Rare Plant and Vegetation Survey of Alta Lake State Park

Pacific Biodiversity Institute

Rare Plant and Vegetation Survey of the Alta Lake State Park

George Wooten
georgewooten@pacificbio.org

Peter H. Morrison
pm@pacificbio.org

and

Juliet Rhodes
juliet@pacificbio.org

December 2008

Pacific Biodiversity Institute
P.O. Box 298
Winthrop, Washington 98862
509-996-2490

Recommended Citation

Wooten G., P.H. Morrison and J. Rhodes, 2008. Rare Plant and Vegetation Survey of the Alta Lake State Park. Pacific Biodiversity Institute, Winthrop, Washington. 80 p.

Acknowledgements

Diana Hackenburg, Hans Smith and Alexis Monetta assisted with fieldwork and entered the data we collected into databases. The photographs in this report were taken during this project.

Project Funding

This project was funded by the Washington State Parks and Recreation Commission.

Executive Summary

Pacific Biodiversity Institute (PBI) conducted a rare plant and vegetation survey of Alta Lake State Park for the Washington State Parks and Recreation Commission (WSPRC).

Alta Lake State Park covers 168.4 acres. Most of the park is in the bottom of a glacially carved valley. However, the park goes to the top of the cliffs that bound the valley on both sides.

34 polygons covered by 11 plant associations and 8 general land cover types were mapped and visited in Alta Lake State Park. Existing plant communities were characterized within each polygon. Natural forest communities were predominantly Ponderosa pine / bitterbrush / bluebunch wheatgrass or Douglas-fir / bitterbrush / bluebunch wheatgrass. Common shrub-dominated communities were stands of big sagebrush, bitterbrush, black hawthorn or smooth sumac. Due to fire suppression, many of the upland areas have become heavily stocked with woody species that now pose a fire hazard. Lacustrine and riparian communities occur around the perimeter of Alta Lake. These historically had black cottonwood or aspen as the dominant overstory, although today they are highly altered by the presence of invasive species.

No rare plants listed by the State of Washington were found in Alta Lake State Park. The Washington Department of Natural Resources Natural Heritage Program (WADNR NHP) has a record for many-headed sedge (*Carex sychnocephala*) in the park, but we could not locate a current population despite several diligent searches.

The ecological condition of non-developed plant communities in Alta Lake State Park varied from poor to excellent. About one-third of the park is developed. The most widespread noxious weed in the park is Dalmatian toadflax (*Linaria dalmatica* ssp. *dalmatica*). This plant has spread into natural areas following a wildfire that burned through part of the park about a decade ago.

There are property ownership issues along the eastern border of the park. Fence lines between the park and the adjacent private ranch extend inside the GIS delineated park boundary. Heavy livestock grazing is occurring in those areas.

Table of Contents

Introduction

Alta Lake State Park is located in Okanogan County, covering 168.4 acres in a steep-walled valley about a mile west of the Columbia River. The broad-bottom of Alta Canyon was formed by the action of glacial ice and meltwater (see cover photo). The granitic bedrock is well exposed on the valley walls as steep cliffs and talus.

The bottom of Alta Canyon is occupied by Alta Lake, which forms the main attraction for many visitors to Alta Lake State Park. The north part of the park also contains a seasonal lakebed that is becoming a meadow as ground water lowers over time. The lakeshore and the park are both popular recreation destinations.

Alta Lake has a paved road going half way through the park. On the east side of the park, the road dead ends adjacent to a steep cliff that is nearly inaccessible from within the park, even on foot. To the west, another cliff has a hiking trail winding upward from the overnight camping area. Beyond the park boundary, the trail is faint and difficult to follow across lands administered by the National Forest.

Alta Lake extends north and south of Alta Lake State Park along privately owned parcels. The park abuts National Forest to the west. Adjacent private parcels are undergoing rapid development in the form of vacation and primary homes. New developments adjacent to the park are concentrated along the lake and along the entrance road north of the park.

Survey Conditions and Survey Routes

Alta Lake State Park was initially visited on May 12 and 13 by one botanist. Follow-up visits were conducted on June 23 and 24 by four botanists/ecologists and two conservation science interns, and July 3 by one botanist/ecologist and two interns. The survey routes are shown in Figure 1.

Access to the easternmost portion of Alta Lake State Park is blocked by a steep cliff above the lake. Access is possible only by crossing private land or by scrambling up the cliff talus. Therefore, this polygon was only visited once.

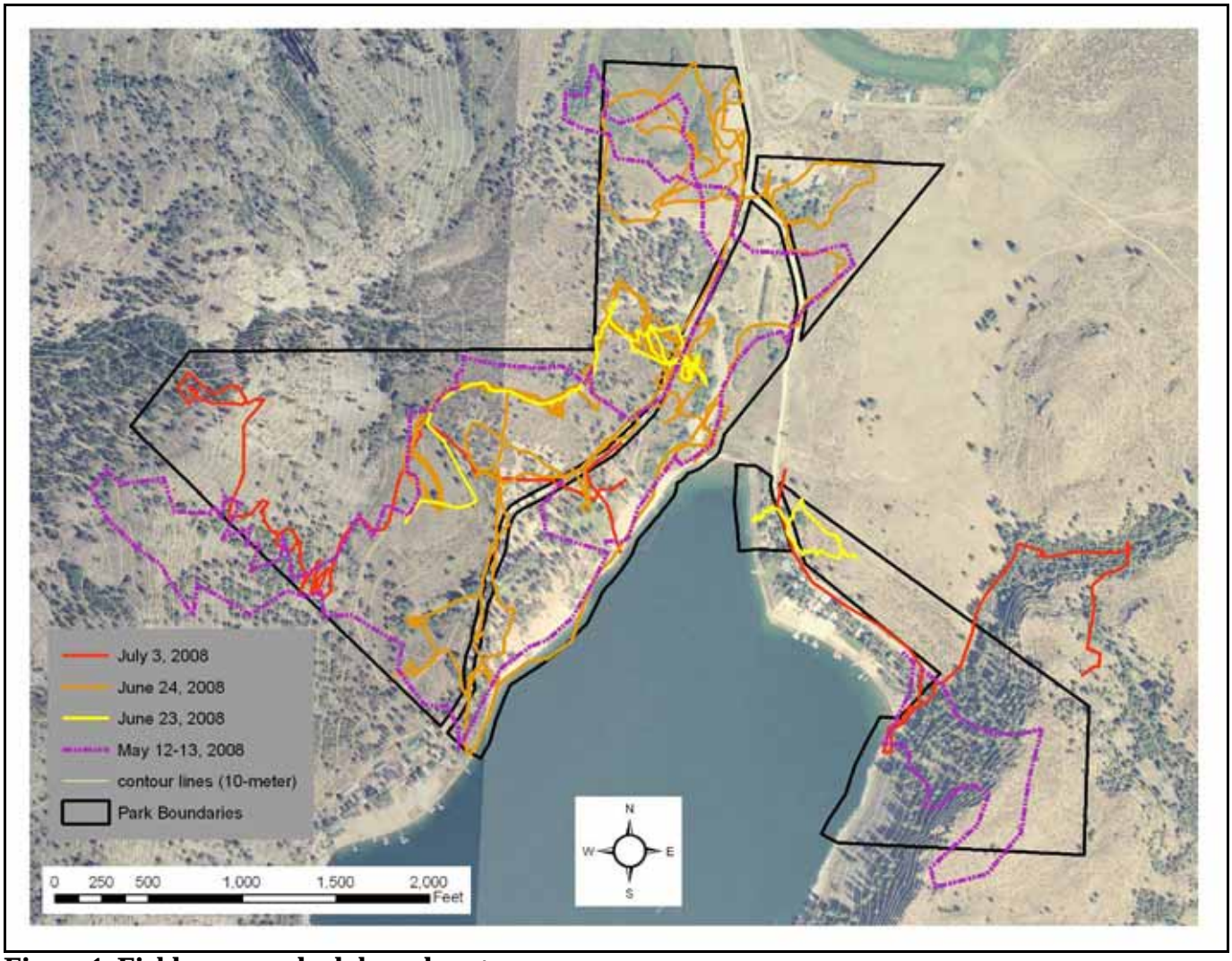


Figure 1. Field survey schedule and routes.

Vegetation Communities

Methods

Pre-field reviews of literature, GIS data, and remote sensing data were conducted early in the season. Maps, GIS data, and remotely-sensed data were assembled together into an ArcMap GIS project covering the project area. Topographic maps and digital elevation models (DEMs) were also used. Using the gathered spatial data resources, discrete vegetation polygons meant to represent specific plant communities or mosaics of plant communities were manually delineated by staff ecologists as polygon features in an ESRI shapefile format.

The park was then visited several times during the field season to assure observation of both early and late-blooming plant species. The first visit was primarily a reconnaissance of the project area, meant to create a basic plant list for the park and to conduct initial rare plant surveys for early bloomers. Later visits focused on collecting field data for the vegetation polygon map and adding more species to the plant list during different times of the season. Before the field season was complete, all vegetation polygons that could be accessed safely were visited and field data was collected.

Plant community data was recorded on a form initially developed by WSPRC (Appendix A). Recorded data include a wide variety of information about the vegetation composition, environmental characteristics, disturbance history and other notes for each polygon. Each polygon was rated for its overall ecological condition according to a simple ranking system (Appendix B). Vegetation community and land cover classifications were assigned using information and keys from standard literature sources cited in the Reference section of this document (Bourgeron and Engelking 1994, Clausnitzer and Zamora 1987, Crawford 1999, Crawford 2003, Daubenmire 1970, Kagan et al 2000, Kovalchik and Clausnitzer 2004, Lillybridge et al 1995, NatureServe 2008).

During field visits survey personnel had printed and digital maps available that included high-resolution aerial imagery. Digital maps were accessed in the field using ArcPad software (ESRI 2007) running on pocket PC, GPS enabled devices. Use of ArcPad allowed all survey routes to be mapped on a GPS recorder in real time, and allowed for viewing and editing data directly from field locations, resulting in field-verified attributes for the vegetation polygons.

Once gathered, the field data was edited and entered into a Microsoft Access database and linked to the vegetation polygon geodatabase. Further refinements and editing of the vegetation data stored in the personal geodatabase was made based on information collected in the field with ArcPad.

Historical Vegetation

The vegetation condition within Alta Lake State Park is less altered than many other state parks in eastern Washington. One reason for this is that the area does not have an extensive agricultural or industrial history. Another reason is that the cliffs on either side of the park are too steep to be easily developed or converted to agriculture. In addition, rocky cliffs historically had a longer fire return interval, so they are less affected by ubiquitous fire suppression.

Cliff and shrub-steppe communities are the least altered habitats at Alta Lake State Park. Plants include a mix of early and late seral species. Under historic fire regimes, annual species and grasslands would have been more predominant than they are today. Wetlands and the lakeshore have the most highly altered habitats. The water level of the lake went through a period of gradual lowering in the past few decades, but recently this has been reversed by pumping water from outside the park to raise the level. This altered hydrologic regime has undoubtedly had a large influence on the lakeshore communities, but the condition of the historic ecosystem is largely unknown. The large wetland area in the north part of the park has also suffered from a drop of the water table, followed by conversion to weedy grassland. One area of this wetland that is dominated by quaking aspen appears to be maintaining itself.

Between the lake and the cliffs are shrub-steppe communities with scattered ponderosa pine and Douglas-fir. These areas are largely managed as campgrounds. Some of the trees may be several hundred years old or more, particularly in talus where there are natural firebreaks and more storage for ground water. Shrub-steppe areas were formerly maintained by frequent, low-severity wildfires. With fire suppression, the shrubs have become dense, at the expense of herbs and grasses. When fire returns to these areas, it will likely burn more severely than the historic norm.

Results

Vegetation Community Mapping

A total of 34 vegetation community polygons were mapped and surveyed in Alta Lake State Park (Figure 2). These polygons were categorized into 11 plant associations and 8 generalized land cover classes (Table 1). Table 2 gives additional reference and global conservation status information about the plant associations (see Appendix C for status codes). The communities were assigned to a primary, secondary or a tertiary community. Primary community types are the dominant or matrix vegetation community within a polygon, whereas secondary and tertiary community types are less abundant vegetation community types that occur within the same polygon and were not conducive to being mapped as a separate polygon due to the size, shape, or pattern of the community patches within the polygon.

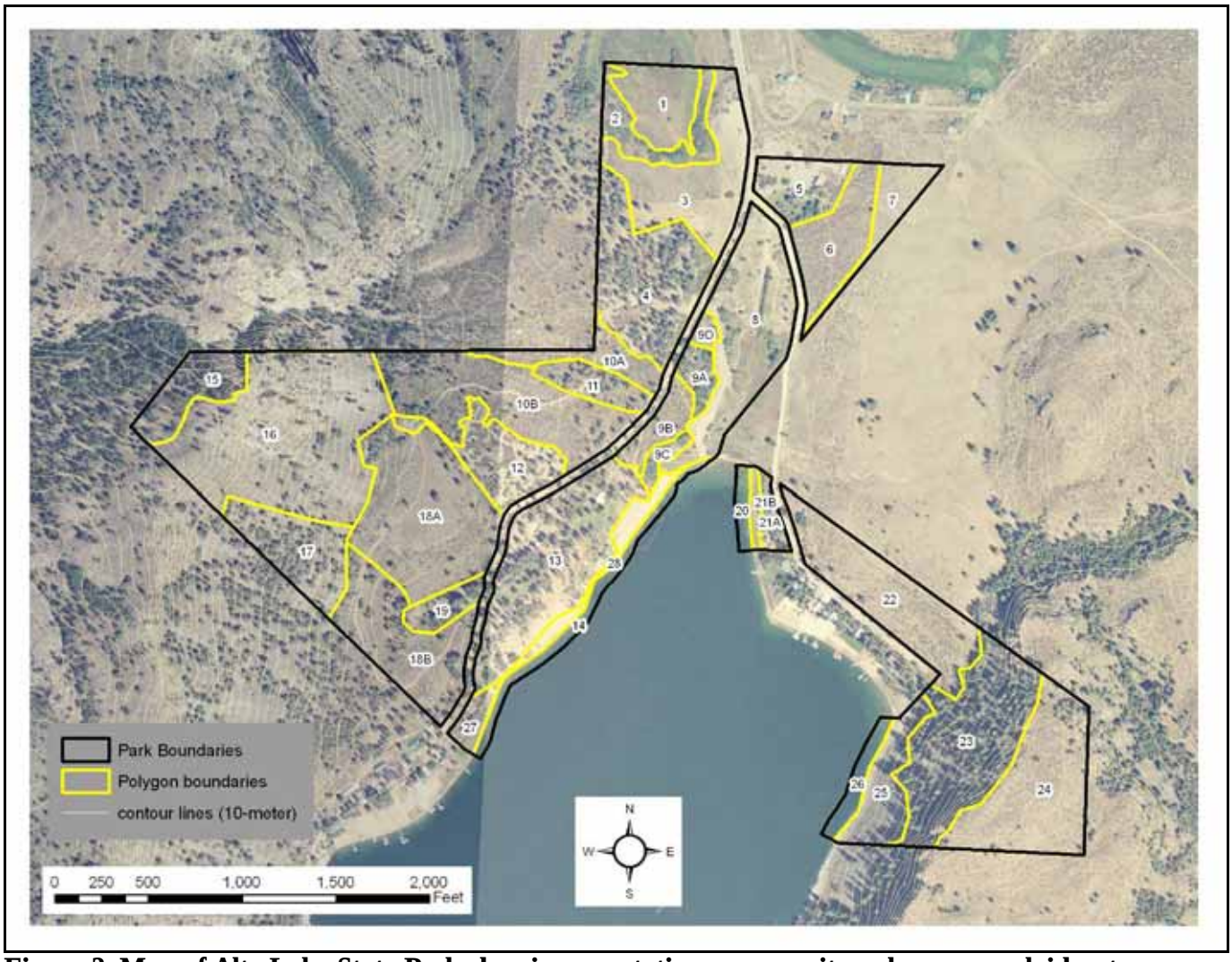


Figure 2. Map of Alta Lake State Park showing vegetation community polygons overlaid onto an aerial photo of the park.

Table 1. Plant communities and land cover types observed in Alta Lake State Park.

Plant Association, Vegetation Community or Land Cover (Codes)	Existing Vegetation and Land Cover Observed (Codes)
Ponderosa pine / bitterbrush / bluebunch wheatgrass (PIPO/PUTR2/PSSP6)	PIPO/PUTR2; PIPO/GYPA-POBU; PIPO/POPR; AMAL2-PUTR2-RICE (without PSSP6; with ELGL); PIPO/PUTR2 (without PSSP6; with ELGL); PIPO/PUTR2/HECO26-PSSP6; PIPO/PUTR2/POBU; PIPO/PUTR2-AMAL2/POBU; PIPO/PUTR2-AMAL2-PHLE4/BRTE; PIPO/ROWO-PUTR2/STOC
Douglas-fir / bitterbrush / bluebunch wheatgrass (PSME/PUTR2/PSSP6)	PIPO-POTR5/AMAL2-CRDO2-CLLI2/BASA3; PIPO-PSME/AMAL2-PUTR2-PRVI/PSSP6; PIPO-PSME/PUTR2-AMAL2-PHLE4/BASA3-BRTE-PSSP6; PIPO-PSME/PUTR2-PHLE4-RHGL/PSSP6; PIPO-PSME/PUTR2-RICE-PHLE4/BRTE-ACMI2-PSSP6; PSME-PIPO/PUTR2-AMAL2-ACGLD4/PSSP6-HECY2-WOSC; PSME-PIPO/PUTR2-AMAL2/PSSP6-ANMI3
Douglas-fir / bitterbrush / pinegrass (PSME/PUTR2/CARU)	PSME-PIPO/PUTR2/CARU
Douglas-fir / oceanspray (PSME/HODI)	PHLE4-RHGL-HODI/PSSP6
Cottonwood / scouring rush horsetail (POBAT/EQHY)	POBAT/EQHY
Cottonwood / Baltic rush (POBAT/JUARL)	POBAT-POTR5/CRDO2-SALIX-ELAN
Quaking aspen / Douglas hawthorn (POTR5/CRDO2)	SAAL2-POBAT-PIPO/CRDO2-AMAL2; SAAL2-POBAT-POTR5
Black hawthorn - Woods' rose (CRDO2-ROWO)	CRDO2-ROWO
Bitterbrush / bluebunch wheatgrass (PUTR2/PSSP6)	PUTR2/PSSP6; PUTR2-ARTR2-ERHE2/HECO26-PSSP6-EREL5; ERHE2-PUTR2-ARTR4/PSSP6-BASA3-LUSE4; PUTR2-ARTR2-AMAL2/PSSP6-BASA3
Baltic rush (JUARL)	JUARL-CAREX
Hardstem bulrush or tule (SCAC3)	SCAC3-JUARL-SOCA6, SCAC3-CAPE42
Talus and cliffs	Talus and cliffs; RHGL/PSSP6
Disturbed shrub-steppe	Disturbed shrub-steppe; SAKA-LASE-CHAL7
Disturbed wetland	CIAR4-SIAL2; Disturbed wetland
Former agricultural field	Old field undergoing succession
Beach	Sandy beach
Water	Water
Developed	Campground areas and other developed areas; SAKA-LASE-CHAL7 (drainfield area)
Ownership	Ownership issue (not park land?)

Table 2. Plant association authority and status. (See Appendix C for a description of status codes.) Note that the "~" under Global Status represents the rank estimated by PBI.

Common Name	Scientific Name	Code	Authority	Global Status
Ponderosa pine / bitterbrush / bluebunch wheatgrass	*Pinus ponderosa / Purshia tridentata / Pseudoroegneria spicata*	PIPO/PUTR2/PSSP6	Lillybridge et al. 1995	G4
Douglas-fir / bitterbrush / bluebunch wheatgrass	*Pseudotsuga menziesii / Purshia tridentata / Pseudoroegneria spicata*	PSME/PUTR2/PSSP6	Lillybridge et al. 1995	~G3
Douglas-fir / bitterbrush / pinegrass	*Pseudotsuga menziesii / Purshia tridentata / Calamagrostis rubescens*	PSME/PUTR2/CARU	Lillybridge et al. 1995	~G3
Douglas-fir / oceanspray	*Pseudotsuga menziesii / Holodiscus discolor*	PSME/HODI	Clausnitzer and Zamora (1987); Kagan et al. (2000)	~G3
Cottonwood / scouring rush horsetail	*Populus balsamifera* ssp. *trichocarpa / Equisetum hyemale*	POBAT/EQHY	Crawford 2003	NR
Cottonwood / Baltic rush	*Populus balsamifera ssp. trichocarpa / Juncus arcticus ssp. littoralis*	POBAT/JUARL	Crawford 2003	G5
Aspen / black hawthorn	*Populus tremuloides / Crataegus douglasii*	POTR5/CRDO2	Crawford 2003; Kagan et al. 2000	G3 (for SYAL phase of Kagan et al. 2000)
Black hawthorn - Woods' rose	*Crataegus douglasii - Rosa woodsii*	CRDO2-ROWO	Crawford 2003	G2
Antelope bitterbrush / bluebunch wheatgrass	*Purshia tridentata / Pseudoroegneria spicata*	PUTR2/PSSP6	Crawford 1999	G3
Baltic rush	*Juncus arcticus* ssp. *littoralis*	JUARL	Crawford 2003	G5
Hardstem bulrush	*Schoenoplectus acutus*	SCAC3	Crawford 2003; Kovalchik and Clausnitzer 2004	G5
Talus and cliffs	Includes: *Rhus glabra / Pseudoroegneria spicata* (RHGL/PSSP6) *and Douglas-fir / Holodiscus discolor* (PSME/HODI)	Talus and cliffs	Daubenmire, 1970; Bourgeron and Engelking 1994; Clausnitzer and Zamora (1987);	~G2

Each vegetation community polygon has at least one primary vegetation community/land cover types assigned to it, and up to two additional sub-types. Figure 3 shows a map depicting the primary vegetation community/land cover class for each polygon within the park. Appendix D details all the attributes described for each polygon mapped within the project area.

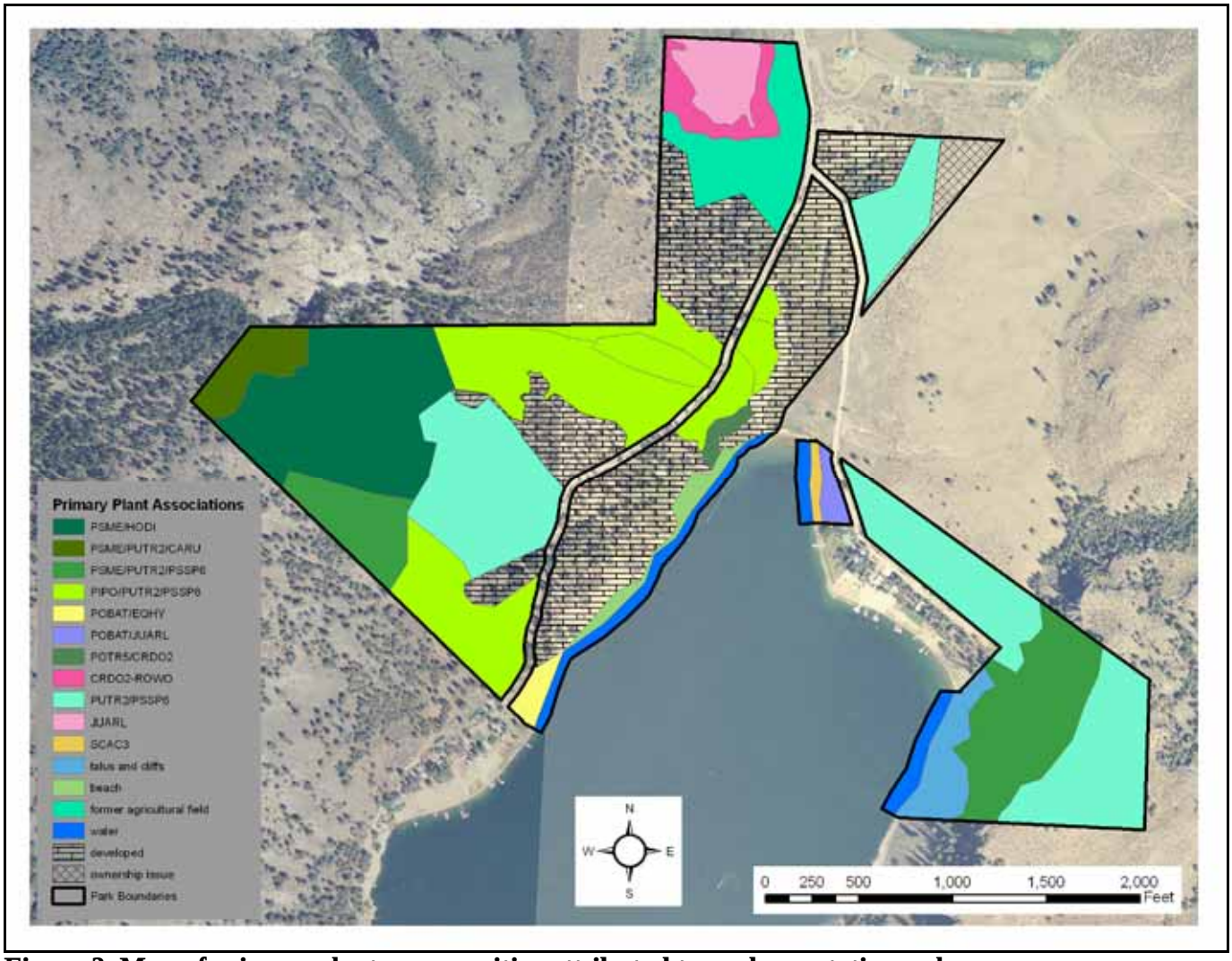


Figure 3. Map of primary plant communities attributed to each vegetation polygon.

Vegetation Community and Land Cover Types

Ponderosa pine / bitterbrush / bluebunch wheatgrass (PIPO/PUTR2/PSSP6) (G4)

Figure 4. An example of the ponderosa pine / bitterbrush / bluebunch wheatgrass association at Alta Lake State Park, here in a campground area with an overstocked understory of bitterbrush.

The ponderosa pine / bitterbrush / bluebunch wheatgrass association has an overstory of ponderosa pine, a shrub layer dominated by bitterbrush, and a forb layer dominated by bluebunch wheatgrass (Figure 4). It was described by Lillybridge (1995). It has a G4 ranking, which implies that it is globally secure. This community is common in the valley bottom and lower benches at the center of Alta Lake State Park, where it is frequently converted to campground use. A number of other shrubs are commonly found in this community including Lewis' mock-orange (*Philadelphus lewisii*), Wood's rose (*Rosa woodsii*), parsnipflower buckwheat (*Eriogonum heracleoides*), and serviceberry (*Amelanchier alnifolia*), the latter of which has edible fruits that are attractive to both wildlife and campground visitors. Common forbs are arrowleaf balsamroot (*Balsamorhiza sagittata*) and common yarrow (*Achillea millefolium*).

At Alta Lake State Park, the ponderosa pine / bitterbrush / bluebunch wheatgrass association can have different understory dominants from those described by Lillybridge (1995). Instead of bluebunch wheatgrass, one community was dominated by needle and thread grass (*Hesperostipa comata*), while another community was dominated by western needlegrass (*Achnatherum occidentale*). These are both native species present and dominant in non-forested plant associations. Here these two may just be seral

phases of the ponderosa pine / bitterbrush association, since there was a fire recently burned in the area where these two species are more common.

Some of the ponderosa pine / bitterbrush / bluebunch wheatgrass communities are being invaded by non-native species, particularly in disturbed sites such as roads and campsites. One common invasive species is bulbous bluegrass (*Poa bulbosa*); another is cheatgrass (*Bromus tectorum*). Both of these species have the potential to displace native species and alter the natural succession process.

Under historic disturbance regimes, this plant association would be an open forest, free of Douglas-fir. In pre-settlement times, the ponderosa pine / bitterbrush / bluebunch wheatgrass association was maintained in an open, park-like condition by frequent, relatively low-temperature wildfires that burned every 5-15 years (Ohlson 1996). With fire suppression and changed hydrology, Douglas-fir may increase and become nutrient stressed. Without fire, the shrub layer has sometimes increased at the expense of grasses and forbs. Dense shrub canopies are hazardous fuels in the same way that overstocked trees are. They were also historically maintained with higher predominance of grasses by periodic fires. A recent wildfire that burned in a portion of the park reduced the shrub fuel component in some areas, indicating that a return to natural conditions is possible with controlled burning. Unfortunately, Dalmatian toadflax (*Linaria dalmatica* ssp. *dalmatica*) also increased after this fire. In the event of future wildfires, it is important that fire-fighters take care not to spread seed during operations and that managers specify the use of noxious-weed-free seed for reseeding where it is necessary.

Although this association can maintain much of its natural character in low-intensity tent camping areas, it is susceptible to invasion where soils are heavily disturbed. The most widespread noxious weed observed in this community is Dalmation toadflax. It can become a dominant species if left to itself. Several biological control insects can be introduced that may eventually bring this species under control. Baby's breath (*Gypsophila paniculata*) has invaded several stands. Another commonly seen invasive species is wild lettuce (*Lactuca serriola*), which tends to grow in disturbed areas such as roadsides.

Left to themselves, both bulbous bluegrass and cheatgrass can displace native species and ultimately dominate the understory of a stand. Neither of these two species currently has a practical control method, but this could change. Promising research efforts for controlling cheatgrass are underway. Until then, minimizing disturbance and reseeding with beneficial natives after disturbances are recommended.

Douglas-fir / bitterbrush / bluebunch wheatgrass (PSME/PUTR2/PSSP6) (~G3)

Figure 5. An example of the Douglas-fir / bitterbrush / bluebunch wheatgrass association at Alta Lake State Park.

This Douglas-fir / bitterbrush / bluebunch wheatgrass community is similar to the previous community, but Douglas-fir is present and regenerating successfully (Figure 5). It was described by Lillybridge (1995). It is considered globally vulnerable to extirpation or extinction (G3 rank), but is locally common in the project area. It occurs on slightly moister, cooler sites than the previous community. On even cooler sites, the forests grade into Douglas-fir / bitterbrush / pinegrass.

Within the Douglas-fir / bitterbrush / bluebunch association, commonly occurring shrubs include serviceberry (*Amelanchier alnifolia*), Lewis' mock-orange (*Philadelphus lewisi*), smooth sumac (*Rhus glabra*), wax currant (*Ribes cereum*), chokecherry (*Prunus virginiana*), black hawthorn (*Crataegus douglasii*) and western white clematis (*Clematis ligusticifolia*). Commonly occurring forbs include arrowleaf balsamroot (*Balsamorhiza sagittata*) and littleleaf pussytoes (*Antennaria microphylla*). Bluebunch wheatgrass is the most common native grass, while cheatgrass is the most common invader.

At Alta Lake State Park, the Douglas-fir / bitterbrush / bluebunch wheatgrass association sometimes occurs on steep, rocky slopes and cliffs. In this habitat, talus-inhabiting species become more common such as oceanspray (*Holodiscus discolor*), Lewis' mock-orange and smooth sumac. The presence of smooth sumac (*Rhus glabra*) helps differentiate this plant association from the Douglas fir / ocean spray association. On the southeast cliffs above Alta Lake, one of these stands has attained old growth status,

where rocky ground has helped prevent overstocking. This community can become overstocked with fire suppression; however, the cliffs of Alta Lake help maintain lower stocking densities.

The effects of wildfire on the Douglas-fir / bitterbrush / bluebunch wheatgrass association can be observed on the west cliff face that burned within the last decade or two. The effect of fire on the forest structure was primarily beneficial. Trees and brush were thinned out and fire-prone species were regenerated. Unfortunately, the noxious weed Dalmatian toadflax has since spread thickly into the burned area. It may have been introduced as a contaminant in grass seed planted after the fire. It is now well established and spreading on the cliffs and along the cliff trail. In the event of future wildfires, it is important that fire-fighters take care not to spread seed during operations and that managers specify the use of noxious-weed-free seed for reseeding where it is necessary. Except for Dalmatian toadflax and cheatgrass, invasive species are infrequent in this plant association.

Douglas-fir / bitterbrush / pinegrass (PSME/PUTR2/CARU) (~G3)

The Douglas-fir / bitterbrush / pinegrass association was observed in one polygon at the highest point of Alta Lake State Park. This association is similar to the Douglas-fir / bitterbrush / bluebunch wheatgrass community (Figure 5), except that the understory has pinegrass instead of bluebunch wheatgrass. It was described by Lillybridge (1995). It is considered globally vulnerable to extirpation or extinction (G3 rank), but is locally common in the project area, particularly at mid-montane elevations higher on the slopes above the park.

Shrubs found in this plant association include whiteleaf spiraea (*Spiraea betulifolia*) and kinnickinnick (*Arctostaphylos uva-ursi*). Both of these species also exist as plant association dominants in different Douglas-fir plant communities. This polygon also had rock outcrops and mossy bedrock seeps within it, dominated by Wyeth biscuitroot (*Lomatium ambiguum*). No noxious weeds and few invasive species were observed in the Douglas-fir / bitterbrush / pinegrass association.

The Douglas-fir / bitterbrush / pinegrass association may result from fire exclusion in stands that were previously more characteristic of the Douglas-fir / pinegrass association. Fire exclusion would allow bitterbrush to compete more successfully in the forest understory. However, Douglas-fir and pinegrass also have the potential to dominate these stands with fire exclusion at the expense of less shade-tolerant bitterbrush.

Douglas-fir / oceanspray (PSME/HODI) (~G3)

The Douglas-fir / oceanspray association occurs on steep, rocky slopes on the lower part of cliffs on the west side of Alta Lake State Park. It was described on the Colville Indian Reservation by Clausnitzer and Zamora (1987). This association may be functionally equivalent to the plant association of the same name described by Kagan and others (2000) from Oregon. This association is published by Natureserve (2008). It has a status of G3, globally vulnerable to extirpation. However, the Douglas-fir / ocean spray association at Alta Lake State Park is different from several other plant associations from western Washington or the southwest U.S. that are listed by Natureserve that have both Douglas fir and oceanspray in the dominant classes. The outstanding feature of this association at Alta Lake State Park is the presence of open forest on steep scree and talus, in an area with 12 inches or less of yearly precipitation.

The Douglas fir / ocean spray association has more soil moisture than adjacent stands on gentler slopes. There is less sunlight available due shading by the cliffs, and snow lingers longer. This plant association can be differentiated from similar stands on steep, exposed slopes by having less smooth sumac (*Rhus glabra*). Characteristic plant species found in this association include ones that prefer rocky outcrops,

including the round leaf alumroot (*Heuchera cylindrical*), the fern Rocky Mountain woodsia (*Woodsia scopulina*) and Lewis' mock orange (*Philadelphus lewisii*). Mosses are common in openings with rocky talus soils.

This plant association is susceptible to invasion by non-native species, if the soil is disturbed. Likely invaders include Dalmatian toadflax, cheatgrass and bulbous bluegrass.

Cottonwood / scouring rush horsetail (POBAT/EQHY) (unranked)

The cottonwood / scouring rush horsetail vegetative type occurs along the south end of Alta Lake. This community is characterized by an overstory of cottonwood (*Populus balsamifera* ssp. *trichocarpa*) and an understory of scouring rush horsetail (*Equisetum hyemale*). It was described as a vegetation type by Crawford (2003). The status is not ranked by NatureServe; however, it is similar to the adjacent cottonwood / Baltic rush vegetative type (Figure 6) ranked as G5, secure. It is also similar to the Baltic rush vegetative type that occurs on the park, and the woolly sedge (*Carex pellita*) vegetative type, which was not identified in the park. Although woolly sedge is common within the cottonwood / scouring rush horsetail vegetative type, the published descriptions of woolly sedge do not include cottonwood.

The cottonwood / scouring rush horsetail community at Alta Lake State Park is also similar to the aspen / Douglas' hawthorn vegetation type (*Populus tremuloides / Crataegus douglasii*) of Crawford (2003) (see below on page 18), but the factors that determine whether cottonwood or aspen is dominant are complex and largely unknown. Most lakeside stands at Alta Lake State Park that have cottonwood also have some aspen, but the converse is not true.

A historical sighting of *Carex sychnocephala* was located in the polygon typed as cottonwood / Baltic rush. The sighting could not be confirmed (see the section on rare plant surveys).

As with the other lakeside communities at Alta Lake State Park, this community is highly altered due to past changes in lake levels as well as management and recreation activities that disturb soil and invasion by non-native species. Introduced deciduous trees have replaced cottonwood as the dominant species in some parts of these communities. Common woody deciduous invaders include Russian olive (*Elaegnus angustifolia*) and hybrid willows such as white willow (*Salix alba*). Like other wetland communities, noxious weeds have seriously affected ecosystem functions in these plant communities. Noxious weeds commonly observed in the cottonwood communities include diffuse knapweed (*Centaurea diffusa*) and Canada thistle (*Cirsium arvense*).

Cottonwood / Baltic rush (POBAT/JUARL) (G5)

Figure 6. An example of the Cottonwood / Baltic rush association at Alta Lake State Park. Deciduous woody species visible in the photo are Norway maple and Russian olive, as well as cottonwood.

The cottonwood / Baltic rush vegetative type is characterized by an overstory of cottonwood (*Populus balsamifera* ssp. *trichocarpa*) and an understory of Baltic rush (*Juncus arcticus* ssp. *littoralis*). It is described in Crawford (2003). It is ranked G5 (secure). This vegetative type is associated with wetlands and deciduous stands at Alta Lake State Park (Figure 6).

Cottonwood communities occur sporadically around the perimeter of Alta Lake. These communities are highly fragmented with altered ecological functions, so their assignments to vegetative types are tentative. The cottonwood / Baltic rush community is also similar to the cottonwood / scouring rush horsetail vegetation type, described above, and the cottonwood / black hawthorn community of Crawford (2003). It is also similar to the woolly sedge (*Carex pellita*) vegetative type, which was not identified in the park. Although woolly sedge is common within the cottonwood / scouring rush horsetail vegetative type, the published descriptions of woolly sedge do not include cottonwood.

Plants that occur in the cottonwood / Baltic rush community include black hawthorn, aspen and typical wetland species, such as willows and sedges. Figure 6 shows an example of this plant association with other non-native deciduous woody species invading the stand.

As with the other lakeside communities at Alta Lake State Park this community is highly altered by recreational activities, lake level changes and invasive species. Introduced deciduous trees have replaced cottonwood as the dominant species in some parts of these communities. Common deciduous invaders include Russian olive (*Elaegnus angustifolia*) and hybrid willows such as white willow (*Salix alba*). Like other wetland communities, noxious weeds have seriously affected ecosystem functions in these plant communities. Noxious weeds that are commonly observed in cottonwood communities include diffuse knapweed (*Centaurea diffusa*) and Canada thistle (*Cirsium arvense*).

Aspen / black hawthorn (POTR5/CRDO2) (G3)

Figure 7. An example of the aspen / black hawthorn association at Alta Lake State Park.

The aspen / black hawthorn community is characterized by an overstory of aspen (*Populus tremuloides*) and an understory of black hawthorn (*Crataegus douglasii*). Aspen / black hawthorn has been described by Crawford (2003) and by Kagan et al. (2000; for the snowberry phase in Oregon). Aspen / black hawthorn is ranked as G3 by NatureServe (2008) (for the snowberry phase of Kagan et al. 2000) meaning it is globally vulnerable to extirpation or extinction. The vegetation community described by Crawford (2003) is not listed on NatureServe, but is probably just as rare.

Aspen / black hawthorn occurs on moist sites such as lakeshores, wetlands, and cliff bases. On cooler sites, it grades into Douglas-fir / bitterbrush / pinegrass. Aspen communities were often identified as secondary communities within other plant associations at Alta Lake State Park, because stands are highly fragmented by introduced species and developments. It is possible that aspen was the climax species

along the margins of Alta Lake in pre-settlement times. Aspen communities were undoubtedly more common at Alta Lake State Park during pre-settlement times. An example of an intact aspen stand occurs just outside the park boundary along the edge of the wetland at the north end of the park. The rarity of aspen throughout the west is due to a number of factors including the loss of periodic wildfire, the loss of beavers to maintain stands in healthy condition and grazing pressure from native and non-native ungulates.

The species that commonly occur within the aspen stands at Alta Lake State Park are the same as those described within cottonwood plant associations. The native black hawthorn has become dominant in several stands near the north end of the lake, and there it appears to be in the process of overtaking most other species to form a continuous monoclonal shrub layer.

Black hawthorn / Woods' rose (CRDO2-ROWO) (G2)

Figure 8. Black hawthorn – Wood's rose community in northernmost polygon at Alta Lake SP.

The black hawthorn - Woods' rose vegetation type is characterized by an overstory of the shrub black hawthorn (*Crataegus douglasii*) and an understory of the shorter shrub Woods' rose *(Rosa woodsii*). It was described by Crawford (2003). It is ranked G2, globally imperiled. This vegetation type occurs at Alta Lake State Park on mesic sites with higher water tables at the north end of the park (Figure 8).

The black hawthorn - Wood's rose vegetation type is not well understood. Crawford (2003) classified this community as a vegetation type rather than a plant association. At Alta Lake, it is rapidly changing due to

fire suppression and invasive species. Black hawthorn appears to be increasing its presence with fire suppression. This vegetation type may be a seral phase of the aspen / black hawthorn association, which has a similar floristic composition.

The black hawthorn - Wood's rose association supports a number of sedges and rushes including Douglas sedge (*Carex douglasii*) and Baltic rush (*Juncus arcticus* ssp. *littoralis*).

Under natural conditions the black hawthorn - Woods' rose association was probably maintained in an open condition by a dynamic interaction of fire and high water tables. With fire suppression, it tends to form continuous canopies of hawthorn, such as the small stand just west of the road leading to the Ranger Station. With mowing, the hawthorn persists as an ornamental, but the Wood's rose does not persist and understory forbs are replaced by lawn grasses. For this plant association to persist in this park, a stable hydrologic regime and periodic controlled fire or other means of thinning the stems would be required.

Bitterbrush / bluebunch wheatgrass (PUTR2/PSSP6) (G3)

Figure 9. An example of the bitterbrush / bluebunch wheatgrass association at Alta Lake State Park.

The bitterbrush / bluebunch wheatgrass association is characterized by non-forested grasses and forbs dominated by bitterbrush. This association was described by Crawford (1999). It is considered globally vulnerable to extirpation or extinction (G3 rank), but is common in the area near Alta Lake State Park (Figure 9).

Common species in the bitterbrush / bluebunch wheatgrass association are arrowleaf balsamroot (*Balsamorhiza sagittata*), silky lupine (*Lupinus sericeus*) and big sagebrush (*Artemisia tridentata*).

The bitterbrush / bluebunch wheatgrass association probably evolved with a frequent fire-return interval in this general area. Similar areas with scattered ponderosa pines had a fire-return interval of 8-15 years (Ohlson 1996). Under historic fire regimes, fires would likely have decreased the abundance of bitterbrush and increased the abundance of forbs and grasses. However the survival of bitterbrush may depend partly on whether historic fire regimes were the result of lightning ignitions or of Indian ignitions. The post-fire survival of bitterbrush is higher for cool, spring burns (personal communication, Tod Johnson, Fire Management Officer, National Park Service). Anecdotal evidence indicates that native burning often began in the spring and followed the snowline (Boyd 1999). In contrast, lightning results primarily in summer fires. Today, bitterbrush has become overstocked and presents a fire hazard in some parts of the park.

Due to its ability of the buds to be available as winter forage, bitterbrush is known to provide critical winter browse for mule deer. The largest population of mule deer in Washington State is in the Methow Valley, which is the same valley that Alta Lake State Park is located in. Yet almost no deer and no signs of deer were observed within the park (see the discussion under restoration and recommendations).

The bitterbrush / bluebunch association is sensitive to damage from livestock grazing and motorized recreational use. Several healthy stands of bitterbrush that occur within the park could be maintained or restored to a functional condition if they were protected from unnatural disturbances and periodically allowed to be burned.

With grazing along the park boundary, the bitterbrush / bluebunch wheatgrass association has converted to a big sagebrush / bluebunch wheatgrass association characterized by the dominant occurrence of big sagebrush and bluebunch wheatgrass (Figure 10). This community was described by Daubenmire (1970) and is listed as globally secure (G5).

Figure 10. The big sagebrush / bluebunch wheatgrass association lies on the boundary between Alta Lake State Park (right side of fence) and grazed private rangelands (left side of fence).

The big sagebrush / bluebunch wheatgrass association shown in Figure 10 did not extend far within the park and so it was not listed as a plant association; however, it is listed here to illustrate that it has the potential to occur at Alta Lake State Park.

Big sagebrush and bitterbrush often compete for dominance where they both find suitable habitat. Big sagebrush typically grows on deeper soils than bitterbrush, and in addition, it is more resistant to overgrazing, as shown by the appearance of the two sides of the fence as pictured above. Big sagebrush has both shallow and deep roots that allow it to take better advantage of seasonal water.

Baltic rush (JUARL) (G5)

Figure 11. An example of a Baltic rush plant community at Alta Lake State Park.

The Baltic rush vegetative type was described by Crawford (2003). It is ranked G5 (secure). This vegetative type occurs in and adjacent to wetlands and in openings within deciduous stands (Figure 11).

The dominant species of this community is Baltic rush (*Juncus arcticus* ssp. *littoralis*). Baltic rush communities are frequently associated with black hawthorn, cottonwood and aspen as well as other wetland species. These other species may eventually dominate the stand (note the hawthorn at the left side of the photo). A large meadow complex at the north end of Alta Lake State Park was historically a wetland that likely supported more extensive communities of Baltic rush. Today the water table has dropped and most of the wetland species such as Baltic rush have been replaced by adventive species as illustrated in Figure 11. The vegetation of this wetland is now dominated by introduced grasses, young trees and shrubs, and weeds such as Canada thistle.

Hardstem bulrush (SCAC3) (G5)

The shores of Alta Lake support several examples of the hardstem bulrush association (Figure 12). This plant association is dominated by hardstem bulrush (*Schoenoplectus acutus*). A number of published descriptions are listed in NatureServe (2008) resembling this community. Most descriptions are outside of Washington State; however, Bourgeron and Engelking (1994) described a community that encompasses the vegetation found at Alta Lake State Park. This community has a status of G5 (secure) This plant community is probably the same as the softstem bulrush association (*Schoenoplectus tabernaemontani*) described by Kovalchik and Clausnitzer (2004), which also has a status of G5. The softstem bulrush association can be dominated by either softstem bulrush or hardstem bulrush.

The hardstem bulrush community is limited to perennially flooded areas around Alta Lake. Common associates are cattail (*Typha latifolia*), vase or blister sedge (*Carex vesicaria*), water knotweed (*Polygonum amphibium*), and woolly sedge (*Carex pellita*).

Figure 12. An example of the hardstem bulrush or tule association at Alta Lake State Park.

Rock cliffs and talus; Smooth sumac / bluebunch wheatgrass (RHGL/PSSP6) (~G2)

Figure 13. An example of rock cliffs at Alta Lake State Park.

Alta Lake State Park has prominent cliff and talus communities, but these are not well described in the literature. Two polygons were dominated by cliff features, rock balds, talus blocks and sparse vegetation (Figure 13). The cliff communities have similarities to the Douglas-fir / oceanspray and the smooth sumac / bluebunch wheatgrass associations (Daubenmire 1970), both of which are ranked G3. However, since cliff communities occur less frequently, they are categorized as G2, or more imperiled.

The southwest cliffs at Alta Lake State Park have already been partly described under the Douglas-fir / bitterbrush / bluebunch wheatgrass association, while rock balds have been partly described under the Douglas-fir / bitterbrush / pinegrass association. Rock balds are glaciated bedrock slabs dominated by lichen communities. The area around the rock balds was dominated by Wyeth biscuitroot (*Lomatium ambiguum*) and other spring ephemerals, however no examples of this vegetation type were found in the literature. Although rock balds are rare, in this case, they are not threatened.

The cliffs and talus communities at Alta Lake State Park have other unique features not described in the published references. Bigleaf maple (*Acer macrophyllum*) and Rocky Mountain juniper (*Juniperus scopulorum*) are occasionally found on the cliffs. The former is primarily associated with western Washington and the latter with the Great Basin. Several caves and talus block shelters were found with the gold-backed fern (*Pentagramma triangularis*) a species known up to now only from western Washington.

Other Land Cover Types

Alta Lake State Park has the following general land cover types:

- **Beach**. This is a developed sandy beach used by swimmers.
- **Developed areas**. This includes campgrounds, roads, parking areas, roads, lawns and park facilities.
- **Former agricultural field**; an old field undergoing succession.
- **Disturbed shrub-steppe**. This includes a drainfield covered with a weed community of Russian thistle (*Salsola kali*), wild lettuce (*Lactuca serriola*) and lamb's quarters (*Chenopodium album*);
- **Disturbed wetland**. This is a former wetland at the north end of the park that is going dry.
- **Water**.
- **Ownership issue**. This is an area within the GIS boundary of the park that appears to be owned or controlled by an adjacent landowner.

A large wetland occurs along the administrative boundary of the north part of Alta Lake State Park. This wetland is currently being dewatered, possibly due to the rapid increase of private developments in the area. Because of the extensive ecological alteration in this wetland, it could not be classified into a known community and is described here as a disturbed wetland.

Rare Plant Surveys

Methods

Alta Lake State Park was visited five times by up to six surveyors and botanists during the 2008 field season. We used the WADNR NHP rare plant list to determine the conservation status of vascular plants encountered in the field. We brought a portable plant identification lab with us to the state park, complete with microscopes and other of plant identification tools. We collected plant specimens for later identification when needed. We used a wide range of floras and other plant identification references (e.g. Boersma et al 2006, Flora of North America 1993+, Hitchcock and Cronquist 1973, Hitchcock et al 1955, Hickman 1993, University of Washington Burke Museum Herbarium Vascular Plant Collection, USDA 2008, Washington Natural Heritage Program 2008, Washington Natural Heritage Program. no date, Whitson et al 2000, Wilson 2006).

Field surveys were conducted on May 12, May 13, June 23, June 24, and July 3. We looked for rare plants in habitats previously identified as being likely occurrence sites based on DNR NHP rare plant lists and maps of previous sightings in the surrounding area. We looked for rare plants in habitats previously identified as being likely occurrence sites. So as not to miss any rare plants, all vascular plant species encountered during the inventory were identified on site, at base camp in the portable laboratory, or back at our office.

Survey routes were determined based on the need to cover efficiently a large proportion of the park's area throughout the field season. We surveyed areas such as cliffs, the lakeshore, and the wetland at the north end, more intensively where rare plants were felt more likely to occur. This method is referred to as the intuitive-controlled method of rare plant surveys (Whiteaker et al. 1998). Survey routes for the rare plant inventory and rare plant locations were recorded as GPS waypoints and trackpoints, which were later compiled into a single GIS data layer, depicted in Figure 1.

Results

No rare plants listed as threatened, endangered or sensitive by the State of Washington were found in Alta Lake State Park.

Pre-field reviews indicated that the WADNR NHP has a historic record for many-headed sedge (*Carex sychnocephala*; state sensitive) near the southwest park boundary of Alta Lake State Park (Figure 14). Despite diligent searching, a population of this plant could not be located.

The many-headed sedge is currently known from less than a dozen Washington localities in Okanogan and Ferry Counties, where it is associated with marsh and lakeshore habitats, particularly where the soil is slightly alkaline. It is a distinctive species found in association with other aquatic species. The mapped location was slightly uphill from the shoreline, centered on a dry campsite. This left some doubt about the confidence of the record. However, both the shoreline and the mapped location were searched for many hours by two experienced botanists. At one point, a park employee showed us a location he remembered to be the site, although his recollection of the location was not positive. This site was along a mowed pathway along the edge of a grassy area at the north end of the lake. This site was not even close to the mapped location, although it was a better habitat than the mapped one. A number of sedges were found in this area, but none of them were many-headed sedge.

Plant species of interest

There were 205 vascular taxa identified to species during surveys of Alta Lake State Park (Table 3). These included some interesting or unusual plants. On the west cliff faces, occasional specimens of big leaf maple (*Acer macrophyllum*) and Rocky Mountain juniper (*Juniperus scopulorum*) occur. These two species are uncommon or absent in most of the other Washington parks we surveyed, although each of these can be a dominant species in favorable habitats. A single plant of red-stem ceanothus (*Ceanothus sanguineus*) was observed growing at the base of the west cliffs. Both Ceanothus and big leaf maple are more common in the Chelan drainage to the south, but absent northward from here.

The predominance of bedrock outcrops at Alta Lake State Park helps create habitat for rock-loving species. The naked broomrape (*Orobanche uniflora*) is an ephemeral species that prefers bedrock seeps and ledges such as the ones at the top of the west cliff face. The shrubby bedstraw (*Galium multiflorum*) grows in rock talus on the west cliffs, but is uncommon elsewhere in Okanogan County. The Idaho saxifrage (*Saxifraga idahoensis)* occurs on cliffs in Alta Coulee and surrounding areas, but has formerly only been recorded from Chelan County. Two other rare plants grow together in caves and crevices along the southwest edge of the park boundary. One of these is the gold-backed fern (*Pentagramma triangularis*), with one location under a 30-foot tall boulder exactly on the park boundary; the other is wingstem monkeyflower (*Mimulus alsinoides*), only found several hundred feet south of the park boundary. Both are heretofore only known from the West Cascades according to records maintained by the University of Washington's Burke Museum Herbarium.

Two species that are close to their northern limit here that are classified as rare species in Canada, both occur in shrub-steppe habitats of Alta Lake State Park. These are Whited's fissurewort *(Halimolobos whitedii*) and cat's ears (*Calochortus lyallii*), which is a regional endemic.

The shoreline of Alta Lake supports some deciduous trees and shrubs that provide valuable habitats for a number of other species. These include aspen (*Populus tremuloides*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), Bebb willow (*Salix bebbiana*), and Scouler's willow (*Salix scouleriana*).

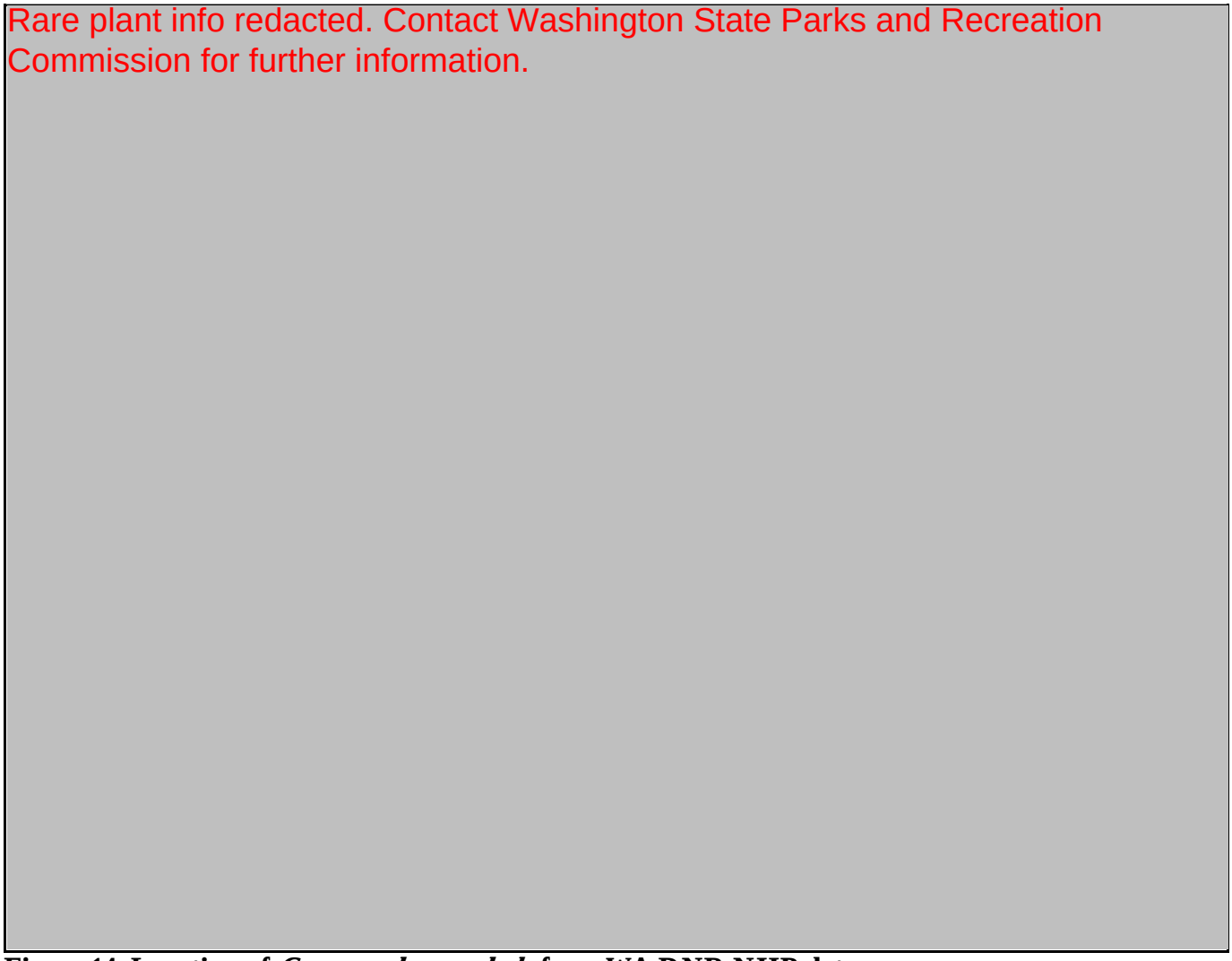


Figure 14. Location of *Carex sychnocephala* from WA DNR NHP data

Vascular Plant List for the 2008 Project Area

There were 205 vascular taxa identified to species during surveys of Alta Lake State Park (Table 3). An additional 23 genera were observed that were only identifiable to the rank of genus or family. Of the genera, 19 probably represent additional taxa, bringing the total number of taxa to approximately 225. Table 3 also identifies 43 non-native species identified within the park, or approximately 19% of the total number of species observed.

Table 3. Vascular Plant Species of Alta Lake State Park. The column "Symbol" represents the plant code used on the USDA PLANTS database.

Symbol	Scientific Name with Author	National Common Name	Family	Exotic
ACGLD4	Acer glabrum Torr. var. douglasii (Hook.) Dippel	Douglas maple	Aceraceae	
ACER	Acer L.	maple	Aceraceae	Yes
ACMA3	Acer macrophyllum Pursh	bigleaf maple	Aceraceae	
ACMI2	Achillea millefolium L.	common yarrow	Asteraceae	
ACOC3	Achnatherum occidentale (Thurb.) Barkworth	western needlegrass	Poaceae	
AGHE2	Agoseris heterophylla (Nutt.) Greene	annual agoseris	Asteraceae	
AGOSE	Agoseris Raf.	agoseris	Asteraceae	
AGCR	Agropyron cristatum (L.) Gaertn.	crested wheatgrass	Poaceae	Yes
ALAC4	Allium acuminatum Hook.	tapertip onion	Liliaceae	
AMAL2	Amelanchier alnifolia (Nutt.) Nutt. ex M. Roem.	Saskatoon serviceberry	Rosaceae	
AMUT	Amelanchier utahensis Koehne	Utah serviceberry	Rosaceae	
AMME	Amsinckia menziesii (Lehm.) A. Nelson & J.F. Macbr.	Menzies' fiddleneck	Boraginaceae	
ANMA	Anaphalis margaritacea (L.) Benth.	western pearly everlasting	Asteraceae	
ANDI2	Antennaria dimorpha (Nutt.) Torr. & A. Gray	low pussytoes	Asteraceae	
ANMI3	Antennaria microphylla Rydb.	littleleaf pussytoes	Asteraceae	
ANCO2	Anthemis cotula L.	stinking chamomile	Asteraceae	Yes
APAN2	Apocynum androsaemifolium L.	spreading dogbane	Apocynaceae	
ARHOR	Arabis holboellii Hornem. var. retrofracta (Graham) Rydb.	second rockcress	Brassicaceae	
ARABI2	Arabis L.	rockcress	Brassicaceae	
ARSPA2	Arabis sparsiflora Nutt. var. atrorubens (Suksd. ex Greene) Rollins	elegant rockcress	Brassicaceae	
ARSPS	Arabis sparsiflora Nutt. var. subvillosa (S. Watson) Rollins	hairystem rockcress	Brassicaceae	
ARUV	Arctostaphylos uva-ursi (L.) Spreng.	kinnikinnick	Ericaceae	
ARDR4	Artemisia dracunculus L.	tarragon	Asteraceae	
ARLU	Artemisia ludoviciana Nutt.	white sagebrush	Asteraceae	
ARMI4	Artemisia michauxiana Besser	Michaux's wormwood	Asteraceae	
ARTR2	Artemisia tridentata Nutt.	big sagebrush	Asteraceae	
ARTR4	Artemisia tripartita Rydb.	threetip sagebrush	Asteraceae	
ASSP	Asclepias speciosa Torr.	showy milkweed	Asclepiadaceae	
ASOF	Asparagus officinalis L.	garden asparagus	Liliaceae	Yes
ASCAM3	Astragalus canadensis L. var. mortonii (Nutt.) S. Watson	Morton's Canadian milkvetch	Fabaceae	

Symbol	Scientific Name with Author	National Common Name	Family	Exotic
ASMI9	Astragalus miser Douglas ex Hook.	timber milkvetch	Fabaceae	
ASPU9	Astragalus purshii Douglas ex Hook.	woollypod milkvetch	Fabaceae	
BASA3	Balsamorhiza sagittata (Pursh) Nutt.	arrowleaf balsamroot	Asteraceae	
BETUL	Betula L.	birch	Betulaceae	Yes
BEOC2	Betula occidentalis Hook.	water birch	Betulaceae	
BRAR5	Bromus arvensis L.	field brome	Poaceae	Yes
BRCA5	Bromus carinatus Hook. & Arn.	California brome	Poaceae	
BROMU	Bromus L.	brome	Poaceae	Yes
BRTE	Bromus tectorum L.	cheatgrass	Poaceae	Yes
CARU	Calamagrostis rubescens Buckley	pinegrass	Poaceae	
CALY	Calochortus lyallii Baker	Lyall's mariposa lily	Liliaceae	
CAMA5	Calochortus macrocarpus Douglas	sagebrush mariposa lily	Liliaceae	
CADO2	Carex douglasii Boott	Douglas' sedge	Cyperaceae	
CAFI	Carex filifolia Nutt.	threadleaf sedge	Cyperaceae	
CAREX	Carex L.	sedge	Cyperaceae	
CALAA	Carex lasiocarpa Ehrh. var. americana Fernald	American woollyfruit sedge	Cyperaceae	
CAPE42	Carex pellita Muhl. ex Willd.	woolly sedge	Cyperaceae	
CAPR5	Carex praegracilis W. Boott	clustered field sedge	Cyperaceae	
CARO5	Carex rossii Boott	Ross' sedge	Cyperaceae	
CASY	Carex sychnocephala Carey	manyhead sedge	Cyperaceae	
CAUT	Carex utriculata Boott	Northwest Territory sedge	Cyperaceae	
CAVE6	Carex vesicaria L.	blister sedge	Cyperaceae	
CASTI2	Castilleja Mutis ex L. f.	Indian paintbrush	Scrophulariaceae	
CESA	Ceanothus sanguineus Pursh	redstem ceanothus	Rhamnaceae	
CEVE	Ceanothus velutinus Douglas ex Hook.	snowbrush ceanothus	Rhamnaceae	
CEDI3	Centaurea diffusa Lam.	diffuse knapweed	Asteraceae	Yes
CEARS2	Cerastium arvense L. ssp. strictum (L.) Ugborogho	field chickweed	Caryophyllaceae	
CETE5	Ceratocephala testiculata (Crantz) Roth	curveseed butterwort	Ranunculaceae	Yes
CHDO	Chaenactis douglasii (Hook.) Hook. & Arn.	Douglas' dustymaiden	Asteraceae	
CHAN9	Chamerion angustifolium (L.) Holub	fireweed	Onagraceae	
CHAL7	Chenopodium album L.	lambsquarters	Chenopodiaceae	Yes
CHTE2	Chorispora tenella (Pall.) DC.	crossflower	Brassicaceae	Yes
CIAR4	Cirsium arvense (L.) Scop.	Canada thistle	Asteraceae	Yes
CLPE	Claytonia perfoliata Donn ex Willd.	miner's lettuce	Portulacaceae	
CLLI2	Clematis ligusticifolia Nutt.	western white clematis	Ranunculaceae	
COPA3	Collinsia parviflora Lindl.	maiden blue eyed Mary	Scrophulariaceae	
COGR4	Collomia grandiflora Douglas ex Lindl.	grand collomia	Polemoniaceae	
COLI2	Collomia linearis Nutt.	tiny trumpet	Polemoniaceae	
COUM	Comandra umbellata (L.) Nutt.	bastard toadflax	Santalaceae	
COAR4	Convolvulus arvensis L.	field bindweed	Convolvulaceae	Yes
CRDO2	Crataegus douglasii Lindl.	black hawthorn	Rosaceae	
CRAT	Crepis atribarba A. Heller	slender hawksbeard	Asteraceae	
CREPI	Crepis L.	hawksbeard	Asteraceae	
CRYPT	Cryptantha Lehm. ex G. Don	cryptantha	Boraginaceae	

Symbol	Scientific Name with Author	National Common Name	Family	Exotic
CRTO4	Cryptantha torreyana (A. Gray) Greene	Torrey's cryptantha	Boraginaceae	
CRWA2	Cryptantha watsonii (A. Gray) Greene	Watson's cryptantha	Boraginaceae	
CYFR2	Cystopteris fragilis (L.) Bernh.	brittle bladderfern	Dryopteridaceae	
DELI3	Delphinium lineapetalum Ewan	thinpetal larkspur	Ranunculaceae	
DEPI	Descurainia pinnata (Walter) Britton	western tansymustard	Brassicaceae	
DISTI	Distichlis Raf.	saltgrass	Poaceae	
DOPUC	Dodecatheon pulchellum (Raf.) Merr. ssp. cusickii (Greene) Calder & Roy L. Taylor	Cusick's shootingstar	Primulaceae	
DOPUP2	Dodecatheon pulchellum (Raf.) Merr. ssp. pulchellum	darkthroat shootingstar	Primulaceae	
DRVE2	Draba verna L.	spring draba	Brassicaceae	Yes
ELAN	Elaeagnus angustifolia L.	Russian olive	Elaeagnaceae	Yes
ELGL	Elymus glaucus Buckley	blue wildrye	Poaceae	
ELRE4	Elymus repens (L.) Gould	quackgrass	Poaceae	Yes
EPILO	Epilobium L.	willowherb	Onagraceae	
EPMI	Epilobium minutum Lindl. ex Lehm.	chaparral willowherb	Onagraceae	
EQHY	Equisetum hyemale L.	scouringrush horsetail	Equisetaceae	
EQUIS	Equisetum L.	horsetail	Equisetaceae	
ERNA10	Ericameria nauseosa (Pall. ex Pursh) G.L. Nesom & Baird	rubber rabbitbrush	Asteraceae	
ERCO5	Erigeron corymbosus Nutt.	longleaf fleabane	Asteraceae	
ERFI2	Erigeron filifolius (Hook.) Nutt.	threadleaf fleabane	Asteraceae	
ERLI	Erigeron linearis (Hook.) Piper	desert yellow fleabane	Asteraceae	
ERPH	Erigeron philadelphicus L.	Philadelphia fleabane	Asteraceae	
ERPU2	Erigeron pumilus Nutt.	shaggy fleabane	Asteraceae	
EREL5	Eriogonum elatum Douglas ex Benth.	tall woolly buckwheat	Polygonaceae	
ERHE2	Eriogonum heracleoides Nutt.	parsnipflower buckwheat	Polygonaceae	
ERNI2	Eriogonum niveum Douglas ex Benth.	snow buckwheat	Polygonaceae	
7-Feb	Festuca brevipila Tracey	hard fescue	Poaceae	Yes
FEID	Festuca idahoensis Elmer	Idaho fescue	Poaceae	
FESTU	Festuca L.	fescue	Poaceae	
FRAL2	Frasera albicaulis Douglas ex Griseb.	whitestem frasera	Gentianaceae	
GAAR	Gaillardia aristata Pursh	common gaillardia	Asteraceae	
GAAP2	Galium aparine L.	stickywilly	Rubiaceae	Yes
GAMU2	Galium multiflorum Kellogg	shrubby bedstraw	Rubiaceae	
GADE2	Gayophytum decipiens F.H. Lewis & Szweykowski	deceptive groundsmoke	Onagraceae	
GETR	Geum triflorum Pursh	old man's whiskers	Rosaceae	
GNAPH	Gnaphalium L.	cudweed	Asteraceae	
GNPA	Gnaphalium palustre Nutt.	western marsh cudweed	Asteraceae	
GYPA	Gypsophila paniculata L.	baby's breath	Caryophyllaceae	Yes
HADIA	Hackelia diffusa (Lehm.) I.M. Johnst. var. arida (Piper) R.L. Carr	sagebrush stickseed	Boraginaceae	
HAWH	Halimolobos whitedii (Piper) Rollins	Whited's fissurewort	Brassicaceae	
HECO26	Hesperostipa comata (Trin. & Rupr.) Barkworth	needle and thread	Poaceae	
HECY2	Heuchera cylindrica Douglas ex Hook.	roundleaf alumroot	Saxifragaceae	
HIAL2	Hieracium albiflorum Hook.	white hawkweed	Asteraceae	

Symbol	Scientific Name with Author	National Common Name	Family	Exotic
HISC2	Hieracium scouleri Hook.	Scouler's woollyweed	Asteraceae	
HODI	Holodiscus discolor (Pursh) Maxim.	oceanspray	Rosaceae	
HOJU	Hordeum jubatum L.	foxtail barley	Poaceae	
HYCA4	Hydrophyllum capitatum Douglas ex Benth.	ballhead waterleaf	Hydrophyllaceae	
IPAG	Ipomopsis aggregata (Pursh) V.E. Grant	scarlet gilia	Polemoniaceae	
IRIS	Iris L.	iris	Iridaceae	Yes
JUARL	Juncus arcticus Willd. ssp. littoralis (Engelm.) Hultén	mountain rush	Juncaceae	
JUNCU	Juncus L.	rush	Juncaceae	
JUSC2	Juniperus scopulorum Sarg.	Rocky Mountain juniper	Cupressaceae	
KOMA	Koeleria macrantha (Ledeb.) Schult.	prairie Junegrass	Poaceae	
LASE	Lactuca serriola L.	prickly lettuce	Asteraceae	Yes
LATAP	Lactuca tatarica (L.) C.A. Mey. var. pulchella (Pursh) Breitung	blue lettuce	Asteraceae	
LAOCC	Lappula occidentalis (S. Watson) Greene var. cupulata (A. Gray) Higgins	flatspine stickseed	Boraginaceae	
LELA2	Lepidium latifolium L.	broadleaved pepperweed	Brassicaceae	Yes
LELI14	Leptosiphon liniflorus (Benth.) J.M. Porter & L.A. Johnson	narrowflower flaxflower	Polemoniaceae	
LEDO2	Lesquerella douglasii S. Watson	Douglas' bladderpod	Brassicaceae	
LERE7	Lewisia rediviva Pursh	bitter root	Portulacaceae	
LECI4	Leymus cinereus (Scribn. & Merr.) A. Löve	basin wildrye	Poaceae	
LIPU11	Linanthus pungens (Torr.) J.M. Porter & L.A. Johnson	granite prickly phlox	Polemoniaceae	
LIDAD	Linaria dalmatica (L.) Mill. ssp. dalmatica	Dalmatian toadflax	Scrophulariaceae	Yes
LIGL2	Lithophragma glabrum Nutt.	bulbous woodland-star	Saxifragaceae	
LIPA5	Lithophragma parviflorum (Hook.) Nutt. ex Torr. & A. Gray	smallflower woodland-star	Saxifragaceae	
LIRU4	Lithospermum ruderale Douglas ex Lehm.	western stoneseed	Boraginaceae	
LOAM	Lomatium ambiguum (Nutt.) J.M. Coult. & Rose	Wyeth biscuitroot	Apiaceae	
LODI	Lomatium dissectum (Nutt.) Mathias & Constance	fernleaf biscuitroot	Apiaceae	
LOGE2	Lomatium geyeri (S. Watson) J.M. Coult. & Rose	Geyer's biscuitroot	Apiaceae	
LOMA3	Lomatium macrocarpum (Nutt. ex Torr. & A. Gray) J.M. Coult. & Rose	bigseed biscuitroot	Apiaceae	
LUPIN	Lupinus L.	lupine	Fabaceae	
LUSE4	Lupinus sericeus Pursh	silky lupine	Fabaceae	
MESA	Medicago sativa L.	alfalfa	Fabaceae	Yes
MEOF	Melilotus officinalis (L.) Lam.	yellow sweetclover	Fabaceae	Yes
MEAL6	Mentzelia albicaulis (Hook.) Torr. & A. Gray	whitestem blazingstar	Loasaceae	
MENTZ	Mentzelia L.	blazingstar	Loasaceae	
MELO4	Mertensia longiflora Greene	small bluebells	Boraginaceae	
MIGR	Microsteris gracilis (Hook.) Greene	slender phlox	Polemoniaceae	
MYST2	Myosotis stricta Link ex Roem. & Schult.	strict forget-me-not	Boraginaceae	Yes
NECA2	Nepeta cataria L.	catnip	Lamiaceae	Yes
ORFA	Orobanche fasciculata Nutt.	clustered broomrape	Orobanchaceae	

Symbol	Scientific Name with Author	National Common Name	Family	Exotic
ORUN	Orobanche uniflora L.	oneflowered broomrape	Orobanchaceae	
PAMY	Paxistima myrsinites (Pursh) Raf.	Oregon boxleaf	Celastraceae	
PEPE26	Pectocarya penicillata (Hook. & Arn.) A. DC.	sleeping combseed	Boraginaceae	
PEFR3	Penstemon fruticosus (Pursh) Greene	bush penstemon	Scrophulariaceae	
PEPR3	Penstemon pruinosus Douglas ex Lindl.	Chelan beardtongue	Scrophulariaceae	
PETR7	Pentagramma triangularis (Kaulf.) Yatsk., Windham & E. Wollenw.	goldback fern	Pteridaceae	
PHHA	Phacelia hastata Douglas ex Lehm.	silverleaf phacelia	Hydrophyllaceae	
PHLI	Phacelia linearis (Pursh) Holz.	threadleaf phacelia	Hydrophyllaceae	
PHAR3	Phalaris arundinacea L.	reed canarygrass	Poaceae	Yes
PHLE4	Philadelphus lewisii Pursh	Lewis' mock orange	Hydrangeaceae	
PHLO2	Phlox longifolia Nutt.	longleaf phlox	Polemoniaceae	
PIPO	Pinus ponderosa C. Lawson	ponderosa pine	Pinaceae	
PLMA2	Plantago major L.	common plantain	Plantaginaceae	Yes
PLPA2	Plantago patagonica Jacq.	woolly plantain	Plantaginaceae	
POBU	Poa bulbosa L.	bulbous bluegrass	Poaceae	Yes
POPR	Poa pratensis L.	Kentucky bluegrass	Poaceae	Yes
POSE	Poa secunda J. Presl	Sandberg bluegrass	Poaceae	
POAME	Polygonum amphibium L. var. emersum Michx.	longroot smartweed	Polygonaceae	
POLYG4	Polygonum L.	knotweed	Polygonaceae	
POBAT	Populus balsamifera L. ssp. trichocarpa (Torr. & A. Gray ex Hook.) Brayshaw	black cottonwood	Salicaceae	
POTR5	Populus tremuloides Michx.	quaking aspen	Salicaceae	
POARC	Potentilla arguta Pursh ssp. convallaria (Rydb.) D.D. Keck	cream cinquefoil	Rosaceae	
PRVI	Prunus virginiana L.	chokecherry	Rosaceae	
PSSP6	Pseudoroegneria spicata (Pursh) A. Löve	bluebunch wheatgrass	Poaceae	
PSME	Pseudotsuga menziesii (Mirb.) Franco	Douglas-fir	Pinaceae	
PUTR2	Purshia tridentata (Pursh) DC.	antelope bitterbrush	Rosaceae	
RAGL	Ranunculus glaberrimus Hook.	sagebrush buttercup	Ranunculaceae	
RAIN	Ranunculus inamoenus Greene	graceful buttercup	Ranunculaceae	
RHGL	Rhus glabra L.	smooth sumac	Anacardiaceae	
RICE	Ribes cereum Douglas	wax currant	Grossulariaceae	
RONU	Rosa nutkana C. Presl	Nootka rose	Rosaceae	
ROWO	Rosa woodsii Lindl.	Woods' rose	Rosaceae	
RULE	Rubus leucodermis Douglas ex Torr. & A. Gray	whitebark raspberry	Rosaceae	
SAAL2	Salix alba L.	white willow	Salicaceae	Yes
SABE2	Salix bebbiana Sarg.	Bebb willow	Salicaceae	
SAEX	Salix exigua Nutt.	narrowleaf willow	Salicaceae	
SALIX	Salix L.	willow	Salicaceae	
SAPR3	Salix prolixa Andersson	MacKenzie's willow	Salicaceae	
SASC	Salix scouleriana Barratt ex Hook.	Scouler's willow	Salicaceae	
SAKA	Salsola kali L.	Russian thistle	Chenopodiaceae	Yes
SANIC5	Sambucus nigra L. ssp. cerulea (Raf.) R. Bolli	blue elderberry	Caprifoliaceae	
SAID	Saxifraga idahoensis Piper	Idaho saxifrage	Saxifragaceae	

Symbol	Scientific Name with Author	National Common Name	Family	Exotic
SAXIF	Saxifraga L.	saxifrage	Saxifragaceae	
SANI5	Saxifraga nidifica Greene	peak saxifrage	Saxifragaceae	
SCAC3	Schoenoplectus acutus (Muhl. ex Bigelow) A. Löve & D. Löve	hardstem bulrush	Cyperaceae	
SCTA2	Schoenoplectus tabernaemontani (C.C. Gmel.) Palla	softstem bulrush	Cyperaceae	
SECE	Secale cereale L.	cereal rye	Poaceae	Yes
SEST2	Sedum stenopetalum Pursh	wormleaf stonecrop	Crassulaceae	
SEWA	Selaginella wallacei Hieron.	Wallace's spikemoss	Selaginellaceae	
SIAL2	Sisymbrium altissimum L.	tall tumblemustard	Brassicaceae	Yes
SILO3	Sisymbrium loeselii L.	small tumbleweed mustard	Brassicaceae	
SOCA6	Solidago canadensis L.	Canada goldenrod	Asteraceae	
SONCH	Sonchus L.	sowthistle	Asteraceae	Yes
SPARG	Sparganium L.	bur-reed	Sparganiaceae	
SPBE2	Spiraea betulifolia Pall.	white spirea	Rosaceae	
SPCR	Sporobolus cryptandrus (Torr.) A. Gray	sand dropseed	Poaceae	
STMI13	Stephanomeria minor (Hook.) Nutt.	lesser wirelettuce	Asteraceae	
SYAL	Symphoricarpos albus (L.) S.F. Blake	common snowberry	Caprifoliaceae	
TAOF	Taraxacum officinale F.H. Wigg.	common dandelion	Asteraceae	Yes
THIN6	Thinopyrum intermedium (Host) Barkworth & D.R. Dewey	intermediate wheatgrass	Poaceae	Yes
TORY	Toxicodendron rydbergii (Small ex Rydb.) Greene	western poison ivy	Anacardiaceae	
TRDU	Tragopogon dubius Scop.	yellow salsify	Asteraceae	Yes
TRRE3	Trifolium repens L.	white clover	Fabaceae	Yes
TRGR7	Triteleia grandiflora Lindl.	largeflower triteleia	Liliaceae	
TYLA	Typha latifolia L.	broadleaf cattail	Typhaceae	
ULPU	Ulmus pumila L.	Siberian elm	Ulmaceae	Yes
URDI	Urtica dioica L.	stinging nettle	Urticaceae	
VETH	Verbascum thapsus L.	common mullein	Scrophulariaceae	Yes
VEBR	Verbena bracteata Cav. ex Lag. & Rodr.	bigbract verbena	Verbenaceae	
VEHA2	Verbena hastata L.	swamp verbena	Verbenaceae	
VUBR	Vulpia bromoides (L.) Gray	brome fescue	Poaceae	
WOOR	Woodsia oregana D.C. Eaton	Oregon cliff fern	Dryopteridaceae	
WOSC	Woodsia scopulina D.C. Eaton	Rocky Mountain woodsia	Dryopteridaceae	
ZIVE	Zigadenus venenosus S. Watson	meadow deathcamas	Liliaceae	

Discussion and Recommendations

Noxious Weeds

A list of the noxious weeds found at Alta Lake State Park is presented in Table 4. We found three Class B weeds and five Class C weeds. The most widespread noxious weed we observed was Dalmatian toadflax, which occurs in almost all habitats. Some patches of Dalmatian toadflax appeared to increase in abundance following a recent wildfire. The noxious weeds that were observed within each polygon are recorded in the corresponding record in the vegetation database for the park, which is included in this report as Appendix D.

Table 4. State listed noxious weeds at Alta Lake State Park.

Symbol	Scientific Name with Author	National Common Name	State Weed Status
CEDI3	*Centaurea diffusa* Lam.	diffuse knapweed	B
CIAR4	*Cirsium arvense* (L.) Scop.	Canada thistle	C
COAR4	*Convolvulus arvensis* L.	field bindweed	C
GYPA	*Gypsophila paniculata* L.	baby's breath	C
LELA2	*Lepidium latifolium* L.	broadleaved pepperweed	B
LIDAD	*Linaria dalmatica* (L.) Mill. ssp. *dalmatica*	Dalmatian toadflax	B
SECE	*Secale cereale* L.	cereal rye	C
PHAR3	*Phalaris arundinacea* L.	reed canarygrass	C

Ecological Condition

The ecological condition at Alta Lake State Park ranges from excellent to poor, corresponding to the degree of human disturbance and weed invasion (see Appendix B for definitions). A map of the overall ecological condition of the primary plant associations is presented in Figure 15. It is notable that five large polygons were classified as excellent.

Approximately 225 plant species were observed within Alta Lake State Park, of which about 80% are native. This is relatively high species diversity for an area this size. It reflects the fact that large parts of the park are still relatively undisturbed, as well the fact that the park has an inherent broad diversity of habitats.

The percentage of invasive species is relatively low when compared to other nearby developed areas. However, there are eight species of noxious weeds observed that have the potential to increase their populations.

Although Alta Lake State Park has good habitat for mule deer, these animals are uncommon here. Mule deer scat is also uncommon, so the lack of deer is a year-round phenomenon. The reason for their absence is not clear, but it is even more notable considering that the park is located within the range of the Methow Valley deer herd, which has the highest mule deer population in the state. Mule deer are an important species that may be possible to recover at Alta Lake State Park. There are a number of possible explanations including hunting pressure, endemic disease, lack of migration connectivity, predation or a combination of several factors.

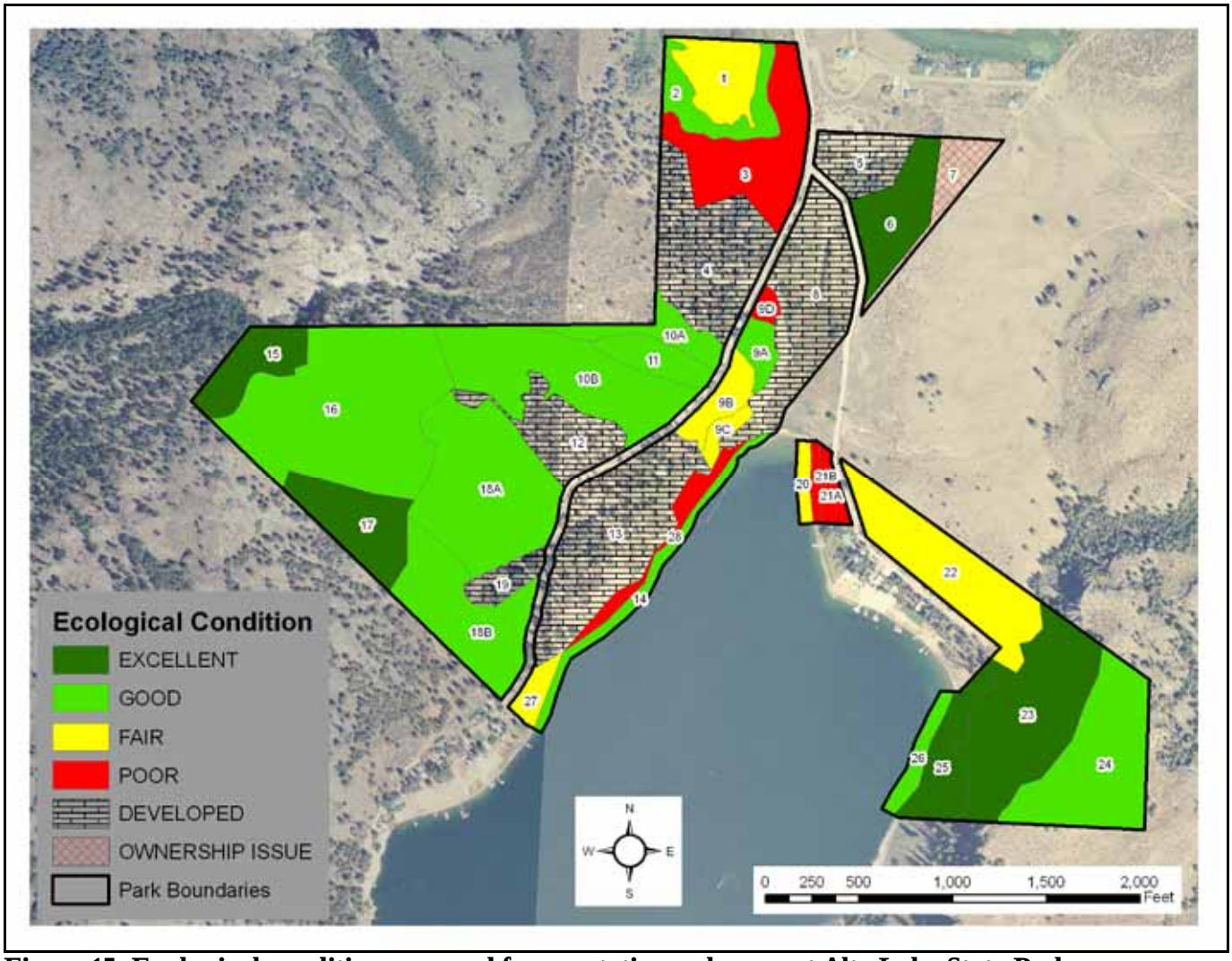


Figure 15. Ecological condition assessed for vegetation polygons at Alta Lake State Park.

Restoration Opportunities

There are opportunities for restoration activities to occur at Alta Lake State Park. One of these could be maintenance of a stable water table on Alta Lake, or at least maintaining a water level that cycles on a natural basis compatible with the ecology of the native flora. It is likely that fluctuating water tables has played a part in the extirpation of wetland plants at Alta Lake. According to the Park Ranger, the lake level dropped severely over the last decade. In response to demands from constituents, water is now pumped in to maintain the lake from dropping. With a stable source of water, it is possible to maintain a hydrologic regime that benefits both park visitors as well as ecological function. Another consideration related to this could be limiting watercraft speeds to help prevent wave erosion.

There was a large wetland on the north border of Alta Lake State Park that has suffered a drop in the water table sufficient to cause the loss of its wetland flora. Most of this area is now a weed-infested wetland and grassy field. Further lowering of the water table may result in the loss of an ecologically valuable stand of aspen along the administrative edge of the wetland. The lowering of the water table may be tied to significant new development and the private golf course around the north end of the park. It may be possible to find the source of the drawdown and restore the water table to a more functional, weed-free state.

The lack of mule deer has already been mentioned as a possible restoration activity at Alta Lake State Park. Other wildlife species that may have conservation concerns include golden eagles, bald eagles, Lewis' woodpeckers, white-headed woodpeckers, flammulated owls and bats. There are excellent opportunities for visitors to have watchable wildlife experiences in the park. Unique cliff habitats occur on and just outside of the park that could potentially be acquired as mitigation for future development.

Alta Lake State Park has a large amount of area that historically burned approximately every 5-15 years with low-severity fire (Ohlson 1996). After 100 years of fire suppression, fuels have built up to the point where fires will be high-severity fires with likely high mortality to desirable trees and with dangerous firefighting conditions. Some stands of trees and shrubs have become overstocked and stressed due to competition for nutrients and sunlight. This has led in turn to a high potential for insect outbreaks. In the last several years, western pine beetles have become active in the park and killed a number of large and small ponderosa pine. This is a safety hazard as well as a potential fire hazard.

The most ecologically sound solution to the problem of fire suppression would be to return controlled fire to the fire-prone ecosystems at Alta Lake State Park. Because the system is out of balance, there may be the need for preparatory thinning of small trees in some locations before this could take place. Controlled fire could take advantage of several natural fuel breaks and the cooperation of adjacent Forest Service and BLM managers that are also interested in returning fire to their lands.

Prescribed fire would need to be repeated on a regular basis, whenever the shrubs and conifer regeneration become thick again. Designated fuel breaks could be used whenever fire returned to the park, whether in a controlled fashion or otherwise. In order to prevent noxious weeds from becoming established following fire, it is important that fire fighters take care not to spread seed during operations and that managers specify the use of noxious-weed-free seed for reseeding where it is necessary.

In addition to active restoration, it should be noted that Alta Lake has some unique ecological features that allows for passive maintenance of healthy forest conditions. This occurs on most of the cliffs and talus, where rocky ground helps reduce the risk of crown fire. Two of the plant associations at Alta Lake State Park are apparently resistant to weed invasion as well: Douglas-fir / ocean spray and Douglas fir / bitterbrush / pinegrass.

Other Recommendations

There is a significant discrepancy between the State Park boundary depicted in the GIS data we were provided and the border fences we observed on the ground. This is mainly the case along the northeast boundary of the park. We mapped all of polygon seven as an "ownership issue" because the area appeared to be part of an adjacent ranch with extensive livestock grazing (Figures 3 and 15). We recommend that the park boundary be surveyed and the GIS data updated to reflect the actual ownership. If the GIS boundary is correct, then the fence needs to be relocated and the overgrazed area needs restoration treatments.

GIS Products Produced

Associated with this report are polygon layers created by Pacific Biodiversity Institute depicting the vegetation community types and associated data mapped within Alta Lake State Park. The datasets have been converted into ESRI shapefile formats and provided to WSPRC. The spatial datasets are complete with metadata meeting FGDC standards. Refer to the associated metadata for descriptions and attribute definitions for each spatial dataset.

References

Bourgeron, P. S. and L. D. Engelking, editors. 1994. A preliminary vegetation classification of the western United States. Unpublished report. The Nature Conservancy, Western Heritage Task Force, Boulder, CO. 175 pp. plus appendix.

Boyd, Robert. Ed. 1999. Indians, Fire, and the Land in the Pacific Northwest, Oregon State University Press, Corvallis, Oregon. The introduction to this book is online: http://oregonstate.edu/dept/press/i-j/IndiansFireIntro.html

Clausnitzer, R. and B. Zamora 1987. Forest habitat types of the Colville Indian Reservation. Unpublished document prepared for the Colville Federated Tribes.

Crawford, R.C. 2003. A riparian vegetation classification of the Columbia Basin, Washington. 2003. Washington Natural Heritage Program, Washington Department of Natural Resources, Olympia, WA 98504-7016. Published in coordination with Bureau of Land Management, Spokane District and The Nature Conservancy.

Crawford, R.C. 1999. Preliminary key to shrub-steppe plant associations in Washington State. Washington Natural Heritage Program, Washington Department of Natural Resources, Olympia, WA.

Daubenmire, R. F. 1970. Steppe vegetation of Washington. Washington State University Agricultural Experiment Station Technical Bulletin No. 62. 131 pp.

Flora of North America Editorial Committee, eds. 1993+. *Flora of North America North of Mexico*. 27 vols. New York and Oxford. Harvard University. http://hua.huh.harvard.edu/FNA/volumes.shtml

Hickman, J.C. (Ed.). 1993. *The Jepson Manual, Higher Plants of California*. Berkeley, CA: University of California Press.

Hitchcock, C.L. and A. Cronquist. 1973. Flora of the Pacific Northwest: An Illustrated Manual University of Washington Press, Seattle.

Hitchcock, C.L., Cronquist, A., Ownbey, M., and J. W. Thompson. 1955. Vascular Plants of the Pacific Northwest. University of Washington Press, Seattle.

Kagan, J. S., J. A. Christy, M. P. Murray, and J. A. Titus. 2000. Classification of native vegetation of Oregon. Oregon Natural Heritage Program, Portland. 63 pp.

Kovalchik, B.L and R.R. Clausnitzer. 2004. Classification and Management of Aquatic, Riparian, and Wetland Sites on the National Forests of Eastern Washington. USDA Forest Service GTR-593.

Lillybridge, T.R., B.L. Kovalchik, C.K. Williams, and B.G. Smith. 1995. Field Guide for Forested Plant Associations of the Wenatchee National Forest. USDA Forest Service GTR-359. Portland, Ore. 336p.

NatureServe. 2008. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.0. NatureServe, Arlington, VA. U.S.A. Available http://www.natureserve.org/explorer.

Ohlson, T.H. 1996. Fire Regimes of the Ponderosa Pine-Douglas-fir/Bluebunch Wheatgrass Plant Association in the Methow Valley of North Central Washington. 85 pp. Unpublished document. On file with: U.S. Department of Agriculture, Forest Service, Methow Valley Ranger District, Winthrop, WA 98862.

Washington Natural Heritage Program. 2008. Field Guide to Selected Rare Plants of Washington State. Washington Natural Heritage Program, Department of Natural Resources, Olympia, WA. http://www1.dnr.wa.gov/nhp/refdesk/fguide/htm/fgmain.htm

Washington Natural Heritage Program. No date. Unpublished data files. Washington Natural Heritage Program, Department of Natural Resources, Olympia, WA.

Western Ecology Working Group of NatureServe. No date. International Ecological Classification Standard: International Vegetation Classification -Terrestrial Vegetation. NatureServe, Boulder, CO.

Whiteaker, Lou; J. Henderson, R. Holmes; L. Hoover; R. Lesher; J. Lippert; E. Olson; L. Potash; J. Seevers; M. Stein; N. Wogen. 1998. Survey protocols for Survey and Manage Strategy 2 Vascular Plants v. 2.0, Bureau of Land Management, December. 1998. (http://www.blm.gov/or/plans/surveyandmanage/SP/VascularPlants/section1.htm)

Whitson, T.D. et al. (Eds.). 2000. *Weeds of the West*. The Western Society of Weed Science and the Western United States Land Grant Universities Cooperative Extension Services. Newark, CA. 630pp.

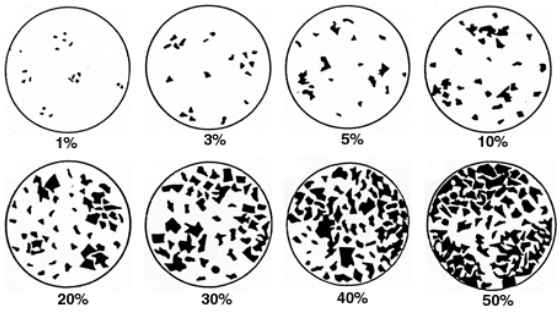
Wilson, L. M. 2006. *Key to Identification of Invasive and Native Hawkweeds (Hiearcium spp.) in the Pacific Northwest*. B.C. Min. For. Range, For. Prac. Br., Kamloops, B.C.

Appendix A - Vegetation Survey Codes and Instructions

Site = name of locality of map project **Name/Date** = your name / day-month-year completed polygon survey
Polygon # = number you put on map
Survey intensity
1 = walked or could see most of polygon (high confidence in survey data)
2 = walked or could see part of polygon interior (moderate confidence)
3 = walked perimeter or could see part of polygon interior (low confidence)
4 = photo interpretation or other remote survey

TOTAL VEGETATION COVER includes all vascular plants, mosses, lichens and foliose lichens (crustose lichens excluded they are considered rock); this never exceeds 100%. Space between leaves/branches is included in "cover".

Code	**Cover (%)**	Cover mid-pt
0	0	0
1	<1	0.5
2	1-5	3
3	5-25	15
4	25-60	43
5	60-90	75
6	>90	95



TREES, SHRUBS, GRAMINOIDS, FORBS, EXOTICS cover includes the space between leaves/branches. Each Life form category canopy cover must be 0-100%. Therefore, the sum of all life forms (layers) can exceed 100%. List most abundant species in each life form category; when trees are cored, note DBH, species, length of core, number of rings counted.

EXOTICS = primary species observed; secondary species observed (please pay special attention to noxious weeds). Also, note the relative abundance of exotics in each polygon, using the 1-6 cover codes noted above.

SOIL SURFACE estimate to nearest **%** the following, the sum of the categories adds to 100%. Describe in comments if there is wide variation in any category; note % standing water if it is persistent or characteristic of site.
Water = exposed standing or flowing water
Rock Outcrop = exposed bedrock including detached boulders over 1m across
Talus = exposed large, loose rocks
Gravel/Cobble = large fragments between sand and boulder
Bare Ground = exposed mineral soil
Mosses/Lichens = nonvascular plant cover on soil
Litter = includes logs, branches, and basal area of plants
Caves = area covered by caves
Mines = area covered by mines

LAND USE - put 0 (zero) if not applicable to site.
Logging
1 = unlogged, no evidence of past logging or occasional cut stumps not part of systematic harvest of trees, no or very little impact on stand composition
2 = selectively logged: frequent cut stumps but origin of dominant or co-dominant cohort appears to be natural disturbance
3 = heavy logging disturbance with natural regeneration: many cut stumps that predate the dominant or co-dominant cohort with no tree planting
4 = tree plantation: dominant cohort appears to be planted after clearcutting
Stand Age
1 = very young 0-40 yr
2 = young 40-90 yr
3 = mature 90-200 yr
4 = old-growth 200+ yr
5 = young with scattered old trees (2-10 old trees per acre)
6 = mature with scattered old trees
Fire
Note presence of fire (i.e. charcoal, fire scars, etc.) and, if present , estimate time of fire.
Agriculture
1 = active annual cropping
2 = active perennial herbaceous cropping
3 = active woody plant cultivation
4 = fallow, plowed no crops this yr
5 = Federal CRP
6 = other
Livestock
1 = active heavy grazing (most forage used, soil compaction or churning)
2 = active moderate grazing (25-75% forage used)
3 = active light grazing (lots of last yr's litter left)
4 = no current, heavy past grazing
5 = no current, light past grazing
6 = no obvious sign of grazing

Development

1 = actively used facilities
2 = roads
3 = established trails
4 = abandoned facilities
5 = none obvious
6 = multiple types (detail in comments)

Wildlife

1 = heavy ungulate use
2 = moderate ungulate use
3 = light to no ungulate use
4 = burrowing animals
5 = active beaver
6 = active porcupine
7 = other, list animal

Recreation Use Severity

1 = heavy use, abundant soil and vegetation displacement off trail/road
2 = moderate use, frequent soil and vegetation displacement off trail/road
3 = light use, little sign of activity off trail/road

Recreation Use Primary Type

1 = wheeled
2 = hoofed
3 = pedestrian
4 = combination of above
5 = other

Hydrology

1 = unaltered 2 = altered; dams, dikes, ditches, culverts, etc 3 = not assessed

Descriptions of Plant Communities

PLANT ASSOCIATION (PA) = list all PAs encountered in polygon survey, in comments list source of name if not on provided key. NOTE: Contractor is required to consult with the WNHP to obtain the most current classification and condition ranking information available.

Existing Vegetation Community – Write down the major tree/shrub/grass-forb-fern community type. Pay attention to indicator species. Alien species may be included in community description.

Condition Rank of PA in key or estimate. (The condition of each plant vegetation community polygon shall be rated using the codes listed in Appendix B.)

% of Polygon = your estimate of % of polygon covered by this plant community

Pattern = how PA is distributed in stand

1 = matrix (most of polygon)	3 = small patches	5 = scattered, more or less evenly repeating	7 = other
2 = large patches	4 = clumped, clustered, contiguous	6 = linear	

Appendix B – Ecological Condition Ranking System

Ecological Condition Ranks

When assessing conservation priorities and management decisions, it can be useful to rank natural communities into levels of ecological condition. For example, an unfragmented area with high native species diversity, absence of non-native species and little soil erosion often has greater conservation value than another area in the same habitat type that is fragmented, infested with weeds or has erosion problems. Likewise, areas with a lower ecological condition rank may be targets for restoration activities.

The flowing ecological condition ranks were applied to vegetation polygons that were surveyed in this project:

- **Excellent Ecological Condition**

Areas in this class have very few non-native plants. The composition and structure of native vegetation in this condition class correspond to the natural range of variation characteristic to this habitat type. Old-growth conditions often exist. Species diversity of native plants and animals is often high relative to the natural community under consideration. Wildlife habitat conditions are optimal for species of conservation concern. Soil compaction, accelerated erosion and hydrologic alteration are absent. Direct signs of human-induced ecological stress are absent. Many rare plant and animal species may only exist within this condition class.

- **Good Ecological Condition**

Areas in this class have few non-native plants. The composition and structure of native vegetation in this condition class correspond to the natural range of variation characteristic to this habitat type. Old-growth conditions may exist, but have been subject to some human-induced stress. Species diversity of native plants and animals is moderately high relative to the natural community under consideration. Wildlife habitat conditions are adequate for species of conservation concern. Soil compaction, accelerated erosion and hydrologic alteration do not significantly influence the area. Direct signs of human-induced ecological stress are infrequent. Some rare plant and animal species may exist within this condition class.

- **Fair Ecological Condition**

Areas in this class often have both native and non-native plants. The composition and structure of native vegetation in this condition class is altered from the natural range of variation characteristic to this habitat type. Old-growth conditions are absent. Species diversity of native plants and animals is lower than the two higher condition classes. Wildlife habitat conditions may be adequate for some species of conservation concern, but not adequate for many. Soil compaction, accelerated erosion and hydrologic alteration may influence the area. Direct signs of human-induced ecological stress are frequent. Most rare plant and animal species are only infrequently encountered within this condition class.

- **Poor Ecological Condition**

Areas in this class are often dominated by non-native plants. The composition and structure of native vegetation in this condition class is often dramatically altered from the natural range of variation characteristic to this habitat type. Old-growth conditions are absent. Species diversity of native plants and animals is often low. Wildlife habitat conditions are not adequate for most species of conservation concern. Soil compaction, accelerated erosion and hydrologic alteration often influence the area. Direct signs of human-induced ecological stress are frequent. Rare plant and animal species are seldom encountered within this condition class.

- **Developed**

Developed portions of the park property: campgrounds, offices, facilities, infrastructure, etc.

- **Ownership Issue**

Areas within the GIS boundary of the park that appear to be owned or controlled by another entity other than the Washington State Parks Commission.

Appendix C – Definitions of Vegetation Community Conservation Status

The following table defines the ranking system for plants and plant communities used by the Washington State Natural Heritage Program.

Code	Definition
G1	Critically imperiled throughout its range; extremely rare with five or fewer occurrences or very few remaining acres.
G2	Imperiled throughout its range; rare with six to 20 occurrences or few remaining acres.
G3	Either very rare and local throughout its range or found locally in a restricted range; uncommon with 21 to 100 occurrences.
G4	Apparently secure throughout its range, though it may be quite rare in some parts of its range, especially at the periphery; many occurrences.
G5	Demonstrably secure in its range, though it may be quite rare in some parts of its range, especially at the periphery; ineradicable under present conditions.
S1	Critically imperiled in Oregon; extremely rare with five or fewer occurrences or very few remaining acres.
S2	Imperiled in Oregon; rare with six to 20 occurrences or few remaining acres.
S3	Either very rare and local in Oregon or found locally in a restricted range; uncommon with 21 to 100 occurrences.
S4	Apparently secure in Oregon, though it may be quite rare in some parts; many occurrences.
S5	Demonstrably secure in Oregon, though it may be quite rare in some parts; ineradicable under present conditions.
U	Unknown
NA	Natural Heritage Rank not available
NR	Not Ranked

Appendix D – Vegetation Survey Data

Polygon Number 1

ParkName:
Alta Lake

Survey Intensity	2
Observer	PM
Date	6/24/2008
Total Vegetation	6
Trees Total	0
Dominant Trees	
emergent	0
maincanopy	0
subcanopy	0
Shrubs Total	1
Dominant Shrubs	CRDO2, Salix, ELAN
> 1.5' tall	1
< 1.5' tall	0
Graminoids Total	5
Dominant Graminoids	Carex1, PHAR3, JUARL, POPR, BRTE, Carex2, BRAR5
Graminoids Perennial	5
Graminoids Annual	3
Forbs Total	3
Dominant Forbs	CIAR4, SILO3, ASOF
Forbs Perennial	3
Forbs Annual	0
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	4
Exotics Perennial	3
Exotics Annual	3
Water	0
Rock Outcrop	0
Gravel	0
Logging	0
Fire:	0
Stand Age	1
Agriculture	0
Livestock	0
Development	0
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
CIAR4, VETH
Other Exotic Plants
BRTE, SIAL2

Water:	0
Rock:	0
Talus:	0
Gravel:	0
Bare Ground:	4
Moss Lichen:	0
Litter:	96

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	Carex1-JUARL	50	Matrix	FAIR
Veg Community1:	JUARL			
Existing Veg2:	CIAR4-SIAL2	50	Large patch	POOR
Veg Community3:	disturbed wetland			
Existing Veg3:		0		
Veg Community3:				

Notes:

Polygon Number 10A

ParkName:
Alta Lake

Survey Intensity	1
Observer	PM, GW, AM
Date	6/23/2008
Total Vegetation	5
Trees Total	2
Dominant Trees	PIPO, PSME
emergent	0
maincanopy	2
subcanopy	2
Shrubs Total	5
Dominant Shrubs	PUTR2, AMAL2, PHLE4, HODI, CLLI2, ERHE2
> 1.5' tall	5
< 1.5' tall	2
Graminoids Total	2
Dominant Graminoids	PSSP6, POBU, BRTE
Graminoids Perennial	2
Graminoids Annual	2
Forbs Total	2
Dominant Forbs	BASA3, ACMI2, EREL5, CRYPT, CEDI3
Forbs Perennial	2
Forbs Annual	1
Ferns Total	1
Ferns Evergreen	0
Ferns Deciduous	1
ExoticsTotal	2
Exotics Perennial	1
Exotics Annual	2
Water	0
Rock Outcrop	1
Gravel	1
Logging	0
Fire:	0
Stand Age	2
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
LIDAD, CEDI3
Other Exotic Plants
VETH, POBU, BRTE

Water:	0
Rock:	1
Talus:	3
Gravel:	1
Bare Ground:	4
Moss Lichen:	1
Litter:	90

Vegetation Types

		Percent	Pattern	Rank	
Existing Veg1:	PIPO-PSME/PUTR2-AMAL2-PHLE4/BASA3-	BRTE-PSSP6	100	Matrix	GOOD
Veg Community1:	PIPO/PUTR2/PSSP6				
Existing Veg2:		0			
Veg Community3:					
Existing Veg3:		0			
Veg Community3:					

Notes: Development-thru power line, roads at edges, camp at edge; abnormally dense, high shrubs; needs fire

Polygon Number 10B

ParkName:
Alta Lake

Survey Intensity	1
Observer	PM, GW, AM
Date	6/23/2008
Total Vegetation	5
Trees Total	3
Dominant Trees	PIPO, PSME
emergent	0
maincanopy	3
subcanopy	2
Shrubs Total	4
Dominant Shrubs	PUTR2, AMAL2, PHLE4, RICE, RONU, CEVE, ARTR2
> 1.5' tall	4
< 1.5' tall	2
Graminoids Total	2
Dominant Graminoids	ACOC3, BRRA2, PSSP6, POBU, FEID, BRTE
Graminoids Perennial	2
Graminoids Annual	2
Forbs Total	3
Dominant Forbs	ACMI2, BASA3, LUSE4, CRYPT, LIDAD, VETH
Forbs Perennial	3
Forbs Annual	2
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	2
Exotics Perennial	2
Exotics Annual	2
Water	0
Rock Outcrop	2
Gravel	1
Logging	0
Fire:	0
Stand Age	2
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	6
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
LIDAD, CEDI3
Other Exotic Plants
VETH, BRTE

Water:	0
Rock:	2
Talus:	2
Gravel:	1
Bare Ground:	2
Moss Lichen:	1
Litter:	92

Vegetation Types

		Percent	Pattern	Rank	
Existing Veg1:	PIPO-PSME/PUTR2-RICE-PHLE4/BRTE-	ACMI2-PSSP6	100	Matrix	GOOD
Veg Community1:	PIPO/PUTR2/PSSP6				
Existing Veg2:		0			
Veg Community3:					
Existing Veg3:		0			
Veg Community3:					

Notes: Development-Power line and trail

Polygon Number 11

ParkName:
Alta Lake

Survey Intensity	3
Observer	GW, AM, PM
Date	6/23/2008
Total Vegetation	5
Trees Total	3
Dominant Trees	PIPO, POTR5
emergent	0
maincanopy	3
subcanopy	1
Shrubs Total	4
Dominant Shrubs	PUTR2, AMAL2, PHLE4, CLLI2, RICE, HODI, ERNA10
> 1.5' tall	4
< 1.5' tall	2
Graminoids Total	2
Dominant Graminoids	PSSP6, ELGL, BRTE
Graminoids Perennial	1
Graminoids Annual	2
Forbs Total	2
Dominant Forbs	ARMI4, LIDAD, BASA3, ACMI2, PEPR3
Forbs Perennial	2
Forbs Annual	1
Ferns Total	1
Ferns Evergreen	0
Ferns Deciduous	1
ExoticsTotal	2
Exotics Perennial	1
Exotics Annual	2
Water	0
Rock Outcrop	4
Gravel	2
Logging	1
Fire:	20 years ago
Stand Age	2
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
LIDAD, CEDI3
Other Exotic Plants
VETH, TRDU, BRTE

Water:	0
Rock:	4
Talus:	5
Gravel:	2
Bare Ground:	1
Moss Lichen:	1
Litter:	87

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	PIPO/PUTR2-AMAL2-PHLE4/BRTE	100	Matrix	GOOD
Veg Community1:	PIPO/PUTR2/PSSP6			
Existing Veg2:		0		
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes: Dry stream through polygon; a couple cut stumps along trail; counted stumps at 70 years

Polygon Number 12

ParkName:
Alta Lake

Survey Intensity	1
Observer	GW, AM
Date	6/24/2008
Total Vegetation	5
Trees Total	3
Dominant Trees	PIPO, PSME
emergent	0
maincanopy	3
subcanopy	2
Shrubs Total	4
Dominant Shrubs	PUTR2, SANIC5, RICE, AMAL2, RHGL, PRVI, PHLE4, ROWO
> 1.5' tall	4
< 1.5' tall	0
Graminoids Total	4
Dominant Graminoids	CARO5, PSSP6, POBU, ACOC3, BRCA5, THIN6, BRTE
Graminoids Perennial	4
Graminoids Annual	1
Forbs Total	3
Dominant Forbs	BASA3, ACMI2, SIAL2, CEDI3, VETH, EREL5
Forbs Perennial	3
Forbs Annual	0
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	3
Exotics Perennial	3
Exotics Annual	1
Water	0
Rock Outcrop	1
Gravel	15
Logging	0
Fire:	0
Stand Age	2
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	1
Recreation Type	5
Hydrology	1

Exotic Species

Noxious Exotic Plants
CEDI3
Other Exotic Plants
VETH, SIAL2, BRTE

Water:	0
Rock:	1
Talus:	2
Gravel:	15
Bare Ground:	10
Moss Lichen:	0
Litter:	72

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	developed	80	Matrix	DEVELO
Veg Community1:	developed			
Existing Veg2:	PIPO/PUTR2-AMAL2/POBU	20	Small patch	FAIR
Veg Community3:	PIPO/PUTR2/PSSP6			
Existing Veg3:		0		
Veg Community3:				

Notes:

Polygon Number 13

ParkName:
Alta Lake

Survey Intensity	1
Observer	GW, AM
Date	6/24/2008
Total Vegetation	5
Trees Total	3
Dominant Trees	PIPO, POBAT
emergent	0
maincanopy	3
subcanopy	1
Shrubs Total	3
Dominant Shrubs	RHGL, PUTR2, AMAL2, ELAN
> 1.5' tall	3
< 1.5' tall	1
Graminoids Total	4
Dominant Graminoids	POPR, POBU, PSSP6, BRTE
Graminoids Perennial	4
Graminoids Annual	1
Forbs Total	2
Dominant Forbs	ACMI2, CEDI3, BASA3, PLMA2, TRRE3
Forbs Perennial	2
Forbs Annual	0
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	4
Exotics Perennial	4
Exotics Annual	1
Water	0
Rock Outcrop	1
Gravel	5
Logging	0
Fire:	0
Stand Age	2
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	1
Recreation Type	4
Hydrology	1

Exotic Species

Noxious Exotic Plants
CEDI3
Other Exotic Plants
POBU, POPR, BRTE

Water:	0
Rock:	1
Talus:	4
Gravel:	5
Bare Ground:	10
Moss Lichen:	0
Litter:	80

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	PIPO/POPR	75	Matrix	DEVELO
Veg Community1:	developed			
Existing Veg2:	PIPO/PUTR2/POBU	25	Large patch	POOR
Veg Community3:	PIPO/PUTR2/PSSP6			
Existing Veg3:		0		
Veg Community3:				

Notes: Camping area-roads and buildings; Western Gray Squirrel spotted in this area

Polygon Number 14

ParkName:
Alta Lake

Survey Intensity	1
Observer	GW, AM
Date	6/24/2008
Total Vegetation	3
Trees Total	0
Dominant Trees	
emergent	0
maincanopy	0
subcanopy	0
Shrubs Total	0
Dominant Shrubs	
> 1.5' tall	0
< 1.5' tall	0
Graminoids Total	3
Dominant Graminoids	
Graminoids Perennial	3
Graminoids Annual	0
Forbs Total	0
Dominant Forbs	
Forbs Perennial	0
Forbs Annual	0
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	0
Exotics Perennial	0
Exotics Annual	0
Water	100
Rock Outcrop	0
Gravel	0
Logging	0
Fire:	0
Stand Age	0
Agriculture	0
Livestock	0
Development	6 (beach)
Wildlife	0
Recreation Severity	1 (boats and
Recreation Type	5
Hydrology	2

Exotic Species

Noxious Exotic Plants

Other Exotic Plants

Water:	100
Rock:	0
Talus:	0
Gravel:	0
Bare Ground:	0
Moss Lichen:	0
Litter:	0

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	water	99	Matrix	GOOD
Veg Community1:	water			
Existing Veg2:	SCAC3	1	linear	FAIR
Veg Community3:	SCAC3			
Existing Veg3:		0		
Veg Community3:				

Notes: beach-boating and swimming

Polygon Number 15

ParkName:
Alta Lake

Survey Intensity	1
Observer	GW, AM, DH
Date	7/3/2008
Total Vegetation	5
Trees Total	4
Dominant Trees	PIPO, PSME
emergent	0
maincanopy	3
subcanopy	3
Shrubs Total	3
Dominant Shrubs	PUTR2, AMAL2, PHLE4, HODI, RICE, CEVE, PAMY, ERHE2,
> 1.5' tall	3
< 1.5' tall	2
Graminoids Total	4
Dominant Graminoids	CARU, PSSP6, FEID, KOMA, BRTE, POA
Graminoids Perennial	4
Graminoids Annual	1
Forbs Total	3
Dominant Forbs	CRAT, CALY, TRGR7, ERCO5, ANMI3, SEWA, HISC2, SPBE2,
Forbs Perennial	3
Forbs Annual	1
Ferns Total	1
Ferns Evergreen	0
Ferns Deciduous	1
ExoticsTotal	1
Exotics Perennial	0
Exotics Annual	1
Water	0
Rock Outcrop	2
Gravel	0
Logging	0
Fire:	fire scars
Stand Age	2
Agriculture	0
Livestock	0
Development	3
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants

Other Exotic Plants
BRTE

Water:	0
Rock:	2
Talus:	1
Gravel:	0
Bare Ground:	2
Moss Lichen:	8
Litter:	87

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	PSME-PIPO/PUTR2/CARU	60	Matrix	EXCELLE
Veg Community1:	PSME/PUTR2/CARU			
Existing Veg2:	PSME-PIPO/PUTR2-AMAL2/PSSP6-ANMI3	40	Large patch	EXCELLE
Veg Community3:	PSME/PUTR2/PSSP6			
Existing Veg3:		0		
Veg Community3:				

Notes:

Polygon Number 16

ParkName:
Alta Lake

Survey Intensity	1
Observer	GW, DH, AM
Date	7/3/2008
Total Vegetation	4
Trees Total	2
Dominant Trees	PSME, PIPO
emergent	0
maincanopy	2
subcanopy	1
Shrubs Total	3
Dominant Shrubs	RHGL, ACGLD4, PHLE4, AMAL2, ERHE2, CLLI2, RICE, HODI
> 1.5' tall	3
< 1.5' tall	2
Graminoids Total	3
Dominant Graminoids	PSSP6, POBU, BRTE
Graminoids Perennial	3
Graminoids Annual	2
Forbs Total	3
Dominant Forbs	ARDR4, LIPU11, CAMA5, PHHE2
Forbs Perennial	3
Forbs Annual	1
Ferns Total	1
Ferns Evergreen	0
Ferns Deciduous	1
ExoticsTotal	2
Exotics Perennial	2
Exotics Annual	1
Water	0
Rock Outcrop	20
Gravel	5
Logging	0
Fire:	25 YEARS AGO
Stand Age	2
Agriculture	0
Livestock	0
Development	3
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants

Other Exotic Plants
BRTE, POBU, TRDU

Water:	0
Rock:	20
Talus:	30
Gravel:	5
Bare Ground:	5
Moss Lichen:	1
Litter:	38

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	PHLE4-RHGL-HODI/PSSP6	100	Matrix	GOOD
Veg Community1:	PSME/HODI			
Existing Veg2:		0		
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes:

Polygon Number 17

ParkName:
Alta Lake

Survey Intensity	1
Observer	GW, DH, AM
Date	7/3/2008
Total Vegetation	4
Trees Total	3
Dominant Trees	PIPO, PSME, ACMA3
emergent	0
maincanopy	3
subcanopy	3
Shrubs Total	3
Dominant Shrubs	PUTR2, AMAL2, PHLE4, RHGL, ROWO, ERHE2, ACGLD4, RICE,
> 1.5' tall	3
< 1.5' tall	2
Graminoids Total	4
Dominant Graminoids	PSSP6, SECE, BRTE, POSE, POBU, CARO5
Graminoids Perennial	4
Graminoids Annual	3
Forbs Total	3
Dominant Forbs	BASA3, STMI13, ACMI2, MEAL6, POARC, LIDAD, HECY2, CAMA5,
Forbs Perennial	3
Forbs Annual	0
Ferns Total	1
Ferns Evergreen	0
Ferns Deciduous	1
ExoticsTotal	3
Exotics Perennial	1
Exotics Annual	3
Water	0
Rock Outcrop	25
Gravel	5
Logging	1
Fire:	near by, long ago
Stand Age	2
Agriculture	0
Livestock	0
Development	3
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
LIDAD
Other Exotic Plants
BRTE, POBU, VETH

Water:	0
Rock:	25
Talus:	10
Gravel:	5
Bare Ground:	5
Moss Lichen:	1
Litter:	53

Vegetation Types

		Percent	Pattern	Rank	
Existing Veg1:	PSME-PIPO/PUTR2-AMAL2-ACGLD4/PSSP6-HECY2-WOSC		70	Matrix	EXCELLE
Veg Community1:	PSME/PUTR2/PSSP6				
Existing Veg2:	PIPO-PSME/PUTR2-PHLE4-RHGL/PSSP6	30	Large patch	GOOD	
Veg Community3:	PSME/PUTR2/PSSP6				
Existing Veg3:		0			
Veg Community3:					

Notes: GOOD SHAPE, PINK ON ROCKS FIRE RETARDANT

Polygon Number 18A

ParkName:
Alta Lake

Survey Intensity	1
Observer	PM, GW, AM
Date	6/23/2008
Total Vegetation	5
Trees Total	1
Dominant Trees	PIPO
emergent	0
maincanopy	1
subcanopy	0
Shrubs Total	3
Dominant Shrubs	PUTR2, RICE, SANIC5, ERHE2, ARTR4
> 1.5' tall	3
< 1.5' tall	3
Graminoids Total	4
Dominant Graminoids	PSSP6, HECO26, POBU, BRRA2, BRTE
Graminoids Perennial	4
Graminoids Annual	3
Forbs Total	3
Dominant Forbs	BASA3, LUSE4, ACMI2, ERFI2, ERPU2, CRAT, EREL5, PHLI
Forbs Perennial	3
Forbs Annual	2
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	3
Exotics Perennial	2
Exotics Annual	2
Water	0
Rock Outcrop	1
Gravel	1
Logging	0
Fire:	approximately 15
Stand Age	2
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
LIDAD
Other Exotic Plants
TRDU, LASE, BRTE

Water:	0
Rock:	1
Talus:	1
Gravel:	1
Bare Ground:	0
Moss Lichen:	0
Litter:	97

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	ERHE2-PUTR2-ARTR4/PSSP6-BASA3-LUSE4	97	Matrix	GOOD
Veg Community1:	PUTR2/PSSP6			
Existing Veg2:	ERHE2-PUTR2-ARTR4/PSSP6-BASA3-LUSE4	3	Large patch	EXCELLE
Veg Community3:	PIPO/PUTR2/PSSP6			
Existing Veg3:		0		
Veg Community3:				

Notes: Development-power line and trail

Polygon Number 18B

ParkName:
Alta Lake

Survey Intensity	1
Observer	GW, AM
Date	6/24/2008
Total Vegetation	5
Trees Total	3
Dominant Trees	PIPO
emergent	0
maincanopy	2
subcanopy	2
Shrubs Total	4
Dominant Shrubs	PUTR2, AMAL2, ARTR4, RICE, ERHE2
> 1.5' tall	4
< 1.5' tall	2
Graminoids Total	5
Dominant Graminoids	PSSP6, HECO26, ACOC3, POBU, LECI4, BRTE
Graminoids Perennial	5
Graminoids Annual	2
Forbs Total	3
Dominant Forbs	BASA3, LUSE4, EREL5, ACMI2, PHLI, EQUIS
Forbs Perennial	3
Forbs Annual	2
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	2
Exotics Perennial	1
Exotics Annual	2
Water	0
Rock Outcrop	1
Gravel	0
Logging	0
Fire:	0
Stand Age	2
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	3
Recreation Type	4
Hydrology	1

Exotic Species

Noxious Exotic Plants
CEDI3
Other Exotic Plants
POBU, LASE, VETH, SAKA, BRTE,

Water:	0
Rock:	1
Talus:	0
Gravel:	0
Bare Ground:	5
Moss Lichen:	0
Litter:	94

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	PIPO/PUTR2/HECO26-PSSP6	90	Matrix	GOOD
Veg Community1:	PIPO/PUTR2/PSSP6			
Existing Veg2:	SAKA-LASE-CHAL7	10	Small patch	POOR
Veg Community3:	disturbed shrub-steppe			
Existing Veg3:		0		
Veg Community3:				

Notes: More trees than 18A; slopes above and below; Equisetum is on slope below drainfield.

Polygon Number 19

ParkName:
Alta Lake

Survey Intensity	1
Observer	GW, AM
Date	6/24/2008
Total Vegetation	6
Trees Total	4
Dominant Trees	PIPO, PSME
emergent	0
maincanopy	4
subcanopy	2
Shrubs Total	4
Dominant Shrubs	PUTR2, PRVI, AMAL2, PHLE4, ROWO, SYAL, RICE
> 1.5' tall	4
< 1.5' tall	1
Graminoids Total	4
Dominant Graminoids	PSSP6, ACOC3, KOMA, POBU, FEBR7
Graminoids Perennial	4
Graminoids Annual	0
Forbs Total	3
Dominant Forbs	LUSE4, BASA3, ACMI2, LIRU4
Forbs Perennial	3
Forbs Annual	1
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	3
Exotics Perennial	3
Exotics Annual	0
Water	0
Rock Outcrop	2
Gravel	7
Logging	0
Fire:	0
Stand Age	3
Agriculture	0
Livestock	0
Development	1
Wildlife	3
Recreation Severity	2
Recreation Type	4
Hydrology	1

Exotic Species

Noxious Exotic Plants
CEDI3
Other Exotic Plants
POBU, TRDU

Water:	0
Rock:	2
Talus:	1
Gravel:	7
Bare Ground:	8
Moss Lichen:	0
Litter:	82

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	developed	80	Matrix	DEVELO
Veg Community1:	developed			
Existing Veg2:	PIPO/ROWO-PUTR2/ACOC3	20	Large patch	FAIR
Veg Community3:	PIPO/PUTR2/PSSP6			
Existing Veg3:		0		
Veg Community3:				

Notes:

Polygon Number 2

ParkName:
Alta Lake

Survey Intensity	2
Observer	PM
Date	6/24/2008
Total Vegetation	6
Trees Total	0
Dominant Trees	
emergent	0
maincanopy	0
subcanopy	0
Shrubs Total	5
Dominant Shrubs	CRDO2, ROWO
> 1.5' tall	5
< 1.5' tall	1
Graminoids Total	3
Dominant Graminoids	POPR, JUARL, BRTE
Graminoids Perennial	3
Graminoids Annual	2
Forbs Total	3
Dominant Forbs	VETH, SIAL2, ASOF
Forbs Perennial	3
Forbs Annual	0
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	2
Exotics Perennial	2
Exotics Annual	2
Water	0
Rock Outcrop	0
Gravel	0
Logging	0
Fire:	0
Stand Age	1
Agriculture	0
Livestock	0
Development	0
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
VETH, CIAR4
Other Exotic Plants
SIAL2, BRTE

Water:	0
Rock:	0
Talus:	0
Gravel:	0
Bare Ground:	2
Moss Lichen:	0
Litter:	98

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	CRDO2-ROWO	100	Matrix	GOOD
Veg Community1:	CRDO2-ROWO			
Existing Veg2:		0		
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes:

Polygon Number 20

ParkName:
Alta Lake

Survey Intensity	1
Observer	HS, JR, DH
Date	6/23/2008
Total Vegetation	0
Trees Total	0
Dominant Trees	
emergent	0
maincanopy	0
subcanopy	0
Shrubs Total	0
Dominant Shrubs	
> 1.5' tall	0
< 1.5' tall	0
Graminoids Total	0
Dominant Graminoids	
Graminoids Perennial	0
Graminoids Annual	0
Forbs Total	0
Dominant Forbs	
Forbs Perennial	0
Forbs Annual	0
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	0
Exotics Perennial	0
Exotics Annual	0
Water	100
Rock Outcrop	0
Gravel	0
Logging	
Fire:	
Stand Age	
Agriculture	
Livestock	
Development	
Wildlife	
Recreation Severity	
Recreation Type	
Hydrology	

Exotic Species

Noxious Exotic Plants

Other Exotic Plants

Water:	100
Rock:	0
Talus:	0
Gravel:	0
Bare Ground:	0
Moss Lichen:	0
Litter:	0

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	water	100	Matrix	FAIR
Veg Community1:	water			
Existing Veg2:		0		
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes:

Polygon Number 21A

ParkName:
Alta Lake

Survey Intensity	1
Observer	HS, JR, DH
Date	6/23/2008
Total Vegetation	5
Trees Total	3
Dominant Trees	POBAT, POTR5
emergent	0
maincanopy	2
subcanopy	2
Shrubs Total	4
Dominant Shrubs	CRDO2, Salix1, ELAN, ROWO, AMAL2, ARDR4, RICE, Salix2,
> 1.5' tall	4
< 1.5' tall	1
Graminoids Total	3
Dominant Graminoids	BRTE, JUARL
Graminoids Perennial	2
Graminoids Annual	3
Forbs Total	3
Dominant Forbs	CIAR4, LIDAD, ASSP, ACMI2, SIAL2, ASTRA
Forbs Perennial	3
Forbs Annual	1
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	4
Exotics Perennial	4
Exotics Annual	3
Water	0
Rock Outcrop	0
Gravel	0
Logging	0
Fire:	0
Stand Age	1
Agriculture	0
Livestock	0
Development	2
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
LIDAD, CEDI3
Other Exotic Plants
ELAN, VETH, BRTE

Water:	0
Rock:	0
Talus:	0
Gravel:	0
Bare Ground:	1
Moss Lichen:	0
Litter:	99

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	POBAT-POTR5/CRDO2-Salix-ELAN	100	Matrix	POOR
Veg Community1:	POBAT/JUARL			
Existing Veg2:		0		
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes: Major weed infestation; development with structures, lawns, and active road

Polygon Number 21B

ParkName:
Alta Lake

Survey Intensity	1
Observer	HS, JR, DH
Date	6/23/2008
Total Vegetation	5
Trees Total	1
Dominant Trees	POBAT
emergent	0
maincanopy	0
subcanopy	1
Shrubs Total	3
Dominant Shrubs	ELAN, CRDO2, ARDR4
> 1.5' tall	3
< 1.5' tall	1
Graminoids Total	5
Dominant Graminoids	SCAC3, JUARL
Graminoids Perennial	5
Graminoids Annual	0
Forbs Total	4
Dominant Forbs	CIAR4, VETH, SOCA6, NECA2, LASE, CHAN9, GNAPH, ERPH
Forbs Perennial	4
Forbs Annual	1
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	4
Exotics Perennial	4
Exotics Annual	1
Water	5
Rock Outcrop	0
Gravel	2
Logging	0
Fire:	0
Stand Age	0
Agriculture	0
Livestock	0
Development	0
Wildlife	3, 7 (birds)
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
CIAR4
Other Exotic Plants
ELAN, VETH

Water:	5
Rock:	0
Talus:	0
Gravel:	2
Bare Ground:	0
Moss Lichen:	0
Litter:	93

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	SCAC3-JUARL-SOCA6	100	Matrix	POOR
Veg Community1:	SCAC3			
Existing Veg2:		0		
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes: major weed infestation

Polygon Number 22

ParkName:
Alta Lake

Survey Intensity	2
Observer	HS, JR, DH
Date	6/23/2008
Total Vegetation	5
Trees Total	1
Dominant Trees	PIPO
emergent	0
maincanopy	1
subcanopy	0
Shrubs Total	3
Dominant Shrubs	PUTR2, ARTR2, ERHE2, PHLE4, ERNI2
> 1.5' tall	3
< 1.5' tall	2
Graminoids Total	3
Dominant Graminoids	PSSP6, HECO26, BRTE, POSE, BROMU
Graminoids Perennial	3
Graminoids Annual	3
Forbs Total	3
Dominant Forbs	BASA3, LIDAD, ACMI2, ERLI, LODI, LUSE4, EREL5, ANAPH,
Forbs Perennial	3
Forbs Annual	2
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	3
Exotics Perennial	3
Exotics Annual	3
Water	0
Rock Outcrop	1
Gravel	3
Logging	0
Fire:	0
Stand Age	1
Agriculture	0
Livestock	0
Development	2
Wildlife	3, 6
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
LIDAD
Other Exotic Plants
BRTE

Water:	0
Rock:	1
Talus:	0
Gravel:	3
Bare Ground:	15
Moss Lichen:	0
Litter:	81

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	PUTR2-ARTR2-ERHE2/HECO26-PSSP6-EREL5	100	Matrix	FAIR
Veg Community1:	PUTR2/PSSP6			
Existing Veg2:		0		
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes: Disturbed along the road; huge difference between grazed land on the other side of the fence; large infestation of LIDA & BRTE

Polygon Number 23

ParkName:
Alta Lake

Survey Intensity	1
Observer	GW, DH, AM
Date	7/3/2008
Total Vegetation	5
Trees Total	4
Dominant Trees	PIPO, PSME
emergent	2
maincanopy	4
subcanopy	2
Shrubs Total	4
Dominant Shrubs	AMAL2, PUTR2, CEVE, ERHE2, PRVI, RICE
> 1.5' tall	3
< 1.5' tall	3
Graminoids Total	4
Dominant Graminoids	PSSP6, POSE, BRTE
Graminoids Perennial	4
Graminoids Annual	1
Forbs Total	3
Dominant Forbs	LIRU4, CALY, CAMA5, HECY2, SEWA, TRGR7, COLLO
Forbs Perennial	3
Forbs Annual	1
Ferns Total	1
Ferns Evergreen	0
Ferns Deciduous	1
ExoticsTotal	2
Exotics Perennial	0
Exotics Annual	2
Water	0
Rock Outcrop	5
Gravel	2
Logging	0
Fire:	MORE THEN 80
Stand Age	3
Agriculture	0
Livestock	0
Development	0
Wildlife	3
Recreation Severity	3
Recreation Type	0
Hydrology	1

Exotic Species

Noxious Exotic Plants

Other Exotic Plants
BRTE

Water:	0
Rock:	5
Talus:	10
Gravel:	2
Bare Ground:	3
Moss Lichen:	2
Litter:	78

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	PIPO-PSME/AMAL2-PUTR2-PRVI/PSSP6	100	Matrix	EXCELLE
Veg Community1:	PSME/PUTR2/PSSP6			
Existing Veg2:		0		
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes:

Polygon Number 24

ParkName:
Alta Lake

Survey Intensity	3
Observer	GW, AM, DH
Date	6/26/2008
Total Vegetation	6
Trees Total	1
Dominant Trees	PIPO
emergent	0
maincanopy	1
subcanopy	1
Shrubs Total	3
Dominant Shrubs	AMAL2, ERNA10, SYAL, PUTR2, ARTR4, ERNI2
> 1.5' tall	2
< 1.5' tall	3
Graminoids Total	3
Dominant Graminoids	PSSP6, HECO26, FEID
Graminoids Perennial	3
Graminoids Annual	1
Forbs Total	3
Dominant Forbs	BASA3
Forbs Perennial	3
Forbs Annual	1
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	1
Exotics Perennial	0
Exotics Annual	1
Water	0
Rock Outcrop	1
Gravel	1
Logging	0
Fire:	0
Stand Age	0
Agriculture	0
Livestock	0
Development	0
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants

Other Exotic Plants
BRTE

Water:	0
Rock:	1
Talus:	0
Gravel:	1
Bare Ground:	5
Moss Lichen:	0
Litter:	93

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	PUTR2/PSSP6	100	Matrix	GOOD
Veg Community1:	PUTR2/PSSP6			
Existing Veg2:		0		
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes: Typical PUTR2/BASA3/PSSP6 shrub-steppe. This was a reconnaisance survey in the evening, but the polygon could not be reached on the return visit (too steep).

Polygon Number 25

ParkName:
Alta Lake

Survey Intensity	2
Observer	GW, DH, AM
Date	7/3/2008
Total Vegetation	0
Trees Total	0
Dominant Trees	
emergent	0
maincanopy	0
subcanopy	0
Shrubs Total	0
Dominant Shrubs	
> 1.5' tall	0
< 1.5' tall	0
Graminoids Total	0
Dominant Graminoids	
Graminoids Perennial	0
Graminoids Annual	0
Forbs Total	0
Dominant Forbs	
Forbs Perennial	0
Forbs Annual	0
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	0
Exotics Perennial	0
Exotics Annual	0
Water	0
Rock Outcrop	0
Gravel	0
Logging	0
Fire:	0
Stand Age	0
Agriculture	0
Livestock	0
Development	0
Wildlife	3
Recreation Severity	0
Recreation Type	0
Hydrology	1

Exotic Species

Noxious Exotic Plants

Other Exotic Plants

Water:	0
Rock:	0
Talus:	100
Gravel:	0
Bare Ground:	0
Moss Lichen:	0
Litter:	0

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	talus and cliffs	100	Matrix	EXCELLE
Veg Community1:	talus and cliffs			
Existing Veg2:		0		
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes:

Polygon Number 26

ParkName:
Alta Lake

Survey Intensity	1
Observer	GW, AM, DH
Date	7/3/2008
Total Vegetation	2
Trees Total	1
Dominant Trees	POTR5
emergent	0
maincanopy	1
subcanopy	0
Shrubs Total	1
Dominant Shrubs	SAEX (hybrid), SASC
> 1.5' tall	1
< 1.5' tall	0
Graminoids Total	2
Dominant Graminoids	SCAC3, CAREX (tall), JUNCU, JUARL, CAPE42, CAVE6
Graminoids Perennial	2
Graminoids Annual	0
Forbs Total	2
Dominant Forbs	ACMI2, Sonchus, CIAR4, TYLA, URDI, LATAP
Forbs Perennial	2
Forbs Annual	1
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	2
Exotics Perennial	2
Exotics Annual	1
Water	85
Rock Outcrop	5
Gravel	0
Logging	0
Fire:	0
Stand Age	0
Agriculture	0
Livestock	0
Development	0
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
CIAR4
Other Exotic Plants
VETH

Water:	85
Rock:	5
Talus:	0
Gravel:	0
Bare Ground:	0
Moss Lichen:	0
Litter:	10

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	water	85	Matrix	GOOD
Veg Community1:	water			
Existing Veg2:	SCAC3-CAPE42	15	linear	GOOD
Veg Community3:	SCAC3			
Existing Veg3:		0		
Veg Community3:				

Notes:

Polygon Number 27

ParkName:
Alta Lake

Survey Intensity	1
Observer	GW, AM
Date	6/24/2008
Total Vegetation	5
Trees Total	4
Dominant Trees	PIPO, SAAL2, BEOC2, POBAT
emergent	0
maincanopy	1
subcanopy	4
Shrubs Total	3
Dominant Shrubs	PUTR2, RHGL, AMAL2
> 1.5' tall	3
< 1.5' tall	0
Graminoids Total	3
Dominant Graminoids	HECO26, SPCR, POBU, PSSP6
Graminoids Perennial	3
Graminoids Annual	0
Forbs Total	3
Dominant Forbs	CEDI3, LIDAD, ERNI2, MESA, ARDR4, EQHY, ACMI2, GYPA
Forbs Perennial	3
Forbs Annual	0
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	3
Exotics Perennial	3
Exotics Annual	0
Water	0
Rock Outcrop	0
Gravel	10
Logging	0
Fire:	0
Stand Age	2
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
CEDI3, LIDAD
Other Exotic Plants

Water:	0
Rock:	0
Talus:	1
Gravel:	10
Bare Ground:	34
Moss Lichen:	0
Litter:	55

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	POBAT/EQHY	70	Matrix	FAIR
Veg Community1:	POBAT/EQHY			
Existing Veg2:	PIPO/PUTR2	15	Small patch	POOR
Veg Community3:	PIPO/PUTR2/PSSP6			
Existing Veg3:	campground	15	Small patch	DEVELO
Veg Community3:	developed			

Notes:

Polygon Number 28

ParkName:
Alta Lake

Survey Intensity	1
Observer	GW, AM
Date	6/24/2008
Total Vegetation	3
Trees Total	3
Dominant Trees	POBAT, SALIX, BEOC2, POTR5, ULPU
emergent	0
maincanopy	2
subcanopy	3
Shrubs Total	1
Dominant Shrubs	RICE, PUTR2, RHGL
> 1.5' tall	1
< 1.5' tall	0
Graminoids Total	3
Dominant Graminoids	JUARL, CALAA, POBU, BRTE
Graminoids Perennial	3
Graminoids Annual	1
Forbs Total	2
Dominant Forbs	LIDAD, CEDI3, MEOF, LACTU, MESA
Forbs Perennial	2
Forbs Annual	0
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	1
Exotics Perennial	1
Exotics Annual	1
Water	0
Rock Outcrop	0
Gravel	5
Logging	0
Fire:	0
Stand Age	0
Agriculture	0
Livestock	0
Development	6
Wildlife	0
Recreation Severity	1
Recreation Type	5
Hydrology	2

Exotic Species

Noxious Exotic Plants
LIDAD, CEDI3
Other Exotic Plants
TRDU, BRTE

Water:	0
Rock:	0
Talus:	0
Gravel:	5
Bare Ground:	85
Moss Lichen:	0
Litter:	10

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	sandy beach	90	Matrix	POOR
Veg Community1:	beach			
Existing Veg2:	POBAT/JUARL	10	Small patch	POOR
Veg Community3:	POBAT/JUARL			
Existing Veg3:		0		
Veg Community3:				

Notes:

Polygon Number 3

ParkName:
Alta Lake

Survey Intensity	1
Observer	JR, DH
Date	6/24/2008
Total Vegetation	5
Trees Total	1
Dominant Trees	PIPO
emergent	0
maincanopy	0
subcanopy	1
Shrubs Total	3
Dominant Shrubs	CRDO2, PUTR2, RICE, ELAN, RHGL, ARTR4, ERNA10
> 1.5' tall	3
< 1.5' tall	2
Graminoids Total	4
Dominant Graminoids	HECO26, FESTU, POBU, BRTE, POPR, AGCR
Graminoids Perennial	4
Graminoids Annual	2
Forbs Total	3
Dominant Forbs	ACMI2, PLPA2, ERLI, ERNI2, VERBE, SAKA, COAR4, ARDR4,
Forbs Perennial	3
Forbs Annual	1
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	4
Exotics Perennial	4
Exotics Annual	2
Water	0
Rock Outcrop	0
Gravel	1
Logging	0
Fire:	0
Stand Age	2
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	3
Recreation Type	4
Hydrology	1

Exotic Species

Noxious Exotic Plants
CEDI3,COAR4, LIDAD, CIAR4
Other Exotic Plants
VETH, ACMI2, BRTE, TRDU

Water:	0
Rock:	0
Talus:	0
Gravel:	1
Bare Ground:	35
Moss Lichen:	1
Litter:	63

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	old field undergoing succession	100	Matrix	POOR
Veg Community1:	former agricultural field			
Existing Veg2:		0		
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes:

Polygon Number 4

ParkName:
Alta Lake

Survey Intensity	1
Observer	PM, JR
Date	6/23/2008
Total Vegetation	5
Trees Total	4
Dominant Trees	PIPO, PSME
emergent	1
maincanopy	4
subcanopy	2
Shrubs Total	3
Dominant Shrubs	AMAL2, PUTR2
> 1.5' tall	3
< 1.5' tall	1
Graminoids Total	3
Dominant Graminoids	BRTE, POBU, PSSP6
Graminoids Perennial	2
Graminoids Annual	3
Forbs Total	3
Dominant Forbs	BASA3, ACMI2, VETH, CEDI3
Forbs Perennial	2
Forbs Annual	2
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	3
Exotics Perennial	2
Exotics Annual	3
Water	0
Rock Outcrop	0
Gravel	20
Logging	1
Fire:	0
Stand Age	3
Agriculture	0
Livestock	0
Development	6 (roads,
Wildlife	0
Recreation Severity	1
Recreation Type	4
Hydrology	1

Exotic Species

Noxious Exotic Plants
CEDI3, VETH
Other Exotic Plants
BRTE

Water:	0
Rock:	0
Talus:	3
Gravel:	20
Bare Ground:	20
Moss Lichen:	1
Litter:	56

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	developed	100	Matrix	DEVELO
Veg Community1:	developed			
Existing Veg2:		0		
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes: Developed campground area with forest overstory

Polygon Number 5

ParkName:
Alta Lake

Survey Intensity	1
Observer	JR, DH
Date	6/24/2008
Total Vegetation	0
Trees Total	0
Dominant Trees	PIPO
emergent	0
maincanopy	0
subcanopy	0
Shrubs Total	0
Dominant Shrubs	PUTR2, ERNI2
> 1.5' tall	0
< 1.5' tall	0
Graminoids Total	0
Dominant Graminoids	POBU, PSSP6
Graminoids Perennial	0
Graminoids Annual	0
Forbs Total	0
Dominant Forbs	CEDI3, ASTRA
Forbs Perennial	0
Forbs Annual	0
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	0
Exotics Perennial	0
Exotics Annual	0
Water	0
Rock Outcrop	0
Gravel	0
Logging	0
Fire:	0
Stand Age	1
Agriculture	0
Livestock	0
Development	6
Wildlife	
Recreation Severity	
Recreation Type	
Hydrology	1

Exotic Species

Noxious Exotic Plants
GYPA, CEDI3, LIDAD
Other Exotic Plants
POBU

Water:	0
Rock:	0
Talus:	0
Gravel:	0
Bare Ground:	0
Moss Lichen:	0
Litter:	0

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	developed	100	Matrix	DEVELO
Veg Community1:	developed			
Existing Veg2:				
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes:

Polygon Number 6

ParkName:
Alta Lake

Survey Intensity	1
Observer	JR, DH
Date	6/24/2008
Total Vegetation	4
Trees Total	1
Dominant Trees	PIPO
emergent	0
maincanopy	1
subcanopy	0
Shrubs Total	4
Dominant Shrubs	PUTR2, ARTR4, AMAL2, ERNI2, ERNA10
> 1.5' tall	4
< 1.5' tall	2
Graminoids Total	3
Dominant Graminoids	HECO26, PSSP6, POPR, FEID
Graminoids Perennial	3
Graminoids Annual	1
Forbs Total	3
Dominant Forbs	BASA3, PLPA2, ERLI, PHLI, AMAL2, ERFI2, LIRU4, ACMI2, EPILO,
Forbs Perennial	3
Forbs Annual	1
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	2
Exotics Perennial	2
Exotics Annual	1
Water	0
Rock Outcrop	0
Gravel	3
Logging	0
Fire:	0
Stand Age	1
Agriculture	0
Livestock	0
Development	2
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
LIDAD, CEDI3
Other Exotic Plants
SAKA

Water:	0
Rock:	0
Talus:	0
Gravel:	3
Bare Ground:	55
Moss Lichen:	0
Litter:	42

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	PUTR2-ARTR4-AMAL2/PSSP6-BASA3	98	Matrix	EXCELLE
Veg Community1:	PUTR2/PSSP6			
Existing Veg2:	disturbed shrub-steppe	2	Small patch	POOR
Veg Community3:	disturbed shrub-steppe			
Existing Veg3:		0		
Veg Community3:				

Notes: Bat-house; weeds along road

Polygon Number 7

ParkName:
Alta Lake

Survey Intensity	1
Observer	JR, DH
Date	6/24/2008
Total Vegetation	4
Trees Total	0
Dominant Trees	
emergent	0
maincanopy	0
subcanopy	0
Shrubs Total	4
Dominant Shrubs	PUTR2, ARTR4, AMAL2, ERNI2, ERNA10
> 1.5' tall	4
< 1.5' tall	2
Graminoids Total	3
Dominant Graminoids	HECO26, PSSP6, POPR, FEID
Graminoids Perennial	3
Graminoids Annual	1
Forbs Total	3
Dominant Forbs	BASA3, PLPA2, ERLI, PHLI, AMAL2, ERFI2, LIRU4, ACMI2, EPILO,
Forbs Perennial	3
Forbs Annual	1
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	2
Exotics Perennial	2
Exotics Annual	1
Water	0
Rock Outcrop	0
Gravel	3
Logging	0
Fire:	0
Stand Age	1
Agriculture	0
Livestock	0
Development	0
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
LIDAD, CEDI3
Other Exotic Plants
SAKA

Water:	0
Rock:	0
Talus:	0
Gravel:	3
Bare Ground:	55
Moss Lichen:	0
Litter:	42

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	disturbed shrub-steppe	100	Matrix	OWNERS
Veg Community1:	ownership			
Existing Veg2:				
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes: Ownership issue (possible grazing w/ fence demarkation)?

Polygon Number 8

ParkName:
Alta Lake

Survey Intensity	1
Observer	JR, DH
Date	6/24/2008
Total Vegetation	0
Trees Total	0
Dominant Trees	POBAT, POTR5, ACER
emergent	0
maincanopy	0
subcanopy	0
Shrubs Total	0
Dominant Shrubs	SALIX, RHGL, AMAL2, PUTR2, ROWO
> 1.5' tall	0
< 1.5' tall	0
Graminoids Total	0
Dominant Graminoids	JUARL, BRTE, POPR, CAREX, LECI4
Graminoids Perennial	0
Graminoids Annual	0
Forbs Total	0
Dominant Forbs	SIAL2, CIAR4, POLYG4, ARDR4, TYLA, ACMI2, SAKA, CHAN9
Forbs Perennial	0
Forbs Annual	0
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	0
Exotics Perennial	0
Exotics Annual	0
Water	0
Rock Outcrop	0
Gravel	0
Logging	0
Fire:	0
Stand Age	
Agriculture	0
Livestock	0
Development	6
Wildlife	
Recreation Severity	
Recreation Type	
Hydrology	

Exotic Species

Noxious Exotic Plants
CIAR4, LIDAD
Other Exotic Plants
VETH, BRTE, TYLA, LECI4

Water:	0
Rock:	0
Talus:	0
Gravel:	0
Bare Ground:	0
Moss Lichen:	0
Litter:	0

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	developed	65	Matrix	DEVELO
Veg Community1:	developed			
Existing Veg2:	disturbed wetland	35	Small patch	POOR
Veg Community3:	disturbed wetland			
Existing Veg3:		0		
Veg Community3:				

Notes: fence along boundary, road

Polygon Number 9A

ParkName:
Alta Lake

Survey Intensity	1
Observer	PM, HS, GW, JR,
Date	6/23/2008
Total Vegetation	5
Trees Total	4
Dominant Trees	PIPO, PSME, POTR5
emergent	0
maincanopy	3
subcanopy	3
Shrubs Total	4
Dominant Shrubs	CRDO2, RONU, CLLI2, PUTR2, RICE, SYAL, ERHE2, PRVI, RHGL,
> 1.5' tall	4
< 1.5' tall	3
Graminoids Total	2
Dominant Graminoids	POA, POBU, BRTE
Graminoids Perennial	2
Graminoids Annual	1
Forbs Total	1
Dominant Forbs	LIRU4, ACMI2, POLYG4, BASA3
Forbs Perennial	1
Forbs Annual	1
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	2
Exotics Perennial	2
Exotics Annual	1
Water	0
Rock Outcrop	0
Gravel	0
Logging	1
Fire:	0
Stand Age	2
Agriculture	0
Livestock	0
Development	6
Wildlife	3, 7
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
LIDAD, GYPA, CEDI3
Other Exotic Plants
BRTE

Water:	0
Rock:	0
Talus:	1
Gravel:	0
Bare Ground:	0
Moss Lichen:	0
Litter:	99

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	PIPO-POTR5/AMAL2-CRDO2-CLLI2/BASA3	100	Matrix	GOOD
Veg Community1:	PIPO/PUTR2/PSSP6			
Existing Veg2:		0		
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes: One recent cut tree at edge of stand; very heterogeneous-high diversity; high bird diversity

Polygon Number 9B

ParkName:
Alta Lake

Survey Intensity	1
Observer	JR, DH
Date	6/24/2008
Total Vegetation	5
Trees Total	2
Dominant Trees	PIPO
emergent	0
maincanopy	1
subcanopy	2
Shrubs Total	5
Dominant Shrubs	AMAL2, PUTR2, RICE, CLLI2, RHGL, PHLE4, ROWO, PRVI, ERHE2
> 1.5' tall	5
< 1.5' tall	2
Graminoids Total	2
Dominant Graminoids	ELGL, BRTE
Graminoids Perennial	2
Graminoids Annual	2
Forbs Total	2
Dominant Forbs	ACMI2, CEDI3, VETH, COAR4, LIDAD
Forbs Perennial	2
Forbs Annual	1
Ferns Total	1
Ferns Evergreen	0
Ferns Deciduous	1
ExoticsTotal	2
Exotics Perennial	2
Exotics Annual	2
Water	0
Rock Outcrop	0
Gravel	0
Logging	2
Fire:	0
Stand Age	2
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
LIDAD
Other Exotic Plants
VETH, BRTE

Water:	0
Rock:	0
Talus:	25
Gravel:	0
Bare Ground:	5
Moss Lichen:	0
Litter:	70

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	AMAL2-PUTR2-RICE	100	Matrix	FAIR
Veg Community1:	PIPO/PUTR2/PSSP6			
Existing Veg2:		0		
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes: cut stumps; dry stream with bridge; PUTR2 dying out

Polygon Number 9C

ParkName:
Alta Lake

Survey Intensity	1
Observer	GW, AM
Date	6/24/2008
Total Vegetation	5
Trees Total	4
Dominant Trees	PIPO, POTR5, SAAL2, POBAT
emergent	0
maincanopy	4
subcanopy	3
Shrubs Total	4
Dominant Shrubs	AMAL2, CRDO2, RICE, RONU, RHGL, SAPR3
> 1.5' tall	4
< 1.5' tall	2
Graminoids Total	3
Dominant Graminoids	AGRE, ELRE4, JUARL, POPR, CALAA, POBU, BRTE
Graminoids Perennial	3
Graminoids Annual	1
Forbs Total	2
Dominant Forbs	LIDAD, CIAR4, CEDI3, Latuca
Forbs Perennial	2
Forbs Annual	1
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	4
Exotics Perennial	3
Exotics Annual	2
Water	0
Rock Outcrop	0
Gravel	1
Logging	0
Fire:	0
Stand Age	2
Agriculture	0
Livestock	0
Development	3
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
LIDAD, CIAR4
Other Exotic Plants
SIAL2, BRTE

Water:	0
Rock:	0
Talus:	1
Gravel:	1
Bare Ground:	3
Moss Lichen:	0
Litter:	95

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	SAAL2-POTR5-PIPO/CRDO2-AMAL2	100	Matrix	FAIR
Veg Community1:	POTR5/CRDO2			
Existing Veg2:				
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes:

Polygon Number 9D

ParkName:
Alta Lake

Survey Intensity	1
Observer	JR, DH
Date	6/24/2008
Total Vegetation	5
Trees Total	1
Dominant Trees	PIPO
emergent	0
maincanopy	0
subcanopy	1
Shrubs Total	4
Dominant Shrubs	CRDO2, RHGL, ROWO, PUTR2, CLLI2, RICE, PHLE4, ELAN
> 1.5' tall	4
< 1.5' tall	1
Graminoids Total	4
Dominant Graminoids	JUARL, CAREX, BRTE, POPR, ELGL
Graminoids Perennial	3
Graminoids Annual	3
Forbs Total	3
Dominant Forbs	ACMI2, CEDI3, SIAL2, TRDU, VETH
Forbs Perennial	3
Forbs Annual	1
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	3
Exotics Perennial	3
Exotics Annual	3
Water	0
Rock Outcrop	0
Gravel	0
Logging	0
Fire:	0
Stand Age	1
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Noxious Exotic Plants
LIDAD, CEDI3
Other Exotic Plants
VETH, TRDU, CONVO, POPR, BRTE,

Water:	0
Rock:	0
Talus:	1
Gravel:	0
Bare Ground:	15
Moss Lichen:	0
Litter:	84

Vegetation Types

		Percent	Pattern	Rank
Existing Veg1:	CRDO2-RHGL-ROWO/JUARL-CAREX	100	Matrix	POOR
Veg Community1:	PIPO/PUTR2/PSSP6			
Existing Veg2:		0		
Veg Community3:				
Existing Veg3:		0		
Veg Community3:				

Notes: Evidence of heavy disturbance; far from PIPO/PUTR2 plant association; old pieces of concrete, tank