMA between the dike and Tacoma Creek will be within dispersal distance for existing amphibian populations and will allow development of metapopulation characteristics. If new breeding sites are also created in the Tacoma Creek WMA peninsula, at least two such sites will be developed, and it may be advisable to "seed" these habitats with egg masses of the target species because of the more remote

setting and unknown sources of colonization. Pending the results of amphibian surveys on the Everett Island WMA, seeding new sites with eggs may also be necessary if there are no existing populations on the site.

- Surface area – Existing sites vary substantially in total area to the extent that guidelines, although necessary, are somewhat arbitrary. Several high quality sites are 0.3 acres or smaller, and there are other high quality sites (including the reference site just south of the WMA) that cover more than 1.5 acres in early spring. Provision of several sites on the WMA that vary in size will emulate naturally occurring amphibian breeding complexes. As a deterrent to bullfrog colonization, it is proposed that new amphibian breeding habitats be no larger than 1.0 acre (and these large sites should be within a wooded landscape). Proposed minimum size is 0.2 acres.

- Shapes – Existing amphibian breeding sites are equally diverse in surface dimensions and shape. High quality reference sites include both broad and narrow rectangular borrow pits, and naturally occurring topographic depressions that are circular or irregularly shaped. Created breeding habitats could include shapes that reflect existing topography. The use of a variety of naturalistic shapes may be preferred for aesthetic reasons, but may not be more suitable ecologically. Final design will require more precise delineation of existing topography and soil patterns. Examples of suitable shapes are illustrated in plan view and cross-section in Appendix D.

- Depths and contours – Existing sites usually include gently sloping shorelines (including all sites where Columbia spotted frog is known to occur), although many sites (especially borrow-pit sites) also include one or more steep sides. Site design can incorporate a shallow margin as the water level control feature (i.e., where excess water will escape and flood the adjacent areas to a shallow depth). Location of a shallow margin on the northeast or north shore vegetated with sedge or grass should provide favorable oviposition sites for Columbia spotted frog (based on observations of egg mass locations noted during relicensing surveys, District 2000). The contours of each breeding site should provide a range of water depths to ensure that the duration of inundation is not uniform and will promote diverse vegetation. Based on preliminary examination of reference site conditions, maximum excavation should be less than 4 feet below grade. The sample design drawings in Appendix D illustrate depths and contours of representative breeding habitats that may be created (photographs from a reference site are also included for comparison).

- Soils – The location of excavations within the Cusick silty clay loam soil unit has a high probability of success because of high clay content. A seasonal high water table and appropriate topography (relatively flat, gently sloping, or flat with existing shallow depressions) are also advantageous. Possibly, existing depressions in this mapped soil unit are already more poorly drained. At the Tacoma Creek WMA Kegel loam may also be suitable, particularly with compaction. However, the limited extent of this soil on the WMA and proximity to Highway 20 may not favorable for location of amphibian breeding habitats. The utility of other soil types to support adequate seasonal flooding if

excavated is unlikely because of high sand content/low clay content (Kanisku sandy loam, Sacheen Variant silt loam, and Scotia fine sandy loam), or unfavorable topography and/or landscape position (Blueslide silt loam and Sacheen Variant silt loam). Prior to final site design, test drillings will be made to confirm soil characteristics, including clay content and soil depth. Examination of soil cores at reference sites is also advisable.

- Hydrology – Ideally, basins should be filled at or near maximum when native amphibians arrive at these habitats to breed, and gradually undergo a drawdown over the succeeding months. In addition, sites should contain areas that dry at different rates, including a relatively small zone that holds water for several weeks longer than the rest of the site. For example, a site might be designed so that 40% of the area is temporarily flooded (dry by May), 40% seasonally flooded (dry by July or August), and 20% semi-permanently flooded (drying or reduced to shallow water late in the growing season). Similarly, all of the sites should not dry in synchrony.

- Vegetation – Excavated wetlands should be planted with native hydrophytic species and flanked at least in part by woody vegetation. Vegetation patterns at reference sites should be used to select species appropriate to the hydrologic regime of each depth zone. Species that are known to aggressively spread and crowd out other species, such as cattail and hardstem bulrush, are not recommended for use. Although it is premature to designate species for use, the general approach for vegetation planting is illustrated on the sample design drawings in Appendix D (photographs from a reference site are also included for comparison).

- Other considerations – Because site enhancements for native amphibians will require excavation, a wetlands inventory will be required to determine wetland boundaries and obtain wetland permits as needed. Site preparation will employ heavy equipment to further compact soils.

Phased construction will ensure that site disruption is localized and any developing weed problems can be controlled. In addition, this approach will provide opportunities to learn from each phase. Each of the native amphibian species is adept at finding and exploiting new breeding habitats (e.g., Monello and Wright 1999, Bull et al. 2001). Stocking ponds with egg masses from other local sites with large numbers of egg masses may accelerate use of the new sites, particularly on the peninsula which is more remote from potential colonizing source populations.

This plan includes no proposal for creating permanently flooded pools on the WMAs. Sites of this kind would almost certainly be successfully invaded by bullfrogs. An existing excavated permanent pond south of the Tacoma Creek WMA between the dike and Trimble Creek provides ideal conditions for bullfrogs and is likely to be a continuing source of dispersing juvenile bullfrogs. Amphibian surveys may also indicate that the secondary channel on the east side of Everett Island is occupied by bullfrogs.

8.1.4 NATIVE AMPHIBIAN NON-BREEDING HABITATS

The WMAs should also be designed to provide other complementary habitats for native amphibians. The objectives for terrestrial habitats include suitability to support non-breeding life stages of species that inhabit small mammal burrows and other subterranean sites (e.g., long-toed salamander); these habitats should be situated at elevations that do not normally flood and allow the animals to retreat below the frost line. In addition, terrestrial habitats should be reasonably proximate to breeding sites, but encompass sufficient area to support a majority of the population. Semlitsch and Jensen (2001) have suggested that terrestrial core habitats for a variety of pond-breeding salamanders (genus *Ambystoma*, but not including *A. macrodactylum*) may extend at least 538 feet (164 meters) from breeding sites, and Graham et al. (1999) proposed that terrestrial habitat suitability for long-toed salamander is highest within 820 feet (250 meters) of potential breeding habitats. Frogs are generally capable of greater dispersal distances than salamanders and some are known to undertake long movements between seasonal habitats (e.g., Dole 1965, Bull and Hayes 2001, Pilliod et al. 2002). However, because long-distance migrations potentially expose amphibians to predators and may include dangerous road crossings, proximate habitats that do not require long migrations may be preferable. Because Everett Island is somewhat isolated (causeways provide a connection) from potential sources of dispersal by a secondary channel of the Pend Oreille River, all necessary habitats for native amphibian populations should be located on the island.

Other micro-habitat features of terrestrial habitats for native amphibians are related to hiding cover, such as downed woody debris, and vegetation, especially woodlands, that maintains moist, cool microclimates. Graham et al. (1999) defined highly suitable terrestrial habitats for long-toed salamander as having a thick layer of leaf litter, vegetation cover, and/or downed woody debris. Habitats for the other terrestrial species are likely to be similar.

Hibernation habitat is terrestrial for Pacific treefrog, long-toed salamander, and western toad. Pacific treefrog is freeze-tolerant and hibernates in protected sites (such as under logs or under leaf litter), including sites subject to freezing (Croes and Thomas 2000). Long-toed salamander and western toad hibernate below the surface (Maxell 2000). The Columbia spotted frog is believed to hibernate at the bottom of ponds or streams that do not freeze completely (Bull and Hayes 2002). Adult Columbia spotted frogs may also use different aquatic sites as non-breeding habitats where seasonally flooded wetlands serve as breeding habitat (Bull and Hayes 2001).

8.1.5 MANAGEMENT FOR NATIVE AMPHIBIAN NON-BREEDING HABITATS

Guidelines for the creation, enhancement, and management of amphibian terrestrial habitats are as follows:

- Location in relation to breeding habitats – Terrestrial habitats must be within easy dispersal distance of breeding habitats for long-toed salamander, the species with the most limited dispersal capabilities. As indicated above, the majority of terrestrial habitats for long-toed salamander should be within 820 feet of breeding sites. Design of the WMAs should promote interspersion of breeding habitats within a woodland matrix.

- Elevation – Elevation requirements for terrestrial amphibian habitats are unknown, but are presumably related to flood exposure. Flooding is likely to displace animals, exposing them to predation. Species that reside in subterranean burrows may also be limited by groundwater elevation for the same reason, and more broadly related to the factors that govern the distribution of burrowing small mammals. Suitable sites should encompass elevations that rarely flood, but lower elevations are almost certainly suitable. Winter hibernation sites that are secure may be key, because the animals will be immobilized or in a state of torpor from low temperatures. To address these questions, the WMAs will be examined for the distribution and elevation of small mammal burrows. Soils excavated to create breeding sites should be used to expand suitable terrestrial habitats by creating ridges and mounds.

- Vegetation – Both deciduous and coniferous woodlands constitute suitable habitat for native amphibians. Long-toed salamander, western toad, and Pacific treefrog each also occurs in regions where shrub-lands or grassland are the dominant vegetation type, suggesting that these habitats are not inherently unsuitable if underground retreats and hiding cover are available.

- Large woody debris – Supplementation of terrestrial habitats with logs, stumps, boards, or sheets of plywood is an effective enhancement for amphibians. Cover objects placed in proximity to breeding sites may be briefly used by breeding adults as they first arrive and then depart and by emigrating juveniles after metamorphosis. Existing woodlands, which are composed of small trees, should also be enhanced with large woody debris.

8.1.6 PREEMPTIVE BULLFROG MANAGEMENT

Bullfrogs are difficult if not impossible to eradicate from an area, particularly when the area is large and where there are no barriers to recolonization. Chemical treatment of aquatic habitats (e.g., use of rotenone) to kill bullfrogs is an option but may be impractical or undesirable because of effects on other species. Trapping and killing larvae, or hunting adult bullfrogs at night may offer short-term reductions in populations, although Govindarajulu et al. (2005) suggest that killing recently metamorphosed frogs may be more effective in controlling population growth than killing larvae or adults. Annually dewatering permanently flooded ponds to kill bullfrog larvae may be an option in situations where this is feasible (Doubledee et al. 2003). An alternative approach is to develop habitats that do not support bullfrog populations and habitat characteristics that are unattractive to bullfrogs. To this purpose, it is useful to review the habitat requirements of the bullfrog in contrast to those of the native Pend Oreille County species.

The bullfrog is highly aquatic during all life stages; only one native species, Columbia spotted frog, is as aquatic. Adult and juvenile bullfrogs typically remain in the water or within leaping distance of water at all times, although they are capable of dispersing long distances over land. Bullfrogs are not freeze tolerant and generally over-winter at the bottom of deep pools or streams. Columbia spotted frog and northern leopard frog also over-winter underwater (northern leopard frog has also been reported to over-winter below the ground). In Pend Oreille County bullfrogs do not begin to breed until air and water temperatures warm (in 1998 freshly laid eggs were found mid-June [District 2000]), later than any of the native species. Bullfrog larvae do not

reach metamorphosis until the following summer (in 1998, this occurred at the end of June, District 2000); none of the native species requires a second year to reach metamorphosis. The occurrence of a seasonal drawdown differentiates nearly all native amphibian breeding sites in Pend Oreille County from sites that support bullfrog populations (See Appendix E3.2-1 in District 2000). Bullfrogs rarely attempt to breed at sites that dry annually, freeze completely in winter, or that become uninhabitable because of extreme temperatures or anoxia when reduced to very shallow water. Ideal sites for bullfrogs are permanently flooded, contain areas of deep water for over-wintering, warm shallows favored by larvae, and dense hiding cover (emergent vegetation or floating aquatic plants). These sites tend to be located in open settings, not in forested settings. Fish have similar habitat requirements and are often present at sites used by bullfrogs. Because bullfrogs are large and male bullfrogs are also aggressively territorial toward other males, ideal sites also tend to be relatively expansive and afford a large area of suitable habitats.

To prevent the creation of new habitats attractive to bullfrogs, the following criteria will be applied:

- No permanently flooded emergent wetlands will be intentionally created and no created amphibian breeding sites will be more than 4 feet deep at normal maximum;
- Each new excavation will be relatively small (less than 1.0 acre); and
- Excavations will be interspersed with wooded areas.

If, despite these design criteria, created habitats do not dry, or nearly dry, annually by September 30, and are used as breeding sites by bullfrogs, these sites will be pumped dry.

8.2 ENHANCING RIPARIAN VEGETATION ALONG TACOMA CREEK

8.2.1 OBJECTIVES

Vegetation on the banks of Tacoma Creek has long been exposed to grazing or mowing, and is generally lacking in woody vegetation, particularly species most palatable to livestock (e.g., red-twig dogwood and black cottonwood). In contrast, the oxbows and channel meanders of Tacoma Creek exhibit a suite of desirable habitat characteristics that should be maintained, including a range of water depths, complex vegetation patterns, and plant communities comprised of native herbaceous and shrub species. The presence or absence of particular species is likely attributable to water depth, seasonal fluctuations, and water currents; vegetation removal or planting to alter species composition is not recommended. Water control structures (e.g., damming oxbow channels of Tacoma Creek) are also not warranted and are not recommended.

The objectives for vegetation on the banks of Tacoma Creek include the following:

- Increase vegetation coverage in sparsely vegetated areas, as feasible. Coverage has improved in most of these areas since the property was purchased. Remaining areas may be excessively well drained, and may require use of long cuttings to establish vegetation.

- Establish shrubs and trees in the riparian corridor where feasible to increase structural complexity and plant species richness. Topographic variation provides a range of exposure to ground water and surface inundation that will be matched to appropriate species.

8.2.2 MANAGEMENT APPROACH

Passive management methods (i.e., livestock exclusion) may be adequate to achieve increased vegetation coverage on the banks of Tacoma Creek, but active management may be necessary to accelerate development of woody vegetation. Sparsely vegetated areas evident in the 1997 aerial photographs showed increased vegetation coverage during field review in 2005, and seed sources for appropriate plant species are available upstream along Tacoma Creek and in adjacent habitats. Periodic monitoring surveys of riparian areas will provide information on natural patterns of vegetation change related to livestock exclusion.

If progress toward increased coverage is slow, active planting of vegetation may be required to accelerate changes or influence species composition. In this instance, the design for riparian plantings will consider site elevation, hydrology, and information on plant species characteristics such as wetland fidelity ("Indicator") ratings (Reed 1988). In addition, plant species will be selected that are appropriately tolerant of prolonged inundations at some elevations, a seasonal high water table, and local soil conditions (in particular, two of the soils mapped along Tacoma Creek, Sacheen Variant silt loam and Kanisku sandy loam, have a high sand content and could require special effort to establish new vegetation).

Native tree and shrub species that may be planted include peach-leaf willow (*Salix amygdaloides*), Geyer willow (*S. geyeriana*), black cottonwood, quaking aspen, or other species occurring in the vicinity. For each of these, the use of long cuttings ("whips"), that are not pre-rooted is likely to be effective if planted early in the growing season and deep into the water table (Hoag 1995). The use of organic mulch may minimize the need for irrigation. Such plantings will probably need to be protected from herbivory by deer and voles until well established. Protection from beavers may require permanent use of hardware cloth, because even relatively large trees can be vulnerable to felling or girdling.

8.3 EXPANDING COTTONWOOD STANDS AND OTHER WOODLANDS

8.3.1 OBJECTIVES

Objectives on the Tacoma and Everett Island WMAs include the protection and expansion of existing deciduous forest stands and establishment of new stands as part of a habitat matrix supporting amphibians, bald eagles, cavity nesting birds, and other wildlife known to use the area. Black cottonwood stands currently occupy about 3.2 acres on the Tacoma Creek WMA and about 0.5 acres on the Everett Island WMA. Black cottonwood is also a constituent species in about 3.4 acres of mixed forest on the Tacoma Creek WMA. Protection of existing stands may include protection from beavers, particularly near shorelines. Encircling vulnerable trees with hardware cloth or chicken wire has been shown to be efficacious in deterring beavers. The need for protection will be evaluated in 2006 and periodically in the future.

Site suitability for black cottonwood is limited to those areas not exposed to prolonged flooding because of elevation. Established cottonwoods are only moderately flood-tolerant, typically becoming stressed "when flood conditions last more than a few weeks" (Neuman et al. 1996, as cited in Borman and Larson 2002). Ogle and Hoag (2000) categorize black cottonwood tolerance to flooding as "medium" (tolerates 6-10 days of flooding); seedlings are less likely to survive prolonged flooding than established trees (Borman and Larson 2002). On the WMAs and in nearby areas, GIS analyses find that cottonwoods are concentrated between 2040-2044 ft elevation, but in some places occur as low as 2039 ft or higher than 2044 ft; areas below the primary range are dominated by flood-tolerant wetland species and at higher elevations tend to be dominated by species typical of coniferous forests. Within the optimum elevation range, cottonwoods occur on sites mapped for most of the soil types also found on the WMAs: Cusick silty clay loam, Blueslide silt loam, Kegel loam, Kanisku sandy loam, and Scotia fine sandy loam. Based on site potential, the following are objectives for deciduous woodlands on the WMA:

- Location – Existing stands of black cottonwood will be expanded and new stands established following elevation contours of 2040 to 2044 ft. Smaller-scale experiments will also be conducted to test survivorship of cuttings at 2039 ft and above 2044 ft elevation. On the Tacoma Creek WMA, initial test stands will be located in the peninsula area and west of the railroad, including suitable locations in proximity to Tacoma Creek. On Everett Island, test stands will be located along the same ridge line as the existing stand

- Extent – There are currently about 3.9 acres of deciduous woodland and over 37 acres of mixed woodland on the WMAs. The extent of areas goal for deciduous and mixed woodlands on the WMAs is the development of at least an additional 50 acres by 2020. Approximately 84 acres on the Tacoma WMA and 100 acres on Everett Island WMA are at or above 2040 ft (but not above 2046 ft) and vegetated by grassland, black hawthorn stands, scattered conifers, or reclaimed disturbed land. These lands are believed to be suitable for cottonwood establishment. Of this area, approximately 2 acres will be used for initial methods testing in 2007, evaluating the above criteria. If successful, the methods will be applied to other cottonwood-suitable lands within the WMA over time.

- Species composition – Plantings to expand deciduous forest on the WMAs will focus on cottonwood, although other species (especially quaking aspen) will be included as planting methods are refined. Quaking aspen is rated as having a low tolerance for flooding (1-6 days duration) (Ogle and Hoag 2000) and often occurs on moist sites, including sites with conifers. Shrubs and understory trees that may be planted in deciduous woodlands include red-twig dogwood, water birch, cascara, service berry, bitter cherry, black twinberry, and mallow ninebark.

- Management – Deciduous forest stands will be managed to accelerate tree growth and development of mature woodland characteristics. Management techniques will include selective thinning, removal of competing shrubs, and noxious weed management as necessary.

8.3.2 COTTONWOOD PLANTING METHODS

Black cottonwood is a fast-rooting species that is easily propagated by cuttings that are collected during dormancy. Practitioners have reported success using a variety of techniques, including the use of cuttings ranging from 6 inches to over 10 feet in length (DeBell 1995). Plantings are uniformly made in early spring so as to ensure soil moisture during establishment, which appears to be a key element in many failed projects. A test planting of relatively short, rootless cuttings on the Tacoma WMA in 2003 was conducted during summer months and no cuttings survived, suggesting that early and deep plantings are warranted in Pend Oreille County. If rooted material is used, planting can also be done in autumn to take advantage of moist soil conditions while soils are still sufficiently warm to promote growth (Ray Entz, Kalispel Tribe, personal communication, May 3, 2006).

The NRCS plant materials program suggests the use of post-hole diggers or other mechanical methods to ensure that rooted cuttings are planted at least 6 inches into the water table, a depth of 2-6 feet below the surface, depending on site conditions. They report over 70% survival after three years (Hoag 1995). The Pend Oreille Conservation District reports success using similar methods in Pend Oreille County (personal communication, Sandy Durand, March 11, 2006). Current NRCS efforts use intensive plantings of rooted cuttings (1 cutting per 9-16 square feet) combined with assertive weed control, ensuring establishment at a given site before expanding the planted area (Mark Stannard, NRCS, personal communication, March 14, 2006). Protection from herbivory by deer, beaver, and voles may be necessary at some sites.

Working with these guidelines, initial cottonwood plantings on the Tacoma and Everett Island WMAs will conform to the following criteria:

- Cuttings – If available, cuttings will be locally collected during dormancy from first or second year growth, and rooted in cold storage prior to planting. If sufficient local cuttings are not available, contract growing and propagation of local stock will be pursued, or appropriate rooted stock will be purchased from a commercial supplier. It is expected that most cuttings will need to be 3-4 feet in length.

- Planting method – Cuttings will be planted to a depth of at least 6 inches into the water table at the time of planting, with approximately 14 inches of top-growth aboveground. Prior to planting, a 2 foot diameter circular area will be tilled to minimize competition or treated with a broad-spectrum herbicide; to further suppress growth of other plants, a weed-barrier fabric and mulch will be used, as feasible. An additional herbicide spot treatment during the first growing season may be necessary if mechanical means of vegetation control are not feasible or effective. To provide protection from herbivores, hardware cloth or chicken wire will be placed around individual cuttings, or fences placed around larger planting areas.

- Timing – Cuttings will be collected after leaf fall, stored in cold storage until use, and planted before the end of April.

- Planting density – Initial efforts will emphasize high-density plantings averaging 9-16 square feet of space per cutting. Other test sites will plant in clumps at twice the density of existing cottonwood stands at reference sites.

8.4 ENHANCING SEASONAL WATERFOWL HABITAT

8.4.1 OBJECTIVES

Objectives on the WMAs include the protection, maintenance, and enhancement of seasonal waterfowl habitats. On the Tacoma Creek WMA habitats suitable for seasonal waterfowl foraging, resting, and brood-rearing are concentrated in the channels and oxbows of Tacoma Creek, where a variety of water depths, emergent and submerged vegetation, and secluded areas occur. At the Everett Island WMA there are currently more than 162 acres of the emergent cover type and more than 99 acres of open water in the secondary channel, shallow sloughs, and a permanent pond. These areas are highly attractive to waterfowl, which occur in large numbers to rest and feed. Everett Island represents an important waterfowl brood-rearing area, supporting ducks and Canada geese (Reese and Hall 1991, District 2000). Because both WMAs are largely free of human activity, sources of disturbance to resting, feeding, or nesting waterfowl are limited. Habitats in other parts of the WMAs could be enhanced for waterfowl by creating shallow topographic depressions that will hold water seasonally. This type of habitat is important to surface feeding ducks, such as mallards, wood ducks, and teal; for pair-bonding and foraging in early spring; and sometimes provides brood-rearing habitat (USDA 2000). At the Tacoma Creek WMA seasonal waterfowl habitat may also be enhanced, if deemed efficacious, by increasing hydrologic support to oxbows south of the WMA road that are separated from Tacoma Creek by road-fill.

The following are objectives for seasonal waterfowl habitat enhancement on the WMAs:

- Limit disturbance to waterfowl by restricting public access to sensitive locations seasonally.
- Maintain areas of wet grassland as nesting cover and Canada goose brood pasture, using controlled burns, tilling, and/or periodic cutting.
- Create additional shallow, seasonally flooded basins no more than 18 inches deep and manage emergent vegetation for waterfowl suitability.

8.4.2 MANAGEMENT APPROACH

Existing waterfowl habitat will be protected and maintained. Livestock grazing is not permitted on the WMAs or other District-owned lands in the Project Boundary as mandated by the license order, and perimeter fences on the WMAs will continue to be maintained to prevent livestock trespass. Since 2001 the Tacoma Creek WMA has been closed to public access between April 1 and June 15 to avoid potential disturbance of waterfowl during the principal breeding period. This seasonal closure will be maintained, at least until sensitive areas have been identified and an appropriate trail system has been developed. At the Everett Island WMA a seasonal closure has not been instituted; however, public access, which is primarily by boat, is likely to be infrequent to rare during this early period prior to the summer season. The eventual increased coverage of tall shrubs and trees adjacent to Tacoma Creek and sloughs on the Everett Island WMA will

provide visual screening, potential nesting cover, and eventually nesting habitat for cavity-nesting ducks.

Nest surveys conducted for the Project relicensing indicated that Canada geese along the Pend Oreille River primarily nest in locations where eggs face minimal threat from coyotes, foxes, and other mammalian predators (i.e., on islands, a few isolated peninsulas, or on elevated platforms). Nests were often located under cover of a shrub (often black hawthorn) or in other concealing vegetation, but also occurred in more exposed locations. Proximity to forage, particularly succulent new growth of grass, sedge, and other herbaceous vegetation, is probably also associated with nest site favorability. Few waterfowl nests were found during a 1998 partial survey of Everett Island, which was still being heavily grazed by livestock at that time. Everett Island, because of its large area and causeways, is also probably not an ideal location for Canada goose nesting compared to other smaller, more isolated islands.

Management to maintain areas of herbaceous cover of an appropriate height and species complexity for duck nesting and foraging is another important step in enhancing the WMAs. Waterfowl nesting habitat management using periodic burning, mowing, or disking has been shown to be generally successful (Higgens et al. 1992). Tilling or scarification (tilling to a depth of two inches or less) increases soil aeration and produces the greatest vegetation yield (Lane and Jensen 1999). When these treatments are applied to densely vegetated areas lacking species diversity, increased waterfowl nesting often results (Bjork 1976). Prescribed burns in wet grasslands are advised for the late fall period and no more frequently than every two years (Stanturf et al. 2002). The recommended frequency for scarification is also usually about every two years.

Shallow, seasonally flooded basins can be created by excavation in certain soils, such as Cusick silty clay loam, that exhibit a very low infiltration rate. These basins would fill from precipitation and surface runoff, and would be expected to gradually dry from evapotranspiration. Seasonal drying is generally understood to be favorable for promoting emergent plant species and invertebrates that are favored by dabbling ducks (Gillespie 2005), which typically feed in water no more than 18 inches deep. Basins will be planted or seeded with native species to be determined based on observations at high quality reference sites in the vicinity of the Project. Sample design drawings for seasonal waterfowl habitats are presented in Appendix D, showing surface area, depths and contours, and vegetation patterns. In addition to these wetlands, seasonally to semi-permanently flooded sites created for amphibian breeding on the WMAs will undoubtedly also be used by waterfowl, as illustrated by waterfowl use of existing sites in the vicinity of the Tacoma Creek WMA.

8.5 STRUCTURES TO ENHANCE WATERFOWL NESTING

8.5.1 OBJECTIVES

A large portion of both of the WMAs is within proximity to water that is suitable habitat for waterfowl broods. However, nesting habitat for ground-nesting waterfowl may be limited by the availability of sites that are also sufficiently elevated to escape seasonal flooding and that have concealing cover to protect against mammalian and avian predators. Cavity-nesting ducks are

limited by the scarcity of trees and snags with suitable cavities. The objectives of this measure will include:

- Providing nest sites for cavity nesting ducks on an interim basis at least until woodlands with natural cavities suitable for nesting have developed.
- Providing nest sites for ground-nesting waterfowl in areas where conditions are suitable except for the availability of nest sites free from flooding

8.5.2 MANAGEMENT APPROACH

The efficacy of artificial nesting structures is well established (Ball 1990) and considerable information is available concerning the design and placement of structures. Mallard and Canada goose readily accept elevated nest platforms or baskets (Bishop and Barratt 1970); these structures are durable and have been shown to be effective in increasing both the numbers of nesting waterfowl and nest productivity (Ball 1990). Typically, these types of artificial nest structures are placed 30-50 feet offshore where water is greater than 18 inches deep and where separation between structures exceeds 300 feet (Ball 1990). Mallards will also use nesting houses located on land adjacent to the water's edge (Messmer et al. 1989). Representative nesting structures that are available for retail purchase are illustrated in Appendix E.

Nest boxes are also available for purchase, but are easily constructed, and numerous technical papers provide guidelines for nest box design, placement, and maintenance (e.g., Ridlehuber and Teaford 1986, Fielder 2000, ODFW 2005) (see examples in Appendix E). Descriptions of the kinds of naturally occurring cavities commonly used by cavity-nesting ducks are also available (e.g., Jensen and Martin 1994, Lewis and Kraege 2004).

8.6 OTHER STRUCTURES TO ENHANCE HABITAT USE

8.6.1 OBJECTIVES

The purpose of these measures is to provide habitat features that are currently scarce and to maintain them at least until comparable natural features have developed. Mature trees and snags are uncommon on the WMAs; even with active management, these habitat features will remain scarce for decades. Provision of artificial roosts for bats and nest boxes for cavity-nesting songbirds will allow for the occurrence of these important species. The objectives are:

- Provide roosting sites for bats that are naturally associated with mature trees and snags, and maintain these roosts at least until suitable conditions for natural roosts have developed.
- Provide nest sites for bluebirds.

8.6.2 BAT BOXES

Installation of "bat boxes" has been a widely popular and successful approach to creating additional roosting habitat for bats where habitat has been lost or would benefit from supplementation. These structures exhibit high rates of occupation when used in areas where natural roosting habitats are scarce (Tuttle and Hensley 1993). On the WMAs artificial roosting structures will be intended to simulate woodland roosting habitat (i.e., tree or snag cavities and exfoliating plates of bark). Structures referred to as "rocket boxes" or "two-chambered rocket

boxes" have been shown to be effective in this regard (Kiser 1998). The literature suggests that the WMAs could successfully support several such structures placed in proximity to still or slow moving water where feeding and drinking opportunities are plentiful. The boxes will be mounted on wooden posts at least 15 feet high (Bat Conservation International 2006). Designs for these types of structure (see Appendix E) are widely available and construction is relatively simple and inexpensive (Bat Conservation International 2006). Following installation the boxes will be monitored for use and annually maintained to ensure remnant insect nests are cleaned out and that the box is properly weatherproofed to minimize leaks and drafts.

8.6.3 BLUE BIRD NEST BOXES

The WMAs will also be enhanced by providing artificial nesting boxes for western bluebird (*Sialia mexicana*) and mountain bluebird (*S. currucoides*). Bluebirds benefit from appropriately designed and situated nest boxes in many locations where natural cavities are scarce and there is competition for nest sites from European starlings or house sparrows (North American Bluebird Society 2002). Fields and meadows with scattered trees, and open woodlands are favored habitats of bluebirds, and are ideal for supplementation with bluebird boxes. Boxes will be mounted on trees or on wooden posts in these types of areas on the WMAs, separated by approximately 500 ft. along a "bluebird trail" (North American Bluebird Society 2002). Plans for design and construction of a variety of bluebird boxes are widely available; boxes can be constructed or purchased at a minimal charge. Bluebird boxes will be monitored to record use by bluebirds, annually cleaned, and repaired (including weatherproofing) or replaced as needed.

8.7 NOXIOUS WEED MANAGEMENT

The Tacoma Creek and Everett Island WMAs are included in the District's Integrated Weed Management Plan (IWMP), mandated by Article 410 of the license order and FS Condition 18. The combined IWMP will address all District-owned lands and Forest Service Campgrounds within the Project boundary. Other Forest Service lands outside the Project boundary on which license implementation activities are conducted will also be treated according to the procedures in the IWMP. Lands managed under the IWMP are surveyed annually for noxious weeds, and certain weeds are targeted for management efforts, as appropriate to the species present, the scale of the infestation, and local conditions. Other IWMP measures adopted by the District include the following (reviewers are directed to the full IWMP text for additional detail):

- Clean equipment and fill policy – Equipment will be cleaned before initial use on the WMA. When used, fill will be certified weed-free or collected on-site.
- Vehicle use – Non-construction vehicles are restricted to roads and will not be driven through weed infestations.
- Re-vegetating efforts – Disturbed areas will be stabilized with certified weed-free straw and seeded with native species meeting Pend Oreille Noxious Weed Control Board (PONWCB) and Forest Service guidelines.
- Staff education – District staff operating vehicles or engaged in ground disturbing activities within the WMAs will be trained on methods to avoid the spread of invasive plant species. A pamphlet will be provided in each District vehicle that outlines measures to minimize the spread of invasive plants.

8.7.1 OBJECTIVES

The objectives of noxious weed management on the WMAs are long-term minimization of noxious weeds and prevention of new infestations such that other management goals (e.g., native amphibian habitats and cottonwood establishment) are not impacted.

8.7.2 SURVEY EFFORTS

The results of surveys of the Tacoma and Everett Island WMAs in 2001 indicated that noxious weed infestations on the WMAs were typical of Pend Oreille County in regards to species, extent, and distribution. Noxious weeds observed on the WMAs are listed in Table 5. On the Tacoma WMA, compacted soils along the access road south of Tacoma Creek supported the most substantial infestations in 2001. On Everett Island WMA, the causeway providing access to the island was the area of highest concern. Both WMAs also supported occasional infestations of common weeds scattered throughout the properties.

Table 5. Noxious weeds documented on the Tacoma Creek (TC) and Everett Island (EI) WMAs in 2001.

Common Name	Scientific Name	TC	EI	POCNWCB Rating
Reed canarygrass	*Phalaris arundinacea*	x	x	C
Dalmatian toadflax	*Linaria dalmatica*	x		B
Meadow hawkweed	*Hieracium caespitosum*	x	x	B
Orange hawkweed	*Hieracium aurantiacum*		x	
Oxeye daisy	*Leucanthemum vulgare*	x	x	B
Spotted knapweed	*Centaurea biebersteinii*	x	x	B
Sulfur cinquefoil	*Potentilla recta*	x	x	B
Absinth wormwood	*Artemisia absinthium*	x		C
Canada thistle	*Cirsium arvense*	x	x	C
Common tansy	*Tanacetum vulgare*	x	x	C
Common St. John's-wort	*Hypericum perforatum*	x	x	C
Yellow-flag	*Iris pseudacorus*		x	
Yellow toadflax	*Linaria vulgaris*	x	x	C

8.7.3 MANAGEMENT EFFORTS

Weed management efforts began on the Tacoma Creek and Everett Island WMAs in 2002 and continue as part of the annual management regime. On both WMAs, management largely consists of spot-treating small infestations scattered throughout the WMA as they recur. A typical herbicide application includes injection using a tank mix of Sylgard (1 pint/100 gallons volume) and ammonium sulfate fines (10 oz/acre), with auxiliary injections of Transline (10 oz/acre), Garlon 3A (2 quarts/acre), Tordon 22K (1-4 pints/acre), and Escort (1-2 oz/acre) for more difficult infestations. Areas of particular note and individualized treatment include:

- Hawkweed (*Hieracium* spp.) occurrences – On the Tacoma Creek WMA, the area next to the highway and south of the dike access road has been heavily infested at times. On the Everett Island WMA, the causeway bed also supports hawkweed infestations.

- Newly created cottonwood enhancement and wetland sites – These will be aggressively planted with native species and may be spot-treated with herbicide during their establishment.

- Test management of reed canarygrass – The 2001 weed survey of the Tacoma Creek WMA recommended a combination of mowing and herbicide applications to manage reed canarygrass, although earlier reviews found the species so widespread and difficult to eradicate as to not justify active management. To evaluate management of this species, test plots will be established on the Tacoma Creek WMA in which the chemical removal of reed canarygrass is followed with planting of native wetland species such as prairie cordgrass (*Spartina pectinata*) and three-square bulrush (*Schoenoplectus americanus*).

8.8 ADDITIONAL VEGETATION MANAGEMENT

Mechanical or manual removal of existing, non-weedy vegetation will be performed on a limited basis where the existing vegetation is interfering with the development of priority vegetation types. For example, selective removal of mature black hawthorn shrubs may be advisable to minimize the legacy of livestock grazing on the WMAs and allow more diverse vegetation patterns. Other sites at similar elevations that were freed from livestock grazing pressure have developed shrubs stands dominated by black hawthorn. This species tends to be already present at low density on grazed sites and undergoes ecological release when grazing is eliminated. Dense stands of black hawthorn may inhibit or delay development of priority vegetation types (aspen and cottonwood groves, and more diverse shrub stands). Similarly, the increase in seedling black hawthorns on the WMAs since hay-mowing and grazing ceased may require vegetation management to enhance the viability of planted trees or shrubs.

8.9 REMOVAL OF LIVESTOCK AND MAINTAINING PERIMETER FENCES

The WMAs have been free of livestock grazing since the lands were purchased. Interior barbed wire fences were subsequently removed to allow safe movement of wildlife. The objective is to maintain perimeter fences indefinitely unless it is determined that there is no risk of livestock trespass onto the WMAs and to delineate property ownership.

8.10 RESTRICTING VEHICLE ACCESS

Locked gates have been installed at both WMAs. The objective is to prevent vehicle access to the WMAs. In addition, authorized vehicle use will be regulated to minimize or prevent disturbance to ground-nesting birds, nesting bald eagles, or other sensitive wildlife that may occur in the future. The road across the southern part of the Tacoma Creek WMA has been retained, at least until the major site enhancement activities requiring heavy machinery have been completed. Long-term need for the road will be re-evaluated within the next five years. The road and causeway at Everett Island WMA will be necessary for future access to the property and will be retained. Controlling weed dispersal by vehicles is addressed in Section 8.7.

8.11 CONTROLING PUBLIC USE

Public pedestrian access to the WMAs is permitted, as is legal hunting (except in a "no-hunting zone" on the east side of Everett Island which is adjacent to several homes). However, the

objective is to prohibit activities that are inconsistent with the development and maintenance of wildlife habitats, and development of non-game wildlife populations. Illegal trapping, killing, harassing, or collecting protected wildlife species; vegetation cutting or removal; unauthorized camping; and bringing dogs onto the WMAs will be prohibited. It may be necessary to limit entry for entry in some areas in the future if conflicts arise. Signs explaining the responsibilities of visitors, permissible activities, and use restrictions will be posted at both entry points, and at other locations on the perimeter of the WMAs. Currently, there is a seasonal restriction on public access to the Tacoma Creek WMA from April 1 – June 15 to prevent disturbance to nesting waterfowl. The need for this or other seasonal closures will be evaluated as additional information on wildlife patterns of use is collected. Protection of wildlife may also be accomplished by situating formal trails away from sensitive areas. The District encourages educational use of the WMAs by school and community groups, provided that visits are scheduled in advance with the District and that the activities do not conflict with wildlife objectives. The District can also schedule guided, interpretive tours of the WMAs.

9.0 MONITORING AND EVALUATION

Monitoring of the WMAs will be performed by District biologists or contracted consultants. All field efforts will be open to participation and review by members of the Technical Committee or other authorized representatives, and all of the information collected from the site, including site photographs and field data, will be available for public review. To facilitate Technical Committee review, an annual site visit will be conducted on a mutually agreeable date.

9.1 MONITORING

Monitoring of the Tacoma Creek and Everett Island WMAs will take two forms: descriptive monitoring of unmodified habitats, and targeted monitoring of intensively managed sites. Each of these will be documented over time so as to evaluate progress toward development of habitats on the WMAs.

In unmodified habitats, five to ten sample points per WMA will be randomly placed within each defined cover type, and habitat data collected at each point every third year, beginning in 2007. Monitoring will occur during the growing season. The exact locations of points will be adjusted as needed to sample core habitats rather than ecotones, and permanently set as locatable UTM coordinates. Other points will be established in areas of particular concern, such as the banks of Tacoma Creek on the Tacoma Creek WMA. If points are substantially altered as the management plan is implemented (e.g., as amphibian breeding habitats are developed), new sampling points may need to be established. Data to be collected at each sample point will include vegetation composition and structural characteristics, presence of habitat features (e.g., large woody debris), and hydrologic regime and water depth. Photographs will also be taken at each sample point.

Intensively managed sites (e.g., amphibian breeding habitats and cottonwood planting sites) will be monitored annually, but will also be examined more frequently while vegetation is becoming established in order to provide irrigation, if needed; to identify and quickly address potential weed problems; and to ensure that protection from herbivory is adequate. Monitoring of these sites will focus on water depths, survivorship and growth of plantings, and the rate at which

excavated wetlands fill and dry. Amphibian use of breeding habitats will be assessed using egg mass counts, followed by occasional examinations during the latter portion of the larval period to confirm that larvae are surviving to metamorphosis; techniques may include dip-net or aquatic funnel trapping or night surveys (Thoms et al. 1997). Sampling design, sample sizes and other essential aspects of monitoring will be tailored to the individual management action, following published standards (e.g., Elzinga et al. 1998 for plants). These visits will also provide an opportunity to identify problems (e.g., developing weed infestations, failed plantings, or bank erosion) quickly, so that corrective actions can be taken.

9.2 EVALUATION

Management of the WMAs will be evaluated on the basis of the following criteria:

- Consistency with the CWMP – The District will report each year whether management measures have been applied consistent with guidelines contained herein, as currently written or as revised subsequently.

- Wildlife use – Although wildlife use of the WMAs cannot be assured, consistent evidence of wildlife use, particularly the target species for enhancements and priority habitat changes (e.g., native amphibians, waterfowl, and cavity-nesting birds), will be understood to demonstrate the effectiveness of a given management approach.

- Survival and growth of vegetation – Planted areas that compare favorably to published accounts of similar efforts in the Intermountain West will be understood to demonstrate the effectiveness of a given management approach.

10.0 REPORTING AND MEETINGS

Each year beginning in 2008 the District will prepare a report summarizing all of the activities associated with compliance with Article 407. The annual report will include a section for each of the plan aspects addressed in the CWMP. Under Part 1, the report will summarize management activities undertaken the previous year, describe current site conditions, and document progress toward the development of site objectives. Based on this progress, possible adjustments to the plan will be evaluated and proposed for adoption. A draft of the report will be distributed to the Technical Committee representatives by March 1. Agency and tribal representatives will have 30 days to review the draft report and to submit comments on the draft to the District. The final annual report will incorporate and address comments from members of the Technical Committee, and will be submitted to FERC no later than April 30 of each year.

Meetings of the Technical Committee to discuss aspects of CWMP compliance will be scheduled as needed. To the extent practicable, a meeting to discuss the findings of the annual report will be scheduled during the draft report review period.

11.0 BUDGET AND SCHEDULE

The estimated budget for known tasks under the WMA management programs is estimated to be about $210,000 for the period 2006-2010, during which time all of the management provisions

will have been initiated. This estimate does not include significant costs associated with tasks that are dependent on the results of other efforts (e.g., creation of native amphibian breeding habitats and enhancing vegetation in Tacoma Creek, each potentially substantial items), or for coordination, reporting, and meetings. Data collection on the WMAs is scheduled to begin in June 2006; reference sites are scheduled for field selection in September 2006. Phased creation of native amphibian breeding habitats is scheduled to begin in April 2008. More detailed budget and schedule information is presented in Appendix F.

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Figure 1. Location of the Tacoma Creek Wildlife Management Area.

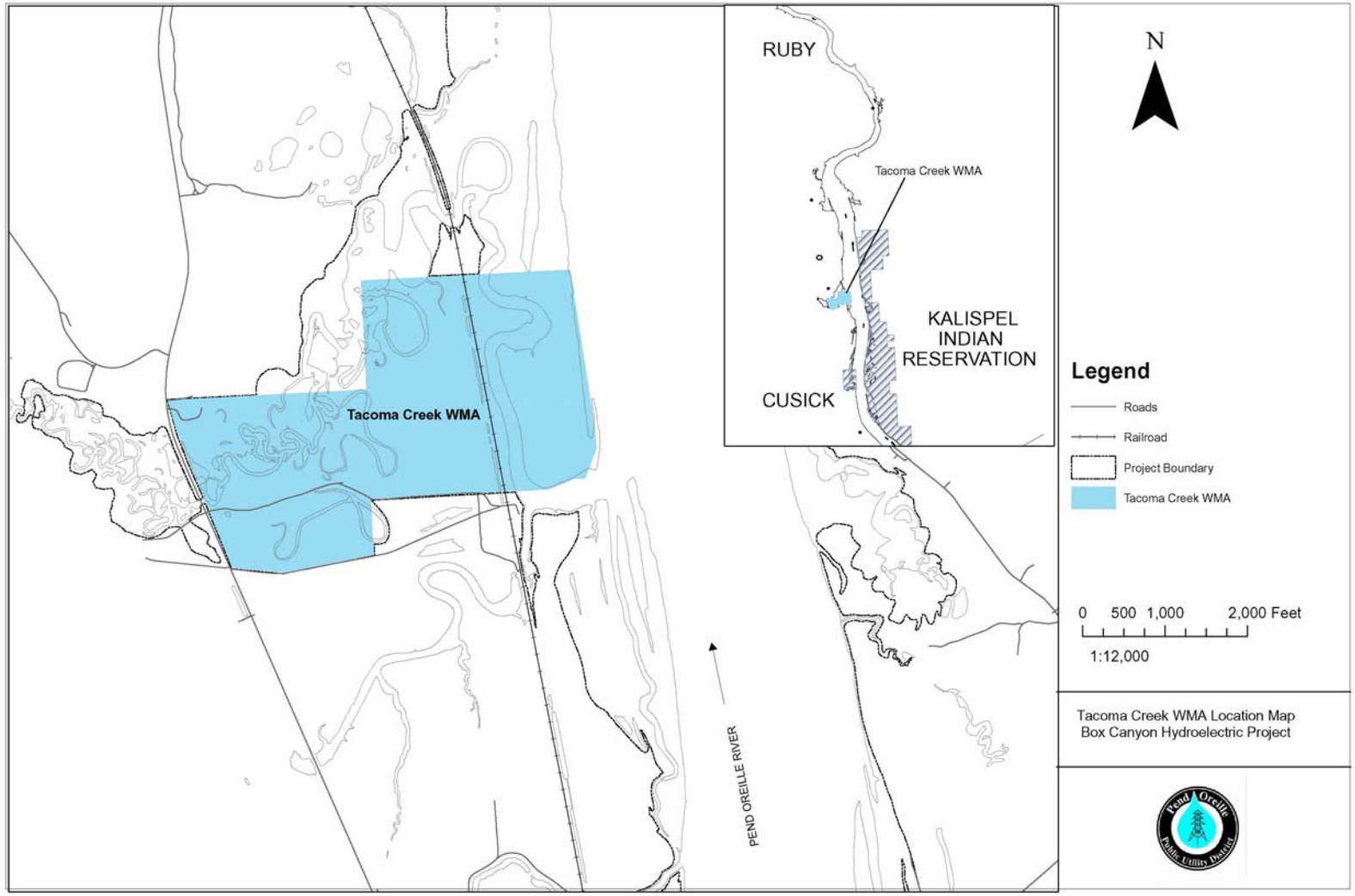


Figure 2. 1943 Aerial Photograph of Tacoma Creek WMA Site.

Figure 3. 1934 US Geological Survey Map of Tacoma Creek WMA Site.

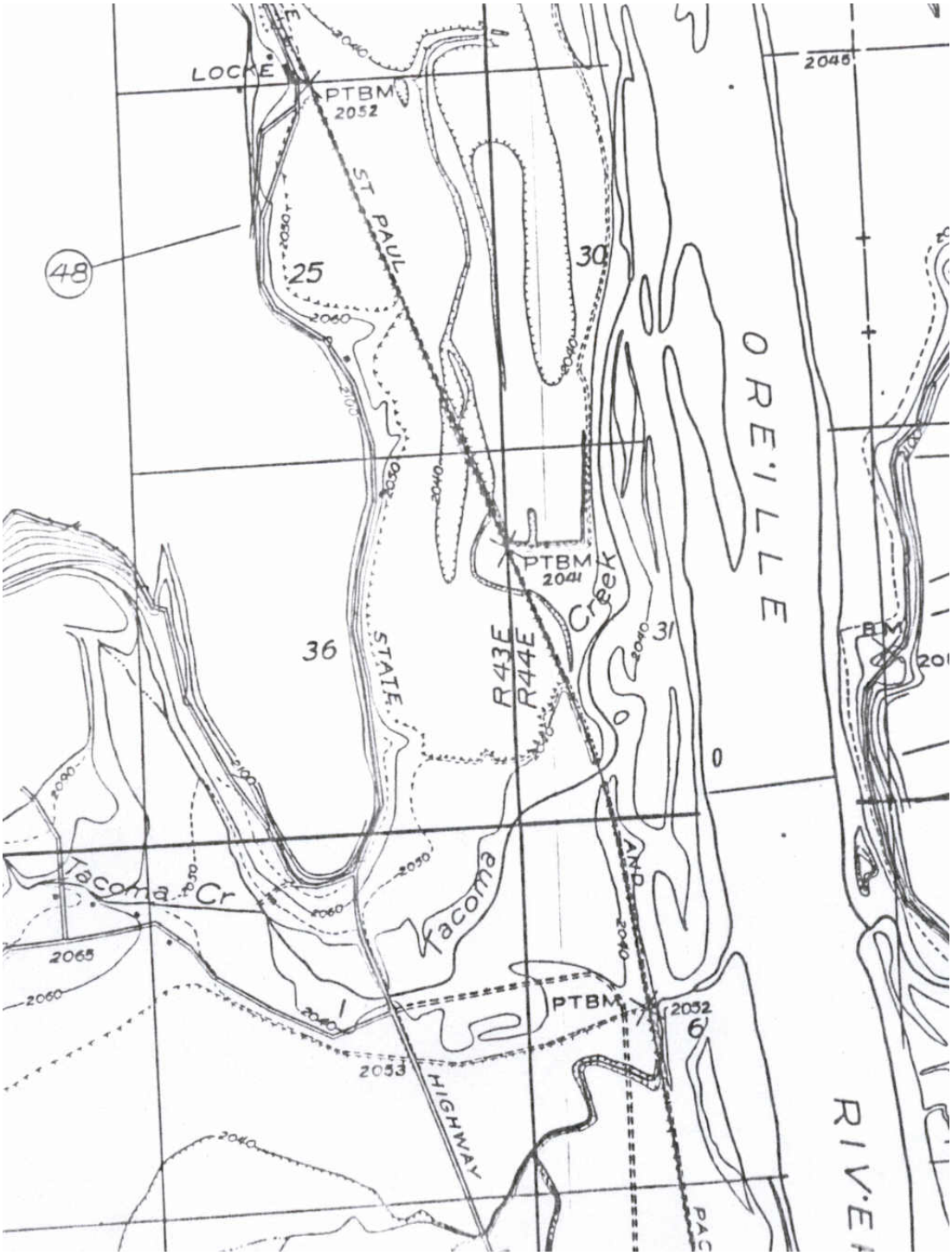


Figure 4. Topographic Map of Tacoma Creek WMA.

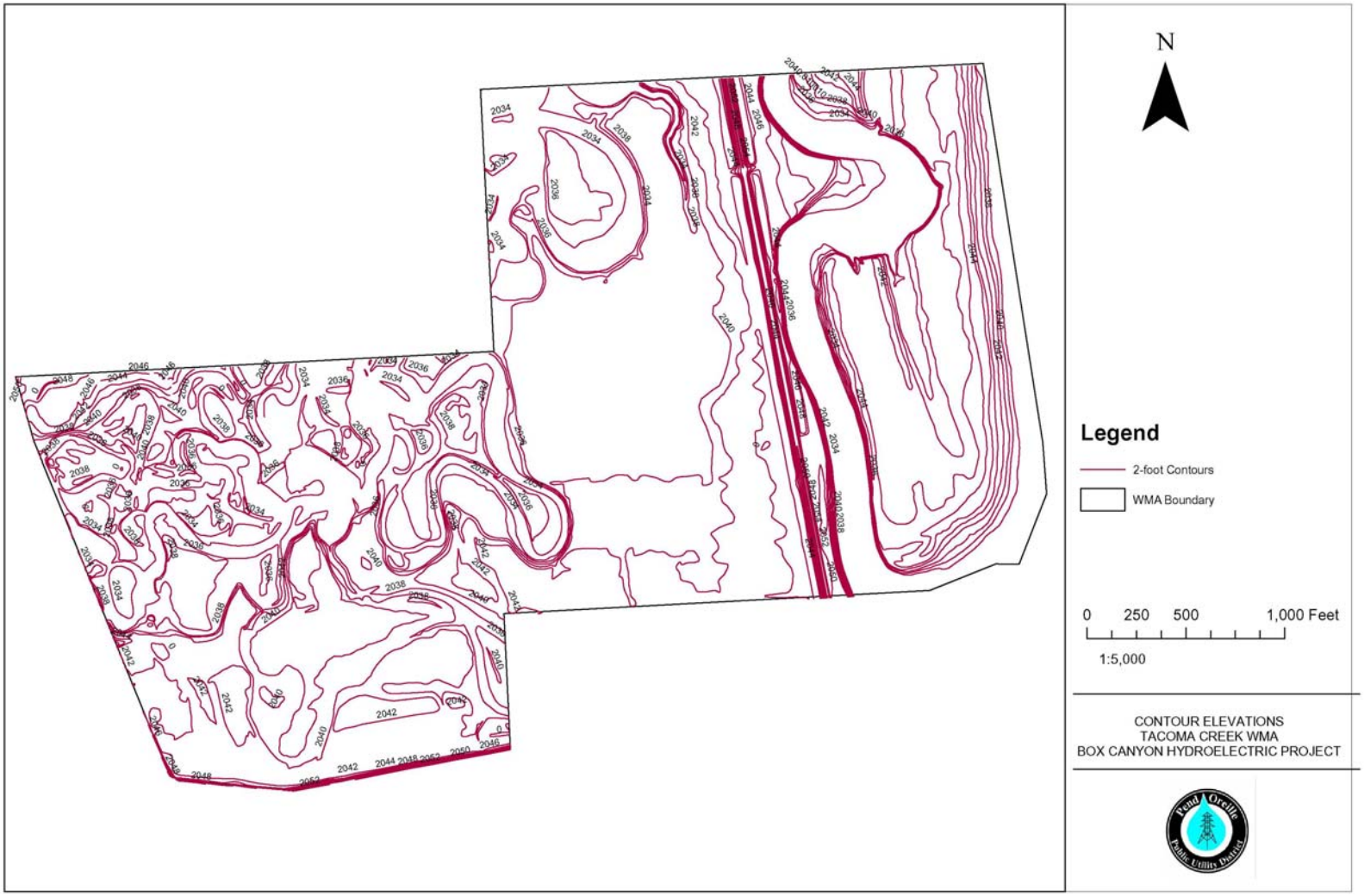


Figure 5. Soils Map of Tacoma Creek WMA.

Figure 6. National Wetlands Inventory Map of Tacoma Creek WMA.

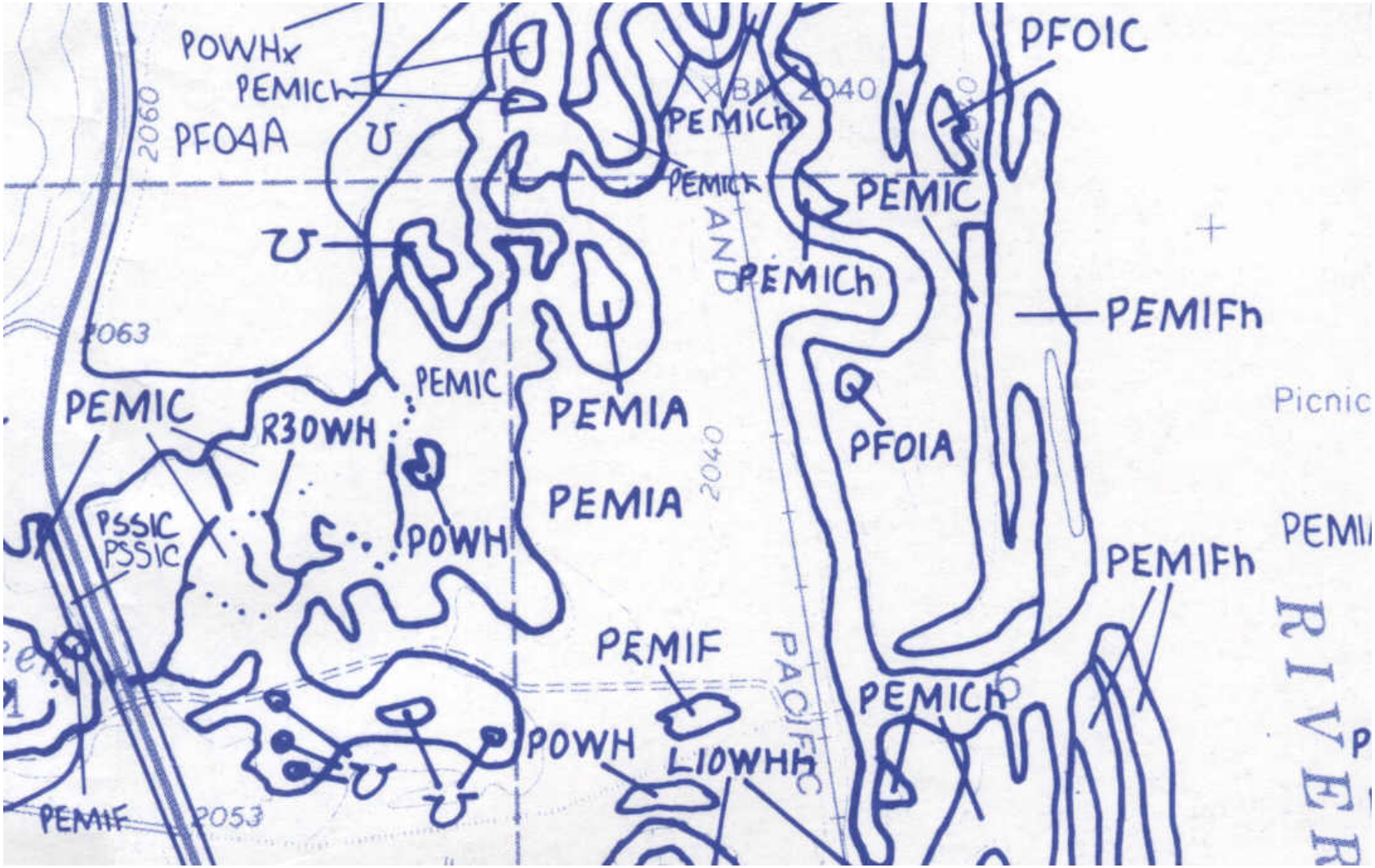


Figure 7. Cover Type Map of Tacoma Creek WMA.

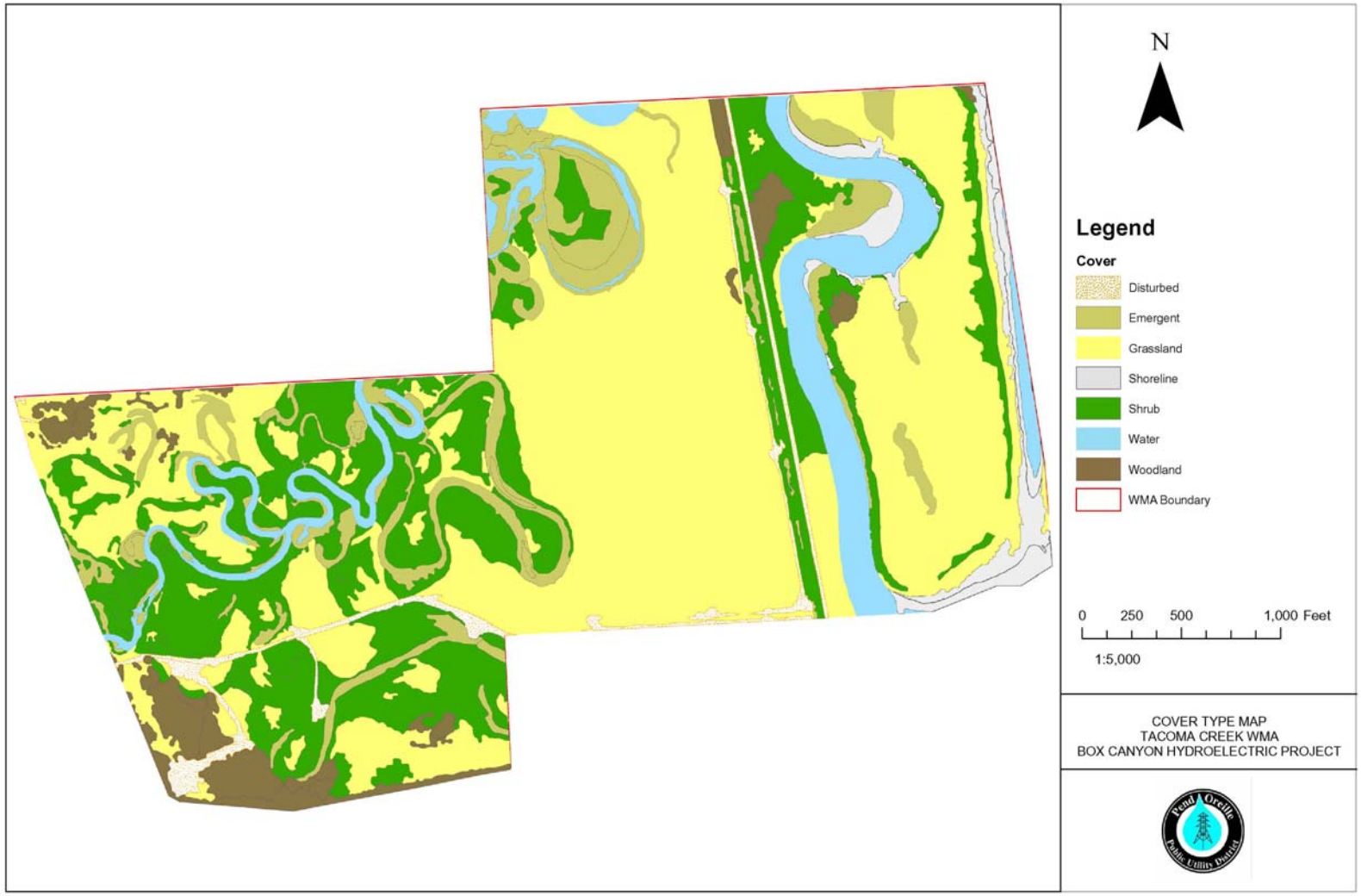


Figure 8. Location of Everett Island WMA.

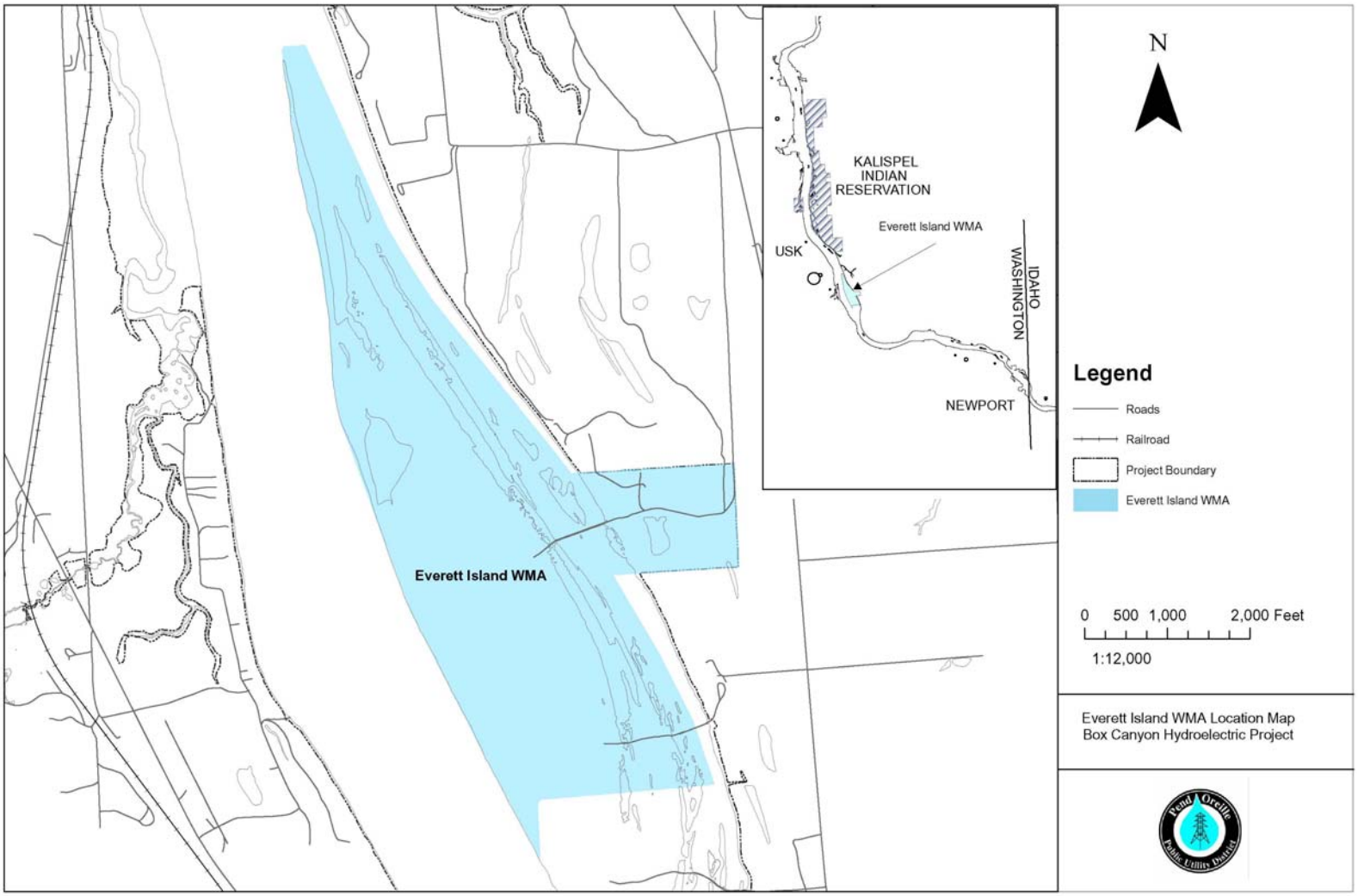


Figure 9. 1943 Aerial Photograph of Everett Island WMA Site.

Figure 10. 1934 US Geological Survey Map of Everett Island WMA Site.

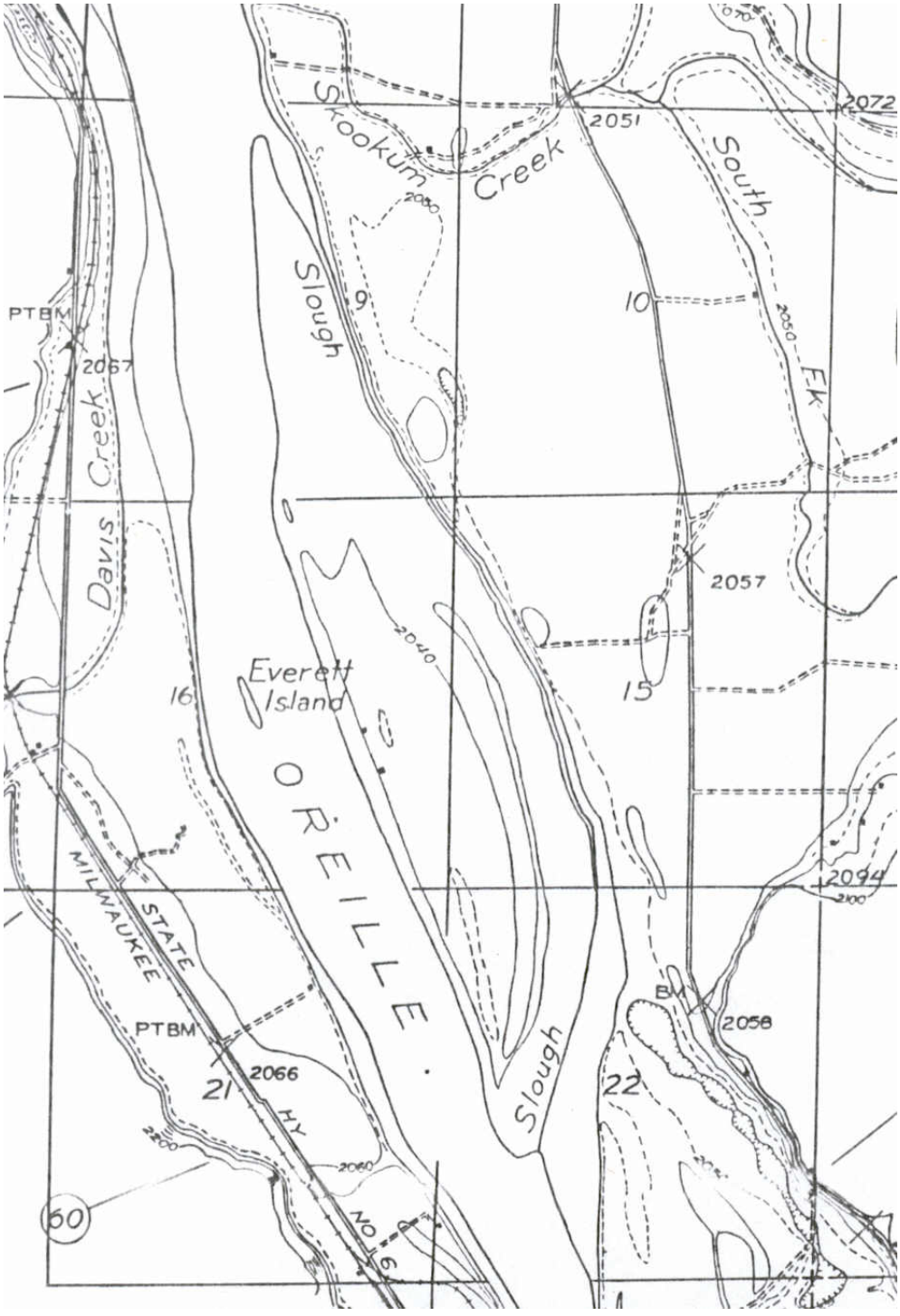


Figure 11. Topographic Map of Everett Island WMA.

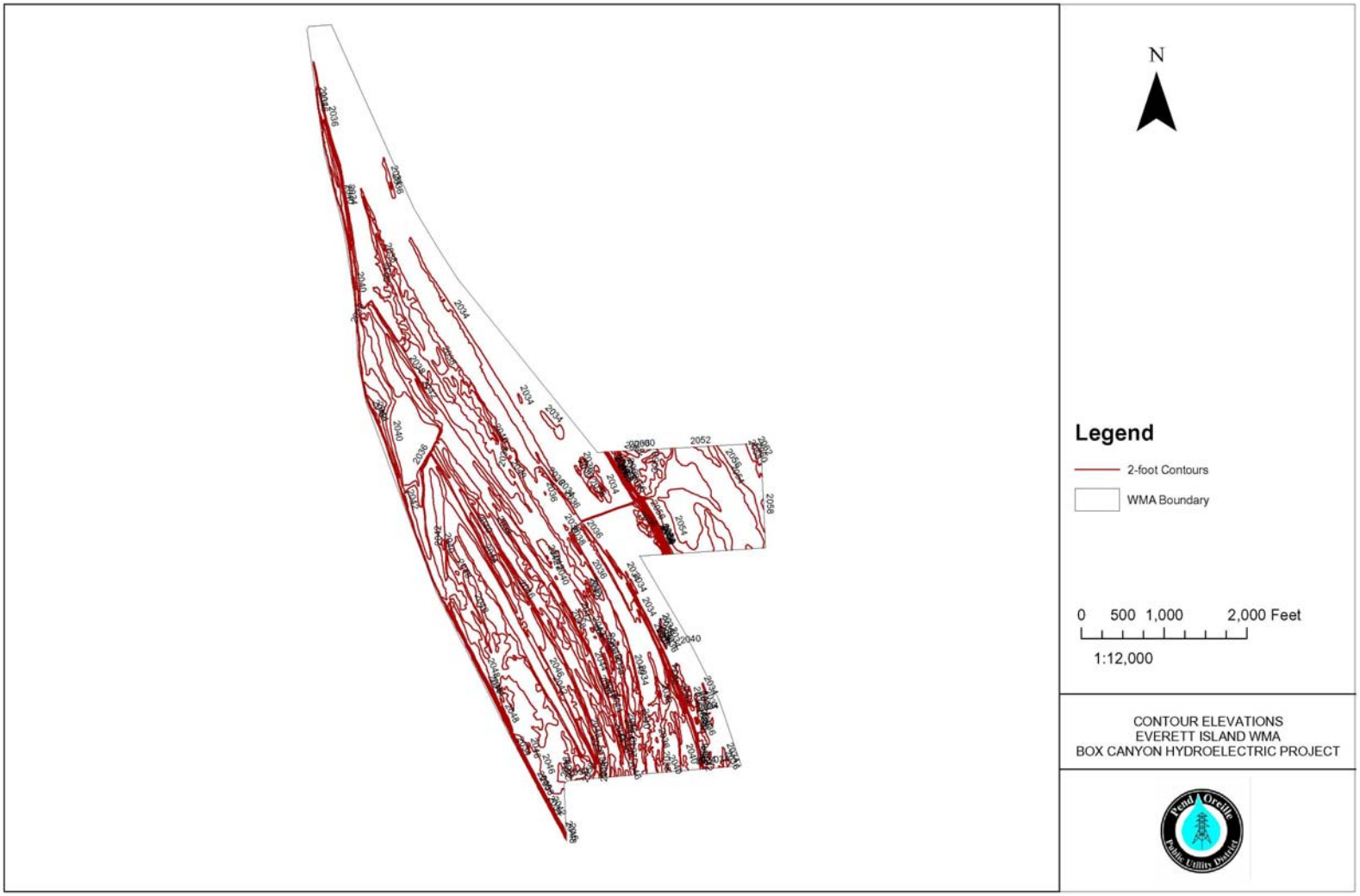


Figure 12. Soils Map of Everett Island WMA.

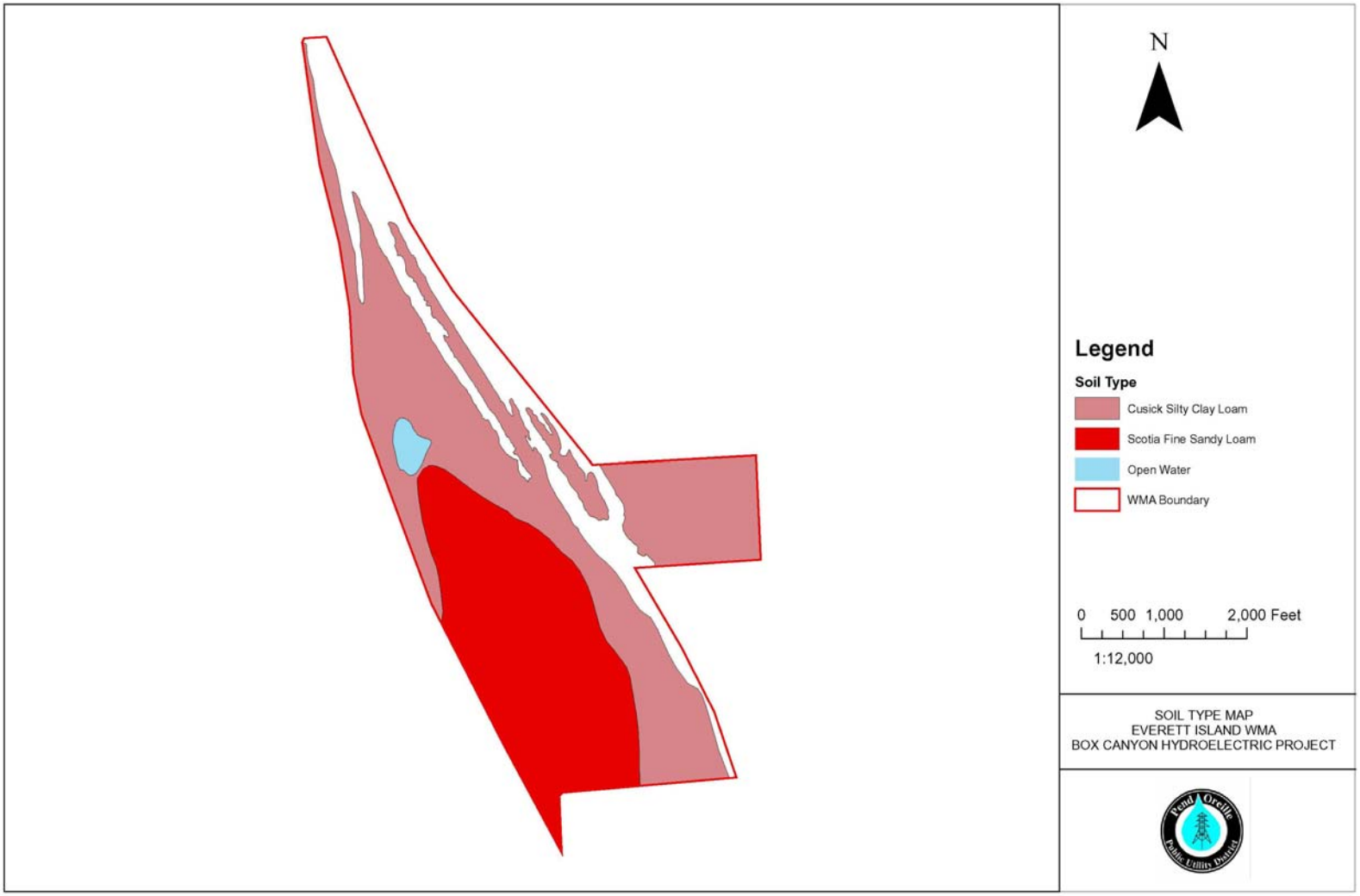


Figure 13. National Wetlands Inventory Map of Everett Island WMA.

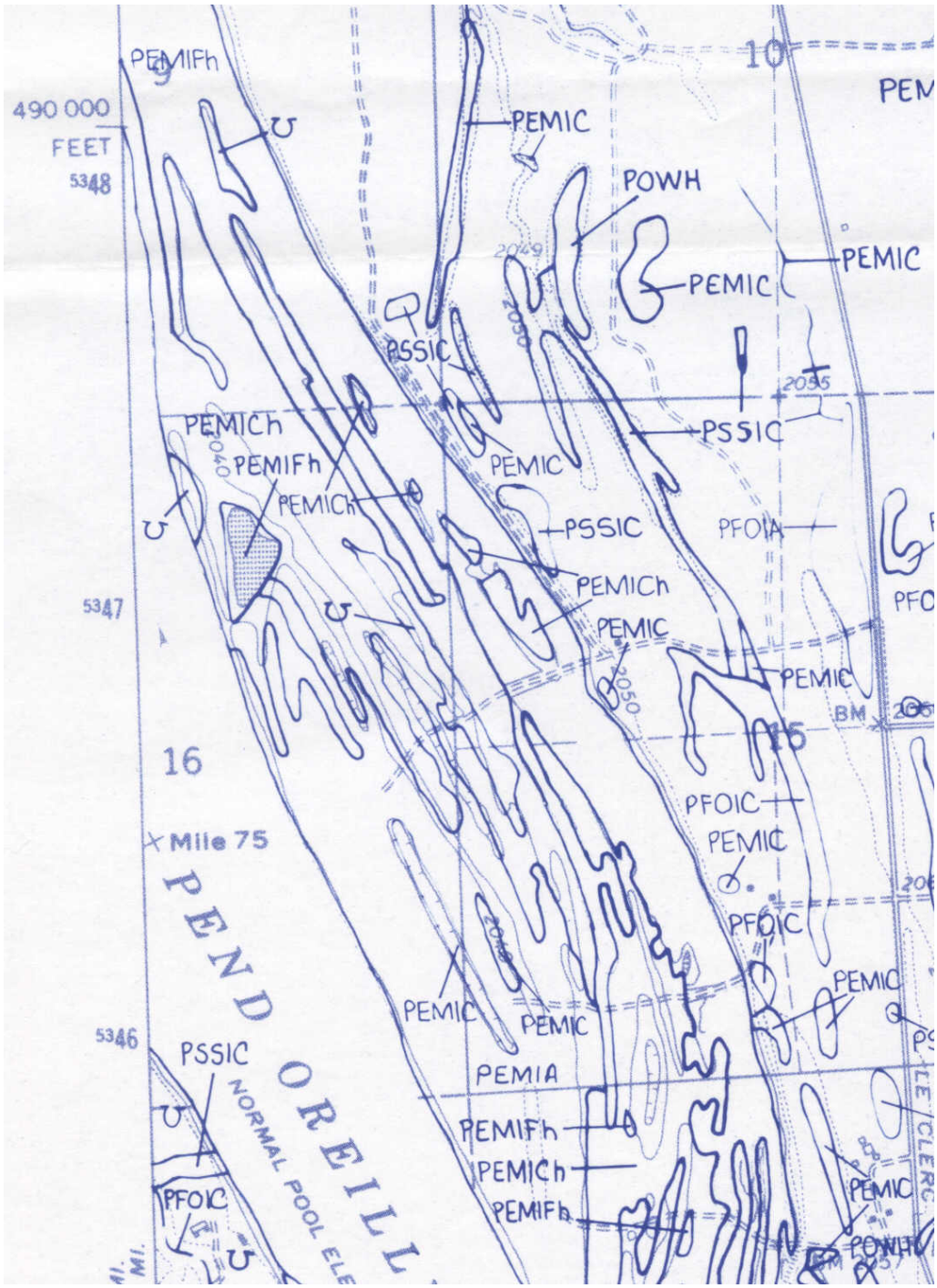
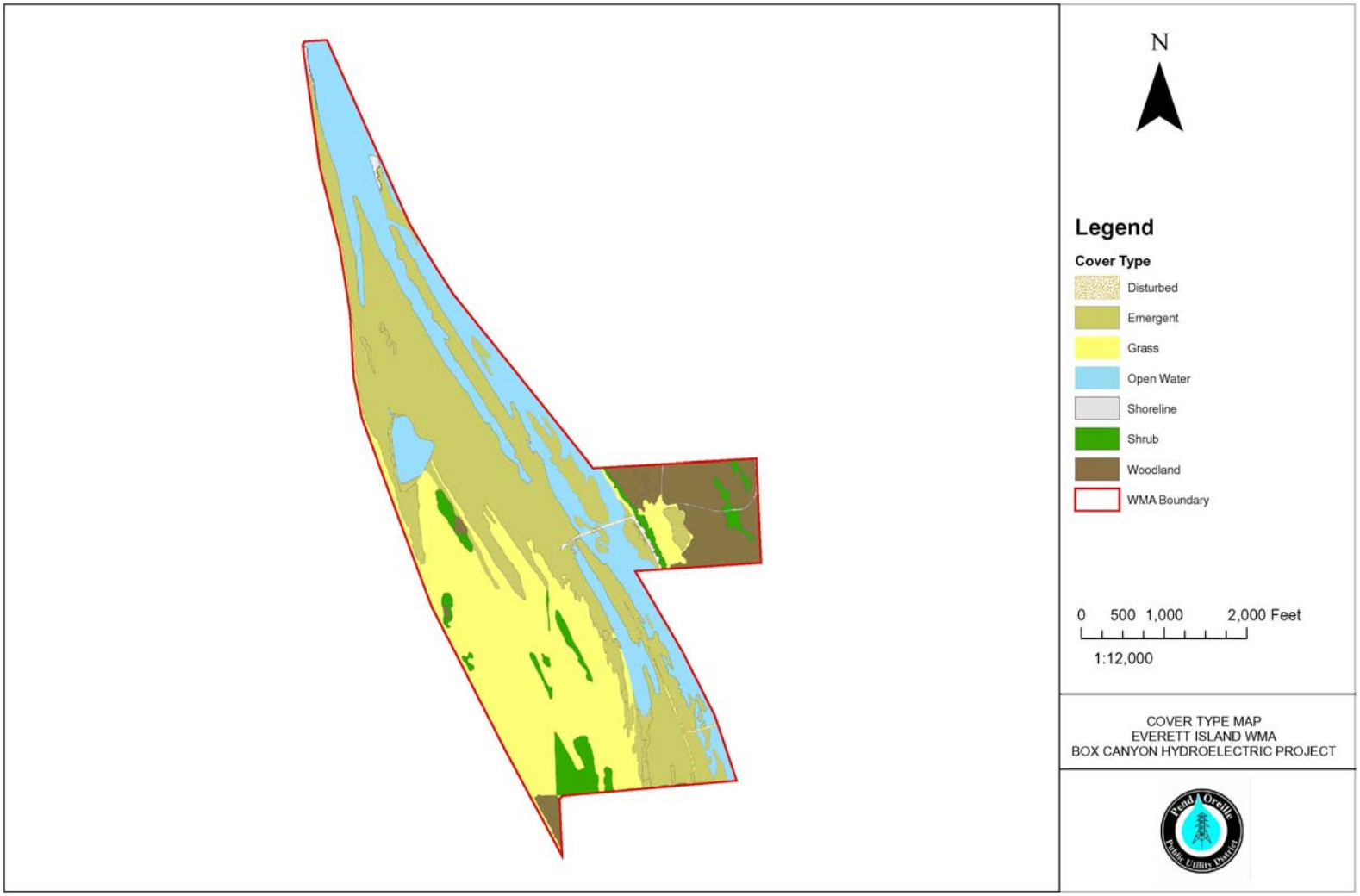


Figure 14. Cover Type Map of Everett Island WMA.



PART 2
COTTONWOOD ENHANCEMENT OUTSIDE OF THE WMAs

1.0 INTRODUCTION

Article 407 of the license order requires the following measures for cottonwood enhancement outside of the WMAs:

1. Provisions to investigate the causes of impaired cottonwood recruitment;
2. Identification of areas and a schedule for cottonwood planting within two years of license issuance; and
3. Measures to provide assistance to other private landowners around the reservoir who may wish to improve cottonwood habitat on their property.

This section describes the District's plans to comply with this FERC mandate. Additional and related cottonwood enhancements are also planned as part of habitat improvements on the Tacoma Creek and Everett Island Wildlife Management Areas (WMAs), described in Part 1 of the CWMP.

2.0 OBJECTIVES

The objectives of the District's cottonwood enhancement efforts outside the WMAs are as follows:

- Investigate whether natural recruitment[1] of black cottonwood trees within the Project Boundary is sufficient to maintain or expand existing stands.
- Increase the extent of black cottonwood on District lands within the Project Boundary (outside of the WMAs) as feasible, based on site potential.
- Provide support to landowners and managers wishing to protect and enhance cottonwood habitats.

3.0 INVESTIGATION OF RECRUITMENT

Impaired recruitment of new cottonwood individuals is widely understood to be a potential consequence of river regulation in the western United States. The Box Canyon Reservoir is part of a regulated system in which inflows are entirely controlled by releases from upstream projects and the Project affects river stage decline after spring floods occur. These events may not coincide with optimum timing for cottonwood seedling germination and establishment, or provide the necessary geomorphic conditions for germination (i.e., disturbed, moist mineral soils at appropriate elevations). Land use and development are similarly important influences. For example, analyses of 1943 and 1955 aerial photos find that cottonwood stands were relatively

[1] Recruitment is defined herein as the entry of propagules into the adult population. Black cottonwood exhibits both asexual reproductive modes (root sprouting and rooting from broken branches) and sexual reproduction by seeds. The proposed investigation will primarily address the dynamics of sexual reproduction.

scarce in the Project vicinity even at those times, likely a result of widespread grazing and land clearing for agriculture, and extensive river dikes. Since that time, some established stands have become smaller, but young stands of cottonwoods have developed in other areas, such as along levees. These photographic comparisons also indicate that the geomorphology of riparian areas is essentially unchanged as a consequence of diking and flow regulation.

To evaluate the relative importance of these potentially contributing factors, the District will complete an investigation of cottonwood recruitment along Box Canyon Reservoir. The investigation will take a comparative approach, composed of the following aspects:

- Document and describe conditions at existing stands.
- Track cottonwood phenology (particularly the timing of seed drop) relative to Pend Oreille River hydrology over a three- to five-year period.
- Based on observed phenology of cottonwood seed drop, compare to historical river stage elevation data (as available).
- Establish test plots at appropriate elevations and subject these to experimental treatments, and monitor plots for seed germination and subsequent establishment.

3.1 DOCUMENTATION OF EXISTING AND POTENTIAL STANDS

Locations of existing riparian cottonwood stands along the Pend Oreille River were documented during Project relicensing (District 2000). Basic descriptive data are available for some of these stands, including site photos and presence/absence of smaller cottonwoods, which could indicate regeneration through suckering or sexual reproduction. These data will be used to select a representative sample of stands for further investigation, based on age (e.g., young, mature, or multi-aged) and general condition (e.g., grazed or undisturbed). Stands will be identified using existing aerial imagery, and screened for ownership and access considerations. Stands that are accessible, including some stands on National Forest System lands, will be designated for additional field documentation, including at minimum the following information:

- Elevation range
- Cottonwood age structure
- Ground coverage and type
- Evidence of grazing or other land use
- Evidence (and extent) of wildlife herbivory
- Evidence of flooding
- Evidence of cottonwood recruitment

These collected data will be evaluated for indications of impaired cottonwood recruitment. For example, mature stands lacking young trees may suggest impaired recruitment if grazing or other conflicting land uses are not evident. In addition, the data will be used to prepare maps describing lands with potential to support cottonwoods (based on elevation and soil conditions relative to nearby stands), but not currently supporting them. These maps will be made available to participants in the landowner/land manager cottonwood assistance program, and will also be used to select sites for experimental treatments (see below).

3.2 ASSESSMENT OF PHENOLOGY AND HYDROLOGY

In unregulated river systems, cottonwood seed dispersal closely follows spring flood hydrology, and the stage decline following the flood is closely tied with successful recruitment. Mahoney and Rood (1998) have identified a "recruitment window" describing dispersal, elevation and stage decline conditions considered favorable for cottonwoods:

> *stream stage should be declining to expose saturated sites for initial seedling establishment during the period of seed dispersal. Ideally, streambanks between 0.6 and 2.0 m above the base stage should be exposed at this time. Subsequent gradual stage decline of less than 2.5 cm per day should permit seedling survival, with improved health and survival accompanying more gradual rates of stage decline.*

To assess the potential for natural cottonwood recruitment, the District will track cottonwood seed dispersal relative to flood and stage decline data near three existing cottonwood stands for a minimum of three years (additional years may be evaluated if historically typical conditions are not met during the initial three-year period). Hydrology data will be collected using pressure transducers, and the collected data will be evaluated relative to the cottonwood recruitment window. Phenology will also be compared to historical river stage elevation data (as available) to establish long-term patterns. If upstream projects appear to preclude cottonwood recruitment in Box Canyon Reservoir under typical operations, the District will open negotiations with upstream operators in regards the feasibility of periodic controlled floods that are designed to support cottonwood recruitment.

3.3 EXPERIMENTAL PLOTS

Maps of existing cottonwood stands prepared under this investigation will be used to choose site locations for three experimental treatments that are thought to have potential to support cottonwood recruitment by the Box Canyon Wildlife Subcommittee:

- Fencing to exclude herbivores
- Soil scarification/preparation
- Fencing with scarification/preparation

Lands owned by the District or managed by the USFS or Kalispel Tribe will be considered suitable for these efforts. In addition, suitable lands will be defined as those at similar elevation to existing cottonwood stands (or adjacent to them), and within expected dispersal distance of cottonwood seeds. Because suitable lands are expected to be limited, experimental design will not be designed for statistical analyses; descriptive statistics will be used for initial evaluation of results. Apparently successful treatments will be investigated in more detail (i.e., repeated on other suitable lands), and considered for inclusion in landowner technical assistance (see below).

4.0 IDENTIFICATION OF COTTONWOOD PLANTING AREAS

Aside from the Tacoma Creek and Everett Island WMAs, the District owns a total of five properties within the Project Boundary; for the purposes of this plan two closely adjacent

properties in the vicinity of Usk are combined here as the Usk Property. The other properties are Finch Property, South of Finch Property, and Box Canyon Dam. Box Canyon Dam is considered unsuitable for habitat improvements, because it primarily supports operational facilities rather than undeveloped habitat. The Usk and Finch properties have been assessed for the potential to support cottonwoods, using a comparative screening process similar to that employed in evaluating the Tacoma Creek and Everett Island WMAs (the South of Finch Property is a very small parcel not addressed herein). At each of the properties, the elevation, soil type, and landform of the nearest established stand of cottonwoods was determined using GIS data, and compared to existing conditions at the property (Table 1).

Table 1. District properties potentially suitable for cottonwood planting.

Existing Property Characteristics		**Adjacent Cottonwood Reference Sites**		**Site Potential**	
Property	**Elevation Range/ Soil Type**	**Nearest Cottonwood Stand**	**Elevation Range/ Soil Type**	**Landform Factors**	**Suitable Acres**
Usk	2033-2050 ft Blueslide silt loam; Cusick silty clay loam	Between tracts owned by District; Right Bank	2040-2042 ft Cusick silty clay loam	Subject to frequent flooding; erosion slow	14.1
Finch	2033-2054 ft Blueslide silt loam	0.2 miles downstream; Right Bank	2040-2042 ft Blueslide silt loam	Partially on island subject to frequent flooding; erosion slow	13.4

These analyses suggest that a total of approximately 27.5 acres of land is available for cottonwood enhancement on District properties. However, much of the land identified on the Finch property is a raised dike, which may preclude planting efforts. The dike will be evaluated from a geotechnical perspective before any enhancement efforts are initiated.

Lands available for cottonwood enhancement on the Usk and Finch properties will be planted (and subsequently monitored) beginning in 2008, after initial methods testing on the Tacoma Creek and Everett Island WMAs and an evaluation of the dike on the Finch property. Planting and monitoring methods will follow guidelines established in the WMA management plans, as periodically revised.

5.0 LANDOWNER/LAND MANAGER ASSISTANCE MEASURES

Over 70 percent of the Box Canyon Reservoir shoreline is privately owned, and less than 4 percent under the control of the District. To assist private and other landowners in cottonwood planting and other riparian habitat enhancements, the District will fund a small-grants program to be administered through the Pend Oreille Conservation District (POCD), which the District will support for the duration of its current license. The goal of the program will be to increase the extent of cottonwoods in suitable areas around the Project and to coordinate efforts with other shoreline stabilization programs promoted or administered by the District.

The program will provide annual support in the form of planting materials and technical assistance to public, private, or tribal landowners and managers wishing to improve habitat

conditions on their property. The program will also contain a public education component addressing the existence of the program, the benefits of participating, the use of cottonwoods and other native plants in shoreline stabilization projects, and information on successful projects. Based on landownership in areas where analysis of site potential indicates potentially suitable conditions for cottonwood establishment, the District will assist the POCD in assembling appropriate landowner contact information, and contacting landowners and land managers. Over the course of the program, the District will track contact efforts, and the extent and success of landowner assistance measures.

Planting materials will primarily be rooted cottonwoods suitable for spring planting, but other native trees and shrubs may be made available as well. Unused program funds for a given year will be made available in subsequent years. Grant recipients will be required to adhere to the following guidelines, as well as others that may be established by the Technical Committee:

- Cottonwoods will be planted in areas reasonably believed to be able to support them, based on District-prepared maps of site potential for cottonwoods. The focus area will be the shoreline of the Pend Oreille River and adjacent areas within the Project reach.
- Cottonwood planting will use methods outlined in the District's WMA management plan, as periodically revised.
- Planting sites will be monitored for methods compliance and success at least once annually until fully established.

6.0 REPORTING AND MEETINGS

Each year beginning in 2008 the District will prepare a report summarizing all of the activities associated with compliance with Article 407. The annual report will include a section for each of the plan aspects addressed in the CWMP. A draft of the report will be distributed to the Technical Committee representatives by March 1. Agency and tribal representatives will have 30 days to review the draft report and to submit comments on the draft to the District. The final annual report will incorporate and address comments from members of the Technical Committee, and will be submitted to FERC no later than April 30 of each year.

Meetings of the Technical Committee to discuss aspects of CWMP compliance will be scheduled as needed. To the extent practicable, a meeting to discuss the findings of the annual report will be scheduled during the draft report review period.

7.0 BUDGET AND SCHEDULE

The budget for the recruitment study and identification of planting areas is estimated to be about $25,000. Costs for establishing test plots, cottonwood planting and monitoring, associated reporting and meetings are not included. The annual budget for the landowner assistance program is $5,000. The cottonwood recruitment study will begin in April 2007. More detailed budget and schedule information is presented in Appendix F.

8.0 LITERATURE CITED

Mahoney, J.M., and S.B. Rood. 1998. Streamflow requirements for cottonwood seedling recruitment – an integrative model. Wetlands 18:634-645.

Figure 1a. Location of Other District Properties Within Project Boundary.

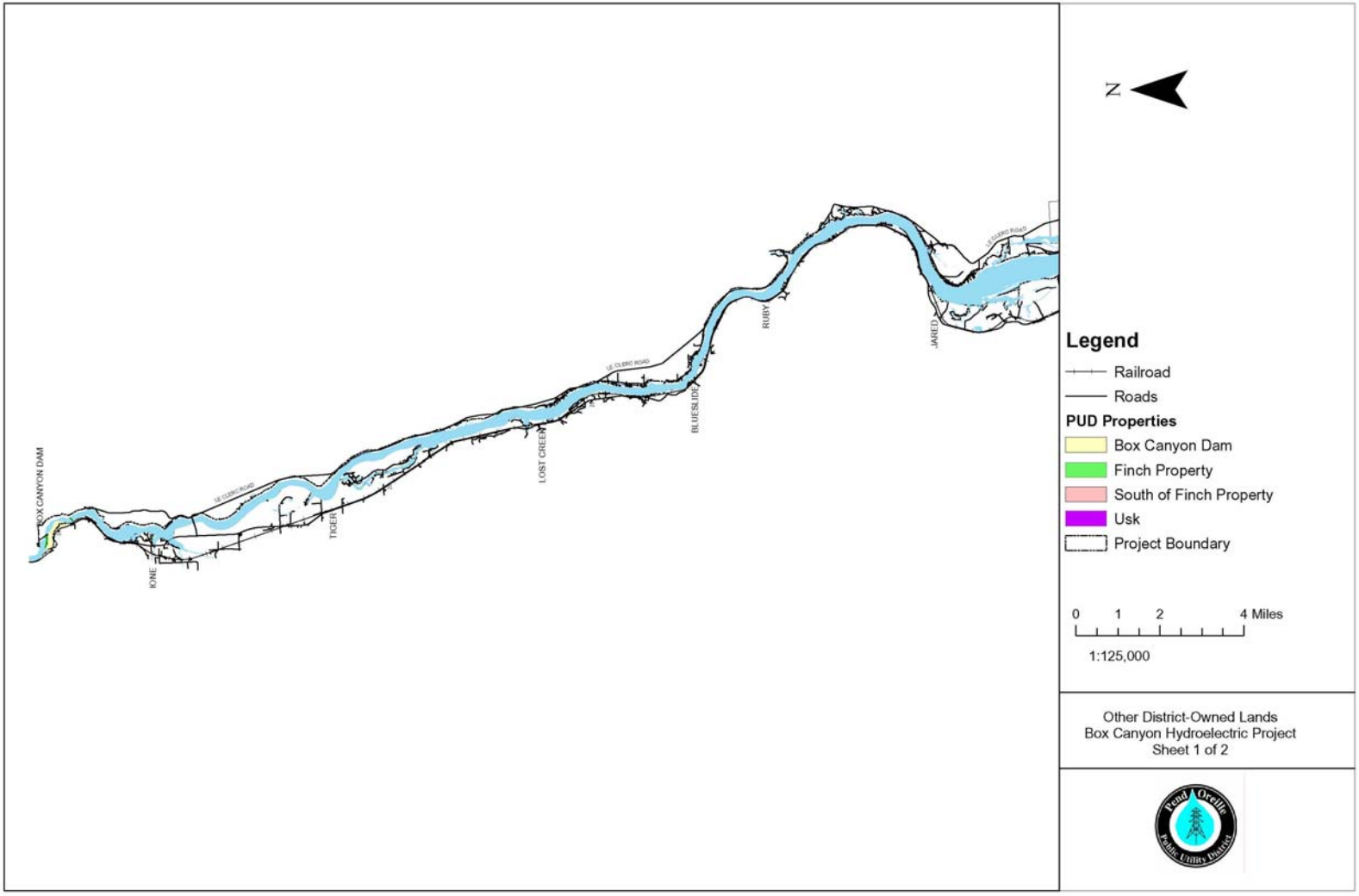
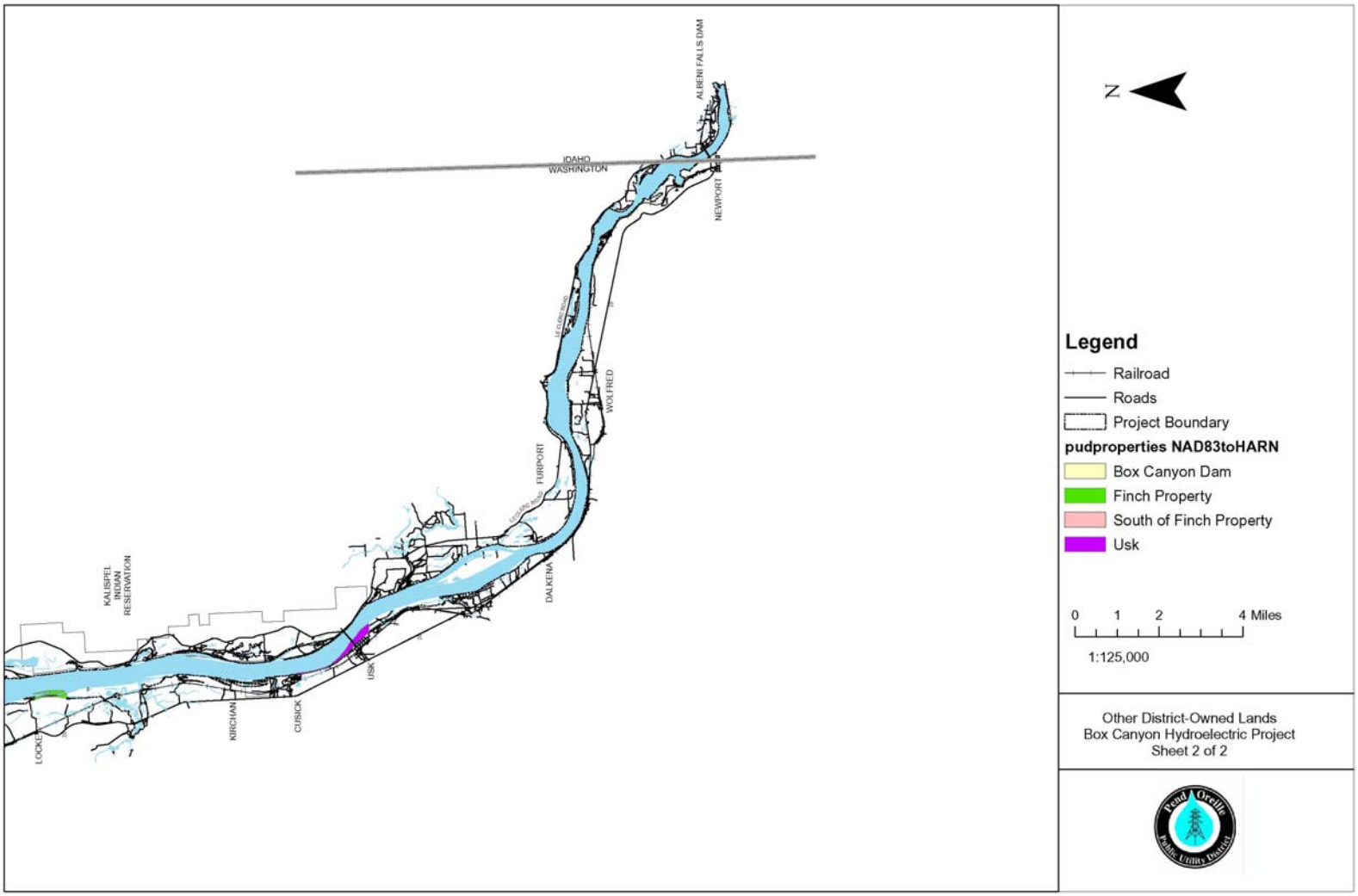


Figure 1b. Location of Other District Properties Within Project Boundary.



PART 3
LIVESTOCK GRAZING MANAGEMENT

1.0 INTRODUCTION

Article 407 of the license order requires provisions to eliminate livestock grazing on licensee-owned lands within the Project Boundary. There are a total of six District properties inside the Project Boundary, none of which have authorized livestock grazing. Since purchase, livestock grazing has been eliminated on the two WMAs and perimeter fences have been improved to prevent livestock trespass. The two properties at Usk and the Box Canyon Dam are not in proximity to livestock operations and do not require perimeter fences for livestock exclusion. The Finch Property and South of Finch Property are situated adjacent to a livestock ranch and could be subject to trespass if fences are not adequate. A causeway to the island on the Finch Property has been used in the past for livestock access; if this causeway is extant and accessible to livestock, it should be removed.

2.0 OBJECTIVES

The following objectives apply to this measure:

- Exclude livestock from District properties within the Project Boundary throughout the term of the new license with perimeter fences.
- Regularly inspect and maintain fences as needed.
- If necessary, remove the causeway to the island on the Finch Property.

3.0 LIVESTOCK EXCLUSION

Inspections and maintenance of perimeter fences on the WMAs is addressed in Part 1 of the CWMP. An examination of the Finch Property will be performed in 2006 to evaluate existing fences; any necessary repairs or improvements will also be completed this year. The fences at this site will be inspected each year at the beginning of the grazing season and periodically to ensure proper maintenance. Necessary repairs will be made as soon as possible. The causeway at the Finch Property will also be inspected in 2006 at low river flows. If it is determined that the causeway could allow livestock to access the island, the causeway will be removed.

4.0 REPORTING AND MEETINGS

Each year beginning in 2008 the District will prepare a report summarizing all of the activities associated with compliance with Article 407. The annual report will include a section for each of the plan aspects addressed in the CWMP. A draft of the report will be distributed to the Technical Committee representatives by March 1. Agency and tribal representatives will have 30 days to review the draft report and to submit comments on the draft to the District. The final annual report will incorporate and address comments from members of the Technical Committee, and will be submitted to FERC no later than April 30 of each year.

Meetings of the Technical Committee to discuss aspects of CWMP compliance will be scheduled as needed. To the extent practicable, a meeting to discuss the findings of the annual report will be scheduled during the draft report review period.

5.0 BUDGET AND SCHEDULE

The budget for evaluating grazing exclusions at the Finch Property is estimated at about $1,000. Costs for fencing and possible removal of the causeway to the island on the Finch property cannot be determined at this time. Any necessary improvements to fences will be completed prior to 2007, with annual examinations in subsequent years. More detailed budget and schedule information is presented in Appendix F.

PART 4
WATERFOWL PROVISIONS OUTSIDE OF THE WMAs

1.0 INTRODUCTION

Article 407 of the license order includes the following measures related to waterfowl management:

1. Provisions for habitat protection and enhancement on lands owned by the licensee within the project boundary;
2. Provisions to support the efforts of local conservation groups, school groups, or landowners to improve waterfowl nesting habitat; and
3. Measures to construct and install artificial nest structures within the wildlife management areas.

All measures associated with the WMAs are incorporated into Chapter 1 of the CWMP. The District owns a total of five other properties within the Project Boundary; for the purposes of this plan two properties in the vicinity of Usk are combined here as the Usk Property. Box Canyon Dam is considered unsuitable for habitat improvements, because it primarily supports operational facilities. Although Box Canyon Dam includes some undeveloped areas, it is unlikely to contain seasonal waterfowl habitat due to steep shorelines and upland forested terrain. The Finch and Usk properties provide a variety of habitats known to be used by waterfowl for foraging, resting, nesting, or brood-rearing. The District will protect and enhance these habitats. The District will also provide support for waterfowl nesting habitat improvement elsewhere within or adjacent to the Project by funding workshops and furnishing technical assistance to interested groups or landowners.

2.0 OBJECTIVES

The following specific objectives for District-owned lands within the Project Boundary outside of the WMAs are addressed herein:

- Identify and prioritize existing habitats used by waterfowl.
- Protect these waterfowl habitats from livestock grazing and from human disturbance to the extent practicable.
- Identify and implement appropriate habitat enhancements for waterfowl, possibly including deployment and management of artificial nesting structures, and/or management to maintain or improve waterfowl nesting cover and forage.

In addition, the District will support improvement of waterfowl nesting habitat elsewhere in the Project area. The objective of this measure is to:

- Provide financial and technical support to local groups or landowners interested in enhancing waterfowl nesting with artificial nesting structures or habitat management.

3.0 HABITAT PROTECTION AND ENHANCEMENT ON DISTRICT LANDS

The Finch and Usk properties mostly consist of low-lying, grassy areas below 2040 ft elevation and higher ground associated with levees. There is a shallow slough and an emergent fringe at the Usk property that is used by waterfowl for feeding and resting; shrubs and grasses on the higher ground may provide nesting cover, although this area may not be sufficiently isolated for Canada goose nesting. At the Finch property, waterfowl habitat is found around the grassy horseshoe-shaped island which supports nesting by Canada geese (three nests found in 1998), with ample areas for brood foraging.

Livestock grazing is not permitted on any District properties within the Project Boundary. The Usk property is not adjacent to any livestock operations. In contrast, the Finch property is adjacent to a cattle ranch; perimeter fences are necessary to prevent livestock trespass. A causeway has provided livestock access to the island at the Finch property in the past. If the causeway is still extant, it will be removed by the District. The status of perimeter fences for the Finch property will be determined, made adequate to restrict livestock trespass, and will be subsequently inspected and maintained annually. Both of the properties are accessible to visitation by boaters; the Usk property can also be accessed by land. Indications are that the Finch property is rarely visited, particularly early in the year when waterfowl are nesting. Greater rates of visitations at the Usk property, which is adjacent to the town and which includes a boat launch area downstream of the bridge, may affect suitability for waterfowl nesting. However, imposing seasonal closures would not be practical.

Opportunities for waterfowl habitat enhancement at the properties are limited by the constraints of topography and elevation, but the District will examine the feasibility and possible value of providing artificial nesting structures, improving nesting cover, or improving forage as appropriate. The properties may benefit from measures to maintain areas of herbaceous cover of an appropriate height and species complexity for waterfowl nesting and foraging. Waterfowl nesting habitat management using periodic burning, mowing, or disking has been shown to be generally successful (Higgens et al. 1992). Tilling or scarification (tilling to a depth of two inches or less) increases soil aeration and produces the greatest vegetation yield (Lane and Jensen 1999). When these treatments are applied to densely vegetated areas lacking species diversity, increased waterfowl nesting often results (Bjork 1976). Prescribed burns in wet grasslands are advised for the late fall period and no more frequently than every two years (USDA 1998, Stanturf et al. 2002). The recommended frequency for scarification is also usually about every two years.

Deployment of artificial nesting structures may be effective on the properties. Elevated nest platforms may permit duck nesting in areas where nests would otherwise not be successful because of seasonal flooding. Canada goose, an early-nesting species generally unaffected by river flooding in the Project area, nonetheless may also benefit because elevated nest structures provide protection from nest predators. Mallard and Canada goose readily accept elevated nest platforms or baskets (Bishop and Barratt 1970) and these structures have been shown to be effective in increasing both the numbers of nesting waterfowl and nest productivity (Ball 1990). Concrete culverts placed upright in wetlands, filled with soil, and naturally vegetated are a low

maintenance option for enhancing nesting habitat. Similarly, nest boxes designed for wood ducks are readily accepted (Dugger and Fredrickson 1992). Nest boxes provide nesting opportunities that may not develop in locations where trees cannot be grown and an interim measure for areas where mature trees will eventually appear.

Nesting structures will be selected from existing widely available, as well as prefabricated structures for retail purchase (See Appendix E). Use of such structures will be consistent with published guidelines. Ball (1990) recommends that nest platforms be placed over water more than 18 inches deep, 30-50 ft. offshore, and with separation between structures greater than 300 ft. Fielder (2000) presents recommendations for wood duck nest box placement and periodic maintenance.

4.0 PUBLIC SUPPORT PROGRAM

The District will offer financial and technical support to local groups or landowners interested in enhancing waterfowl nesting habitat in the Project area. This will include financial support for an existing program of the Pend Oreille Conservation District that provides artificial nesting structures to private landowners upon request. In addition, annual funding for this provision will be available for landowner vegetation management (e.g., prescribed burning or scarification) to benefit waterfowl.

To assess interest in District-sponsored workshops, the District will place announcements in its customer newsletter, and will contact local community groups such as the Pend Oreille Conservation District, the local chapter of Ducks Unlimited, and Boy/Girl Scouts of America. Workshops will be conducted when sufficient interest is expressed for a workshop to be cost effective. Workshop participants will be furnished with detailed instructions on proper location of structures and maintenance. The District will contact registered workshop participants through a mail-in questionnaire approximately six months after each workshop. From this sample, the District will ascertain the number of structures installed and the use of structures by waterfowl, and will use this information to periodically assess the effectiveness of the program.

5.0 REPORTING AND MEETINGS

Each year beginning in 2008 the District will prepare a report summarizing all of the activities associated with compliance with Article 407. The annual report will include a section for each of the plan aspects addressed in the CWMP. A draft of the report will be distributed to the Technical Committee representatives by March 1. Agency and tribal representatives will have 30 days to review the draft report and to submit comments on the draft to the District. The final annual report will incorporate and address comments from members of the Technical Committee, and will be submitted to FERC no later than April 30 of each year.

Meetings of the Technical Committee to discuss aspects of CWMP compliance will be scheduled as needed. To the extent practicable, a meeting to discuss the findings of the annual report will be scheduled during the draft report review period.

6.0 BUDGET AND SCHEDULE

The estimated budget for assessing feasibility of habitat enhancements at the Usk and Finch properties is about $2,800. Costs for implementing habitat enhancements cannot be predicted at this time. The annual budget for the public support program is $5,000, with actual costs dependent on the degree of local interest. The assessment of the Finch and Usk properties will begin in April 2007, and the public support program is scheduled to begin in June 2007. More detailed budget and schedule information is presented in Appendix F.

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PART 5
PUBLIC AWARENESS OF GRIZZLY BEAR ISSUES

1.0 INTRODUCTION

The following provisions to increase public awareness of grizzly bear issues are stipulated in the license order as part of Article 407:

1. Measures to improve grizzly bear awareness;
2. Provisions for posting signs and/or providing educational pamphlets at each of the recreation facilities to inform visitors of steps they can take to prevent conflicts with grizzly bears (e.g., proper sanitation and food storage); and
3. Measures to include the resupply of informational materials, such as posters and pamphlets, into the regular maintenance program.

Within northeastern Washington, the grizzly bear is found in the Selkirk Mountains with population numbers estimated to be around 50 grizzly bears. Although very few grizzly bears have been documented in the project area, the western margin of the Selkirk/Cabinet/Yaak Grizzly Bear Recovery Area is designated within about two miles of the project boundary along the east side of the Box Canyon Reservoir. As a result of habitat protection and management, grizzly bear movements through the area may be more frequent in the future.

Food and other refuse carelessly disposed of at recreation facilities can sometimes habituate bears, including grizzly bears, to these areas (USFWS 1993). Grizzly bears that become accustomed to foraging at recreation sites or residences are generally relocated or destroyed. For this reason, these conflicts represent a significant threat to the species.

2.0 OBJECTIVES

The objectives of this measure will include:

- Improving public awareness of grizzly bear issues through the posting of signs and educational materials at each District-owned recreational site to inform visitors of steps that they can take to prevent conflicts with grizzly bears
- A plan to periodically resupplying appropriate recreational sites with education materials on grizzly bears as part of regular maintenance program.

In addition, the District will review current provisions for animal-resistant garbage containers at the District's public facilities, and if existing containers are not animal resistant, will seek funding support to purchase new containers.

3.0 MEASURES TO IMPROVE PUBLIC AWARENESS

In order to improve public awareness of grizzly bear issues, the District will make available educational materials at its recreation facilities. A variety of educational materials have been developed by agencies and organizations concerned with grizzly bear conservation. These

include signs and brochures that explain means to reduce potential bear attractants and to differentiate grizzly bears from black bears.

The District manages several sites as public access or recreation use facilities: Box Canyon Dam, the Visitor Center at Box Canyon Dam, an adjacent public viewpoint of the dam, and Campbell Park. Because these sites are all closely adjacent, the District will post educational materials at the Box Canyon Dam Visitor Center and Campbell Park, where patterns of public use are likely to be most conducive to this purpose. In addition, the Tacoma Creek and Everett Island WMAs should be suitable locations for disseminating educational materials to visitors. Although the WMAs are primarily managed for wildlife and not recreation, seasonal public access, including hunting, is permitted.

3.1 SIGNAGE AND EDUCATION MATERIALS

There are ample existing materials on grizzly bear awareness and identification from which to select. Materials used by the Newport-Sullivan Lake Ranger Districts, Colville National Forest include a variety of informational brochures created through cooperative grizzly bear awareness groups, such as Grizzly Bear Outreach Project (www.bearinfo.org), Be Bear Aware (www.bebearaware.org), and the Interagency Grizzly Bear Committee, as well as weatherproof placards. These materials address the importance of proper outdoor food storage and camp/picnic site sanitation, and information on key identifying features of black bear (*Ursus americanus*) and grizzly bear (see Appendix G). A selection of brochures and placards will be purchased by the District from source organizations and posted.

Grizzly bear awareness materials will be provided by the District at the Box Canyon Dam Visitor Center, Campbell Park, and if appropriate, the Tacoma Creek and Everett Island WMAs. These materials will be posted on a conspicuous bulletin or reader board. If no bulletin board presently exists, or there is no other suitable place to post education materials, a bulletin board with weatherproof brochure holders will be erected at a sensible location to allow for public access to these materials.

3.2 RESUPPLY OF SIGNAGE AND EDUCATION MATERIALS

Brochures available on a public access reader board will need to be routinely checked and periodically replenished; placards should only require periodic replacement if vandalized. Replenishment of materials at the Visitor Center and Campbell Park will be assigned to personnel stationed at these locations who currently maintain the facilities. At the WMAs, the need to replenish materials will be determined by personnel with primary responsibility for administering and monitoring these areas. Personnel will be instructed to report to the District's Director of Environmental and Regulatory Affairs when stocks of the materials reach the specified level of a three-month supply. The Director of Environmental and Regulatory Affairs will then order additional stock. Prior to ordering brochures and placards from the production company, the appropriate number and types of grizzly bear awareness material will be determined based on visitation rates and the rate at which the stocks are being exhausted.

4.0 REPORTING AND MEETINGS

Each year beginning in 2008 the District will prepare a report summarizing all of the activities associated with compliance with Article 407. The annual report will include a section for each of the plan aspects addressed in the CWMP. A draft of the report will be distributed to the Technical Committee representatives by March 1. Agency and tribal representatives will have 30 days to review the draft report and to submit comments on the draft to the District. The final annual report will incorporate and address comments from members of the Technical Committee, and will be submitted to FERC no later than April 30 of each year.

Meetings of the Technical Committee to discuss aspects of CWMP compliance will be scheduled as needed. To the extent practicable, a meeting to discuss the findings of the annual report will be scheduled during the draft report review period.

5.0 BUDGET AND SCHEDULE

The estimated budget for this measure for the first four years is about $5,000, with implementation beginning April 2007. More detailed budget and schedule information is presented in Appendix F.

6.0 LITERATURE CITED

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PART 6
BALD EAGLE MANAGEMENT

1.0 INTRODUCTION

The license order stipulates the following provisions for bald eagle management as part of Article 407:

1. Measures to consult with the agencies and tribes and affected landowners in developing individual nest site management plans for established nest stands, preferred perches, winter roosts, and foraging areas for bald eagle pairs that nest on lands within the project boundary and for pairs that nest nearby, but that rely on the Box Canyon reservoir as a foraging area;
2. Provisions to develop cooperative management plans and identify which entities are responsible for managing various aspects of disturbance (e.g., the Licensee, the Army Corps of Engineers, Washington Department of Fish and Wildlife, Pend Oreille County or Bonner County);
3. Measures to complete two years of survey at each known nest site within the project boundary to provide data needed to develop nest site management plans;
4. Measures to complete annual surveys during the breeding season to monitor both nesting and nest productivity[1]; annual surveys in winter to document winter use; and surveys to investigate establishment of new nests;
5. Provisions to produce and distribute annual reports to track changes in bald eagle populations and productivity;
6. Protocols to compare results with survey information collected on osprey, great blue heron, and double-crested cormorant populations, identify areas of resource conflict, and define any necessary changes in management;
7. Documentation of how the bald eagle protection measures would be coordinated with the licensee's routine operation and maintenance and with the shoreline management plan, the recreation management plan, and the erosion control plan;
8. Provisions for providing information about bald eagle protection (e.g., signage and brochures) at licensee-operated recreational sites; and
9. Provisions for silvicultural treatments to improve potential bald eagle nesting habitat along the reservoir between river mile 47 and river mile 90.[2]

Bald eagle (*Haliaeetus leucocephalus*) is listed as a Threatened species under the Endangered Species Act of 1973. Although delisting has been proposed (USFWS 2006), federal protection of the bald eagle will continue under the jurisdiction of the Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-699c) and the Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712). Bald eagles are protected in Washington State as authorized by the Bald Eagle Protection Law of 1984 (RCW 77.12.655) and the Bald Eagle Protection Rule (WAC 232-12-292) which was

[1] Parallels a portion of FS 4(e) Condition 13.
[2] Relates to FS 4(e) Condition 12.

adopted by the Washington State Wildlife Commission in 1986. The protection of bald eagle habitat through site management plans is the primary objective of the Bald Eagle Protection Rule. The basic premise of a Bald Eagle Management Plan (BEMP) is to forge a habitat agreement between a landowner and WDFW to allow reasonable land use activities and minimize impacts to bald eagles (Watson et al. 2005). Information from the most recent WDFW bald eagle status report indicated that there were 6 BEMPs within Pend Oreille County in September of 2000 (specific locations not indicated) (Stinson et al. 2001).

Under its new license, the District will manage the Tacoma Creek Wildlife Management Area (WMA) and Everett Island WMA for the benefit of wildlife, including bald eagle, and will provide various wildlife provisions to other District-owned lands within the Project Boundary. These provisions include a livestock grazing prohibition and possible enhancements of waterfowl habitat and cottonwood stands, if feasible. Management of other properties under private or public ownership, which constitutes the majority of lands within the Project Boundary, is beyond the authority of the District. However, FERC has directed the District to provide technical assistance to these other landowners in possession of important bald eagle habitats in the development of cooperative bald eagle nest site management plans. The District also has the responsibility to ensure that other plans to be developed by the District are consistent with bald eagle protection.

Aerial surveys by helicopter have been used by WDFW in recent years to assess bald eagle nest occupancy and productivity, although these surveys are not scheduled to be continued (S. Zender, WDFW, pers. comm., 2006). The most recent data from WDFW (April 2005) indicate that there were a total of 23 active bald eagle nests in Pend Oreille County, including 15 located along the Pend Oreille River between Albeni Falls Dam and Box Canyon Dam or within one mile of this reach; four of the 15 nests were new as of 2005 (Figure 1, Table 1). This compares to 7 nests documented in the same reach in 1999. Several of the current nests are located on lands administered by USFS or the Kalispel Tribe, and there is one nest on District-owned land. Previous surveys conducted by the District for relicensing did not suggest the occurrence of winter roosts where large numbers of bald eagles concentrate, and instead suggested that most of the birds observed in winter were pairs on their territories and immature birds that may have fledged in the area.

Table 1. Summary of Bald Eagle Nest Sites in Pend Oreille County (adapted from WDFW, 2005)

Territory Name	WRDS Number[1]	Date	Survey Method	USGS Map Quad	Comments
Sand Creek[2]	97	12-Apr-05	Helicopter	Metaline	2.2 miles North of Project Reservoir
Everett Island[2]	174	12-Apr-05	Helicopter	Skookum Creek	
Trimble Creek[2]	229	12-Apr-05	Helicopter	Jared	
Indian Island[2]	459	12-Apr-05	Helicopter	Diamond Lake	
Z Canyon	480	12-Apr-05	Helicopter	Boundary Dam	17.0 miles North of Project Reservoir
Calispell Lake[2]	875	5-Apr-05	Ground	Cusick	2.8 miles West of Project Reservoir
Riverbend[2]	911	12-Apr-05	Helicopter	Jared	New territory on east bank. Labeled as Fountain Ranch in Exhibit E
Lost Creek[2]	1002	12-Apr-05	Helicopter	Ruby	
Diamond Lake	1049	12-Apr-05	Helicopter	Diamond Lake	7.1 miles Southwest of Project Reservoir
Mill Creek[2]	1172	12-Apr-05	Helicopter	Jared	
Kalispel Tribes[2]	1175	12-Apr-05	Helicopter	Cusick	
Usk Mill	1300	12-Apr-05	Helicopter	Cusick	
Newport	1301	12-Apr-05	Helicopter	Newport	
Box Canyon	1312	12-Apr-05	Helicopter	Metaline	1.0 mile North of Project Reservoir
Sullivan Lake	1465	15-Apr-05	Helicopter	Metaline Falls	5.2 miles Northeast of Project Reservoir
LeClerc DNR	1533	12-Apr-05	Helicopter	Ruby	
River Mile 82 Island	1579	12-Apr-05	Helicopter	Diamond Lake	
Everett Island South	1583	12-Apr-05	Helicopter	Skookum Creek	
Campbell's Slough	1577	12-Apr-05	Helicopter	Jared	Riverbend Nest # 2 on East bank ; Territory split
Renshaw Creek. Mouth	1580	12-Apr-05	Helicopter	Ione	
Metaline East	1581	12-Apr-05	Helicopter	Metaline	4.5 miles North of Project Reservoir
Kings Lake	1584	13-Apr-05	Helicopter	Browns Lake	3.8 miles East of Project Reservoir
Horseshoe Lake	1578	15-Apr-05	Helicopter	Fan Lake	17.6 miles Southwest of Project Reservoir

[1]Unique nest identification number maintained in WDFW database.

[2]Nest site included in District (2000).

2.0 OBJECTIVES

Under the provisions of FERC Article 407, the District will provide information that can be used by landowners to develop cooperative Standard BEMPs as needed for established nest stands, preferred perches, winter roosts, and foraging areas within the Project Boundary. BEMPs provide the basis for protecting important habitat features within individual bald eagle territories in areas where landowners wish to acquire permits to harvest timber, build, or otherwise develop lands. Annual nesting and winter use surveys are intended to provide wildlife management agencies and affected landowners information on status and productivity of specific nests and long-term data on the overall status of the population. These provisions exceed the most recent available WDFW standards that recommend monitoring sufficient to detect a 20 percent change in the number of occupied nests over a 20 year period (Stinson et al. 2001). The bald eagle provisions are also designed to ensure that bald eagle management is properly considered in other aspects of the District's operation and maintenance of the Project and implementation of other plans; address increased public awareness of bald eagle protection; and a FS Condition for specific silvicultural treatments on NFS lands inside the Project Boundary intended for future benefit of the bald eagle population.

The specific objectives of these provisions are as follows:

- Within two years, collect the survey information and provide technical assistance as needed to have completed within three years cooperative BEMPs for existing nesting territories or other regularly used habitats of importance to bald eagles associated with the Project.
- Beginning in 2007, collect and analyze bald eagle population data annually, and distribute reports that will facilitate agency and Tribal management.
- Facilitate bald eagle management by identifying potential sources of disturbance and alerting appropriate agencies or other public entities responsible for management.
- Facilitate bald eagle management by providing the agencies and Tribe with nesting data that tracks three other species of fish-eating birds associated with the Project, any observations of resource conflict between these species and bald eagles, and suggestions for changes to management if appropriate.
- Review routine Project operation and maintenance, Shoreline Management Plan, Recreation Management Plan, and Erosion Control Plan for consistency with bald eagle protection measures, and, to the extent practicable, schedule related field activities for time periods when the potential for bald eagle disturbance is low.
- Within one year, post signs and pamphlets at the District's public recreation facilities that encourage visitors to avoid disturbance of bald eagles and that describe the public's role in bald eagle protection.
- Perform silvicultural treatments as specified by FS (Condition 12) on NFS lands adjacent to the Project.

3.0 INITIAL FIELD SURVEYS AND DEVELOPMENT OF COOPERATIVE BALD EAGLE MANAGEMENT PLANS

3.1 INITIAL CONSULTATION

WDFW conducted a comprehensive bald eagle nest survey in 2005. Based on these known locations of bald eagle nests, the District will 1) determine property ownership; 2) determine whether there is an existing BEMP for each territory; and 3) contact property owners. Several bald eagle nests are known to be located on FS or Kalispel Tribal lands. Ownership of other nest sites has not been determined, but may include other public entities. An undetermined number of nests are located on private lands. To determine property ownership, the District will compare available maps showing nest locations with property maps on file with the Pend Oreille County Planning Department or the Pend Oreille County Tax Assessor. Because bald eagle territories extend beyond the nest tree, property owners within a 0.25 mile radius of each nest will also be identified and contacted.

Affected public landowners and land managers, including FS and the Kalispel Tribe, will be contacted to determine whether there are BEMPs or current survey data for nests on or within 0.25 mile of their lands and to establish whether more current survey information is needed. The District will offer to perform surveys as needed for nests on public lands.

For nest territories on private lands, the District will prefer cooperation of property owners to proceed. Although it may be possible to perform surveys of nest territories remotely (e.g., from a boat), the cooperation of the property owner to permit closer access if needed is preferable. The District will first request that any existing pertinent BEMP or survey data on file with WDFW or Pend Oreille County be reviewed by WDFW and be made available to the District for review. Based on this review the District will then contact property owners where more current survey data are needed. The District will mail these property owners an informational brochure explaining the need to survey bald eagle nesting territories as part of its new operating license, the value of participating of the recovery of the species, and the need for current survey information if the property owner plans activities that may affect nesting territories. This letter will also include a postage-paid envelope and a permission form to authorize the surveys. Property owners that are unresponsive to the mailings will be called a minimum of three times in an attempt to gain property access. If a property owner does not respond to the phone calls, or has an unlisted phone number, then a representative from the District will visit the property owner at home.

In order to begin nest surveys in 2007, property owner permissions will need to be secured in advance of the field season (April 7, 2007). The District will make a dedicated effort to contact affected property owners in a timely fashion. If a property owner is uncooperative or all methods of contact fail, the District will perform surveys of that site remotely and include the results, including GIS map products, in reports to be distributed to the reviewing agencies.

3.2 FIELD SURVEYS

In order to acquire data on current conditions and bald eagle habitat use, the District will perform field surveys at bald eagle nesting territories, winter roosts, or other areas of known importance

to bald eagles in the Project area. Bald eagle nests are conspicuous, easily documented, and characteristically used repeatedly by nesting pairs over many years. Other important habitat features within bald eagle nesting territories, such as alternate nests, preferred perch trees, and roost trees, are often less apparent, but can be determined through observation. Surveys at each nesting territory will be conducted from a stationary position (from a boat or on the ground) at a non-threatening distance using binoculars or a spotting scope. According to Logan (2002) surveys should be conducted no closer than about 750 feet to avoid influencing bald eagle behavior.

The District is unaware of any specific guidelines or recommendations regarding the length, frequency, or timing of field surveys necessary to identify preferred perches, roosts, or other regularly used bald eagle habitat elements. Comments provided by Doug Robison, WDFW representative to the Wildlife Subcommittee of the Technical Committee, include a recommendation by Jim Watson, WDFW Raptor Specialist, for the timing and duration of surveys for winter roosts, which is incorporated in this plan. Logan (2002) provides guidelines for bald eagle surveys designed to detect behaviors that may indicate disturbance (e.g., when a construction activity near a bald eagle territory is proposed); a four-hour survey beginning at dawn is recommended.

Each nesting territory will be surveyed a total of two times, once in 2007 and once in 2008; each survey will be four hours in duration and occur during the first four hours after sunrise. Surveys will be scheduled for June, when nesting birds are likely to be supporting one or more large nestling. Surveys will not be conducted under severe weather conditions (i.e., strong winds or rain).

A survey to identify winter roosts will also be conducted sometime between December 1 and February 1; the survey period will focus on the last two hours prior to darkness. Because there are no known winter roosting concentrations in the Project area, sections of the river with potential roost habitat will first be patrolled by boat in this late evening period for evidence of eagles gathering at staging areas. If a staging area is detected, the survey will continue at the location to determine the location of roost trees.

Data to be collected during each observation period will include weather conditions (temperature, wind state, visibility, and precipitation) at the beginning and end of the period, a description of bald eagle activities, and the time spent in each behavior and location. For each survey the location of the observer(s) and relative position of important habitat features and flight paths will be marked on an orthophoto or enlarged aerial photograph of the nest territory. A sketch map of the territory will also be made and site photographs will be taken to illustrate these features and other landmarks.

3.3 BEMP DEVELOPMENT

After completion of the two-year survey effort at existing nest sites, the District will prepare a detailed BEMP for any nests on District-owned lands within the Project Boundary (currently limited to a nest on the Everett Island WMA). In addition, the District will provide technical advice to participating private landowners that need to update or prepare a new BEMP for a nest

on their property. In addition, the District will submit survey data to WDFW through Wildlife Data Storage and Retrieval (WRDS, Wildlife Management, 600 Capital Way North, Olympia, WA 98501); these data are then entered into the Heritage Database and are made available to the Washington Department of Natural Resources, County Planners, and other permitting agencies.

For nesting territories on FS, Kalispel Tribe, or other public lands, the District will furnish data and GIS map products related to those territories. Each of the resulting cooperatively developed BEMPs will clearly identify the entity responsible for managing future land use activities that may affect the territory.

Watson and Rodrick (2004) suggest that BEMPs should normally encompass a habitat management zone up to 0.25 mile from a river shoreline. They also provide specific recommendations for BEMPs that will be adhered to, including protection of nest trees and other mature trees, maintaining adequate buffers around nests, guidance regarding tree cutting and other noise-producing activities or visual disturbances, protection of roosts and perches, and screening of foraging areas.

4.0 ANNUAL MONITORING

Because helicopter-based surveys provide a highly efficient means of determining nest occupancy, nest productivity, and locating new nests, the District proposes to perform annual monitoring by this technique. Furthermore, the District will invite participation in the monitoring by a WDFW biologist. Two biologists (one on either side of the helicopter) will perform monitoring surveys in tandem equipped with maps showing the previous years' locations of nests and alternate nests. Monitoring will encompass the area from Albeni Falls Dam to about one mile north of Box Canyon Dam (where a nest is currently located). The monitoring survey team will record the location of active nests and the location of eagles on or near the nests. The locations of unoccupied nests and new nests will also be recorded. A one-day helicopter survey will be conducted early in the season (April 7-25) each year to monitor nest occupancy. A second one-day helicopter survey will also be conducted each year in the period June 10-25 to assess nest productivity; during this survey the number of nestlings in each nest will be recorded. Helicopter surveys will be performed at an elevation of about 700 feet. Annual nest monitoring of bald eagles is also mandated by FS 4(e) Condition 13, for which a separate plan is included in this volume.

An annual winter use survey will also be conducted sometime between December 1 and February 1. Surveys will be conducted by boat. Previous surveys conducted by the District during this period suggest that each survey will require two days to complete. During the survey the locations of bald eagles (identified as adults or sub-adults) and their behaviors will be recorded. All location data will be entered into a Geographic Information System (GIS) database.

5.0 COORDINATION WITH OTHER PLANS

In addition to the FERC requirements described in Article 407, the District is developing other plans as required by Article 408 (Erosion Control and Monitoring), Article 409 (Shoreline Management Plan), and Article 412 (Recreation Plan), which may have implications to bald

eagle protection. As these plans are developed and implemented, they will be reviewed for consistency with bald eagle habitat management measures addressed herein. Resolution of conflicts will be focused on avoiding sensitive bald eagle habitats wherever possible, but where actions are required in proximity to these habitats, disturbance-producing activities will be scheduled for the post-nesting period (i.e., after July 15), consistent with guidelines described in Watson and Rodrick (2004). This will include erosion remediation under Article 408, which may require the use of heavy equipment to install bank protection. Similarly, an element of Article 409 requires the District to *[provide] appropriate maps showing proposed shoreline development and uses*. The District will insure that bald eagle nest or other identified important habitats are a component of these maps, in addition to mitigating potential disturbances by limiting disturbances to the post-nesting period. Finally, the provisions of Article 412 call for recreational improvements that may include land clearing activities and a potential source of disturbance to bald eagles (e.g., additional parking at Ponderay Shores boat launch). As the District finalizes its Recreation Plan and expands recreational facilities, appropriate measures to minimize impacts to bald eagle nest sites will be included.

The District will also assess the potential for bald eagle protection to be affected by routine Project operations and maintenance activities, and will, to the extent practicable, schedule these activities to have the least effect on bald eagles. Currently, there are no known bald eagle nests or other preferred use areas in proximity to Project facilities.

6.0 SIGNAGE AND BROCHURES

The District operates a small number of formal recreational facilities concentrated in the vicinity of Box Canyon Dam (Visitor Center, Campbell Park, and View Point) where signs and brochures will be posted explaining the importance of bald eagle protection and asking visitors to maintain a suitable distance from bald eagle nests. The two WMAs, although not primarily designed as recreation areas, are open to the public and will provide an additional venue for disseminating these information materials. To date, the District has not found existing material that would meet this purpose. If a standard bald eagle brochure and signage is not available from natural resource agencies, the District will prepare materials for agency review.

7.0 SILVICULTURAL TREATMENTS

The license order includes "provisions for silvicultural treatments to improve potential bald eagle nesting habitat along the reservoir between river mile 47 and river mile 90." The District understands this measure as relating to a portion of FS 4(e) Condition No.12 ("Cottonwood and Wet Shrub Habitats") that addresses specific forest treatments[1], but not including another part of the condition calling for acquisition of 25 acres of new lands or management of an equivalent acreage on existing District lands outside of the WMAs. The condition stipulates that various silvicultural treatments be undertaken by the District on NFS lands, including planting three acres of cottonwoods, thinning existing conifer stands, planting ponderosa pine, creation of

[1] The District is also undertaking other forest improvements along the reservoir between river mile 47 and river mile 90: improving potential bald eagle habitat on its WMAs, on other District-owned lands in the Project Boundary where feasible, providing assistance to private landowners interested in improving cottonwood habitat (all addressed as part of the CWMP), and expanding cottonwood stands as part of DOI Condition 7.

snags, and associated monitoring. The District will perform a field investigation of NFS lands adjacent to the Project in 2007 to locate sites where elevations and existing vegetation may be suitable, and will report findings to FS. FERC requires submission of the Site-Specific Cottonwood and Riparian Habitat Management Plan within three years of license issuance, and FS requires initial silvicultural treatments to occur prior to 2010.

8.0 REPORTING AND MEETINGS

Each year beginning in 2008 the District will prepare a report summarizing all of the activities associated with compliance with Article 407. The annual report will include a section for each of the plan aspects addressed in the CWMP. For Part 6, the report will provide data on bald eagle nest use and productivity, new nests, and any pertinent field observations related to possible resource conflicts between bald eagles and the other fish-eating species (osprey, great blue heron, and double-crested cormorant). Each annual report will include earlier population data and a trend analysis. A draft of the report will be distributed to the Technical Committee representatives by March 1. Agency and tribal representatives will have 30 days to review the draft report and to submit comments on the draft to the District. The final annual report will incorporate and address comments from members of the Technical Committee, and will be submitted to FERC no later than April 30 of each year.

Meetings of the Technical Committee to discuss aspects of CWMP compliance will be scheduled as needed. To the extent practicable, a meeting to discuss the findings of the annual report will be scheduled during the draft report review period.

9.0 BUDGET AND SCHEDULE

The budget for two years of surveys and assistance in BEMP development is estimated to be about $77,000, not including the cost of technical assistance to participating landowners, which cannot be predicted at this time. Annual monitoring is estimated at about $17,000. Landowner contacts and consultation will be initiated in November 2006, with winter use surveys to begin in January 2007, and nest territory surveys to begin in April 2007. Signage and educational materials will be posted beginning in April 2007. More detailed budget and schedule information is presented in Appendix F.

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Figure 1a. Location of Active Bald Eagle Nests in 2005.

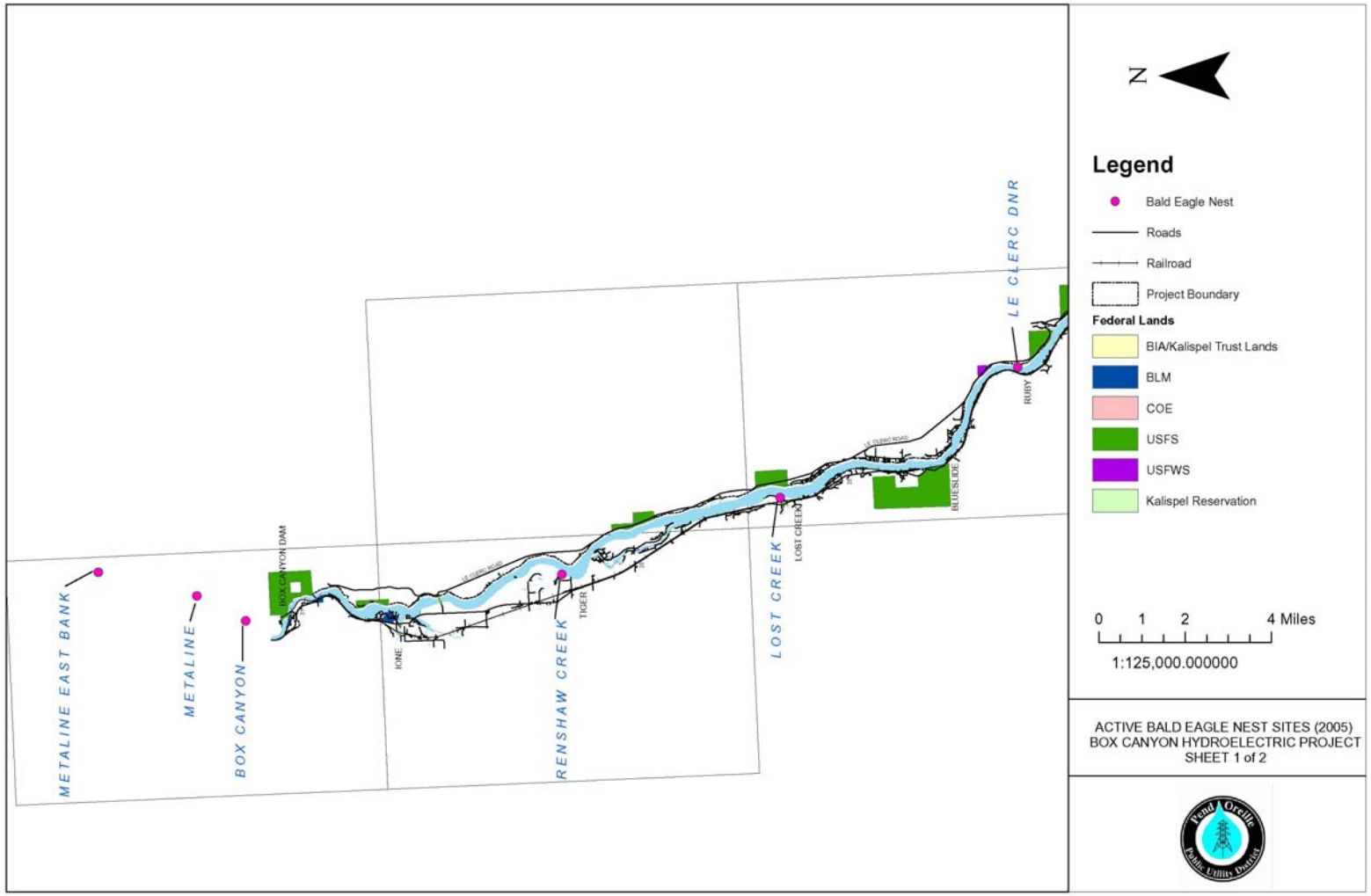
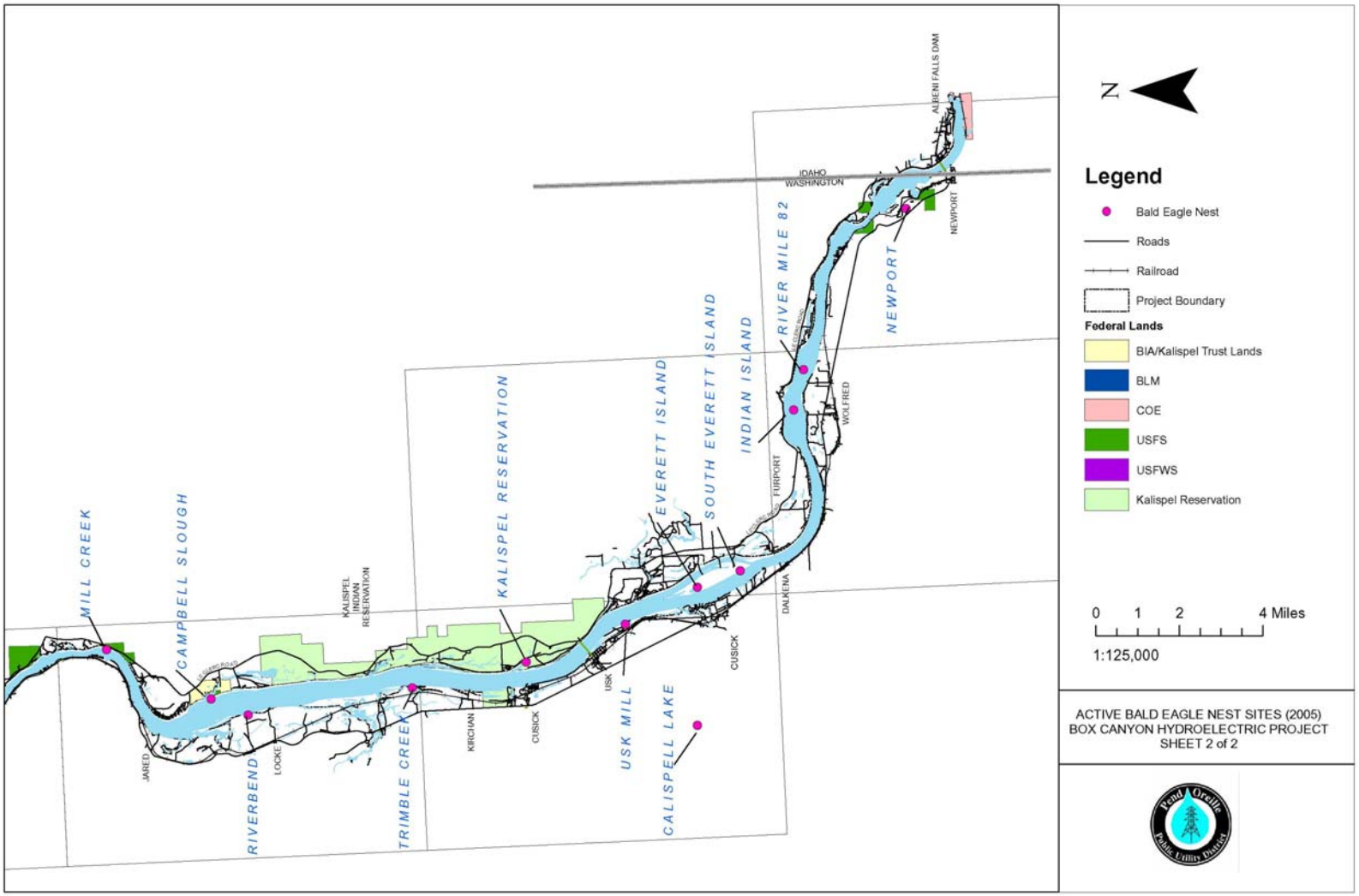


Figure 1b. Location of Active Bald Eagle Nests in 2005.



PART 7
FISH-EATING BIRD MONITORING

1.0 INTRODUCTION

The following provisions for fish-eating bird monitoring are included in compliance with License Article 407:

1. Provisions to monitor population trends of osprey and great blue heron within the project area;
2. Measures to conduct annual nesting and population surveys for osprey and great blue heron until a threshold is reached, with an appropriate threshold to be determined as part of the plan development (e.g., less than 10 percent change over a three-year period); and
3. Provisions for reporting and regular meetings with agencies and the Kalispel Tribe of Indians to review monitoring results and determine whether additional study or management action is needed.

Article 407 does not explicitly require monitoring of double-crested cormorants. However, the FS Condition No. 13 does require it, and Article 407 requires "protocols to compare results with survey information collected on osprey, great blue heron, and double-crested cormorant populations, identify areas of resource conflict, and define any necessary changes in management." (See Chapter 6, Bald Eagle Management). Accordingly, double-crested cormorant monitoring is addressed herein.

Forest Service condition No.13 (Bald Eagle/Osprey/Cormorant/Heron Monitoring) quoted below addresses essentially the same topics as those in Article 407. This section of the CWMP will harmonize the following terms of the FS condition for monitoring and reporting with the terms of Article 407:

> *The Licensee shall conduct or provide funding for a qualified wildlife biologist(s) to annually survey nests of bald eagles, osprey, double-crested cormorants, and great blue herons within the Project area. Within one year of license issuance the Licensee shall develop a monitoring plan in consultation with and approved by the USDA Forest Service to guide these activities. Monitoring shall include nest use and productivity, specific searches for new nests, and any pertinent field observations related to resource partitioning / competition between cormorants and the other species.*
>
> *The Licensee shall complete an annual report that includes the above data, as well as the population status of each species across the Project area. Monitoring reports shall be provided to the USDA Forest Service within 60 days of the end of the calendar year.*

> *If monitoring reveals that cormorants are increasing in the Project area with a coincident, threshold reduction in any of the other species, the Licensee shall consult with the USDA Forest Service on these findings, and assist in determining the specific direct or indirect effects the cormorants are having on the other birds (if any), and what measures should be taken to mitigate those impacts. If mitigation measures are needed to reduce affects to the other species, the Licensee shall undertake any that are related to habitat enhancement for the affected species within the Project area (such as the creation of supplemental nest or perch sites).*

The District will perform nest surveys for osprey (*Pandion haliaetus*), great blue heron (*Ardea herodias*), and double-crested cormorant (*Phalacrocorax auritus*) populations within the Project area. Ospreys typically nest in the tops of trees, on rock pinnacles, and on various man-made structures up to considerable distances from the water. Osprey nests occur throughout the Project area, with a substantial concentration of nest sites on abandoned river pilings near the town of Usk, Washington. Surveys conducted by the District during Project relicensing indicated that there were 73 osprey nests in 1999 (District 2000).

Great blue herons typically nest in communal aggregations (rookeries) in evergreen or deciduous trees, but occasionally nests in low-lying bushes or in artificial structures (Quinn and Milner 2004). During Project relicensing there were two known rookeries in the vicinity of the Project, at Campbell Slough on FS land, which is directly adjacent to the river, and south of Usk on private land, about 0.4 miles from the Project. The Usk rookery was by far the largest rookery in the area, with 142 active nests documented in 1999. Logging around the Usk rookery caused its temporary abandonment in 2001 and there were just "several" active nests in 2004 (WDFW 2006). The Campbell Slough rookery reportedly had 19 active nests in 2004 (WDFW 2006).

Double-crested cormorant is also a communal nester, occurring along sea coasts, large rivers, lakes, and reservoirs. Nests may be located in trees, on cliffs or rock ledges, or on other elevated structures. Surveys conducted by the District during Project relicensing indicated there were 128 nests in 1999 (District 2000).

2.0 OBJECTIVES

The overall objective of these surveys is to monitor the nesting populations of the three target species (osprey, great blue heron and double-crested cormorant) associated with the Project, document the establishment of new nests, provide population status reports to the reviewing agencies and Tribe.

3.0 MONITORING

The focus of the monitoring efforts will be the use of nesting locations that are closely associated with the Project, such as abandoned river pilings and trees along the Pend Oreille River between Albeni Falls Dam and Box Canyon Dam. The target species may also use nest sites removed from the vicinity of the Project. However, because the area removed from the Project is under a variety of private and public ownerships (including areas subject to logging and other land use

practices), and is unaffected by Project operations, this area will not be surveyed for nests. The monitoring area is likely to encompass the great majority of nest sites of osprey and double-crested cormorants that feed in the Project area. The current status and location of great blue heron nesting is not known. Possibly, new great blue heron rookeries were established in the vicinity of the Project after the Usk rookery was largely abandoned as a result of logging. However, it is also possible that the birds moved to rookeries much farther from the Project, in which event it would be impractical and unrelated to the objectives of the study to monitor their nesting.

Monitoring surveys will be conducted annually, appropriately scheduled to document nesting by each of the target species. The optimal timing of surveys may vary annually but previous survey efforts and guidance from the literature (District 2000) suggest that surveys any time in June would be appropriate for osprey, early June for great blue heron, and late June for double-crested cormorant. Because double-crested cormorants tend to nest asynchronously, surveys will be scheduled for a time period when the entire nesting population is likely to have young in the nest. Prior to each annual survey, the District will make spot observations of the target species to adjust survey timing as needed.

Osprey nests will be surveyed by boat[1]. All active nests visible from the boat will be documented, with locations photographed and noted on an orthophoto. If nestlings can be counted, their presence will also be recorded. Observed osprey behaviors will be documented.

Double-crested cormorant nests will be surveyed by boat or from other locations where feasible (e.g., from the Usk bridge) using binoculars and spotting scope. Nest locations will be recorded for inclusion in a GIS database and the number of nestlings, if apparent, will also be noted, along with observed behaviors.

Because the known great blue heron nests are located within forested areas, nest observations are more difficult. During relicensing surveys the District was able to count the number of herons at the Campbell Slough rookery using a spotting scope and binoculars from a position on the Flying Goose Ranch. This approach avoids disturbance of nesting birds, but tends to sacrifice accuracy. More accurate counts of active nests will require visitation to the rookery where concentrations of fecal staining, egg shells, and other debris, as well as the presence of adults or nestlings provide the best evidence of active nests (Butler, 1992, Vennesland and Norman, 2004). There is little scientific evidence that human disturbance causes substantial harm to herons (Nisbet 2000); nonetheless, to minimize the potential for harm, surveys will be conducted annually in early June, after incubation and hatching have occurred. Observations of nestlings will be recorded, but counts are likely to be incomplete because viewing opportunities may not be ideal. The District does not propose to survey the Usk rookery, if still active, because its status is entirely unrelated to the Project. The District will also be vigilant during bald eagle helicopter surveys (see Chapter 6), the osprey survey, and other field efforts for indications (particularly

[1] Because bald eagle nest monitoring is being performed by helicopter it may be feasible to also collect information on osprey nests at the same time. The District will test the practicality of this approach during the bald eagle monitoring in 2007.

recurrent flights by great blue herons away from the Project) that suggest the presence of other rookeries in the monitoring area that may require future surveys.

The goal of the surveys is not a complete census of any of the species. A census would require some means of tracking or differentiating individual birds, including non-breeding adults and sub-adults over a very large area. For each of the species, counts of active nests will be assumed to be equivalent to at least half the number of adults in each population.

The District is not proposing a threshold for assessing population change in any of the target species until there is a sufficient body of monitoring data to demonstrate population trends, as well as to understand normal annual fluctuations in these populations. However, if future monitoring results appear to support a reduction in monitoring frequency, the District will consult with the agencies and Tribe, and report to FERC to discuss the issue. No change in monitoring frequency would be instituted without uniform consent.

4.0 REPORTING AND MEETINGS

Each year beginning in 2008 the District will prepare a report summarizing all of the activities associated with compliance with Article 407. The annual report will include a section for each of the plan aspects addressed in the CWMP. For Part 7, the report will provide data on the population status of the target species, and any pertinent field observations related to possible resource conflicts between bald eagles and the other fish-eating species (osprey, great blue heron, and double-crested cormorant). Each annual report will include earlier population data and a trend analysis. A draft of the report will be distributed to the Technical Committee representatives by March 1. Agency and tribal representatives will have 30 days to review the draft report and to submit comments on the draft to the District. The final annual report will incorporate and address comments from members of the Technical Committee, and will be submitted to FERC no later than April 30 of each year.

Meetings of the Technical Committee to discuss aspects of CWMP compliance will be scheduled as needed. To the extent practicable, a meeting to discuss the findings of the annual report will be scheduled during the draft report review period. At the completion of a three-year monitoring cycle, the District will meet with resource agencies and the Kalispel Indian Tribe to guide future monitoring efforts. If osprey or great blue heron populations exhibit a substantial decrease (>20%) the District will consult with the agencies and the Tribe to determine the need for additional studies or management actions.

5.0 BUDGET AND SCHEDULE

The budget for the first four years of annual nesting surveys is estimated at about $39,000, not including the costs associated with developing and producing annual reports. The first surveys will be conducted in June 2007. More detailed budget and schedule information is presented in Appendix F.

6.0 LITERATURE CITED

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Washington Department of Fish and Wildlife (WDFW). 2006. Results of Priority Habitats and Species query. Submitted March 6, 2006.

FOREST SERVICE 4(E) CONDITION 12

COTTONWOOD AND WET SHRUB HABITATS[1]

1.0 INTRODUCTION

FS 4(e) Condition 12 requires the following:

> *Habitat Protection / Restoration: Within three years of license issuance, the Licensee shall provide for the protection / restoration of at least 14 acres of cottonwoods and at least 11 acres of riparian shrub habitat in the Project area. Lands owned by the Licensee may be used for this purpose, but shall not include their wildlife management areas (WMAs) purchased to meet the terms of the Settlement Agreement. Protected / restored lands shall be dedicated to wildlife habitat over the term of the new license. To the extent possible, lands shall be protected / restored in one block. Additional acreage of cottonwoods may be substituted for riparian shrub habitat.*
>
> *Within one year of dedicating the above property, the Licensee shall develop and implement a site-specific habitat management plan. The plan shall be developed in consultation with and approved by the USDA Forest Service and filed with the Commission. The plan shall detail how the parcel will be managed to maintain, restore, or promote mature habitat conditions by the end of the new license term. Effectiveness monitoring shall be incorporated into the plan to determine whether management is creating habitat components for beavers, cavity excavators, raptors, great blue heron, migratory songbirds and sensitive plants.*
>
> *Cottonwood Restoration on National Forest System Lands: The Licensee shall restore three acres of cottonwoods on National Forest System lands in the Project area. Cuttings and / or rooted stock will be collected locally and planted. The Licensee shall monitor survival of plantings annually for a minimum of five years, or as long as necessary to achieve an 80% survival rate. If 80% survival is not achieved, the Licensee shall conduct additional replanting and / or protect plantings from moderate to severe hedging until this objective is achieved. The Licensee shall cage existing young cottonwoods present in the habitat to be restored in order to protect them from browse damage and assist in the restoration effort.*
>
> *Maintenance of Alternate Mature Tree Habitat on National Forest System Lands: The Licensee shall complete habitat improvements on National Forest System lands to enhance or maintain alternate mature tree habitat (conifers) for bald eagles and other wildlife species within the Project area. All improvements shall*

[1]Because the schedule does not require a plan until 2008, this text is intended only to present the terms of the condition, the District's approach to compliance, and a schedule for development of the plan.

be completed in coordination with and approved by the USDA Forest Service. In general the Licensee shall:

- *Remove trees from 0 - 6" dbh from around large (20+" dbh) ponderosa pines growing within the Riparian Habitat Conservation Area (RHCA) of the Project area. This treatment shall occur within an area extending from the tree bole to 10 feet beyond the drip line of each tree.*
- *Plant widely spaced ponderosa pine trees in upland openings or other areas where over-story trees are lacking within the RHCA,*
- *Pre-commercially thin (14' x 14'spacing) or under-burn through conifer stands located within the RHCA.*
- *Create snags from selected live conifers. Trees will be selected so as to reduce competition for neighboring dominant trees (alternate mature tree habitat). Treatments could include chainsaw topping, top girdling, or stem inoculation. Preferred species to treat will be lodgepole pine and western larch.*

Exhibit No. 1 to Condition Number 12 displays habitat improvements to be completed on National Forest System lands within the Project area.

Activity	*Units*	*Initial Treatment*	*Follow-up Treatment*
Plant cottonwoods	*3 acres*	*within 5 years of license issuance*	*As needed to produce target acreage within 15 years*
Cage existing cottonwood seedlings/saplings	*50 cages*	*within 5 years of license issuance*	*Move cages as needed*
Pre-commercial thin around large pines	*17 trees*	*within 5 years of license issuance*	*Re-treat 15 years after license issuance if necessary*
Plant pine trees	*100 trees*	*within 5 years of license issuance*	*Monitor and evaluate the need for replanting as stated below*
Pre-commercial thin and /or underburn	*24 acres total*	*within 5 years of license issuance*	*Re-treat 20 years after license issuance if necessary*
Create snags	*17 trees*	*within 5 years of license issuance*	*Create an additional 17 trees 15 years after license issuance*
Monitoring	• *Snags/perch trees – monitor use twice annually (once in winter, once in nesting season) for ten years.* • *Plantings – monitor annually until survival standards are met. Also, evaluate the need for caging or replanting.* • *Caging – monitor annually as needed, evaluate the need to move cages to smaller plants as necessary.* • *Thin/underburn – monitor for two years after treatment, evaluate the need to repeat treatment after 20 yrs.*		

2.0 APPROACH

The "Habitat Protection/Restoration" section of FS Condition No.12 describes measures that must be implemented on 25 acres of District-owned lands (Usk property and Finch property), not including the WMAs, to the extent feasible, as discussed in the CWMP, Part 2, which includes a

preliminary analysis of areas that might support cottonwoods. Results of that analysis, including the results of test plantings of cottonwoods at a variety of elevations, will determine whether the lands owned by the District will be suitable for these purposes. Alternatively, the terms of the condition may be met by restoring habitats on state lands or by protecting existing habitats on private land through a conservation easement.

The other two sections of the condition address measures to be completed on NFS lands. To identify potentially suitable locations, the District will conduct a comprehensive review of NFS lands within and adjacent to the Project, including field examination of potentially suitable sites. The District will complete any required NEPA analyses for the silvicultural projects on NFS lands, and will integrate these projects with, and maintain consistency with other plans for erosion control, noxious weeds, cultural resources, and sensitive species.

The District welcomes the opportunity to work with the FS in regards to the planning and implementation of the silvicultural projects on NFS lands. Because FS has local personnel with expertise in completing similar projects, the District would be interested in setting up a cost-share project wherein the District would fund the labor, supplied by FS personnel, and FS would fund and procure supplies and materials.

3.0 SCHEDULE

FERC Article 401 requires the District to file a plan for implementation of this condition, including site-specific management plan for protected/restored habitats, within three years of license issuance (i.e., prior to July 11, 2008). The schedule for compliance with this condition also stipulates that habitat protection/restoration on District lands be implemented within three years of license issuance, and that habitat improvements on NFS lands be initiated within five years of issuance of the license (i.e., by 2010). Consistent with Article 407, Part 2 (Cottonwood Enhancement Outside of the WMAs) the District will identify areas where cottonwoods can be planted and have a schedule for planting on its Usk and Finch properties by July 2007. The District will evaluate potential sites for implementing measures on NFS lands, report findings to FS, consult with FS by August 2007, and proceed with initial silvicultural treatments by 2010.

FOREST SERVICE 4(E) CONDITION 13

BALD EAGLE, OSPREY, CORMORANT, AND HERON MONITORING PLAN

1.0 INTRODUCTION

FS 4(e) Condition 13 requires the following:

> *The Licensee shall conduct or provide funding for a qualified wildlife biologist(s) to annually survey nests of bald eagles, osprey, double-crested cormorants, and great blue herons within the Project area. Within one year of license issuance the Licensee shall develop a monitoring plan in consultation with and approved by the USDA Forest Service to guide these activities. Monitoring shall include nest use and productivity, specific searches for new nests, and any pertinent field observations related to resource partitioning / competition between cormorants and the other species.*
>
> *The Licensee shall complete an annual report that includes the above data, as well as the population status of each species across the Project area. Monitoring reports shall be provided to the USDA Forest Service within 60 days of the end of the calendar year.*
>
> *If monitoring reveals that cormorants are increasing in the Project area with a coincident, threshold reduction in any of the other species, the Licensee shall consult with the USDA Forest Service on these findings, and assist in determining the specific direct or indirect effects the cormorants are having on the other birds (if any), and what measures should be taken to mitigate those impacts. If mitigation measures are needed to reduce affects to the other species, the Licensee shall undertake any that are related to habitat enhancement for the affected species within the Project area (such as the creation of supplemental nest or perch sites).*

This plan parallels requirements of License Article 407 to perform nest monitoring of bald eagle and other fish-eating birds, report results, and consult with the agencies and Tribe.

The District will perform nest surveys for bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), great blue heron (*Ardea herodias*), and double-crested cormorant (*Phalacrocorax auritus*) populations within the Project area. Bald eagles nest in large trees near water. The most recent data from WDFW (April 2005) indicate that there were a total of 14 active bald eagle nests in the Project area, four of which were new as of 2005 (Figure 1, Table 1). This compares to 6 nests documented in the same reach in 1999. Two of the current nests in the Project area (Mill Creek and Campbell Slough) are located on lands administered by FS.

Ospreys typically nest in the tops of trees, on rock pinnacles, and on various man-made structures up to considerable distances from the water. Osprey nests occur throughout the

Project area, with a substantial concentration of nest sites on abandoned river pilings near the town of Usk, Washington. Surveys conducted by the District during Project relicensing indicated that there were 73 osprey nests in 1999 (District 2000).

Great blue herons typically nest in communal aggregations (rookeries) in evergreen or deciduous trees, but occasionally nests in low-lying bushes or in artificial structures (Quinn and Milner 2004). During Project relicensing there were two known rookeries in the vicinity of the Project, at Campbell Slough on FS land, which is directly adjacent to the river, and south of Usk on private land, about 0.4 miles from the Project. The Usk rookery was by far the largest rookery in the area, with 142 active nests documented in 1999. Logging around the Usk rookery caused its temporary abandonment in 2001 and there were just "several" active nests in 2004 (WDFW 2006). The Campbell Slough rookery reportedly had 19 active nests in 2004 (WDFW 2006).

Double-crested cormorant is also a communal nester, occurring along sea coasts, large rivers, lakes, and reservoirs. Nests may be located in trees, on cliffs or rock ledges, or on other elevated structures. Surveys conducted by the District during Project relicensing indicated there were 128 nests in 1999, all located on abandoned river pilings (District 2000).

Known interactions between the target species at other locations include food robbing by bald eagles from osprey and predation by bald eagles on great blue heron nestlings (Butler 1997, Kushlan and Hafner 2000). The location of bald eagle nests near great blue heron rookeries sometimes results in rookery abandonment. Bald eagles are also known to displace osprey from nest sites. In the 1999 survey of the Project area, double-crested cormorants nested where there are clusters of abandoned river pilings. Ospreys also used these pilings, as well as trees and pilings not located in clusters.

2.0 MONITORING

The focus of the monitoring efforts will be the use of nesting locations that are closely associated with the Project, such as abandoned river pilings and trees along the Pend Oreille River between Albeni Falls Dam and Box Canyon Dam. The target species may also use nest sites removed from the vicinity of the Project. However, because the area removed from the Project is under a variety of private and public ownerships (including areas subject to logging and other land use practices), and is unaffected by Project operations, this area will not be surveyed for nests. The monitoring area is likely to encompass the great majority of nest sites of osprey and double-crested cormorants that feed in the Project area. The current status and location of great blue heron nesting is not known. Possibly, new great blue heron rookeries were established in the vicinity of the Project after the Usk rookery was largely abandoned as a result of logging. However, it is also possible that the birds moved to rookeries much farther from the Project, in which event it would be impractical and unrelated to the objectives of the study to monitor their nesting.

Monitoring surveys will be conducted annually, appropriately scheduled to document nesting by each of the target species. The optimal timing of surveys may vary annually but previous survey efforts (District 2000) suggest that surveys any time in June would be appropriate for bald eagle and osprey, early June for great blue heron, and late June for double-crested cormorant. Because

double-crested cormorants tend to nest asynchronously, surveys will be scheduled for a time period when the entire nesting population is likely to have young in the nest. Prior to each annual survey, the District will make spot observations of the target species to adjust survey timing as needed.

Osprey nests will be surveyed by boat[1]. All active nests visible from the boat will be documented, with locations mapped and noted on an orthophoto. If nestlings can be counted, their presence will be recorded. Observed osprey behaviors will also be documented.

Double-crested cormorant nests will be surveyed by boat or from other locations where feasible (e.g., from the Usk bridge) using binoculars and spotting scope. Nest locations will be recorded for inclusion in a GIS database and the number of nestlings, if apparent, will also be noted, along with observed behaviors.

Because the known great blue heron nests are located within forested areas, nest observations are more difficult. During relicensing surveys, the District was able to count the number of herons at the Campbell Slough rookery using a spotting scope and binoculars from a position on the Flying Goose Ranch. This approach avoids disturbance of nesting birds, but tends to sacrifice accuracy. More accurate counts of active nests will require visitation to the rookery where concentrations of fecal staining, egg shells, and other debris, as well as the presence of adults or nestlings provide the best evidence of active nests (Butler 1992, Vennesland and Norman 2004). There is little scientific evidence that human disturbance causes substantial harm to herons (Nisbet 2000); nonetheless, to minimize the potential for harm, surveys will be conducted annually in early June, after incubation and hatching have occurred. Observations of nestlings will be recorded, but counts are likely to be incomplete because viewing opportunities may not be ideal. The District does not propose to survey the Usk rookery, if still active, because its status is entirely unrelated to the Project. The District will also be vigilant during other field surveys for indications (particularly recurrent flights by great blue herons away from the Project) that suggest the presence of other rookeries in the monitoring area that may require future surveys.

The goal of the survey is not a complete census of any of the species. A census would require some means of tracking or differentiating individual birds, including non-breeding adults and sub-adults over a very large area. For each of the species, counts of active nests will be assumed to be equivalent to at least half the number of adults in each population.

The monitoring survey is not specifically designed to collect behavioral data, except as observed incidentally. Because the schedule for field efforts is designed to document nest occupancy, not pre-nesting activities, observations of behaviors related to nest site selection are not anticipated.

[1] Because bald eagle nest monitoring is being performed by helicopter it may be feasible to also collect information on osprey nests at the same time. The District will test the practicality of this approach during the bald eagle monitoring in 2007.

3.0 INTERPRETATION OF MONITORING DATA

The District is not proposing a threshold for assessing population change in any of the target species until there is a sufficient body of monitoring data to demonstrate population trends, as well as to understand normal annual fluctuations in these populations. However, if monitoring results indicate progressive decline or a substantial annual decrease (>20%) in the bald eagle, osprey, or great blue heron nesting populations, and there is a corresponding increase in the double-crested cormorant population, the District will consult with the FS, the other agencies and the Tribe to determine the need for additional data or management actions. Because the District does not have management authority over the river pilings where all of the double-crested cormorants and the majority of ospreys currently nest, the District would have limited options for management of these species, but could provide supplemental platforms for osprey nests on District lands. The District is undertaking significant measures to increase the extent and quality of riparian woodlands under the provisions of FERC Article 407, FS Condition No.12, and DOI Condition No.7. These measures should eventually substantially increase the availability of potential nest sites for the target species.

4.0 REPORTING

Each year beginning in 2008 the District will prepare a report summarizing compliance with the condition. The annual report will include data on the population status of the target species, and any pertinent field observations related to possible resource conflicts between the species. Each annual report will include earlier population data and a trend analysis. Because the District will also be reporting the results of monitoring the target species as part of Article 407 of the license order, the District requests that FS revise the reporting requirement to allow a single report on the same schedule as provided under License Article 407. Under this schedule, a draft of the report would be distributed to FS and other members of the Technical Committee representatives by March 1. Agency and tribal representatives would then have 30 days to review the draft report and to submit comments on the draft to the District. The final annual report would incorporate and address comments from members of the Technical Committee, and would be filed with FS and FERC no later than April 30 of each year.

5.0 SCHEDULE

The first nesting surveys for osprey, great blue heron, and double-crested will be conducted in June 2007. Bald eagle nesting surveys will be conducted in April and June each year, beginning in 2007.

6.0 LITERATURE CITED

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DEPARTMENT OF INTERIOR 4(E) CONDITION 7

REPLACEMENT OF HABITATS ON KALISPEL RESERVATION

1.0 INTRODUCTION

DOI 4(e) Condition 7 presents the following terms:

> *A. Within 1 year after license issuance, the Licensee, in collaboration with the Kalispel Indian Tribe ("Tribe"), shall identify:*
>
> *1. 6 acres of sandbar habitat on the Kalispel Indian Reservation (KIR), or other lands owned by the Tribe, that are capable of producing a cottonwood riparian community.*
>
> *2. Lands on the KIR, or other lands owned by the Tribe, that are suitable for replacing the following habitat values lost on the KIR:*
>
> *a. Deciduous Forest - 8 AAHUs*
> *b. Pond - 8.47 AAHUs*
> *c. Emergent and/or wet Grassland - 65.89 AAHUs*
>
> *If it is impossible to replace lost habitat values on the KIR, or on other lands the Tribe owns, the District may use lands it owns after receiving concurrence from the Secretary of the Interior and the Tribe.*
>
> *B. Within 1 year after identifying lands described in paragraph (A), the Licensee shall, in collaboration with the Tribe, develop a scope of work for the restoration, enhancement, and annual operation and maintenance of cottonwood habitat and other habitat values identified pursuant to the requirements of paragraph (A).*
>
> *C. The Licensee shall implement the scope of work developed pursuant to paragraph (B) and report all efforts and progress made toward achieving cottonwood restoration and target AAHUs in the Annual Report required by Condition No. 1.*

2.0 APPROACH

The use of AAHUs (average annualized habitat units) in Paragraph A(2) of the condition to measure compliance poses problems with implementation. This approach requires that habitat value be defined according to an associated HSI (habitat suitability index) model. Optimum conditions for each variable are specified in the model and only actions that positively affect variables in the model are credited with increasing habitat value. Habitat units (HUs) are the product of habitat value (SI, as defined by the model) and the extent (acreage) of the habitat. The AAHUs for a given habitat represent the arithmetic mean of the HUs for every year over some specified period of years. Simply stated, the objective of management is to sufficiently increase habitat value within a sufficient acreage to reach the target habitat units. For example,

attaining the highest habitat value (SI = 1.0) over an acre of habitat would yield 1.0 HU, as would a lower habitat value over a larger area (e.g., [SI = 0.25] * [4.0 acres] = 1.0 HU). This management approach is credible if the habitat models are accurate and valid for the management location. However, this approach will be flawed if management for the model variables will not achieve empirical habitat value for target species, has unintended and undesirable consequences, or is inconsistent with other management objectives.

Review of the HSI habitat models associated with this condition indicates that the native amphibian model does not accurately describe habitat suitability for the target species. The model assigns highest suitability to permanently flooded sites representing as much as 35 percent of total area, despite the likelihood that such a habitat would also support fish or bullfrogs. Thus, managing for the model will not achieve the desired results and will have unintended and undesirable consequences. Similar unintended consequences would result from implementation using the muskrat model for "emergent" habitat, which accurately describes bullfrog habitat. Also problematic, two of the habitat types are represented by more than one model. "Pond" is represented by both muskrat and native amphibians, and "deciduous forest" is represented by both beaver and bald eagle, providing unclear and conflicting management guidance.

Regarding the requirements of Paragraph A(1) of the condition, it was also determined that there do not now exist on Tribal lands "6 acres of sandbar habitat…capable of producing a cottonwood riparian community" (sandbar habitat was defined as a depositional area with little or no vegetation). However, there exist other Tribal lands where cottonwood stands might be expanded or restored, and other sites formerly in agricultural use where new stands might be established.

During discussions of these issues at the March 27, 2006 and subsequent Wildlife Subcommittee meetings, the District proposed consideration of an array of management measures that would achieve the underlying intent of the condition to provide and maintain desired habitats, but circumventing the problems with compliance detailed above. Habitat projects implemented under the condition would entail the development, enhancement, restoration, stabilization, or maintenance of desired habitats. The following examples are illustrative:

- Restoration of a cottonwood stand lost because of livestock grazing near the mouth of Cee Cee Ah Creek.
- Bank stabilization to protect an existing cottonwood stand on Tribal lands north of the Tacoma Creek WMA from future erosion.
- Creation of seasonally or semi-permanently flooded habitats designed to be suitable for native amphibian breeding.
- Expansion of existing cottonwood stands and development of new stands.
- Other types of vegetation management, such as removal of black hawthorn and management for waterfowl nesting, goose brood foraging habitat, and camas fields.

As agreed at the March 27, 2006 meeting, the Kalispel Natural Resources Department provided maps showing locations where habitat projects that meet the requirements of DOI Condition No.7 could be implemented. The District has attached these maps (see Figure 1) of five

locations on Tribal lands including a total of about 142 acres, in compliance with the requirement to identify lands that will be the basis for this condition. Additional Tribal lands where habitat projects could be implemented were identified at a February 8, 2007 meeting among the parties (see Figure 2a and 2b). The total area identified is now approximately 650 acres.

The terms permit the condition to be implemented on District lands "*if it is impossible to replace lost habitat values on the KIR, or on other lands the Tribe owns;"* however, the parties would prefer that implementation occur on Reservation lands so that the Tribe has free access to the lands and can conduct traditional practices (Entz, personal communication, March 27, 2006).

Rather than using AAHUs to measure compliance with Paragraph A(2), the parties agree to substitute 2 acres of in-kind habitat for each identified AAHU that is replaced by restoration and enhancement actions, and 3 acres of in-kind habitat for each AAHU protected by management actions. For example, bank stabilization to protect an existing, 6-acre mature cottonwood stand would be counted as 2 AAHUs of the required total 8 AAHUs of deciduous forest, whereas creation of 4 acres of native amphibian habitat would be measured as 2 AAHUs of the required total 8.47 AAHUs of pond habitat. Additionally, we agree that the AAHUs set aside for emergent and/or wet grassland habitats may be exchanged in total or in part for the other habitats specified in Paragraph A(2) (deciduous forest and pond) at a ratio of one AAHU: one AAHU, to be replaced at the acres to AAHU ratios (i.e., 2:1 or 3:1) as discussed above.

The habitat measures will be implemented on the lands that have been identified. However, if further analyses to develop the implementation plan indicate that these lands are insufficient in extent, additional lands may be specified by the Tribe for inclusion in the plan by agreement of the parties.

"Deciduous forest" in Paragraph A(2) will be understood to mean stands of cottonwood. "Pond" habitat will be understood to mean habitat suitable for native amphibian breeding, but unsuitable for bullfrogs (i.e., seasonally flooded emergent or scrub-shrub wetlands). Habitat standards for native amphibian habitat will be consistent with those described in Section 8.1 of the CWMP, which were derived from a review of native amphibian habitats in the Pend Oreille River valley and published accounts of the target species. "Emergent" and "wet grassland" will be understood to mean various seasonally wet or saturated, grassy or herb-dominated habitats where surface flooding, if it occurs, is limited to shallow water and short periods of duration. These habitats are intended to be suitable for upland waterfowl (i.e., mallard or Canada goose) nesting, goose brood foraging, or camas fields, and so will not include lands at elevations subject to persistent flooding.

All active habitat improvement measures (restoration, enhancement, and protection actions) will be completed by 2017 and maintained for the term of the license. Standards to evaluate the quality of habitats will be defined in the implementation plan and will be based on attaining the highest achievable level of similarity to biotic conditions (vegetation characteristics, and use by small mammals, breeding birds, and amphibians) at reference sites used in the Kalispel Tribe's Albeni Falls Wildlife Monitoring and Evaluation Plan, or other reference sites used for evaluation purposes in Part 1 of the CWMP. The implementation plan will also include

provisions for maintaining habitats free of conflicting land uses under a memorandum of understanding or conservation easement to be held by a third party.

3.0 SCHEDULE

Within two years of issuance of the License, the final version of the 4(e) Condition 7 implementation plan will be completed and will identify the types of measures to be implemented, locations of lands where each type of habitat measure can be implemented, and a scope of work and budget to implement these actions. The District will consult with the Tribe in the development of specific plans for habitat management under this condition beginning in January 2007. By July 2007, specific plans for implementing habitat measures will be finalized in collaboration with the Tribe and will be submitted to DOI and FERC.

Figure 1a. Locations where DOI 4(e) Condition 7 could be implemented.

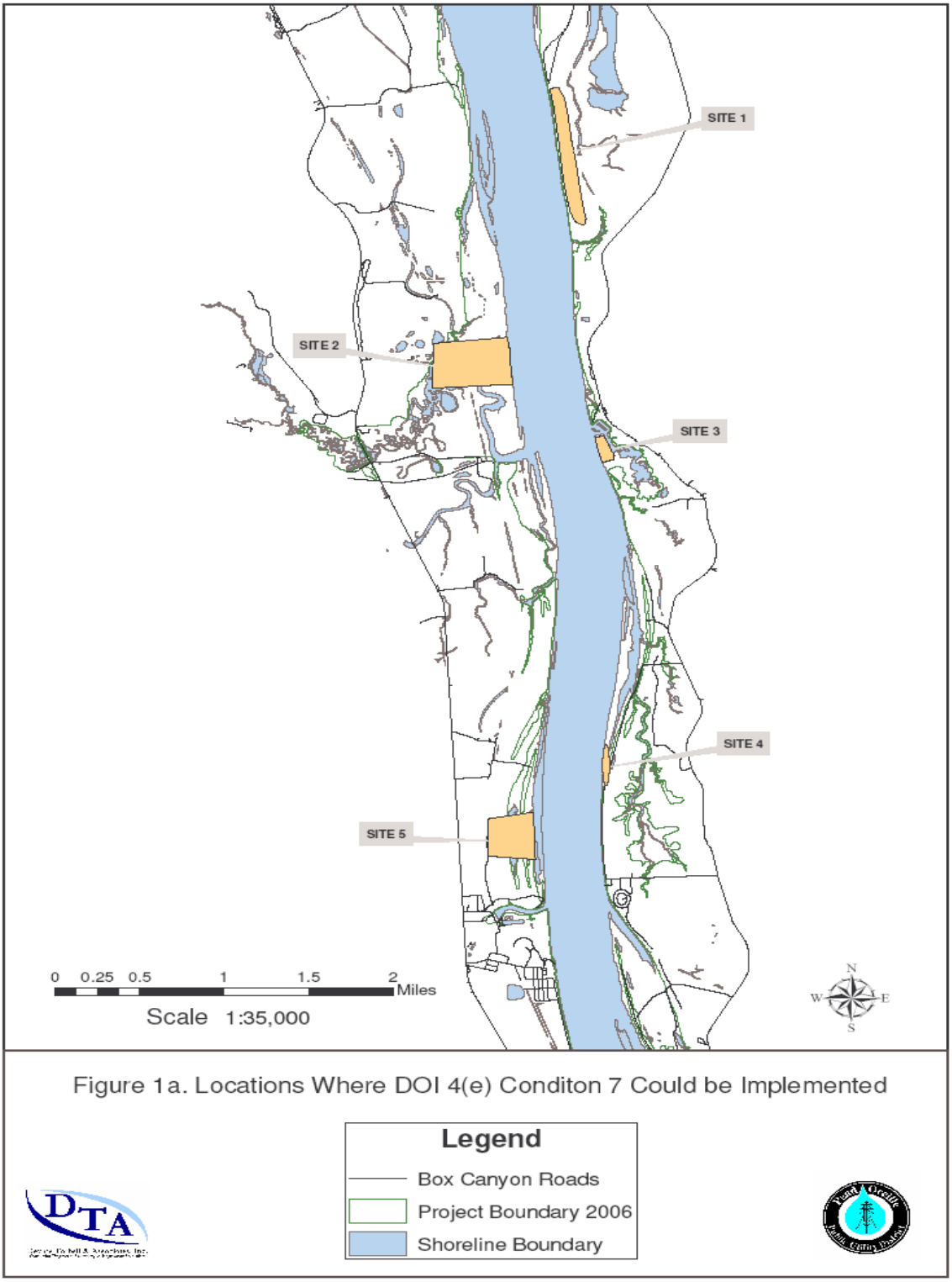

Figure 1b. Site 1

Figure 1c. Site 2

Figure 1d. Site 3

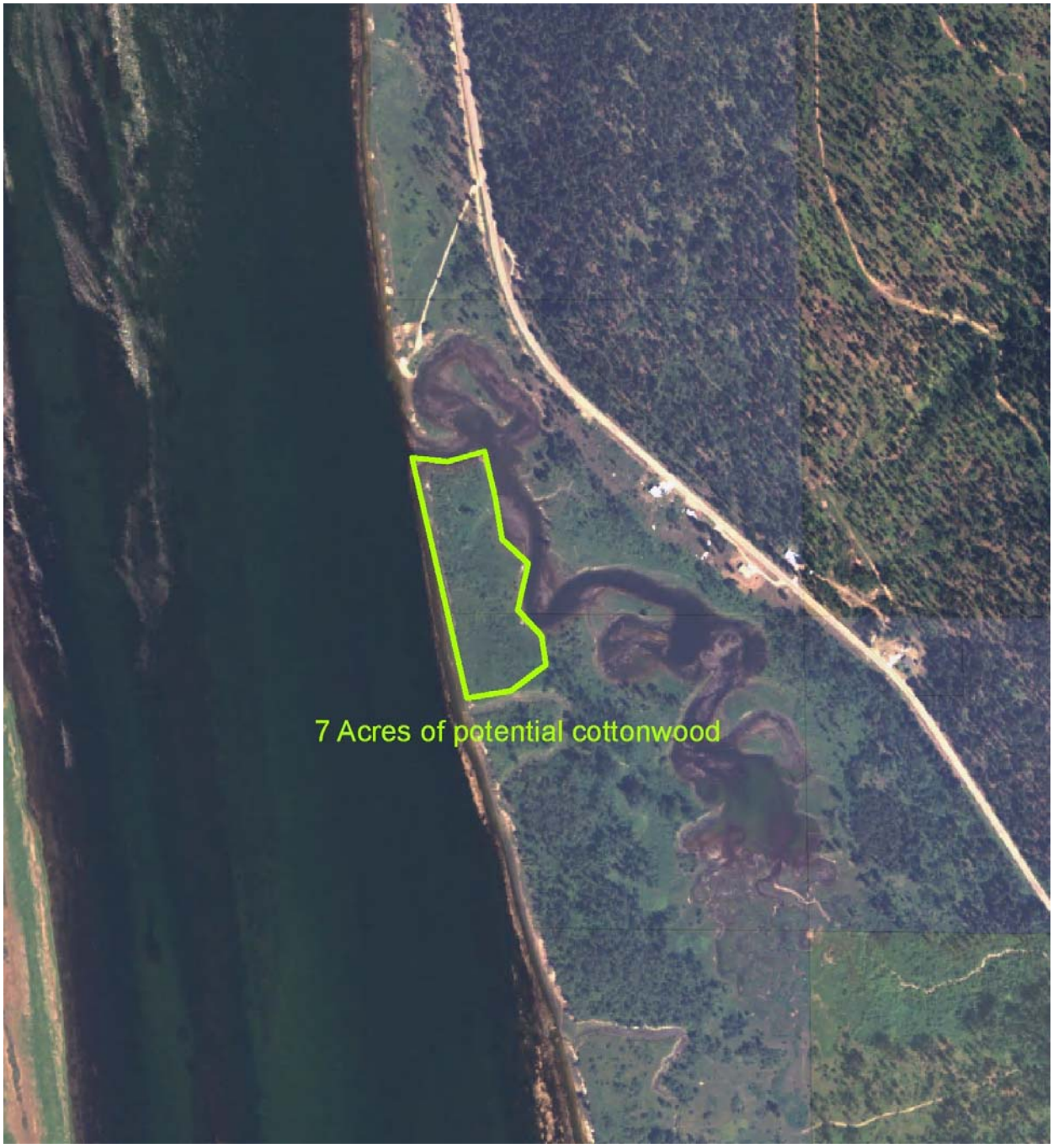

Figure 1e. Site 4

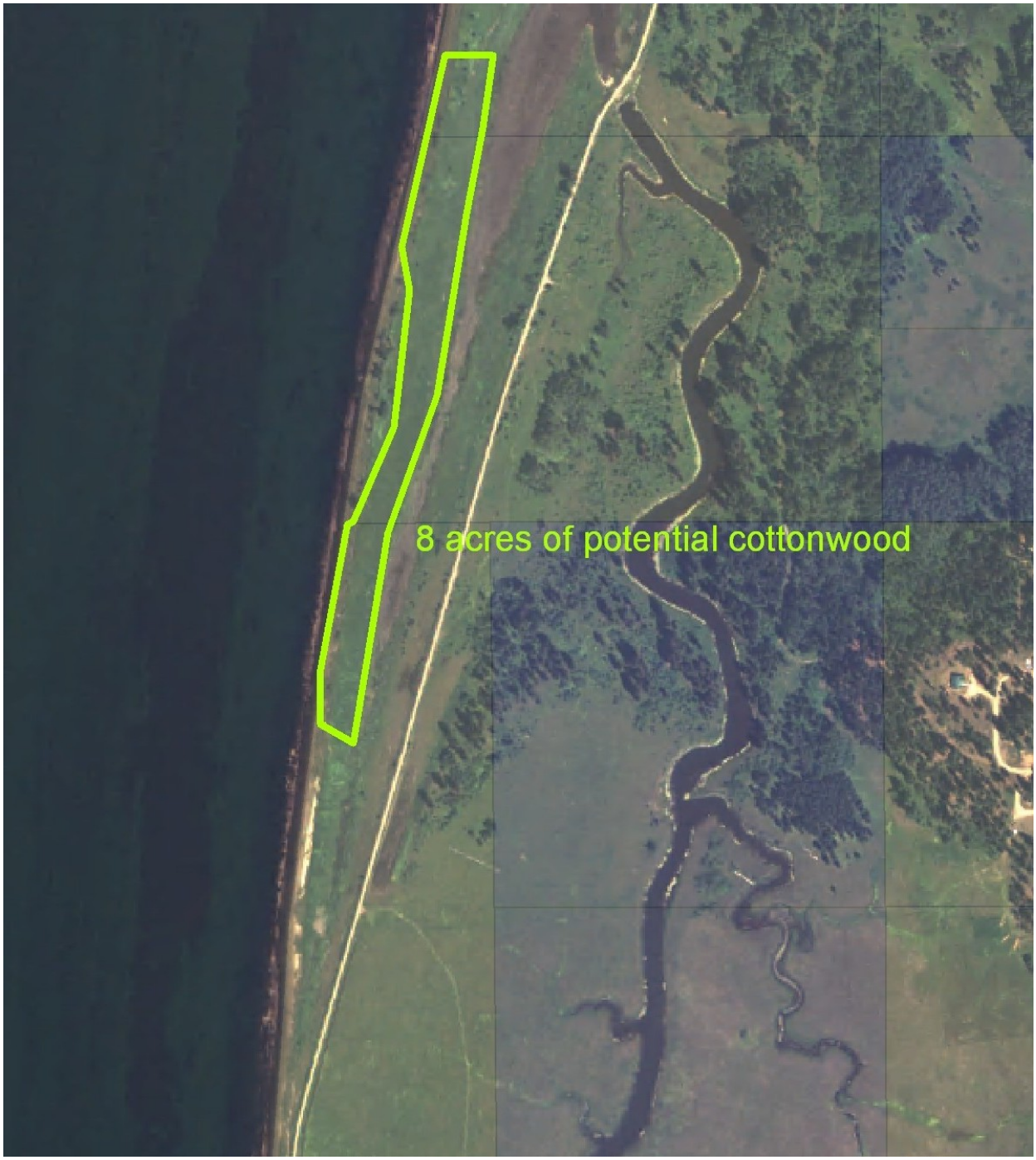

Figure 1f. Site 5

Figure 2a. Additional Tribal lands identified on February 8, 2007 that can be used as the basis for this condition.

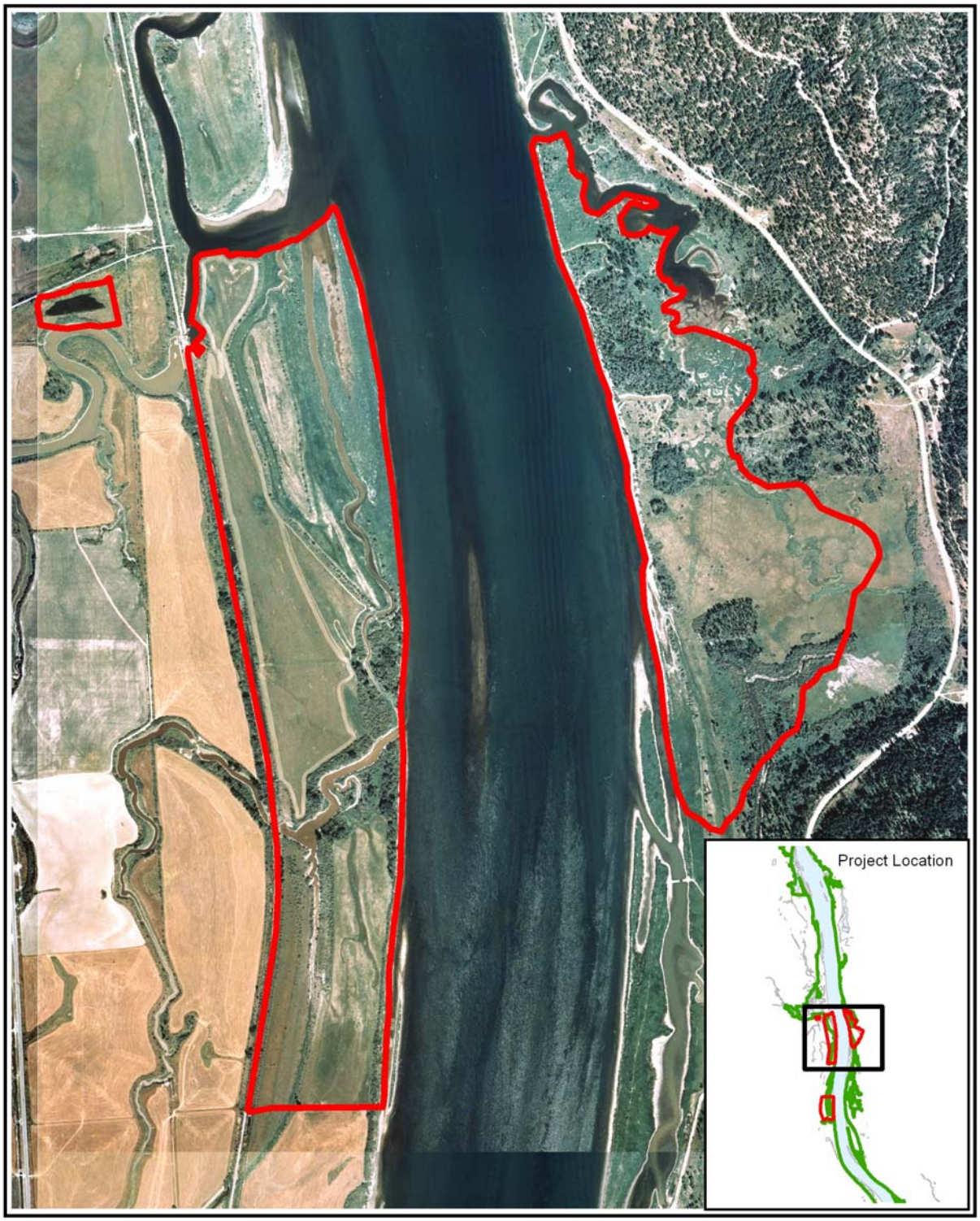

Figure 2b. Additional Tribal lands identified on February 8, 2007 that can be used as the basis for this condition.