WINDY BAY

Wildlife Mitigation Unit

THE COEUR D'ALENE TRIBE

Draft Wildlife Management Plan

March 2008

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Wildlife Management Plan

ALBENI FALLS

WILDLIFE MITIGATION

Anders Mikkelsen - Wildlife Project Manager

Thomas Prewitt - Wildlife Habitat Biologist

THE COEUR D'ALENE TRIBE

DRAFT REPORT

March 2008

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INTRODUCTION

The Coeur d'Alene Tribe in conjunction with the Bonneville Power Administration purchased the Windy Bay Property in July of 2002 as partial mitigation for Construction and Inundation losses attributed to Albeni Falls Dam. The Windy Bay Property is located at the head of Windy Bay on the west side of Lake Coeur d'Alene and at the mouth of Lake Creek in the northwest portion of the Coeur d'Alene Indian Reservation. This Management Plan is based largely on the biological/hydrological assessment of the Windy Bay Property that was completed in the fall of 2004. This Management Plan summarizes the assessment findings, however if more detailed information on the techniques used to assess the property and habitat conditions and potential are desired, please consult the Windy Bay Property Habitat Assessment.

Figure 1: Photo of Windy Bay. Source: Tetra Tech, Inc.

SECTION 1 BACKGROUND INFORMATION

The following section presents an overview of management provisions that have an effect on wetland and lake management in the region, and that have an effect on mitigation of habitat losses as a result of key regional development; primarily, the construction of the Albeni Falls hydroelectric facility.

1.1 HISTORY

Dams built to generate power, control flooding, and provide navigation, irrigation, and recreation, have altered streams draining the Columbia River Basin. Twenty-nine Federal hydroelectric dams and numerous other dams now regulate the flow of many of these streams. The development of the hydropower system has had far reaching effects on wildlife and wildlife habitat. Many floodplain and riparian habitats important to wildlife were inundated by reservoirs caused by the system. Streams were channelized as roads and power distribution facilities were constructed (IDFG 1987). Area drainage features and their ecosystems have been adversely affected.

In 1955, the Albeni Falls Hydroelectric Dam was constructed at approximately mile 90 on the

Pend Oreille River in Bonner County, Idaho. The dam is a concrete gravity gate-controlled structure that is 90-feet high and 755-feet long. The power plant's generators have the capacity to produce 42.6 megawatts of power. The Albeni site includes the actual dam site with a reservoir that together affects approximately 94,600 acres within 226 square miles of shoreline that were authorized for development or inundation under the Flood Control Act of 1950.

The Pacific Northwest Electric Power Planning Act of 1980 (Public Law 96-501) directed that measures be implemented to protect, mitigate, and enhance fish and wildlife to the extent affected by development and operation of hydropower projects on the Columbia River System. This Act created the Northwest Power Conservation Council (NPCC), which in turn developed the Columbia River Basin Fish and Wildlife Program (the CRBFWP). The CRBFWP established a four-part process that included the construction of Wildlife Mitigation Status Reports; Wildlife Impact Assessments; Wildlife Protection, Mitigation, and Enhancement Plans; and Implementation of protection, mitigation, and enhancement projects in an effort to mitigate wildlife habitat losses that resulted from development and operation of regional hydroelectric facilities.

The Albeni Falls hydroelectric project significantly affected the balance of water and wildlife in the Inland Northwest. Thus, a specific mitigation/enhancement plan was developed for the Albeni Falls Hydroelectric Facility to fulfill requirements of Sections 1003(b)(2) and (3) of the CRBFWP, and to generally assist in the study, preservation, and propagation of wildlife in the project vicinity to mitigate habitat losses. Scientists with the Idaho Department of Fish and Game (IDFG) produced the plan, which is titled "Albeni Falls Wildlife Protection, Mitigation and Enhancement Plan" in 1988.

The plan documents the Habitat Evaluation Procedure (HEP) used to evaluate pre- and post-construction habitat conditions at the Albeni Falls Project with the idea that the procedures to evaluate habitat would be implemented elsewhere as part of Albeni Falls mitigation. Included in the Albeni Falls study, nine evaluation or "target" species were identified as example species that were affected by the dam. Impacts to the habitat of the nine target species are expressed in terms of Habitat Units (HUs) within the plan. The Albeni Falls target species include mallard, Canada goose, redhead, bald eagle, peregrine falcon, black-capped chickadee, yellow warbler, white-tailed deer, and muskrat.

For a given species, one HU is equivalent to one acre of prime habitat for that species. For each target species, the effects of the Albeni project were estimated based upon the species' habitat, measured with the Habitat Suitability Index (HSI). An HSI is a number between 0 and 1.0. It is a numerical index that represents the capacity of a given habitat to support a selected fish or wildlife species. For instance, should a habitat be found less than optimal for a given species, the HSI for the species might be 0.45. Enhancement of the habitat may include adding specific plants that would increase the value of the habitat and raise the HSI and the number of HUs in a given area. Generally, the Albeni Falls HEP was extended for use by biologists to estimate the benefits of proposed mitigation acquisitions and enhancement projects regionally.

Habitat losses at Albeni Falls had a significant effect on plants and wildlife. The Brown Book states that a total of 28,587 HUs were lost as a result of the Albeni Falls project. To mitigate these losses, in 1953, the United States Fish and Wildlife Service (USFWS) and the IDFG recommended that 8,140 acres of land and shallow water areas be acquired for mitigation and transferred to IDFG for administration and management (IDFG 1987). About 4,000-acres were originally submitted for development and management for the purposes of enhancing wildlife and assisting with Albeni Falls habitat loss mitigation (BPA 1988). It was suggested that some of that acreage would be lost due to future development.

A memorandum of agreement (MOA) was established in 1996 between CDAT and the BPA to implement wildlife mitigation in association with the loss assessments for Albeni Falls Dam. The agreement included a recommendation for the use of the Albeni Falls Brown Book to perform HEPs and determine HUs on reservation lands. The specific objectives stated in the Albeni Falls Brown Book include wildlife protection, mitigation, and enhancement planning; estimating the net effects on wildlife resulting from hydroelectric development and operation; selecting target wildlife species and identifying the current status, management goals and plans for the species; development of protection, mitigation and enhancement goals and objectives for the target species; and development of management plans (recommended actions) for the protection, mitigation and enhancement of the target wildlife species.

In 2002, the subject Windy Bay Property acquisition was completed by the Tribe. The purchase is also known as the *Ramsey* acquisition. The property was acquired as a part of a continual effort by the Tribe to purchase properties for the purposes of restoring or maintaining valuable wildlife habitat. Maintaining and restoring valuable habitat areas on site is part of a regional

effort undertaken by the Tribe to enhance and maintain the health of area ecosystems.

1.2 PURPOSE AND GOALS

The purpose of this Wildlife Mitigation and Management Plan effort is to identify approaches for effective management and/or restoration of the property to allow wildlife on site to continue to prosper. *The overall goal of this work is to protect, enhance, and maintain wetland and riparian habitat in the Lake Creek drainage as partial mitigation for the impacts attributed to the construction and operation of the Albeni Falls hydroelectric facility* (Coeur d'Alene Tribe 2000, NWPPC Lake Creek Project Submittal).

Figure 2: A 1933 aerial photograph of Lake Creek and Windy Bay courtesy of the Coeur d'Alene Tribe.

SECTION 2 PHYSICAL ENVIRONMENT

This section includes a general assessment of the physical environment at the subject Windy Bay Property. The purposes of completing this work include:

- To document the location of the property and the project area;
- To generally characterize the environment of the project area, the property, and the vicinity;
- To provide an overview of plant species observed within the project area and on the property.

The following section describes the subject site as observed by Tetra Tech personnel during various visits and as found during review of maps and records. A current USGS topographic map depicting the location of the property is included within this section as Figure 4. Photographs of the property are provided in Appendix A of this report.

2.1 LOCATION AND DESCRIPTION

The Windy Bay Property consists of a single parcel of real property that is described as Government Lot 1, and Lot 2, and the East Half of the Southeast Quarter in Section 35, Township 48 North, and Range 5 West of the Boise Meridian. The Kootenai County Assessor's parcel number for the property is 48N05W-35-7400. There is an appraised total of 147 acres (uplands) on site.

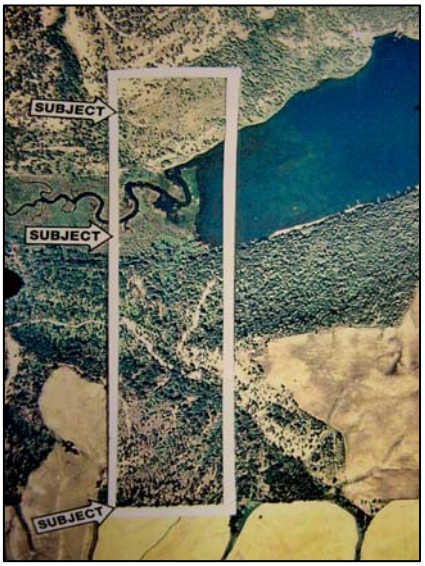


Figure 3: Photo of Windy Bay property.

The topography of the subject area is generally rugged, consisting primarily of forested mountainous or hill terrain, with comparatively narrow and steep valleys, and ephemeral and perennial streams. Lake Creek flows east into a marshy meandering channel that enters the west side of the Property and spills into Lake Coeur d'Alene on the east side of the Property. The Lake Creek drainage widens to the northwest and includes 23,117 acres in Kootenai County, Idaho and Spokane County, Washington. The topography of the subject property mirrors that of the vicinity with steep forested hillsides cut with ephemeral and perennial streams.

The elevation of the subject property varies greatly from wetland/Lake side at its lowest elevations to forested plain at its highest. The elevation of marshlands on site is approximately 2,128 feet above Mean Sea Level (MSL). Marshland areas are at the base level of the Lake,

which varies seasonally by several feet (see Section 3.0 Hydrologic Assessment for greater detail). The marshlands and open water areas on the Property are bounded naturally to the north and south by hillsides; and to the east by open water of Lake Coeur d'Alene. The Lake Creek Canyon extends westward from the Property. The hillsides to the north and south of the mouth of Lake Creek rise to approximately 2,690 feet above MSL. Portions of the property climb 500 feet within an approximate distance of 1,300 feet, or 0.25 miles; many even steeper sections of the property were discovered during site visits.

The Windy Bay Property is an approximate one mile by 1,300-foot rectangle of property that is oriented lengthwise north and south across and at the head of the Windy Bay Arm of Lake Coeur d'Alene. The Property appears to consist of approximately 160 acres of upland, marshland, and open water. The total upland area on site is estimated at 120.2 acres using current GIS coverages. It should be noted that while the property appears 160 acres in size, only 147 acres are considered a part of the subject property, as the 13 remaining acres are permanently flooded open water areas of Lake Coeur d'Alene, according to current county sources.

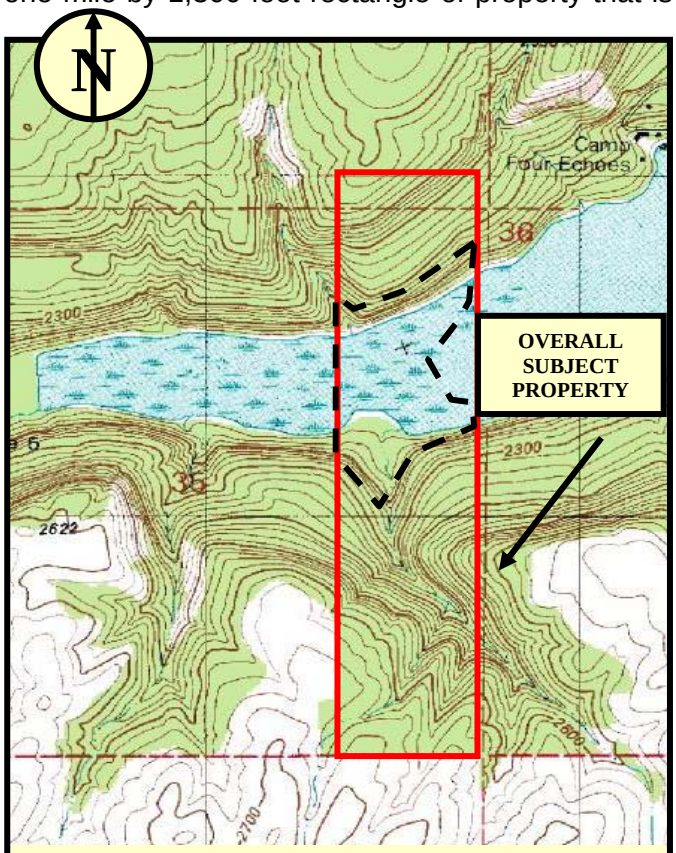


Figure 4. Topographic Map of the Windy Bay Property

Source: 1981 USGS 7.5-Minute Topographic Map of Worley, Idaho
Outline: Subject 147-Acre (Upland) Property
Approximate Scale: 1 Mile = 4.5 Inches

Windy Bay wanes from the middle portion of the lake to the west as it approaches the eastern termination of Lake Creek, which flows east into Lake Coeur d'Alene. The Bay extends westward from the middle portion of the Lake to include the westernmost waters of the Lake where the Bay terminates on the Windy Bay Property. The Windy Bay Property also encompasses the mouth of Lake Creek. The bay and the subject property are located approximately 3.5 miles north northwest of the town of Worley, in southern Kootenai County, in a northwest portion of the Coeur d'Alene Indian Reservation, in the panhandle or northern section of the State of Idaho, in a northwest portion of

the United States.

There is essentially a northern parcel and a southern parcel of uplands that are part of the Property, with “submerged lands” along the shores of Lake Creek and Windy Bay resting in between. The northern upland portion of the property consists of approximately 28.6 acres and is accessed from the north via US Highway 95 to Sun Up Bay Road, and then to Sun Meadow Road, which winds south through a rural neighborhood toward the lake. The southern upland portion of the subject property includes approximately 91.7 acres of uplands, and is accessed from the south via US Highway 95 to Bitter Road, and then by heading east on Bitter Road to a south adjoining dry-land grass or wheat field parcel that fronts Bitter Road. Access to the subject property is then gained by walking north across the several adjoining wheat fields from Bitter Road.

Topographically, the subject property may be generally described as two undulated hillsides that decline in elevation to the base level of Lake Coeur d’Alene at the mouth of Lake Creek. Vegetation on site consists of cutover timberlands on uplands and hydrophytic vegetation on lowlands. The acreages of the property appear based on upland areas, as noted within a past appraisal of the site. However, the biological function of the property is dependent upon its proximity to the lake and nearby creek and ephemeral drainages.

The upland or timbered sections of the property comprise approximately 120.3 acres. These upland timbered areas steeply slope toward lowland wetland and lake areas on site. There are two well-defined ephemeral drainage features on the subject property, one on the north (south facing) slopes and one on the south (north facing) slopes. Both features have well-defined channels and empty into the lake.

2.3 GEOLOGY

During the Precambrian and approximately 1.5 to 1.6 billion years ago, layered sedimentary rocks began to accumulate in much of the region that would eventually become the northern Rocky Mountains. Sediment continued to accumulate for some 800 million years to become more than 12 miles thick in some parts of western Montana and northern Idaho (Alt 1995). The prevailing theory to explain such deposition is that an inland sea rested in the region that continued to subside as sediment accumulated. This sedimentary basin was uplifted and tilted

during the formation of the northern Rocky Mountains. These billion-and-a-half-year-old rocks are within the project vicinity. They are primarily low-grade metasedimentary rocks of the Belt Supergroup and high-grade (amphibolite facies) metamorphic rocks whose prolith may have been the Belt Supergroup. Most are mudstones and dirty sandstones in shades of gray and dark gray, and have occasional fossils. Many of the layers tilt and extend far beneath the surface. Miocene era basalts on the subject site overlay the majority of these rocks on the Windy Bay Property.

The subject property rests on the eastern portion of the expansive flood basalts of the Columbia River Plateau. The physiognomy of the area was reformed en masse many times in geologic history. Six to seventeen million years ago the flows erupted to cover 164,000 square kilometers, an area which includes portions of northeast Oregon, southwest Washington and western Idaho, and the vicinity of the subject property (Alt 1995). These basalts have been covered with loess (windblown silt soil) through time, and have been subject to at least two large-scale glacial events.

Approximately 10,000 years ago and previously, the Columbia River Plateau was subjected to the floodwaters of the Missoula, or Bretz Floods (Figure 5). The cyclical large-scale floods resulted from the retreat of the Cordilleran Ice Sheet from Missoula, where an arm of the sheet (the Purcell Trench) often created a large lake that impounded inland waters. The sheet created an ice dam that failed after weakening from global warming. When the dam failed, the Columbia River Plateau flooded with an amount of water that is calculated to be over 20 times the amount of water that currently flows through all of the combined rivers of the world. These floods are estimated to have occurred at the end of each ice age, and to have lasted approximately five days per event. The floodwaters scoured soil from the basalt substrate, carved basalt, left scablands, and deposited rocks and boulders across the region.

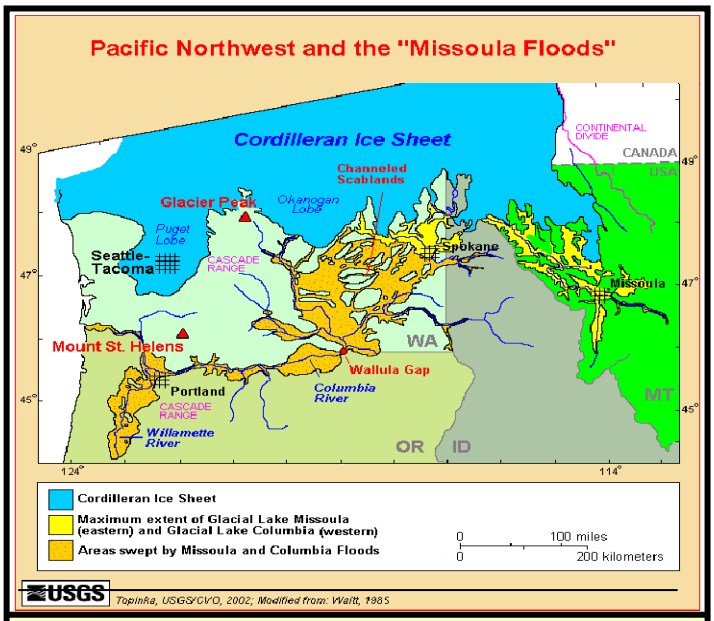


Figure 5. Map of Missoula Floods

Source: USGS 2002; Modified from Waitt, 1985
Outline: Pacific Northwest and the Misoula Floods

The effects of these catastrophic floods are evident in the landscape in the vicinity of the subject property today. Lastly, over the past 10,000 to 20,000 years, and perhaps even longer, in areas unaffected by the cyclical floodwaters of Glacial Lake Missoula, eolian deposition in the form of loess have coated the basalt substrate, forming the rounded hills of the Palouse. The dune-like appearing hills are rich in silt, which is a necessary component of dry-land wheat, lentil, and pea farming within the area, due to its high capacity to hold water. The agricultural productivity of the region is entirely dependent upon the water holding capacities of these silty loess soils. So too are Ponderosa pine, snowberry, and other drought tolerant trees and shrubs. Undulated wheat and blue-grass fields that adjoin the subject property to the south would not likely exist without such soil characteristics.

2.4 TOPOGRAPHY AND SOILS

As noted previously, the topography of the property was primarily formed through volcanism and glaciation. However, areal deposition of ash and weathering has also occurred. Approximately 7,000 years ago, the eruption of Mt. Mazama at Crater Lake, Oregon coated the Northwest with ash, including nearly all of Idaho, Oregon, and Washington, and significant portions of Nevada, and western Montana (Figure 3). Mount St. Helens ash has also contributed to area soils. Consequently, layers of ash are often found in area basins. Ash collects in basins and can form impermeable linings.

Mechanical and chemical weathering of parent rock has occurred in the area, and frequent flooding (or dewatering – as a result in lake level changes) at the Lake Creek mouth has occurred on an annual basis. Further, nearby farming practices may have resulted in siltification of ephemeral streambeds and perhaps the wetland basin areas on site. All of these factors have contributed to the formation of the topography and soils on the property. Soil coverages are quantified in Table 1 and their distribution is illustrated in Figure
7.

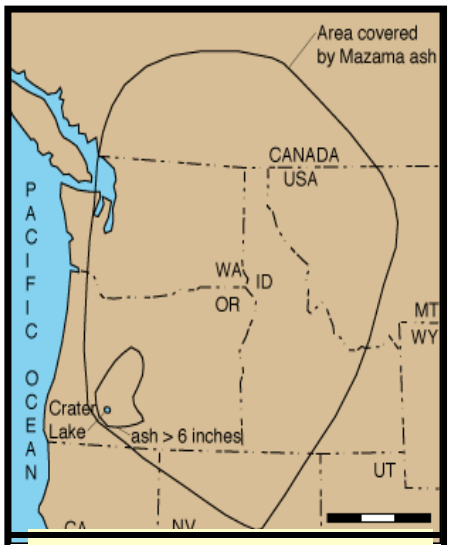


Figure 6. Map of Mazama Ash Plume

Source: Williams and Goles, 1968
Outline: Area Covered by Masama Ash
Approximate Scale: 1 Inch = 300 Miles

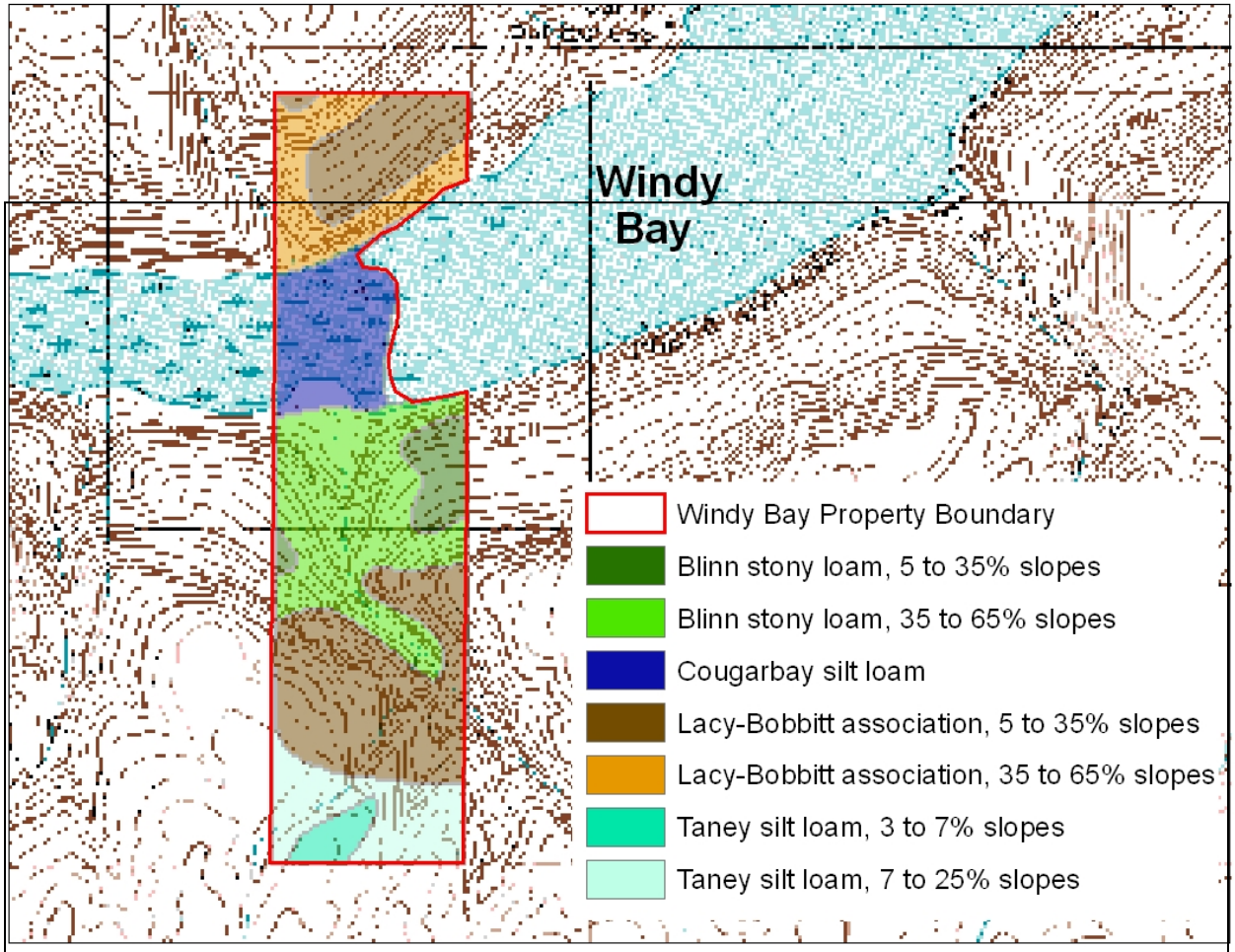


Figure 7. Distribution of soils on the Windy Bay Property (Weisel 1981)

Soils on uplands are typically shallow and have a stony loam surface layer over a basalt substrate. It appears that the south-facing hillsides on the northern portion of the Property are dryer than the southern or north-facing hillsides. The ephemeral drainage on the north-facing slope is mapped as a dryer soil type but has a robust riparian plant community and/or stream associated wetland plant community in a narrow corridor in and near the drainage bottom that is no doubt supported by hydric soils.

Soils within the Lake itself are unmapped but the flat topography on either side of Lake Creek is mapped as Cougarbay silt loam, which is a very poorly drained hydric soil. The flat along Lake Creek was found to have small upland inclusions and talus rock and possibly some small inclusions of hydric soils other than Cougarbay silt loam. The several foot annual drawdown of Lake levels may affect these hydric soils.

Table 1 Soil Types on the Windy Bay Property				
ID #	Name of Soil	Location of Soil	Type	Acres
105	Blinn stony loam, 5 to 35 percent slopes	Hillsides (generally north-facing)	Upland	7.3
106	Blinn stony loam, 35 to 65 percent slopes	Hillsides (generally north-facing)	Upland	35.4
115	Cougarbay silt loam	Adjacent to lakes and streams	Hydric	18.8
136	Lacy-Bobbitt association, 5 to 35 percent slopes	Hillsides (generally south-facing)	Upland	50.0
137	Lacy-Bobbitt association, 35 to 65 percent slopes	Hillsides (generally south-facing)	Upland	15.6
186	Taney silt loam, 3 to 7 percent slopes	Higher elevation upland plains	Upland	4.2
187	Taney silt loam, 7 to 25 percent slopes	Higher elevation upland plains	Upland	15.6

a. This data is from the Kootenai County Soil Survey completed in 1981. Soil mapping was completed in 1975 and 1976 by the Soil Conservation Service (SCS) using aerial photography.

Further, it should be noted that the interface between hydric and upland soils is fairly sharp. Many soils at the wetland/upland interface on site were found to include a basalt talus. In many cases, basalt outcroppings or steep upland slopes descend directly into the lake with a very minor (less than 1 meter in width) belt of hydrophytic vegetation present between open water and upland. Near a former railroad grade resting at the base of the north-facing slope, it appears that native hydric soils have been buried beneath possible tailings or basalt talus.

2.5 CLIMATE

The subject area summers are warm to hot in most valleys and much cooler in the mountains. Winters are cold in the mountains. Valleys are cooler than the lower slopes of adjacent mountains because of cold air drainage. In the surrounding mountains precipitation occurs throughout the year, and a deep snow pack accumulates during the winter. Snowmelt usually supplies much more water than can be used for agriculture in the area. Precipitation occurs in the valleys during summer as showers and thunderstorms. In winter, the ground is covered with snow much of the time. Chinook winds, which blow down slope and are warm and dry, often melt and evaporate snow (NRCS 1981).

In winter, the average temperature is 30.6 degrees F and the average daily minimum temperature is 23.4 degrees F. The lowest recorded minimum temperature in the greater area is

minus 36 degrees F. In summer, the average temperature is 65 degrees F, and the average daily maximum temperature is 82 degrees F. The highest recorded temperature in the greater area is 111 degrees F (NRCS 1981).

Growing-degree days are equivalent to heating units. During the month, growing degree days accumulate by the amount the average temperature each day exceeds a base temperature of 40 degrees F. The normal growing-degree accumulation is used to schedule successive plantings of crops between the last freeze in spring and the first freeze in fall. The growing season is estimated to run from April through September (NRCS 1981).

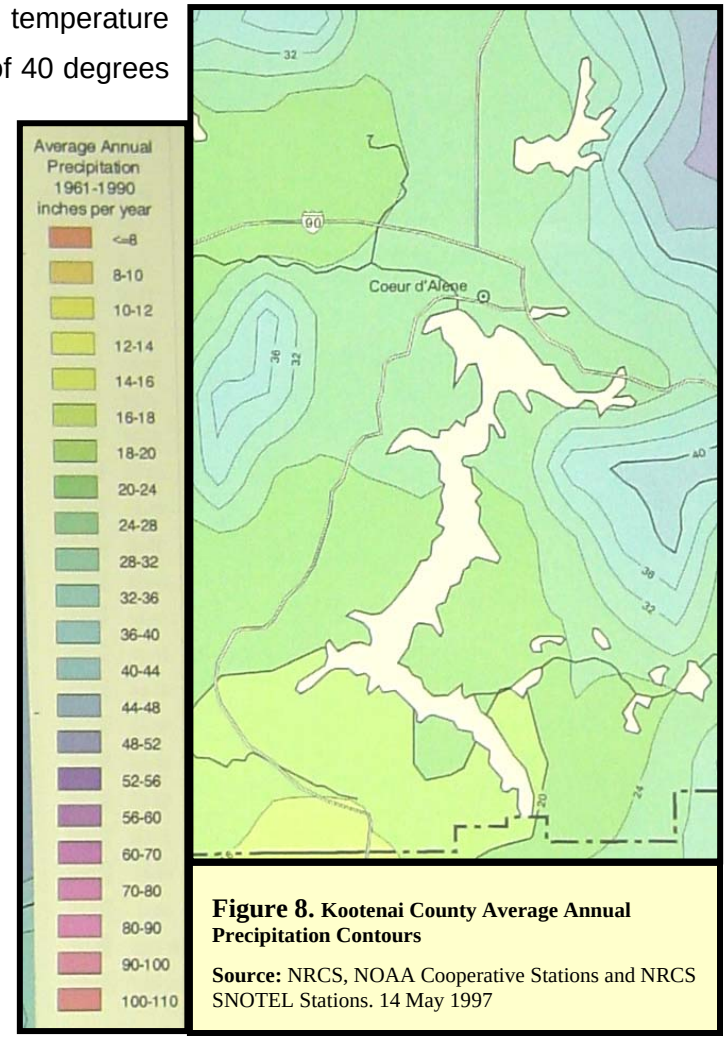


Figure 8. **Kootenai County Average Annual Precipitation Contours**

Source: NRCS, NOAA Cooperative Stations and NRCS SNOTEL Stations. 14 May 1997

The total annual precipitation is about 17 inches on site (Figure 8). Of this, 33 percent usually falls in April through September. The growing season for most crops falls within this period. Thunderstorms occur approximately 15 days each year, occurring mostly in summer. The average seasonal snowfall across Kootenai County is 59.3 inches but varies from 10 inches to over 100 inches. At least one inch of snow is on the ground an average of 28 days; however, the number of days varies from year to year and also with elevation. The average snowfall at Plummer (10 miles south of the site) is about 16.1 inches annually.

The average relative humidity in mid afternoon is about 45 to 50 percent. Humidity is higher at night, and the average at dawn is about 75 percent. The sun shines 75 percent of the time in summer and 30 percent of the time in winter. The prevailing wind is from the southwest. Average windspeed is highest, 10 miles per hour, in the spring (NRCS 2002).

Further hydrological data was uncovered for the specific area of the property. The data is included within the hydrologic assessment portion of this report (see Section 5: Hydrologic Assessment).

2.6 VEGETATION

Land use in the area is currently primarily agricultural dry-land grass and wheat farming. Some managed forested areas are located within the vicinity; however, such areas are giving way to development of rural private residences and recreational development. Natural areas within the project vicinity are generally declining with continued development, with exception to several Tribe and federal government-owned parcels. Shoreline areas of Lake Coeur d'Alene that have the potential for supporting rural private residences or recreational sites are in increasing demand and are consequently undergoing development.

Properties surrounding the southern end of the Lake Creek site support dry land farming where steep slopes are not prohibitive of crop planting. Northern properties are primarily rural residential properties that rest amongst young conifers. Properties nearby and to the east of the southern portion of the subject site are recreational in use. Existing vegetation patterns appear to have been altered by these factors. Deforestation, agriculture, and development have caused noxious weeds and soil erosion within the vicinity, and an adverse effect on the condition of vegetation of within area. No previously undisturbed areas on site or within the vicinity are suspected.

It appears that the Property was thickly forested at one time and that it has been extensively logged within the past 20 years. No old growth timber remains on the subject site. However, the subject site is in a state of recovery. The isolation of the property, primarily its southern acreage, has contributed to its recovery and current improving health. Vegetative diversity was found to be highest in the ephemeral drainages that cut the uplands on the Property. Although areas of upland that were previously forested appeared significantly disturbed by logging activity, understory plant communities along ephemeral hillside streams appeared healthy and diverse with a high percentage of native species. The quantity of large trees in the upland area appeared low relative to similar habitat types on nearby lands; this is anticipated to be the result of selective logging.

A cursory survey of existing vegetation was performed within the *wetland* and *upland* areas during the wetland assessment and was completed during August of 2004. Tetra Tech surveyed the area on foot, ATV, and/or by boat, and consulted aerial photographs and topographic maps. This survey was performed on two levels:

- **Opportunistic**. Plants were identified as they were found during site work such as the wetland delineation or general habitat assessment.

- **Focused.** Focused observations were performed in the accessible areas of the vegetated marsh around the lake, particularly at the transition zones between the seasonal wetland and the permanent vegetated marsh.

2.6.1 WETLAND VEGETATION

Wetlands within the project area fall into two (2) main categories and were delineated during the completion of the HEP model as cover types. Wetland cover types include deciduous forested/shrub-scrub wetlands (abbreviated DFW/DSW on cover type map – see Section 4.0), and herbaceous wetlands (HW). Open water (OW) is not included as a cover type as part of HEP calculations or as generally exhibiting wetland vegetation. Open water portions of the meandering Lake Creek that wind through the marsh are considered open water, also. Vegetation as identified in each cover type is generally as follows:

Deciduous Forested/Shrub-Scrub Wetlands (DFW/DSW)

This wetland cover type comprises is located in the seasonal drainages near the bases of the hillsides and along the transition zone between the steep upland habitats and either the floodplain areas adjacent to Lake Creek or the shoreline of Lake Coeur d'Alene. Ephemeral stream-associated riparian wetland communities and fringe lake-associated wetland communities are generally a part of the deciduous forested/shrub-scrub wetland cover type. The area of this wetland cover type may have been upland prior to the annual drawdown or flooding of Lake Coeur d'Alene, and are those areas that are composed of heavy grass and tall forested (above 5 meters) and deciduous brush vegetation. Vegetation in this habitat type is stratified and was measured in the field to corroborate initial aerial photograph-delineated areas.

This wetland cover type includes a dense understory of herbaceous species such as stinging nettles (*Urtica dioica*) and reed canarygrass (*Phalaris arundinacea*). Shrub species include ninebark *(Physocarpus opulifoius)*, Service serviceberry *(Amelanchier alnifolia)*, wood rose *(Rosa gymnocarpai),* clustered rose *(Rosa Pisocarpa)*. Mid-story (larger shrubs or smaller trees) include red alder *(Alnus rubrus)*, various willow species *(Salix* spp.*)*, and red osier dogwood *(Cornis stolonifera*). Larger trees such as quaking aspen *(Populus tremuloides)* and black cottonwood *(Populus balsamifera* ssp. *trichocarpa)* make up the over-story in this cover type.

Herbaceous Wetlands (HW)

Vegetated permanent marsh (herbaceous wetlands or HW) on site is situated west of and adjacent to open water portions of Lake Coeur d'Alene, along the banks of Lake Creek and between the *DFW/DSW* wetlands at the base of the two hillsides. This habitat type is marked by rooted, emergent wetland vegetation that is found on saturated soil. The meandering channel of Lake Creek divides this wetland type with the larger of the two areas of coverage on the south side of the Creek. The dominant plant species found within this cover type are broadleaf cattail *(Typha latifolia),* wapato or water potato or arrowhead (*Sagittaria cuneata* E. Sheldon), bulrush *(Scirpus* sp.*),* red osier dogwood *(Cornis stolonifera*); wood rose *(Rosa gymnocarpai),* various willow species *(Salix* spp.*)*, and various types of sedges *(Carex* spp.*).*

2.6.2 UPLAND VEGETATION

Uplands within the project area fall into four (4) main categories, closed-canopy forest (CEFU); open-canopy forest (OEFU); open-canopy woodland (OEFU); and upland scrubland (EF). The upland area is primarily dominated by ponderosa pine *(Pinus ponderosa)*, which is primarily found in open-canopy forested portions of the uplands. Scattered Douglas fir *(Pseudotsuga menziesii)*, western larch *(Larix* sp.*)*, grand fir *(Abies grandis)* occur along the steep drainages. Western red cedar *(Thuja plicata)* is found primarily along the watercourses within the wetland and riparian communities as is typical of this species (Cooper et al. 1991). The forested uplands have largely been logged with no remaining old-growth trees (>300 years old). The remaining stands are open and support an extensive understory shrub layer. Representative shrub species include snowberry *(Ceanothus* spp.*)*, creeping Oregon grape *(Berberis repens spp.),* and Saskatoon serviceberry *(Amelanchier alnifolia)*. Noxious weeds were observed (see Section 2.6.4) in the upland forests but no sensitive plant species were recorded in this area.

Logging that has historically and more recently occurred (about 20 years ago) has cleared most of the forested area, though plant succession has replaced portions of the forest. Habitat quality in the upland area is further diminished by an extensive network of logging roads, many of which have been bermed, but many of which could use additional work to assist in reclamation.

Prescribed burning in the upland forests could reduce surface fuel loads, stimulate nitrogen availability, and increase herbaceous productivity, however without thinning or removal of forest floor fuels it can cause high mortality in the overstory trees (Covington et al 1997). Without first managing the forest floor fuel loads and reducing ladder fuels the re-introduction of fire into forests of the type that are found on the Windy Bay Property could be difficult to control and dangerous. Some combination of thinning and manual fuel removal, and possibly the introduction of fire once conditions are appropriate, will be necessary to restore these forests to more natural conditions.

Removal of ruined culverts from upland ephemeral drainages and reclamation of logging roads could assist in recovery of upland forests. This would include a damaged culvert near the railroad line at the northern edge of the southern slope. Abandoned logging roads, particularly on the southern slopes of the Windy Bay Property are in need of revegetation efforts and the road cuts and ditch lines associated with them may require re-sloping as well as additional planting of native vegetation to reduce erosion. Species such as white-tailed deer, elk, moose, and other ungulates will benefit as upland areas continue to improve with time and through a continual effort to limit ORV use, elimination of noxious weeds, and disturbance from adjoining farm fields to the south.

2.6.3 SENSITIVE PLANT SPECIES

Sensitive species are defined as those that are considered rare, threatened, or endangered by local, state, or federal government agencies such as the US Fish and Wildlife Service (USFWS) or the Idaho Conservation Data Center (ICDC), or by public interest groups such as the Idaho Native Plant Society (INPS). Plants limited to a particular habitat or that play a unique role in the ecosystem are also considered sensitive. A list of sensitive plant species that may occur in the study area was generated by performing a literature search and a search of various websites.

Sensitive species that may occur in the area include rush aster *(Aster junciformis)*, least bladdery milkvetch (*Astragalus microcystis*), crenulate moonwort (*Botrychium crenulatum*), mingan moonwort (*B. minganense*), peculiar moonwort (*B. paradoxum*), Constance's bittercress (*Cardamine constancei*), bristly sedge (*Carex comosa*), bristle-stalked sedge (*C. leptalea*), dryland sedge (*C.xerantica*), Howell's gumweed (*Grindelia howelli*), blueflag (*Iris versicolor*), chickweed monkeyflower (*Mimulus alsinoides*), northern beechfern (*Phegopteris connectilis*), Spalding's catchfly *(Silene spaldingii)*, white beakrush (*Rhynchospora alba*), hoary willow (*Salix candida*), Ute ladies' tresses *(Spiranthes diluvialis* Sheviak*),* pod grass (*Scheuchzeria palustris*), Water howellia (*Howellia aquatilis* Gray), and short-style tofieldia (*Triantha occidentalis*) (IDFG 2004).

Sensitive species surveys primarily focused on the area around the permanent marsh, as this would be the area most impacted by restoration or enhancement, and because this area is part of the HEP and wetland project area. Due to project timing, the surveys were carried out when many species were either no longer in bloom, or had not yet bloomed. No sensitive species were identified in the project area during various field visits. It is possible that certain plants such as *Spiranthes diluvuialis* exist in the vicinity of the marsh area. Further surveys during the appropriate flowering season are recommended.

2.6.4 NOXIOUS WEEDS

A variety of noxious weeds were identified within the greater property boundary. Noxious weeds were found primarily along former logging roads, along property boundaries, and within areas that appeared disturbed. The primary noxious weed identified is spotted knapweed (*Centaurea biebersteinii* DC.). Other noxious weeds found included Tansey ragwort *(Senecio spp.),* Yellow star-thistle *(Centaurea solstitialis L.),* Curly dock *(Rumex crispus),* Cockleburr *(Xanthium strumarium),* Hawkweed *(Hieracium aurantiacum L.),* Common mullein *(Verbascum thapsus),* Cheatgrass *(Bromus tectorum L.),* and Dalmation toadflax (*Linaria dalmatica* (L.) P. Mill.). Golden currant *(Ribes aureum* Pursh.*)* is on site, and it is also known as a noxious plant in some areas.

Noxious weeds were identified in most disturbed areas of the subject property; however, the primary concentrations of noxious weeds appeared on higher upland slopes (closer to disturbed

areas) and consisted primarily of spotted knapweed and yellow star-thistle. The presence of these noxious weeds on uplands is likely due to the lower portions of the property being relatively isolated. Eradication of noxious weeds on site is recommended.

2.6.5 WETLAND AND UPLAND PLANT INVENTORY

Plant species identified during the survey are listed in Table 2, according to the habitat type in which they were identified. Several upland species, such as serviceberry and snowberry, were identified near ephemeral drainages. Several wetland species were found interspersed with upland species along wetland fringes. For additional information regarding plants identified within the wetland area on site, please see Section 3. For additional information pertaining to cover types, please see Section 4 of this report.

TABLE 2 Plant Species Identified on the Windy Bay Property		
Location	Species Name (Common, Scientific)	Native/Indicator Status/Noxious
Upland	Italian rye-grass *(Lolium multiflorum)*	Non-native/NI (no indication)
Wetland	Reed canary grass *(Phalaris arundinacea)*	Non-native/FACW
Disturbance	Common mullein *(Verbascum thapsus)*	Non-native/NI/Noxious
Disturbance	Hawkweed *(Hieracium aurantiacum L.)*	Non-native/NI/Noxious
Upland	Common Yarrow *(Achillea millefolium L.)*	Non-native/FACU
Wetland	Tansy ragwort *(Senecio spp.)*	Native/NI/Noxious
Disturbance	Spotted knapweed *(Centaurea biebersteinii DC)*	Non-native/NI/Noxious
Disturbance	Yellow star-thistle *(Centaurea solstitialis L.)*	Non-native/NI/Noxious
Disturbance	Curly dock *(Rumex crispus)*	Non-native/FACW/Noxious
Wetland	Saw-beaked sedge *(Carex spp.)*	Native/FAC+
Wetland	Common rush *(Juncus effuses)*	Native/FACW
Wetland	Water speedwell *(Veronica anagallis-aquatica)*	Native/OBL
Wetland	Weeping willow *(Salix babylonica) – 5 percent*	Native/FAC+
Disturbance	Canada Cockleburr *(Xanthium strumarium)*	Native/FAC/Noxious
Wetland	Tall flatsedge *(Cyperus eragrostris)*	Native/NI
Wetland	Needle spikerush *(Eleocharis acicularis)*	Native/OBL
Wetland	Threepetal bedstraw *(Galium trifidum)*	Native/FACW+
Wetland	Common duckweed *(Lemna minor)*	Native/OBL
Wetland	Common reed *(Phragmites australis)*	Native/FACW+/Noxious
Wetland	Water smartweed *(Polygonum amphibium)*	Native/NI
Wetland	Common tule *(Scirpus acutus* var. *occidentalis)*	Native/NI
Wetland	Broad-leaf cattail *(Typha latifolia)*	Native/OBL
Upland	Saskatoon Serviceberry *(Amelanchier alnifolia)*	Native/FACU
Wetland/Upland	Red alder *(Alnus rubra)*	Native/FAC
Wetland/Upland	Wood rose *(Rosa gymnocarpa)*	Native/FAC+
Upland/Wetland	Cluster rose *(Rosa spp.)*	Native/NI
Wetland	Quaking aspen *(Populus tremuloides)*	Native/FAC+
Wetland	Black cottonwood *(Populus balsamifera* ssp. *trichocarpa)*	Native/FAC
Wetland	Red-Osier Dogwood *(Cornus stolonifera)*	Native/FACW
Upland	Chokecherry *(Prunus virginiana)*	Native/FACU
Upland	Golden currant *(Ribes aureum* Pursh.*)*	Native/NI/Noxious

TABLE 2 Plant Species Identified on the Windy Bay Property		
Location	Species Name (Common, Scientific)	Native/Indicator Status/Noxious
Upland	Dalmation Toadflax *(Linaria dalmatica* L.*)*	Non-native/NI/Noxious
Upland	Oregon grape *(Berberis repens* spp.*)*	Native/NI
Wetland/Upland	Pacific Ninebark (*Physocarpus capitatus*)	Native/FAC+
Upland	Blue spruce *(Picea pungens)*	Native/FAC-
Upland	Lodgepole pine *(Pinus contorta)*	Native/FAC-
Upland	Western Larch (*Larix occidentalis* Nutt.)	Native/FacU+
Upland	Western whitepine *(Pinus monticola)*	Native/FACU
Upland	Grand fir (*Abies grandis)*	Native/FACU
Upland	Ponderosa pine *(Pinus ponderosa)*	Native/FACU-
Upland	Douglas fir *(Pseudotsuga menziesii)*	Native/FACU
Upland	Sticky geranium *(Geranium viscosissimum)*	Non-native/FACU+
Wetland	Weeping willow *(Salix babylonica)*	Native/FAC+
Wetland	Stinging Nettles *(Urtica dioica)*	Non-native/FAC+/Noxious
Upland	Cheatgrass (*Bromus tectorum* L.)	Non-native/NI
Upland	Snowberry *(Symphoricarpus* spp.*)*	Native/UPL
Upland	Elk Sedge (*Carex garberi*)	Native/FACW-
Upland	Lewis' Mock Orange *(Philadelphus lewisii)*	Native/NI
Wetland	Common Horsetail *(Equisetum arvense)*	Native/FAC
Upland	Wild Strawberry *(Duchesnea indica)*	Non-native/UPL
Upland	Oceanspray *(Holodiscus discolor)*	Native/NI
Wetland	Nightshade *(Solanum* L.*)*	Unknown/NI
Wetland	Douglas spirea *(Spirea douglasii)*	Native/NI
Upland	Western red cedar *(Thuja plicata)*	Native
Upland	Big Leaf Maple *(Acer* spp.*)*	Native
Wetland	Wapato or arrowhead (*Sagittaria cuneata*)	Native/OBL
Wetland	Black hawthorn (*Crataegus douglasii)*	Native/FAC
Wetland	Red Top (*Agrostis alba)*	Native/FACW

*** Additional plants may be present. Some plants are not visible due to being late summer. This table represents observations recorded at the time of the field work.*

SECTION 3 HYDROLOGIC ASSESSMENT

This Section summarizes the results of a hydrologic assessment that was conducted for the subject Windy Bay Property. The purposes for completing this work include:

- To establish typical hydrologic patterns in lake level fluctuations;
- To aid in the development of reliable prescriptive management recommendations for the Windy Bay Property.

Primary information sources include the December 2001 *Appraisal of 147.6 Acre Tract at the Mouth of Lake Creek on Lake Coeur d'Alene for the Coeur d'Alene Indian Tribe* by Emerson Valuation, The Federal Emergency Management Agency's (FEMA) *Flood Insurance Study for the City of Hauser, City of Spirit Lake, City of Post Falls, City of Fernan Lake, City of Harrison, City of Coeur d'Alene, and Unincorporated areas of Kootenai County*, and The *Spokane River Project Relicensing Water Budget and Identification of Beneficial Uses* prepared for the Avista Corporation and Water Resources Work Group by Northwest Hydraulic Consultants (NHC).

3.1 GENERAL HYDROLOGIC SETTING

Lake Coeur d'Alene is fed by two major river systems; the Coeur d'Alene River to the east and St. Joe River to the southeast. Outflow from Lake Coeur d'Alene forms the Spokane River, which flows westerly and has an average annual flow of approximately 4.6 million acre-feet. Lake Coeur d'Alene is a natural lake with a drainage area of approximately 3,700 square miles and with a natural outlet to the Spokane River. The Post Falls Dam on the Spokane River, located nine miles below the outlet from Lake Coeur d'Alene, was constructed in 1906 by the Washington Water Power Company (currently Avista Corporation) to regulate the lake level to optimize water power production. This facility controls water levels in Lake Coeur d'Alene, except for periods of high flow when a natural constriction at the lake's outlet provides control.

3.2 LAKE LEVELS

Avista's regulation of the Spokane River Hydroelectric Project (Post Falls Dam) maintains higher water levels in Lake Coeur d'Alene through the summer and early fall. During the months of September through November, the lake is drawn down to its winter water levels. In general, flows and water levels are unaffected by Project operations during the months of

December through March as regulation at Post Falls is minimal during this period. The Post Falls operation schedule allows the lake to refill starting in April, where the lake is refilled to its summer water level of 2128 feet. This is maintained July 1st through September 1st.

3.3 FLOODING

Most major floods occur in the drainage basins of Kootenai County during the winter and spring when warm rains fall on melting snow. The highest floods are usually the winter floods, which result from heavy rainfall augmented by snowmelt. Winter flows can rise from normal to extreme flood peaks in 2 days. Spring floods are more frequent, but lower, and occur primarily during April and May. Spring floods are basically the result of snowmelt, sometimes in combination with rainfall. They can rise from normal to extreme flood peaks within 5 days and remain above flood stages for more than 2 weeks.

Table 3
FEMA Flood Insurance Study Lake Elevations

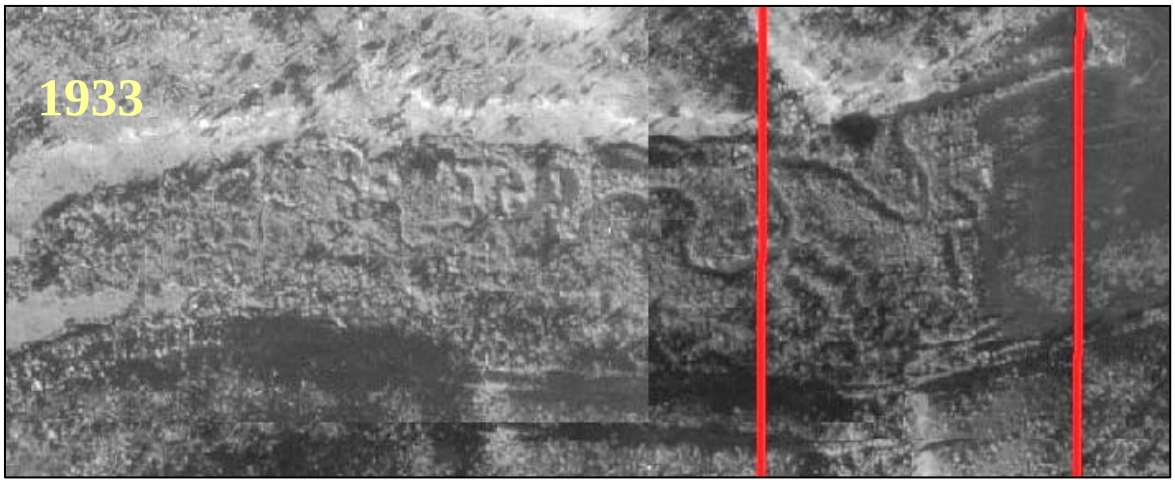
Lake	Drainage Area	10-Year Flood Elevation	100-Year Flood Elevation
Lake Coeur d'Alene	3700 Sq Miles	2131.8 feet	2135.5 feet

3.4 CONCLUSIONS

Under the current Spokane River Hydroelectric Project Operating Procedures, Lake Coeur d'Alene remains at a static elevation of 2128± feet during the summer months (July 1st through September 1st) each year. During the wet season (September 1st through June 30th), the lake levels vary over a significant range, typically from 2121± feet to 2127.5± feet with the lowest lake levels in January and February and the highest lake levels in May, June & September. The most significant fluctuations are likely to occur in April and May during spring runoff. A comparison of 90% exceedance lake levels indicates an increase in lake levels of 2.25 during the month of March and 3.25 feet during the month of April. The rate of drawdown beginning in early September is typically linear between September and December, except for extreme wet years as indicated by the 10% exceedance line. Based on the graph, the rate of drawdown for these months is typically about 1.5 feet per month.

Below are digital orthophotos of the mouth of Lake Creek taken in 1998 (top) and 1933

(bottom). At the time of the 1933 photo, the subject property would have been inundated for approximately 29 years by Lake Coeur d'Alene, which was maintained at approximately 2,126 feet above MSL during the summer months by Post Falls Dam. This annual cycle is the reverse of the natural hydrograph, which would drop summer lake levels to around 2,121 feet. From the orthophotos it appears that the operation of Post Falls Dam has resulted in a decrease in scrub-shrub wetlands and an increase in open water.



SECTION 4 WETLAND ASSESSMENT

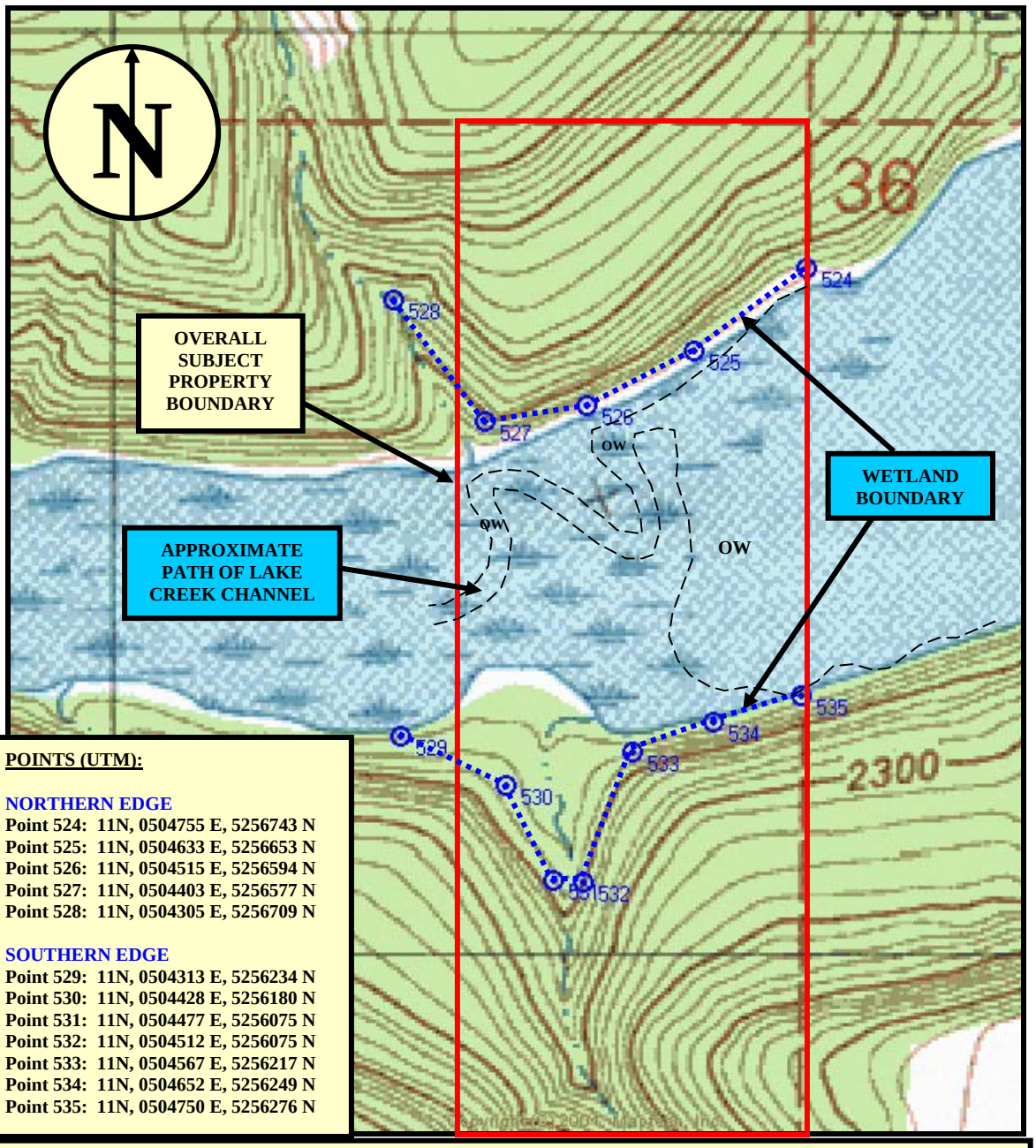
The wetlands on the Windy Bay Property were delineated for four primary purposes:

- To characterize and document the current qualities and boundaries of wetlands on site;
- To assist in fulfilling Section 404 permitting obligations, should restoration or enhancement alternatives be planned that affect wetlands.
- To assist in determining restoration potential of the Property.
- To corroborate the extent of cover types identified for the HEP

This assessment was based upon a review of topographic maps, aerial photographs, subsurface conditions, vegetation, hydrological assessment, and consultation with US Army Corps of Engineers (ACOE) regulatory officials. The status and boundaries of wetlands were established by field surveys using the ACOE 1987 Wetland Delineation Manual (Environmental Laboratory 1987), and/or through consultation with ACOE officials, where appropriate. ACOE officials were consulted to determine whether official lake boundaries have precedence over delineation boundaries, should these boundaries differ.

4.1 WETLAND DELINEATION

The study boundary was defined generally as the upland/wetland interface along the southern edges and northern edges of the semi-permanently inundated portions of the subject property. The general study boundary and the precise locations and limits of the wetlands as part of this wetland assessment are shown in Figure 6. Field biologists conducted delineation work during early August of 2004.



POINTS (UTM):

NORTHERN EDGE
Point 524: 11N, 0504755 E, 5256743 N
Point 525: 11N, 0504633 E, 5256653 N
Point 526: 11N, 0504515 E, 5256594 N
Point 527: 11N, 0504403 E, 5256577 N
Point 528: 11N, 0504305 E, 5256709 N

SOUTHERN EDGE
Point 529: 11N, 0504313 E, 5256234 N
Point 530: 11N, 0504428 E, 5256180 N
Point 531: 11N, 0504477 E, 5256075 N
Point 532: 11N, 0504512 E, 5256075 N
Point 533: 11N, 0504567 E, 5256217 N
Point 534: 11N, 0504652 E, 5256249 N
Point 535: 11N, 0504750 E, 5256276 N

Figure 9. Wetland Points and Boundary

Source: 1981 USGS 7.5-Minute Topographic Map of Worley, Idaho and GPS points collected by Tetra Tech, Inc.
Outline: Wetland Boundary and the Subject 147-Acre Property
Approximate Scale: 1 Inch = 650 Feet

The following sources were consulted for this assessment:

- Aerial photographs;
- *Corps Wetland Delineation Manual* (Environmental Laboratory 1987);
- Soil Survey of Kootenai County, Idaho (USDA 1981);
- 1981 USGS 7.5-Minute Topographic Quadrangle Map of Worley, Idaho
- National Wetland Inventory (NWI) map of Worley area, Idaho

NWI maps indicated that wetlands on site consist of three types of features that are all part of the Palustrine system of wetland classification (Cowardin, et al. USFWS FWS/OBS 79/31. 1979). There is the PFO1C feature, or Palustrine, forested, broad-leaved deciduous, seasonally flooded feature; the PEM2H feature, or Palustrine, emergent, non-persistent, permanently flooded feature; and the PSS1C, which is a Palustrine, shrub/scrub, broad-leaved deciduous, seasonally flooded feature. While two of these three features are reportedly seasonally flooded, the seasonal variation in water appears to result from human-controlled changes in lake levels.

4.1.1 HYDROPHYTIC VEGETATION

Dominant plant species found within the study boundary were primarily of the shrub/scrub layer. Table 7 below depicts the indicator statuses and the approximate areal coverages for all the plant species observed within the wetland area on site. Coverages are based upon their respective canopy layers.

Table 4
Plant Species Identified in the Wetland Area

Indicator Status*	Species Name *(*Common and *Scientific) - % of entire wetland*	Native/Non-
FACU**	Italian rye-grass *(Lolium multiflorum) - presence*	Non-native
FACW	Reed canary grass *(Phalaris arundinaceae) - 20 percent*	Non-native
FACW	Curly dock *(Rumex crispus) – presence*	Non-native
FAC	Canada Cockleburr *(Xanthium strumarium) – presence*	Native
NI	Tall Flatsedge *(Cyperus eragrostris) - presence*	Native
OBL	Needle spikerush *(Eleocharis acicularis) – presence*	Native
FACW+	Threepetal bedstraw *(Galium trifidum) - presence*	Native
OBL	Common duckweed *(Lemna minor) – 10 percent*	Native
OBL	Common Horsetail *(Equisetum arvense) – 10 percent*	Native

Table 4 Plant Species Identified in the Wetland Area		
Indicator Status*	Species Name *(*Common and *Scientific) - % of entire wetland*	Native/Non-
OBL	Water potato (*Sagittaria cuneata* E. Sheldon) *– 20 percent*	Native
FACW	Common reed *(Phragmites australis) – presence*	Native
OBL***	Water smartweed *(Polygonum amphibium) – presence*	Native
NI	Common bulrush; tule *(Scirpus acutus) – presence*	Native
OBL	Broad-leaf cattail *(Typha latifolia) – 60 percent*	Native
FAC	Red alder *(Alnus rubra) – 20 percent*	Native
FAC+	Wood rose *(Rosa gymnocarpa) – 10 percent*	Native
FAC+	Quaking aspen *(Populus tremuloides) – 5 percent*	Native
FAC	Black cottonwood *(Populus balsamifera* ssp.*) – 5 percent*	Native
FACW	Red-Osier Dogwood *(Cornus stolonifera) – 20 percent*	Native
FAC+	Pacific Ninebark *(Physocarpus capitatus) – 10 percent*	Native
FAC	Western red cedar *(Thuja plicata) – presence*	Native
FAC***	Tansy ragwort *(Senecio spp.) – presence*	Native
FAC+	Stinging nettles *(Urtica dioica) – 5 percent*	Non-native
FAC+***	Saw-beaked sedge *(Carex spp.) – 5 percent*	Native
FAC	Black hawthorn (*Crataegus douglasii) – 10 percent*	Native
FACW	Common rush *(Juncus effuses) – 5 percent*	Native
OBL	Water speedwell *(Veronica anagallis-aquatica) - presence*	Native
FACW	Red Top (*Agrostis alba) – presence*	Native
FAC+	Weeping willow *(Salix babylonica) – 5 percent*	Native

* Indicator status is determined using USDA/NRCS criteria for Region 9, which includes Idaho, Washington, Oregon, Western Montana, and Western Wyoming.
** Indicator status was determined using field guide (Cooke 1997).
*** Indicator status estimated through observation.

The dominant hydrophyte within the wetland is broadleaf cattail *(typha latifolia)* at approximately 60 percent coverage. Reed canarygrass *(Phalaris arundinaceae)* has approximately 20 percent of coverage in the herbaceous wetland area. It should be noted that these species were found intermixed. Closer toward the meandering stream and lake edge, the ground cover was completely dominated by cattails *(Typha latifolia)* and wapato [water potato (*Sagittaria cuneata* E. Sheldon)]. Curly dock (*Rumex crispus*), bulrush (*Scirpus* spp.), sedges (*Carex* spp.), common horsetail (*Equisetum argosii)*, common tule *(Scirpus acutus),* tall flatsedge *(Cyperus eragrostis)* and needle spikerush *(Eleocharis acicularis)* were noted closer to the edges of the herbaceous wetland. Common duckweed *(Lemna minor)* flourished near the water's edge. Occasional red-

osier dogwood *(Cornus stolonifera)* and wood rose *(Rosa gymnocarpa)* were found on small (one meter in size) lumps within the herbaceous wetland.

Shrub-scrub species occurred near the bases of the northern and southern hillsides near the edge of the wetland in the deciduous forested and shrub/scrub communities. This area of the wetland was dominated by shrubs that were interspersed with reed canarygrass *(Phalaris arundinacea)* and species of the *carex*, *salix*, and *juncus* variety. The primary hydrophyte in the shrub layer of canopy coverage along the fringe is red alder *(Alnus rubra).* Red alder was also noted within the tree layer, when appropriate. Other species of shrubs that were also noted within the tree layer included quaking aspen *(Populus tremuloides),* black cottonwood *(Populus balsamifera),* and weeping willow *(Salix babylonica).*

4.1.3 HYDRIC SOILS

Hydric soils are those that have been saturated, flooded, or ponded long enough during the growing season to develop anaerobic (oxygen-depleted) conditions in upper zones. Soils were sampled, unless otherwise noted in the data forms. Hydric soils were determined based on criteria established by the Soil Conservation Service (USDA 1995) and described in the Corps manual (Environmental Laboratory 1987). Indicators of hydric soils included soil color, mottles, oxidized rhizospheres (root channels), and concretions of iron or manganese. Soil color and chroma were characterized using Munsell Soil Color Charts (Kollmorgen Instruments Corp. 1992). Soil classification was based upon the Soil Survey of Kootenai County Area, Idaho (USDA 1981). Only one potential hydric soil type on site was identified within the soil survey.

Cougarbay silt loam is found on the Hydric Soils list. Soils uncovered at test pits near the wetland interface averaged 2/1 on the Munsell 10YR page of soil color. Mottles and gleyed soils were also uncovered. True hydric soil appears to extend somewhat into marshlands and ends at basalt outcrops and talus slopes at the wetland edges. In most places, hydric soil exists within about one meter from the water's edge. The soil at these locations is filled with 4-inch-cobbles of basalt. It is likely that, prior to lake level rises, that a broader band of hydric soil existed on site. It is also likely that a broader shrub-scrub wetland community once existed.

4.1.4 WETLAND HYDROLOGY

Wetland hydrology implies a hydrologic regime involving periodic inundation or soil saturation to the surface for at least five percent of the growing season. Wetland hydrology is one factor that determines whether a site is considered a “wetland” or “other water of the United States”. Evidence of wetland hydrology (e.g., saturation and ponding, sediment deposition, and presence of bed and bank or scouring) was recorded when observed. Ordinary high water was measured in the field using standard primary field indicators, such as high water marks, drift lines, and sediment deposits. It is evident, however, that the majority of the wetlands are fairly stagnant, as the lake levels are managed and control the hydrology of the area. During August, the Lake Coeur d’Alene lake levels are generally at their highest point (2,128 feet above MSL). Increased moisture levels extend approximately 1 meter above the highest lake level due to wakes and winds that cause waves as evidenced by the presence of facultative vegetation that transitions abruptly to upland species such as Ponderosa pine *(Pinus ponderosa)* along steeper portions of the Lake shore.

4.2 RESULTS OF DELINEATION

A total of approximately 42.46 acres of jurisdictional wetlands were delineated within the project area (Table 8). Vegetation cover types within these jurisdictional wetlands include Deciduous Forest-Scrub/Shrub Wetland and Herbaceous. A further 20.98 acres of unvegetated waters were found within Coeur d’Alene Lake and Lake Creek. Data points were established at a total of twelve locations, and wetland conditions were found at all of those locations.

Table 5
Type and Extent of Wetlands on the Windy Bay Property

Wetland Sites	Sampling Points	Habitat Type	Wetlands or Waters	Acres
Lake Creek perimeter	524-535 (12 points)	Fresh emergent marsh and deciduous/shrub-scrub forested wetlands	Wetlands	**21.48**
Total Wetlands				**21.48**
Creek interior and Lake CDA	Observed via boat	Open Water	Waters	**20.98**

Table 5 Type and Extent of Wetlands on the Windy Bay Property				
Wetland Sites	Sampling Points	Habitat Type	Wetlands or Waters	Acres
Total Waters				**20.98**
Total Jurisdictional Wetlands and Waters				***42.46***

Vegetation

Greater than 50 percent of the dominant species within the investigated area are either facultative or obligate wetland species, which is consistent with the definition of hydrophytic vegetation.

Soils

Soils within the investigated area were determined to have a low chroma/color matrix (10YR:2/1) with high chroma (5YR:4/6) redox concentrations, which is consistent with the hydric designation on the National Hydric Soils list.

Hydrology

Wetland hydrology was determined by the presence of standing water or saturated soils within 12 inches of the ground surface in excavated pits for at least five percent of the growing season. Low topographic position was a secondary indicator. Observations indicated the presence of standing water for nearly the entire growing season for the investigated area.

Jurisdictional Status Determination for Wetlands on Site

The Herbaceous Wetland and Deciduous Forest-Scrub/Shrub delineated areas were determined to be jurisdictional wetlands as it was dominated by hydrophytic vegetation, has hydric soils, and exhibited indicators of wetland hydrology.

SECTION 5 HABITAT EVALUATION PROCEDURE

The overall goal of this work is to protect, enhance, and maintain wetland and riparian habitat in the Lake Creek drainage as partial mitigation for the impacts attributed to the construction and operation of the Albeni Falls hydroelectric facility (Coeur d'Alene Tribe 2000, NWPP C Lake Creek Project Submittal). In order to meet this goal, Habitat Evaluation Procedures

(HEP) were conducted for 7 Albeni Falls Target Species, which include mallard duck, Canada goose, bald eagle, black-capped chickadee, white-tailed deer, muskrat, and yellow warbler. The habitats for bald eagle were evaluated for both winter and nesting suitability indexes. The purposes for completing these HEPs include:

- To complete an inventory of current wildlife habitat on the property;
- To calculate available Habitat Units (HUs) for crediting against Albeni Falls Construction and Inundation Losses.
- To assist in determining the best prescriptions for the habitat restoration, enhancement and/or management within the Windy Bay Property.

5.1 BASELINE HEP ANALYSIS

The habitat units (HUs) calculated for each target species is presented in Table 11. The results of each HSI model and the raw data for the calculation of each model variable are presented in Appendix B. Habitat for target species on the Windy Bay Property is near its maximum suitability assuming lake levels are non-negotiable.

Table 6
Habitat Unit Summaries by Target Species

Species	Cover Types	Evaluation Area (Acres)	HSI	Habitat Units
Black-capped chickadee	DFW/DSW	11.17	0.79	8.82
Yellow Warbler	DFW/DSW	11.17	0.56	6.26
White-tailed deer	DFW/DSW	11.17	1.0	11.17
Muskrat	HW	10.31	0.82	8.45
Mallard	DFW/DSW and HW	21.48	0.5	10.74
Bald Eagle Wintering	DFW/DSW	11.17	0.84	9.38
Bald Eagle Nesting	DFW/DSW	11.17	0.62	6.93
Canada Goose	HW	10.31	0.5	5.16
Total		**97.95**		**66.91**

SECTION 6 MANAGEMENT GOALS

Management actions within the Windy Bay Property will strive to provide long term, self sustaining native habitat mosaics that support an abundance of native fish, wildlife and plant species that will in turn sustain important subsistence/cultural activities.

To fulfill the purpose of property management several broad scale strategies must be employed. The property currently provides wildlife habitats where vestiges of native vegetation exist and where native vegetation has been able to establish after severe disturbance. These habitats must be secured and, where appropriate, altered to optimize their diversity of and benefit to appropriate species. All strategies employed on the property will serve to support native fish and wildlife populations and provide subsistence and/or cultural uses.

Three goals were selected to encompass the variety of needed actions on the Windy Bay Property. These goals are consistent with the directions provided by Coeur d'Alene Tribe Elders, Coeur d'Alene Tribal Youth, Tribal resolutions and policy, and BPA mandates and policy for mitigation crediting, as well as regional management directives. The goals also reflect both wildlife and fisheries needs within the property.

Goal 1. Protect, enhance, and manage wetland, riparian and forest habitats that support endemic, migratory and resident fish and wildlife species.

The Windy Bay Property encompasses 147 acres of forested canyon, scrub-shrub wetland, emergent wetland and stream habitats that will be devoted to supporting migratory and resident fish and wildlife populations.

Goal 2. Promote hydrologic functions that support native wetland plant communities and instream habitats favorable to native salmonid populations.

Currently, the Windy Bay Property encompasses approximately 20.98 acres of open water, 10.31 acres of herbaceous wetland, and 11.17 acres of Deciduous Forested/Scrub-Shrub Wetland. Lake Creek is one of the 4 streams within the Coeur d'Alene Reservation that is the focus of the Coeur d'Alene Tribe Fisheries Program's efforts to restore native westslope cutthroat trout. The Windy Bay Property and

particularly the wetland portions of this property occupy a unique position on the landscape in that it encompasses the mouth of Lake Creek. All migratory fish must pass through this critical property in order to access spawning habitats within the Lake Creek Watershed. Management actions will protect these 42.46 acres of wetlands to promote functioning habitats that support stream flows within Lake Creek and allow the passage of spawning population of westslope cutthroat trout.

Goal 3. Maintain habitats in perpetuity that will support subsistence and cultural activities while maintaining native fish and wildlife populations.

Management will strive to maintain the current HU production while providing habitats that will support hunting, foraging and other Coeur d'Alene Tribal cultural pursuits within the Windy Bay property.

SECTION 7 MANAGEMENT OBJECTIVES

7.1 Objective 1: Upland Forest Management

7.1.1 Prescribed Burns

Recent extensive logging of the forests that cover the upland habitats on the Windy Bay Property has left a ragged, dispersed overstory and a dense understory shrub community. Abandoned logging roads evidence erosion and weed infestations where they were not properly decommissioned. Recommendations for habitat improvement include eradication of invasive non-native plant species and logging road and damaged culvert reclamation. Control of the fuel loads, particularly in the shrub/seedling/sapling strata, that could contribute to the rapid spread of wildfire is also recommended.

Previous research has shown that although prescribed burning alone (without thinning or removal of forest floor fuels) can reduce surface fuel loads, stimulate nitrogen availability, and increase herbaceous productivity, it can also cause high tree mortality (60% mortality over a 20-year period) and lethal soil temperatures under tree canopies (Covington et al. 1997). Although some tree thinning can be accomplished by prescribed burning, results are localized, unpredictable, and difficult to control. Timber forest fuels reduction crews can remove the predominant under-story, secondary growth and woody-herbaceous layers, and thin existing

decadent growth with tillers/chainsaws and hand piling burning techniques to promote low intensity prescribed burns.

Project managers are currently working with the Coeur d'Alene Tribe Fuels Planner to establish a comprehensive long-term fuels management plan. Active management of the upland areas adjacent to Goose Haven Lake is limited to noxious weed control due to monetary constraints and associative habitat management priorities (i.e. wetland creation).

7.2 Objective 2: Noxious Weed Control

7.2.1 Control and Maintenance

Weed species, life cycles, abundance and dispersion will dictate the mechanism(s) for control and/or elimination. Several types of control mechanisms are likely to be used individually or in combination. In most cases, the initial weed compositions are such that large-scale chemical treatments will likely be necessary. Subsequent treatments may consist of spot spraying, manual removal, controlled burns, short-term inundation, and reseeding and planting desired species of native vegetation.

Current noxious weed control consists of annual burns, mowing, spot spraying and large scale chemical treatments. Further investigation may yield inundation as a possible course of action should it not conflict with an established hydrological regime.

7.3 Objective 3: Monitoring and Evaluation

The CDAT will implement the *Monitoring and Evaluation Plan for the Albeni Falls Wildlife Mitigation Project* (AFIWG 2001). The CDAT will monitor wildlife populations and vegetative cover, and the results will be correlated with a HEP analysis to be conducted every five years. Reference data relative to changes in the baseline condition will be collected throughout the life of the Goose Haven Wildlife Mitigation Project. Habitat and vegetation responses will be measured and correlated with trends in wildlife populations. Permanent plots in each habitat type will be established and measured every five years using HEP and transect data.

The HEP sites in each of the cover types were randomly selected and permanently marked to monitor habitat and crediting value. Parameters to be measured include HEP variables; species of trees, shrubs, forbs and grasses; height, density and distribution of these species; percent tree and shrub canopy cover; and acres of wetlands and riparian forest successfully established. Water table levels will be monitored and correlated with vegetation development. Annual photographic documentation will occur at each HEP site and at each planting site to record vegetation development.

Techniques for deriving field data are currently being developed by Eastern Washington University (2005).

7.4 Objective 4: Operations and Maintenance

The CDAT will conduct operations and maintenance (O&M) activities to assure long-term management success of the Subject Property effective adaptive management. O&M activities will follow the *Guidelines for Enhancement, Operation, and Maintenance Activities for Wildlife Mitigation Projects* (CBFWA 1998).

SECTION 8 BUDGET

Table 7. Total Operation & Maintenance and Monitoring & Evaluation Budget for the Windy Bay Property.

Costs by Fiscal Year					
Objective	**2009**	**2010**	**2011**	**2012**	**2013**
Operations & Maintenance					
Noxious weed control+*	500	525	551	579	608
Controlled burning	500	500	500	500	500
Equipment maintenance/lease+*	500	525	551	579	608
Materials & Supplies+	100	105	110	116	122
Vehicle Lease/Fuel*	1,060	1,113	1,169	1,227	1,288
Monitoring & Evaluation					
Wildlife surveys*	3,333	3,500	3,675	3,858	4,051
HEP		5,000			
Total Annual Costs	**5,993**	**11,268**	**6,566**	**6,859**	**7,177**

+ Excluding Personnel

* 5% per annum Inflation Increase

SECTION 9 REFERENCES

Alt, D. and Hyndman, D.W. 1995. Northwest exposures: A geologic story of the northwest. Mountain Press Publishing. Pp. 443.

Askins, R.A. 1997. History of grasslands in the northeastern United States: implications for bird conservation. Pp. 119-136. In P.D. Vickery and P.W. Dunwiddie (eds) Grasslands of Northeastern North America. Massachusetts Audubon society, Lincoln, MA.

Barrett, S.W. 1980. Indians and fire. Western Wildlands. 6:17-21

Bookhout, T.A., K.E. Bednarik, and R.W. Kroll. 1989. The Great Lakes marshes *in* Habitat management for migrating waterfowl in North America. L.M Smith, R.L.Pederson, and R.M. Kaminski (eds.). Texas Tech University Press, Lubbock, Texas. Pp. 121-156.

Boyd, R. 1986. Strategies of Indian burning in the Williamette Valley. Canadian Journal of Anthropology 5:65-86.

CBFWA. (Columbia Basin Fish and Wildlife Authority). 1998. Guidelines for enhancement, operation, and maintenance activities for wildlife mitigation projects. Portland, OR.

Cooper, S. V., K. E. Neiman, and D. W. Roberts. 1991. Forest habitat types of northern Idaho: a second approximation. USDA Forest Service General Technical Report INT-236. Intermountain Research Station, Ogden. 143 pp.

Chabreck, R.H. 1988. Coastal marshes: ecology and wildlife management. University of Minnesota Press, Minneapolis, Minnesota. 138 p.

Coeur d'Alene Tribe 2002. Benewah Creek Management Plan: Albeni Falls wildlife mitigation. Couer d'Alene Tribe, Plummer, Idaho. 41 p.

Covington, W. Wallace, Fule, Peter Z., Moore, Margaret M., Hart, Stephen C., Kolb, Thomas E., Mast, Joy N., Sackett, Stephen S., and Wagner, Michael R. 1997. Restoring

ecosystem health in ponderosa pine forests of the Southwest. *Journal of Forestry* 95: 23-29.

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual, Technical Report* Y-87-1. US Army Engineers Waterways Experiment Station, Vicksburg, Mississippi.

Fredrickson, L.H. and M.K. Laubham. 1996. Managing wetlands for wildlife *in* Research and management techniques for wildlife and habitats. T. A. Bookhout (ed.). The Wildlife Society and Allen Press, Lawrence, Kansas. Pp. 623-647.

Fredrickson, L.H. and F.A. Reid. 1988. Waterfowl use of wetland complexes *in* Waterfowl Management Handbook, D.H. Cross (ed.). US Fish and Wildlife Service Leaflet 13. Pp. 1-6.

Fredrickson, L.H. and F.A. Reid. 1986. Wetland and riparian habitats: a non-game management review *in* Management of non-game wildlife in the Midwest: a developing art. J.B. Hale, L.B. Best, and R.L. Clawson (eds.). North Central Section of The Wildlife Society. Chelsea, Mississippi. Pp. 59-96.

Fredrickson, L.H. and T.S. Taylor. 1982. Management of seasonally flooded impoundments for wildlife. US Fish and Wildlife Service Research Publication 148. 29 p.

Graul, W.D., and G.C. Miller. 1984. Strengthening ecosystem management approaches. Wildlife Society Bulletin 12: 282-289.

Idaho Data Conservation Center (IDCC). 2004. Plant community element tracking database. Electronic database file in the Biological and Conservation Data System. Idaho Department of Fish and Game, Boise, Idaho. http://www2.state.id.us/fishgame/info/cdc/cdc.htm

Idaho Fish and Game. 1987. Albeni Falls wildlife protection, mitigation and enhancement plan. Pp 124. Produced for the Bonneville Power Administration.

Idaho Fish and Game. 2004. Rare Plant Guide to the Idaho Panhandle National Forests. Internet web site located at http://www2.state.id.us/fishgame/info/cdc/plants/ipnf_plant_guide_intro.htm Accessed on 9-13-03.

Johnson, W.C. 1998. Adjustment of riparian vegetation to river regulation in the Great Plains, USA. Wetlands 18:608-618.

Kantrud, H.A., J.B. Millar, and A.G. van der Valk. 1989. Vegetation of wetlands of the prairie pothole region. Pp. 132-187. In, A. van der Valk (ed.) Northern Prairie Wetlands. Iowa State University Press, Ames, IA.

Kautz, R.S. 1984. Criteria for evaluating impacts of development on wildlife habitats. Proceedings of the Annual Conference of Southeast Fish and Wildlife Agencies 38: 121-136.

Kollmorgen Instruments Corp. 1992. *Munsell Soil Color Charts*. Newburgh, New York.

Linde, A.F. 1969. Techniques for wetland management. Wisconsisn Department of Natural Resources Report 45. 156 pp.

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

Malamud-Roam, Carl. 2002. Wetlands without Mosquitoes. Symposium sponsored by Contra Costa County Mosquito Abatement District, Contra Costa County, CA.

Martin, R. C., H. J. Hansen, and G. A. Meuleman. 1988. Albeni Falls wildlife protection, mitigation, and enhancement plan. Proj. 87-43. Bonneville Power Administration, Portland, OR. 123 pp.

Morrison, M.L. 1986. Bird populations as indicators of environmental change. Pp. 429-451 in R.J. Johnson (ed.). Current Ornithology, Vol 3. Plenum Press, New York. 522 p.

Nelson, J.C., R.E. Sparks, L. Dehann, and L. Robinson. 1998. Presettlement and contemporary vegetation patterns along two navigation reaches of the Upper Mississippi River. Pp. 51-60. In, T.D. Sisk (ed.) Perspectives on the land-use history of North America: a context for understanding our changing environment. U.S. Geological Survey, Biological Resources Division. USGS/BRD/BSR-1998-0003.

Northwest Power Planning Council. 1995. Columbia River fish and wildlife program, 1995 amendments. NPPC, Portland, OR.

Northwest Power Planning Council. 2000. Columbia River fish and wildlife program. NPPC, Portland, OR.

Payne, N.F. 1992. Techniques for wildlife habitat management in wetlands. McGraw-Hill. 549 p.

Pederson, R.L., D.G. Jorde, and S.G. Simpson. 1989. Northern Great Plains *in* Habitat management for migrating waterfowl in North America. L.M Smith, R.L.Pederson, and R.M. Kaminski (eds.). Texas Tech University Press, Lubbock, Texas. Pp. 281-310.

Pennak, R.W. 1978. Freshwater invertebrates of the United States. Second ed. John Wiley and Sons, New York, New York. 803 p.

Rutherford, W.H. and W.D. Snyder. 1983, Guidelines for habitat modification to benefit wildlife. Colorado Division of Wildlife, Denver, Colorado. 194 p.

Schroeder, R.L. 1987. Community models for wildlife impact assessment: a review of concepts and approaches. US Fish and Wildlife Service Biol. Rep. 87(2). 41 p.

U.S. Fish and Wildlife Service. 1980. Ecological Service Manuals (Habitat Evaluation Procedures), ESM 101, 102, and 103. U.S. Department of Interior, USFWS, Division of Ecological Services, Washington, D.C.

U.S. Fish and Wildlife Service. 1980a. Habitat evaluation procedures (HEP). Ecological Services Manual 102. Division of Ecological Services, Washington D.C.

U.S. Fish and Wildlife Service. 1980b. Habitat as a basis for environmental assessment. Ecological Services Manual 101. Division of Ecological Services, Washington D.C.

U.S. Fish and Wildlife Service. 1981. Standards for the development of habitat suitability index models for use in HEP. Ecological Services Manual 103. U.S. Fish and Wildlife Service Division of Ecological Services, Washington D.C.

U.S. Department of Agriculture (USDA). 1981. *Soil Survey of Kootenai County Area, Idaho.* U.S. Department of Agriculture, Soil Conservation Service; U.S. Department of the Interior, Bureau of Indian Affairs.

U.S. Department of Agriculture (USDA). 1995. *Hydric Soils of the United States.* US Department of Agriculture, Natural Resource Conservation Service, National Technical Committee for Hydric Soils. Web site (http://www.statlab.iastate.edu:80/soils/ hydric), updated December 15, 1995.

U.S. Fish and Wildlife Service. 1996. National List of Vascular Plant Species that Occur in Wetlands: 1996 National Summary.

U.S. Department of Agriculture (USDA). 2002. *Soil Survey of St. Joe Area, Parts of Benewah and Shoshone Counties, Idaho.* U.S. Department of Agriculture, Natural Resources Conservation Service; U.S. Department of the Interior, Bureau of Land Management; the University of Idaho, College of Agriculture; and the Idaho Conservation Commission.

Weller, M.W. and L.H. Fredrickson, 1973. Avian ecology of a managed glacial marsh. Living Bird 12:269-291.

Weisel, C. J. 1981. Soil survey of Kootenai County area, Idaho. United States Department of Agriculture. Soil Conservation Service. 255 pp.

APPENDIX A: SITE PHOTOGRAPHS

Photo 1: Looking southwest across wetlands of the Windy Bay Property.

Photo 2: Looking south across the property at a heron on site in water potato.

Photo 3: Looking north from the creek at the geology of the subject site. In many cases, lake waters were found at the edge of Basalt rock rather than soil.

Photo 4: Looking at a narrow band of herbaceous vegetation with rock shoreline.

Photo 5: Looking southwest across a meter band of reed canarygrass at the edge of the creek system.

Photo 6: Duckweed, reed canarygrass, and cattail reside at this location within the herbaceous wetland. Pits within the herbaceous wetland can be more than five feet deep, but most are shallow.

Photo 7: This patch of nuphar was spotted in the open water of Lake Coeur d'Alene. It is unknown whether it's attached or floating. Nuphar was not found on the subject property.

Photo 8: Bullrush was also identified on site. It occurred in isolated 10-meter patches.

Photo 9: Looking west across the southern edge of the lake and wetland.

Photo 10: Looking west at the mouth of Lake Creek from Lake Coeur d'Alene.

Photo 11: Looking north through a stand of fir on the southern edge of the upland. The topography here slopes steeply to the north. Black-capped chickadees were noted in cover.

Photo 12: Looking west at a recovering logging road on site. This section of this logging road appeared in better shape than other sections where knapweed was a problem.

Photo 13: Looking at a different section of the same logging road with noxious weeds.

Photo 14: A broken culvert below a former logging road has caused damage in this section of ephemeral drainage on the southern portion of uplands on site.

Photo 15: Looking at uplands to the south of the Windy Bay Property. The trees in the background represent the southern boundary of the site.

Photo 16: Looking at a large hive along the northern side of the subject site. Bees on site were common. Yellow star-thistle, which bees can use to make honey, was noted on logging roads on the north site of the property.

APPENDIX B: HEP REPORT

BACKGROUND INFORMATION

To be consistent with the Albeni Falls Mitigation process, the HEP project area is limited to Deciduous Forest Wetland/Shrub-Scrub Wetland (DFW/SW) areas and Herbaceous Wetland (HW) areas that were identified during the wetland delineation. HEPs began in early July of 2004 and continued through September of 2004. A power analysis was conducted and transect strategies were then confirmed. Biological fieldwork was completed of the project area over a two-week period in late July and early August of 2004. Data collected from transect points was compiled, analyzed, and calculated during September of 2004.

HEP relies on Habitat Suitability Index (HSI) models that ascribe a value between 0 and 1 to available habitats for a given species. Habitat that is completely unsuitable for a given species is given a 0 while optimum habitat is ascribed as 1. These models are primarily for the breeding life history stage of the species, with the exception of the muskrat and bald eagle. Sampling procedures are based on applicable HSI models. Many of the variables can be derived by remote sensing analysis, aerial photo interpretation, and the use of GIS software. Variables that require estimates of species composition, cover and density, and habitat structure required on–the-ground measurements utilizing a sampling scheme which provided accurate estimates for the HEP evaluation and the necessary power to confirm reliability and to detect future changes. Once the HSI is derived, that value is then multiplied by the number of acres in the cover type being evaluated to derive the number of HUs. HU values for each cover type and species are summed to derive the total number of HUs credited against Albeni Falls Dam Construction and Inundation Losses.

VEGETATIVE COVER TYPES

The first step in determining the appropriate sampling effort and placement of transects was to map the vegetative cover types on the Windy Bay Property using a classification scheme consistent with HSI models. The entire Windy Bay Property was mapped according to cover type (Figure 7) and the results are summarized in Table 9. However the cover types that HEP was applied to include Herbaceous Wetland (HW) and Deciduous Forested/Scrub-Shrub Wetland (DFW/DSW) (Figure 8). Cover type delineations were made on a digital orthophoto

quad dated 1998 and then verified by field observations. The HEP area was intensively investigated during the wetland delineation portion of this assessment. Other features mapped included those pertinent to the initial GIS-derived model variables. This included potential Bald eagle nest/perch habitat, points of human activity, distances from wetlands, and open water shoreline edge types.

Table 8
Cover Types on the Windy Bay Property

Cover Type	Code	Definition	Acres
Open Water	OW	Open water present year round	20.98
Herbaceous Wetland	HW	Persistent on non-persistent emergent vegetation cover more than 50% of wetland.	10.31
Deciduous Forested/Scrub-Shrub Wetland	DFW-DSW	Seasonal Wetland with deciduous tree and shrub cover (cottonwood, willow, alder, dogwood etc,)	11.17
Deciduous Shrub Upland	DSU	Less than 25% treecover and deciduous shrubs dominate the understory (ninebark, serviceberry, chole cherry, etc)	14.79
Closed Evergreen Forested Upland	CEFU	Greater than 50% cover of conifers (Doug fir, ponderosa pine, spruce, etc,)	53.29
Open Evergreen Forested Upland	OEFU	Less than 50% cover or conifers understory grass/low shrubs(snowberry)	52.20
		Total Acres	**162.74**

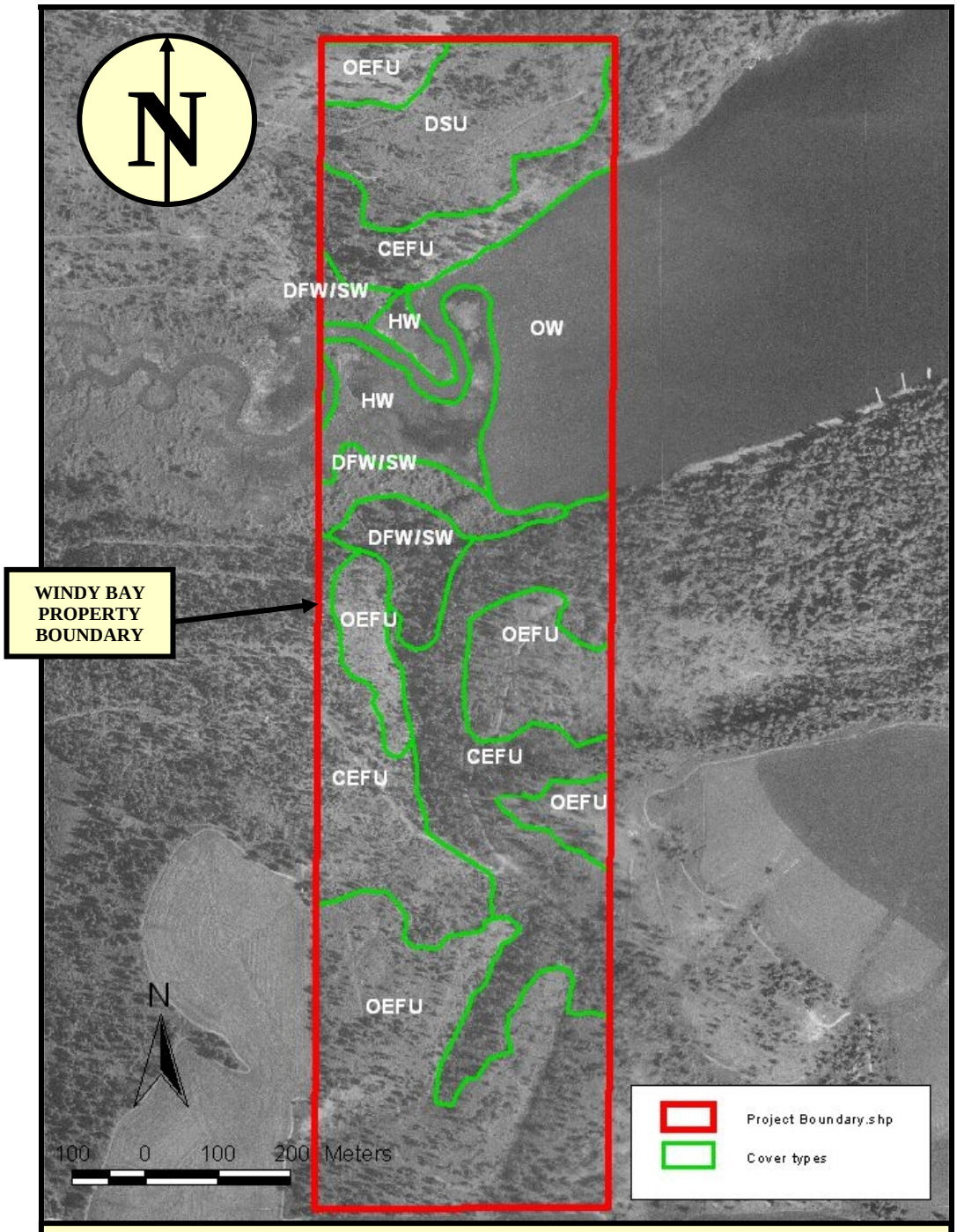


Figure 10. Cover Types on the Windy Bay Property

Source: 1998 USGS Digital Ortho Quadrangle of Worley, Idaho
Outline: Windy Bay Property Cover Types, Codes, and the Property Boundary
Approximate Scale: 1 Inch = 1,000 Feet

BASELINE TRANSECT LOCATION

All HEP baseline transects were 100 meters long. Each cover type polygon received at least one (1) transect. Transect location and orientation (Table 10) was chosen to sample representative portions of each polygon. Consideration was also given to covering the greatest portion of each polygon with each transect (Figure 8). Initial delineation of the DFW/SW cover type resulted in three polygons as over story conditions appeared to be different between the southern two polygons. The southern two polygons were considered the same type after ground reconnaissance but a HEP baseline transect was placed in each to provide more through coverage. A GPS waypoint was recorded for the beginning and ending of each transect to aide in its location, and permanent Carsonite stakes were positioned to assist in finding the transect in future data gathering efforts. A Carsonite stake at the beginning of each baseline was labeled with the cover type code. A total of five baseline transects were used to measure habitat variables in the HW and DFW/DSW cover types. Six 20-meter transects were established perpendicular to the baseline transects at 20 meter intervals. The baseline transect bisects each 20 meter transect with 10 meters of transect extending on either side of baseline transect. For the purpose of data analysis, each 20-meter transect is considered a sampling unit. Transect photos are presented in Appendix F.

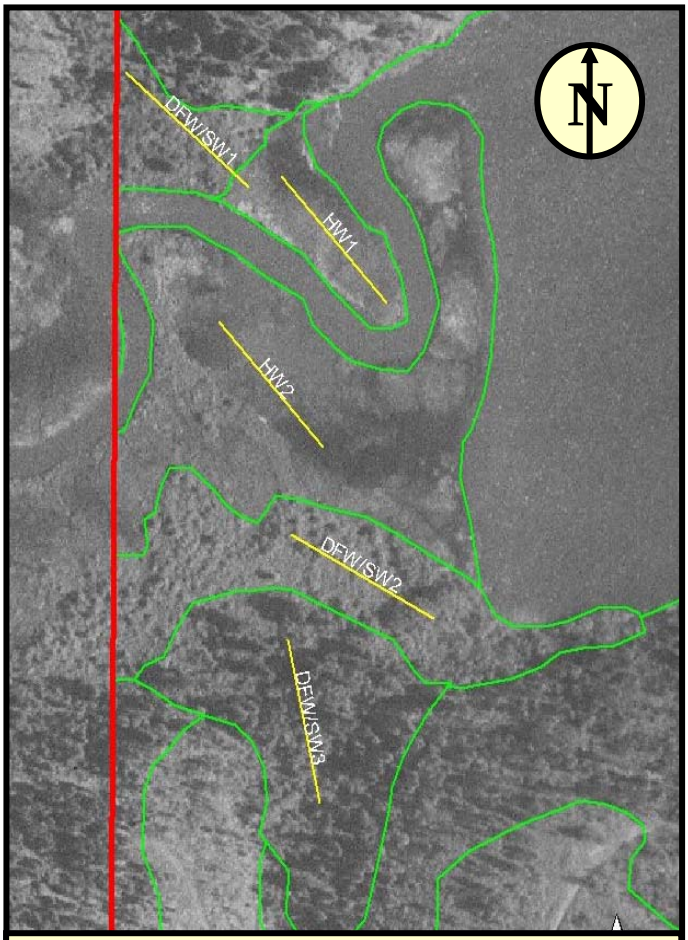


Figure 11: HEP Transect Locations

Source: 1998 USGS Digital Ortho Quadrangle of Worley, Idaho
Outline: Lake Creek Cover Types and Transect Locations
Approximate Scale: 1 Inch = 400 Feet

Table 9 Transect Codes and GPS Data			
Transect	**Beginning UTM Coordinate**	**Bearing**	**Length**
HW1 – Herbaceous Wetland	11N, 0504454E, 5256825N	140 Degrees	100 M
HW2 – Herbaceous Wetland	11N, 0504406E, 5256429N	140 Degrees	100 M
DFW/DSW1 – Deciduous Wetland	11N, 0504347E, 5256582N	112 Degrees	100 M
DFW/DSW2 – Deciduous Wetland	11N, 0504454E, 5256825N	120 Degrees	100 M
DFW/DSW3 – Deciduous Wetland	11N, 0504477E, 5256146N	350 Degrees	100 M

VARIABLES MEASURED USING AERIAL PHOTOS AND GIS

There were several variables that were best measured using remote sensing techniques and GIS Spatial Analysis Tools. The following are the procedures used to obtain values for these variables:

Area of Each Cover Type (Applicable to All Species)

Area calculations were completed for each applicable polygon using ARCHMAP 9 GIS on the Coeur d'Alene Tribe's network system.

Area of Each Wetland Type (Mallard)

The NWI map was clipped by the Windy Bay Property boundary and the acres for the NWI coverages were then summed.

Percent of Open Water Shoreline with Emergent or Scrub/Shrub Vegetation (Mallard).

Using the distance tool in ARCVIEW GIS, the total open water shoreline vegetated by emergents and scrub/shrub vegetation was measured and divided by the measure of total open water shoreline.

Interspersion (Mallard)

The number of wetland and upland nesting types in the project area were counted and divided by the number of these types in a comparable sized portion of an area with known good mallard breeding habitat such as Turnbull NWR to derive the mallard interspersion SI.

Presence of Islands (Canada Goose)

This was determined by use of aerial photo interpretation.

Shoreline Habitat (Canada Goose)

The height of grassland cover within 10 meters of shoreline was estimated from aerial photos and then visually measured in the field. NWI maps were clipped with a shoreline buffer to determine the wetland types within 50 meters of the Lake Shore. The presence of brood habitat at one mile, one to two miles, and greater than two miles away was interpreted using digital orthophoto quads.

Brood Rearing (Canada Goose)

The proximity of brood pasture to the main water body, common foraging zones, and open water wetlands were completed using photo interpretation and visual estimation.

Food Requirements (Bald Eagle)

Prey availability of bald eagles (availability of ungulate carrion, fish of several species, waterfowl, small mammals) is based on habitat types present within five miles of potential nest or perch sites. The potential for water frozen in relation to the nesting season was determined through obtaining climate data for Lake Coeur d'Alene.

Nest/Perch Structure (Bald Eagle)

The potential presence of mature or old growth trees, size of stands, and the presence of screening by younger trees was obtained through photo interpretation of the 1998 digital orthophoto quads and mapping of mature stands in GIS.

Distance to Water Body with Sufficient Prey Availability (Bald Eagle)

Photo interpretation and distance tools in GIS enabled distances to be determined.

Human Activity Level (Bald Eagle)

The localized human activity level was determined through identifying the presence of agriculture and points of human activity (camp sites, trails, homes, boat docks, etc.) within a 1.5 mile radius of potential nest/perch and foraging areas. This activity was completed through

photo-interpretation of a 1.5 km buffer of project area boundary.

FIELD-MEASURED VARIABLES IN DFW/DSW COVER TYPE

In the deciduous forested/shrub-scrub wetland cover type, variables for models included canopy cover for white-tailed deer and black-capped chickadee; overstory height for Black-capped chickadee; snag density for black-capped chickadee; shrub canopy for yellow warbler; and shrub heights relative to yellow warbler. Field data taken for the mallard model consisted primarily of visual obstruction measurements taken with a Robel pole. Field measurements were considered unnecessary for bald eagle. Muskrat habitat did not included measurements of this cover type.

Canopy Cover (Black-capped chickadee and White-tailed deer)

A graduated telescoping rod was used to measure the distances along each of the six 20-meter transects that were covered by shrubs less than 1.5-meters and by trees greater than 5-meters tall. The distances along transects that were covered by the shrubs and trees were measured to the nearest decimeter and totaled by 20-meter transect.

Overstory Height (Black-capped chickadee)

The heights of a maximum of 6 overstory trees (trees $\geq$ 5-meters tall) were measured on each of the 20-meter transects that ran perpendicular to the 100-meter transect. Height measurements were taken where the trees crossed the 20-meter transects.

Snag density (Black-capped chickadee)

The density of snags between 10 cm diameter at breast height (dbh) and 25 cm dbh was determined by tallying all snags of this size class within each of five 20 m^2 formed along the 100 meter transect between adjacent 20-meter transects. Each 20 m^2 area was considered a sampling unit.

Canopy Cover of Shrubs (Yellow Warbler)

A graduated telescoping rod was used to measure the distances along each of the 6 20-meter transects that were covered by shrubs regardless of height. The distances along transects that were covered by the shrubs and trees were measured to the nearest decimeter and totaled by 20-meter transect.

Shrub Heights (Yellow Warbler)
The height of a maximum of 5 shrubs was measured to the nearest decimeter on each of the 20-meter transects that run perpendicular to the main 100 meter transect.

FIELD-MEASURED VARIABLES IN HW COVER TYPE

In the herbaceous wetland cover type, variables for models included canopy cover of emergent plants for the muskrat model and *Visual Obstruction Readings* (VOR) for Mallard.

Canopy Cover of Emergent Vegetation (Muskrat)
A graduated telescoping rod was used to measure the distances along each of the six 20-meter transects that were covered by emergent vegetation. The distances along transects that were covered by emergent vegetation were measured to the nearest decimeter and totaled by 20-meter transect.

Visual Obstruction Reading (Mallard)
Robel Pole readings were taken at four points along the upland edge of wetlands to determine height of effective nesting cover.

DETERMINATION OF ADEQUATE SAMPLE SIZE

A determination of adequate sample size for the current and future evaluation of habitat on site for the target species included deriving a 95-percent confidence level for data gathered. For variables measured by sampling on the ground, the sample size needed to achieve a 95% level and a relative precision of 20 percent.

Power calculations were completed using the following formula:

$$n = \left(\frac{Z_c * s}{D * X} \right)^2$$

Where:

Zc = the value obtained from a standardized table and C is the confidence level.

s = the estimated standard deviation

D = the relative precision

X= the estimated mean

The *calculated n* is the sample size needed to assure that a sample mean of ± 20 percent of the mean will include the true population mean with a confidence level of 95 percent. This level of precision and confidence will allow the detection of at least a 20 percent change in a variable at a future sampling date. The *calculated n* was determined for each variable for each cover type then compared to the *actual n* to determine if sampling was adequate. In all cases, the sampling effort was more than adequate. Data sheets and calculations are included in Appendix D of this report, along with other species-specific data.

RESULTS OF HEP ANALYSIS

The habitat units (HUs) calculated for each target species is presented in Table 11. The results of each HSI model and the raw data for the calculation of each model variable is presented in Appendix D.

Table 11
Habitat Unit Summaries by Target Species

Species	Cover Types	Evaluation Area (Acres)	HSI	Habitat Units
Black-capped chickadee	DFW/DSW	11.17	0.79	8.82
Yellow Warbler	DFW/DSW	11.17	0.56	6.26
White-tailed deer	DFW/DSW	11.17	1.0	11.17
Muskrat	HW	10.31	0.82	8.45
Mallard	DFW/DSW and HW	21.48	0.5	10.74
Bald Eagle Wintering	DFW/DSW	11.17	0.84	9.38
Bald Eagle Nesting	DFW/DSW	11.17	0.62	6.93
Canada Goose	HW	10.31	0.5	5.16
Total		**97.95**		**66.91**

Black-Capped Chickadee

HUs for the black-capped chickadee are expected to increase slightly over time. Tree canopy

closure values are expected to increase as the stands develop. Tree heights (V2) were less than 2/3 of optimum in all cover types and are expected to increase as trees mature. Snags (V3) were not limiting for this species.

Bald Eagle Nesting and Wintering

The limiting factors affecting Bald Eagle Nesting HUs on the project area are the absence of stands of mature trees greater than 10 acres in size and the close proximity of human activity. Managing forests on the Property for mature stands with relatively closed canopies will improve nesting habitats for the bald eagle. However, the potential to limit the points of human activity near the Property is limited. Windy Bay is currently remote compared to other portions of Coeur d'Alene Lake but human activity currently reduces the nesting suitability for bald eagles and there is no reason to believe it will decline in the future. The protection of the undeveloped canyon that extends west and upstream from the Property could assist in securing the current suitability of the Property for bald eagles.

Canada Goose

Wetland habitat on the Property is not in close proximity to the Canada goose's preferred foraging habitats of pastures and grain fields. Also, the lack of nesting islands and the steep topography of the Lake Creek Canyon limit both shoreline nesting habitat and the availability of brood pastures for the Canada goose. Placement of nest platforms near the shoreline at the head of Windy Bay could increase the suitability of the immediate area for the Canada goose.

Mallard

The lack of interspersion between wetland and upland nesting types and lack of seasonally flooded meadows limits the suitability of the Windy Bay Property for the mallard. Other than seasonally adjusting Coeur d'Alene Lake elevations, which is not a management option for the Windy Bay Property, no management actions were identified that could increase the suitability of the Property for the mallard duck.

Muskrat

There is no potential of increasing the habitat suitability for muskrat within the Property. An increase in the cover of cattails on the Property may result from seasonally adjusting Coeur d'Alene Lake elevations, however that is not a practical option.

White-Tailed Deer

Currently, the deciduous forested and shrub wetland cover types are at optimum for white-tailed deer. An increase in habitat units may occur with expansion of deciduous shrub into adjacent herbaceous wetlands; however, this could only be accomplished through Lake level manipulation.

Yellow Warbler

The habitat suitability is near its maximum potential on the Property. Height of shrubs may increase naturally with continued growth. Cover of hydrophytic shrubs such as willow, alder, and dogwood may also increase naturally especially in the DSW and DFW cover types. However, increases in these variables are not expected to markedly increase the yellow warbler HSI on the property.

SUMMARY

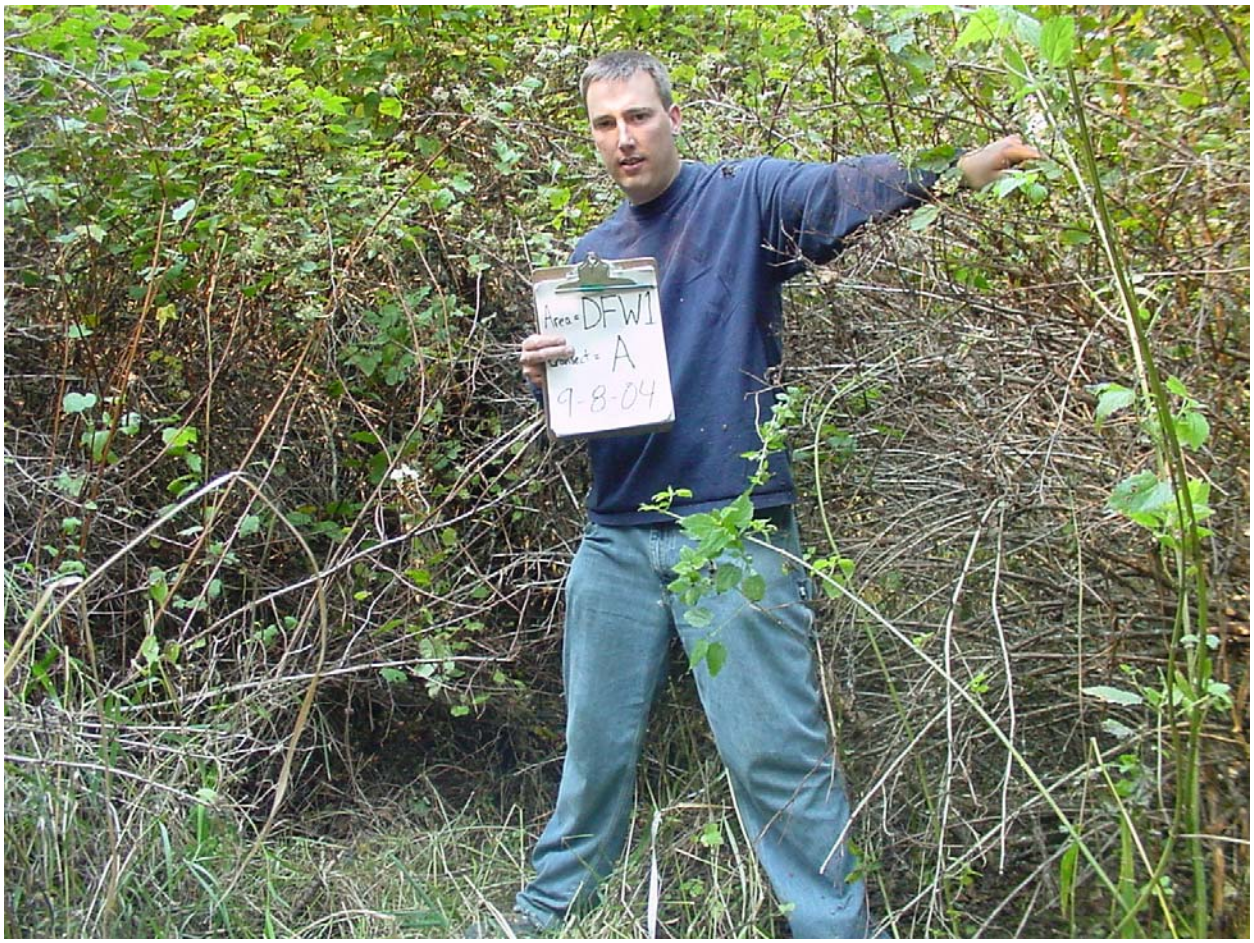
The Habitat Suitability Indexes appear to be near their ecological maximum provided that lowering lake levels is not a viable option. Minor increases in HUs may result from the maturation of the deciduous forest and scrub shrub wetland vegetation.

APPENDIX C: TRANSECT PHOTOS

DFW-DSW 1

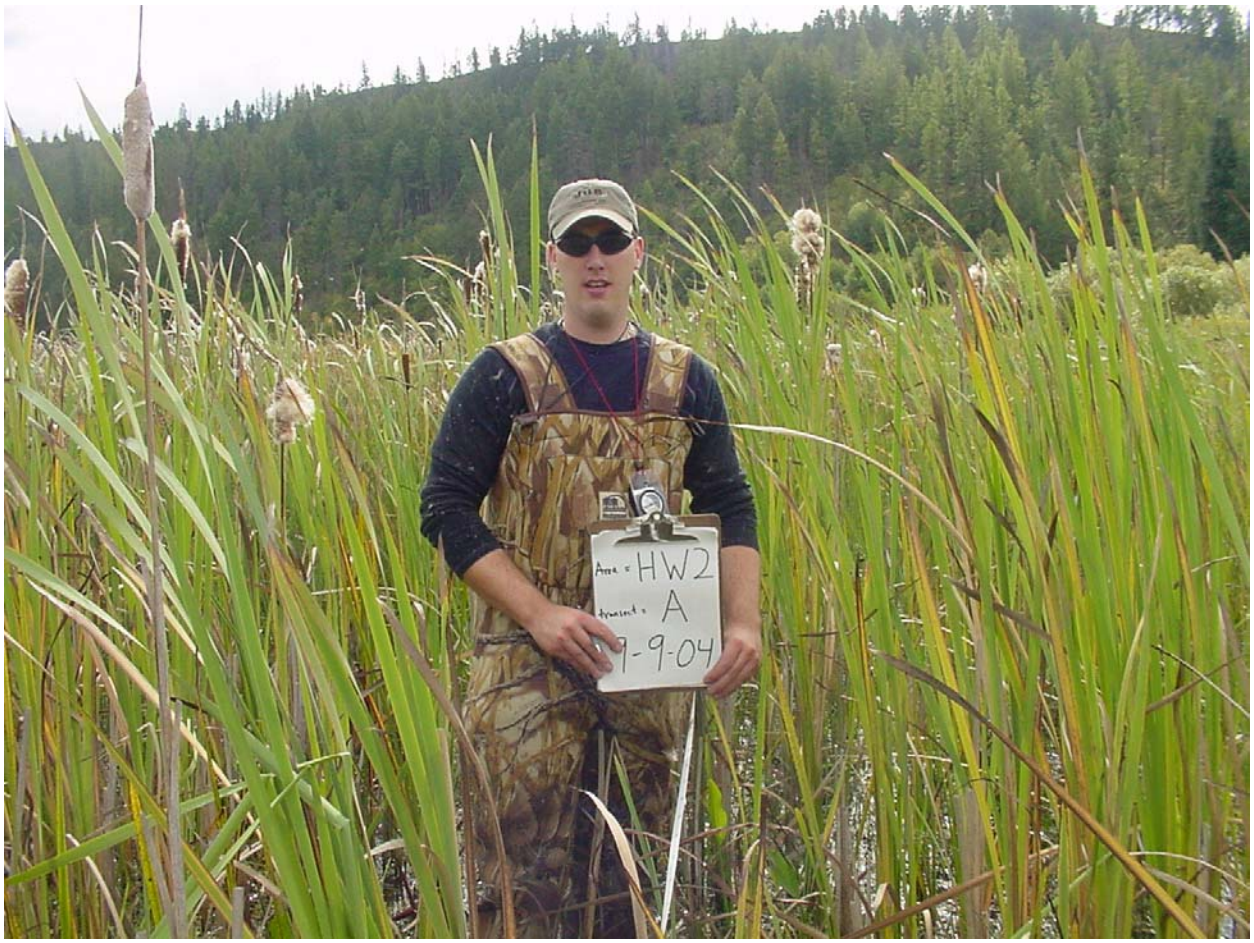
(Note: The transect identification technique changed with inclusion with deciduous forested wetland into the shrub-scrub wetland type).

DFW/DSW 2



DFW/DSW 3

HW1



HW2

TYPICAL FIELD MARKER USED (CARSONITE STAKE)