

Rare Plant and Vegetation Survey of the Proposed Campground Expansion Areas Steamboat Rock State Park



Pacific Biodiversity Institute



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Peter H. Morrison

pm@pacificbio.org

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

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Executive Summary

Pacific Biodiversity Institute conducted a rare plant and vegetation survey for the Washington State Parks and Recreation Commission, of areas slated to be developed as part of a proposed campground expansion at Steamboat Rock State Park. I used standard methods employed in similar work in other parks during the last several years. More intensive field surveys were performed in the 41.41 acre survey sites than in the reconnaissance-level work normally conducted at a park-level.

I surveyed and mapped a total of 16 vegetation community polygons in the four impact areas that were assessed. These polygons were comprised of 5 vegetation community types within the designated survey area. Vegetation community polygons are either stand-alone plant associations or mosaics of multiple plant associations. Most of the survey areas at Steamboat rock are covered by shrub-steppe communities dominated by rubber rabbitbrush (*Ericameria nauseosa*), yellow rabbitbrush (*Chrysothamnus viscidiflorus ssp. lanceolatus*), snow buckwheat (*Eriogonum niveum*) and big sagebrush (*Artemesia tridentata*). The primary plant communities and land cover types in the project area are:

- *Ericameria nauseosa* – *Chrysothamnus viscidiflorus* - *Eriogonum niveum* - *Artemesia tridentata* / *Hesperostipa comata var. comata* - *Achnatherum hymenoides* – *Bromus tectorum*
- *Chrysothamnus viscidiflorus* - *Ericameria nauseosa* - *Eriogonum niveum* / *Pseudoroegneria spicata* – *Balsamorhiza careyana* – *Bromus tectorum*
- *Artemesia tridentata* - *Ericameria nauseosa* - *Eriogonum niveum* / *Poa secunda* - *Pseudoroegneria spicata* - *Aristida purpurea. var. longiseta* – *Bromus tectorum*
- Banks Lake shoreline artificial wetland community
- Sand deposits and dunes

No rare plants listed by the State of Washington were found on the proposed development sites. However, patches of an unidentified onion was found, but was not possible to identify due to the fact that it did not bloom during the survey period. There is an onion species (*Allium biseptum*) that is listed by the State as a sensitive plant that is encountered in Steamboat Rock State Park. Usually, this onion grows in swales in the lithosol soil type, such as encountered at the top of Steamboat Rock. The areas where I encountered patches of the unidentified onion were in fine, sandy soils. It is quite likely that the species of onion that I encountered is not *Allium biseptum*, although it was impossible to determine in a definitive manner. A map is included of the location of the onion patches that I located for further evaluation and consideration in development planning is included in the report. One species of cactus, *Opuntia fragilis*, which was on the DNR NHP “watch” list, but has recently been removed because it is more common than previously thought, was encountered in the area around the sewage lagoons and in the middle proposed campground expansion area. A map of many of the locations where this plant was found is included in this report.

The overall ecological condition of the the proposed campground expansion areas vary from poor to good according to the four ecological condition classes that I used to rate the vegetation communities. A map of the ecological condition of the survey areas is included in the report. Much of the middle proposed campground expansion area was burned by a wildfire in the summer of 2007. The area burned by the 2007 wildfire is recovering remarkably well and the ecological condition of this area may return to a good condition in a decade if it is left undisturbed. Much of the remaining area in the proposed campground expansion sites is in good ecological condition. Part of the proposed sewage lagoon expansion site is in good ecological condition. I recommend siting the sewage lagoon expansion to the east of the existing lagoons to avoid impacting vegetation communities that are in good ecological condition. The proposed water tank expansion site is already heavily impacted by past development activities. No significant conflicts between ecological resources and development occur at that location.

Introduction

Under contract with the Washington State Parks and Recreation Commission, areas slated to be developed as part of a proposed campground expansion at Steamboat Rock State Park were surveyed for rare plant occurrences and surveyed and mapped by existing vegetation communities. This report summarizes the activities and findings of the contracted work.

Vegetation Communities

Methods

First, digital maps provided by Mark Schulz, Eastern Region Environmental Specialist with the Washington State Parks and Recreation Commission, which illustrated the areas to be surveyed for rare plants that are proposed for development as part of proposed campground expansion activities at Steamboat Rock State Park (Figures 1 and 2) were georeferenced to aid in determining the boundaries of the survey areas. In this report the survey areas are labeled as follows: northern campground expansion, middle campground expansion, sewage lagoon expansion and water tank expansion.



Figure 1. Survey areas for rare plants and vegetation (green areas).



Figure 2. Draft conceptual plans for campground expansion.

Once these maps were precisely georeferenced, polygons were digitized that represented the survey areas. The boundaries of the polygons were drawn to include the entire area depicted in the map and a small buffer area to insure that all the potential area proposed for development was included. An additional area was included in the survey area adjacent to and south east of the existing sewage lagoons after Mark Schulz provided new proposed development maps to me during a meeting at the park in May 2008. As a result, the total area surveyed was 41.41 acres.

Normally, Pacific Biodiversity Institute does not conduct vegetation or rare plant surveys outside of the official management boundary of a state park as is provided to us in a GIS layer by state park staff. In the case of this survey, I made an exception in the area of the proposed sewage lagoon expansion area. I mapped vegetation and conducted rare plant surveys to the southwest of the management boundary line for Steamboat Rock State Park because the proposed sewage lagoon expansion site extended to the southwest of the current management boundary (Figure 3). Based on verbal communication with Mark Schulz, State Park environmental specialist, my understanding is that the adjacent land and the area within the state park boundary are both owned by the Bureau of Reclamation and that the management boundary only exists to delineate the boundary between State Park management from Washington Department of Fish and Wildlife management. He indicated that the management boundary line is not an issue with regard to the sewage lagoon expansion because both sides of the management boundary are owned by Bureau of Reclamation. Therefore I surveyed the entire original proposed expansion site plus an

additional alternative site of about 2-acres to the east of the existing sewage lagoon based on maps provide by Mr. Schulz during my May field visit to the site.

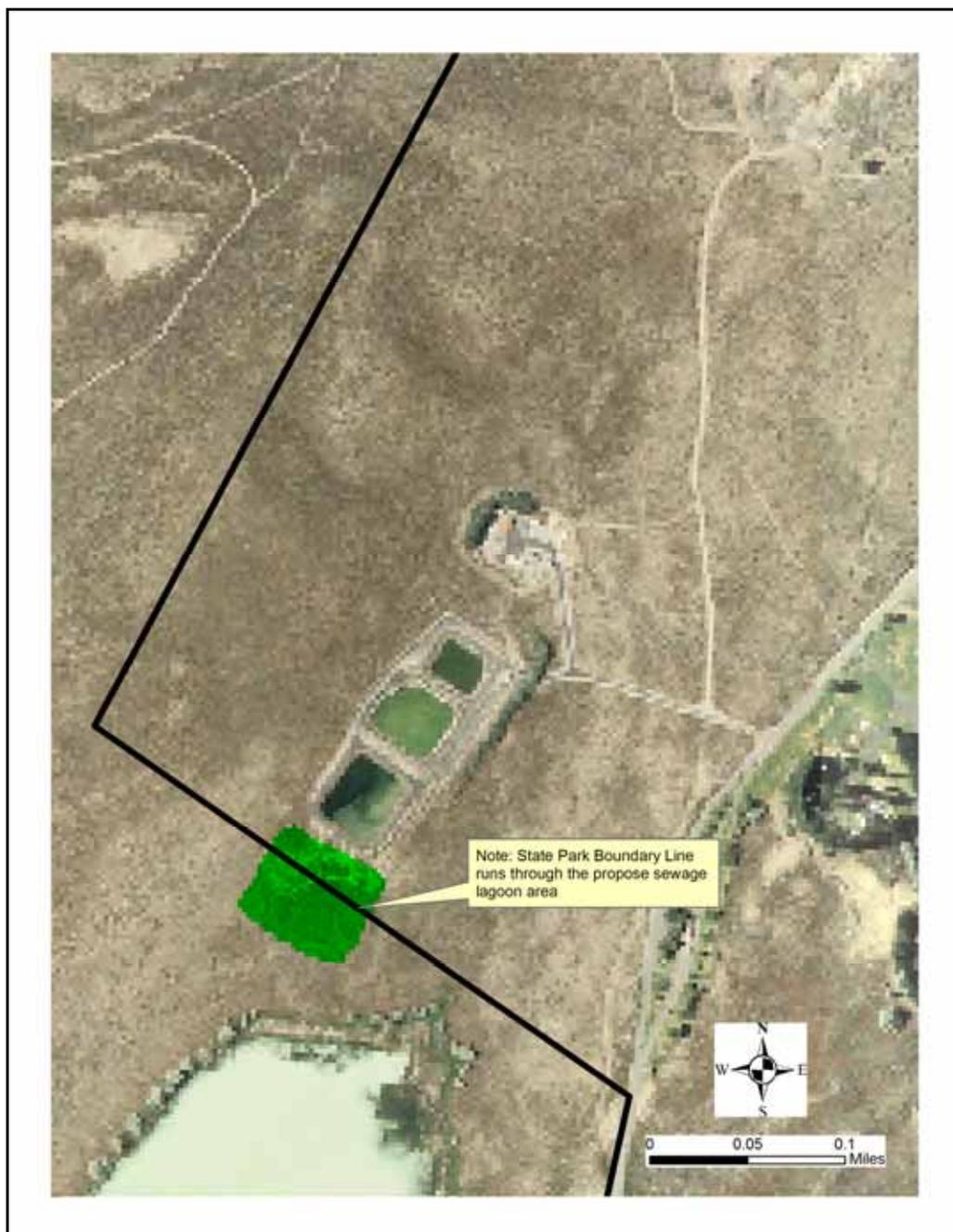


Figure 3. Park management boundary in relationship to the proposed sewage lagoon location.

Overall, the methodology for this work followed the standard methods we have employed in similar work in other state parks during the last several years (e.g. Morrison and Smith 2007).

I reviewed existing, relevant literature about the vegetation and ecology of the project area. This included an existing report on vegetation and rare plants written Northrop Canyon portion of in the Steamboat Rock State Park (Beck and Arnett 2001), the Banks Lake RMP Environmental Assessment, information from the Washington State Department of Natural Resources - Natural Heritage Program (DNR NHP)

including a recent report on inland sand dunes and related vegetation (Hallock et al 2007) and a report on wetland delineation along the Banks Lake shoreline by The Watershed Company (2007).

Next, I delineated discrete vegetation polygons within the boundaries of the survey area. Vegetation polygons represent specific plant communities or variations on vegetation condition following disturbance. They may also represent a significant variation in the ecological condition within a plant community. Initially, I used aerial photography and satellite imagery to manually digitize plant communities or mosaics of plant communities in a GIS environment. I reviewed digital panchromatic aerial photography from 1996 and recent Landsat 7 Enhanced Thematic Mapper satellite images for discernable vegetation or landform patterns. Topographic maps and digital elevation models (DEMs) were also employed to assist the process of vegetation community delineation. Vegetation polygons were created by hand in a GIS by ocular assessment. The vegetation community polygon data were edited and stored in an ESRI shapefile format.

I visited each vegetation polygon at least once during our field surveys, and assigned a vegetation community type and vegetation attributes to each polygon. I surveyed the project area during the 2008 field season on May 5-7, June 5, and July 27. A map of my survey routes is presented in Figure 4.



Figure 4. Field Survey Schedule and Routes. Field Survey Dates: May 5-7, June 5, and July 27.

Some polygons contained more than one plant community type. In those cases, I assigned a secondary or tertiary vegetation community type to each polygon. I relied on plant association keys and descriptions from several recognized sources to make vegetation community assignments, including the Key to Sagebrush Alliances of the Western United States (Crawford, 1999), Classification of Native Vegetation of Oregon (Kagan et al, 2000), A Preliminary Vegetation Classification of the Western United States (Bourgeron and Engelking, 1994) and DNR NHP unpublished data files. In some cases, the community descriptions in existing manuals were not adequate in describing distinctive vegetation associations in the project area. In these cases, new land cover type or plant association names and descriptions were created by PBI.

During field surveys, I took aerial imagery and digital vegetation polygons with us through the use of ArcPad (ESRI 2007) running on pocket PC, GPS enabled devices. This allowed me to easily view the data in the field, to evaluate my polygon delineations, and to make changes based on field conditions. The result was a field-verified delineation of vegetation types.

While I was visiting each vegetation polygon, I also recorded a wide variety of information about the vegetation, environmental characteristics, disturbance history and notes for each polygon. Each polygon was rated for its overall ecological condition according to four condition classes (Appendix A). I used a plant community data collection format that was initially developed by the Washington State Parks and Recreation Commission (Appendix B).

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. This data is presented in Appendix B.

Results

I surveyed and mapped a total of 16 vegetation community polygons in the four impact areas that were assessed. These polygons were comprised of 5 vegetation community types (Table 1) within the designated survey area. Vegetation community polygons are either stand-alone plant associations or mosaics of multiple plant associations.

Figure 5 shows the location of the vegetation community polygons mapped in the survey area, overlain on an aerial photograph of the area. Figure 6 indicates the primary vegetation community (ExistingVeg1 in the database) attributed to each polygon. The GIS database created for this project can be queried and displayed to show the more complex mixtures of vegetation communities that occur in many polygons. Appendix C lists the attributes for each polygon in the project area.

Most of the survey areas at Steamboat rock are covered by shrub-steppe communities dominated by rubber rabbitbrush (*Ericameria nauseosa*), yellow rabbitbrush (*Chrysothamnus viscidiflorus ssp. lanceolatus*), snow buckwheat (*Eriogonum niveum*) and big sagebrush (*Artemisia tridentata*). The primary plant communities and land cover types in the project area are:

- *Ericameria nauseosa* – *Chrysothamnus viscidiflorus* - *Eriogonum niveum* - *Artemisia tridentata* / *Hesperostipa comata* var. *comata* - *Achnatherum hymenoides* – *Bromus tectorum*
- *Chrysothamnus viscidiflorus* - *Ericameria nauseosa* - *Eriogonum niveum* / *Pseudoroegneria spicata* – *Balsamorhiza careyana* – *Bromus tectorum*
- *Artemisia tridentata* - *Ericameria nauseosa* - *Eriogonum niveum* / *Poa secunda* - *Pseudoroegneria spicata* - *Aristida purpurea*. var. *longiseta* – *Bromus tectorum*

- Banks Lake shoreline artificial wetland community
- Sand deposits and dunes

Many of the polygons represent various stages plant succession or response to on-going disturbances and non-native plant invasions but contain significant elements of the above vegetation community types.

The mixture of vegetation in most of the project area does not fit neatly into existing plant association descriptions (e.g. Daubenmire 1970, Crawford 1999, and Crawford 2003). This is due both to the incompleteness of the existing vegetation classifications for eastern Washington and the fact that all of the survey sites have a long history of past human disturbance. This past human disturbance has altered the plant community composition so that it is now probably more complex than would exist in a pristine vegetation community.

These communities are listed in the Table 1 and described further in this report. The *Chrysothamnus vicidiflorus* - *Ericameria nauseosa* - *Eriogonum niveum* / *Pseudoroegneria spicata* – *Balsamorhiza careyana* – *Bromus tectorum* community occurs as a small patch community within some polygons but does not form the matrix of any polygon.

Table 1. Vegetation Community Types Encountered in the Project Area

Association Name	English Name	Abbreviation	Reference
<i>Ericameria nauseosa</i> – <i>Chrysothamnus vicidiflorus</i> - <i>Eriogonum niveum</i> - <i>Artemisia tridentata</i> / <i>Hesperostipa comata</i> var. <i>comata</i> - <i>Achnatherum hymenoides</i> – <i>Bromus tectorum</i>	Rubber rabbitbrush – yellow rabbitbrush – snow- buckwheat - big sagebrush / needle and thread grass – Indian ricegrass - cheatgrass	ERNAN3-CHVI- ERNI2- ARTR2/HECOC8- ACHY-BRTE	PBI (this report)
<i>Chrysothamnus vicidiflorus</i> - <i>Ericameria nauseosa</i> - <i>Eriogonum niveum</i> / <i>Pseudoroegneria spicata</i> – <i>Balsamorhiza careyana</i> – <i>Bromus tectorum</i>	yellow rabbitbrush - Rubber rabbitbrush - big sagebrush / bluebunch wheatgrass - Carey's balsamroot - cheatgrass	ERNAN3-CHVI- ARTR2/PSSP6- BACA3-BRTE	PBI (this report)
<i>Artemisia tridentata</i> - <i>Ericameria nauseosa</i> - <i>Eriogonum niveum</i> / <i>Poa secunda</i> - <i>Pseudoroegneria spicata</i> - <i>Aristida purpurea</i> . var. <i>longiseta</i> – <i>Bromus tectorum</i>	big sagebrush - Rubber rabbitbrush – snow buckwheat / Sandberg bluegrass- bluebunch wheatgrass-Fendler three awn grass - cheatgrass	ARTR2- ERNAN3-ERNI2 /POSE-PSSP6- ARPUL-BRTE	PBI (this report)
Banks Lake shoreline artificial wetland community	Banks Lake shoreline artificial wetland community	WETLAND	PBI (this report)
Sand deposits and dunes	Sand deposits and dunes	SAND	PBI (this report)



Figure 5. Vegetation community polygons in the survey area



Figure 6. Primary plant communities attributed to each vegetation polygon

Vegetation Community and Land Cover Types

Ericameria nauseosa – *Chrysothamnus vicidiflorus* - *Eriogonum niveum niveum* -
Artemisia tridentata / *Hesperostipa comata* var. *comata* - *Achnatherum hymenoides*–
Bromus tectorum



Figure 7. Photograph of portion of northern proposed campground expansion site.

This community is dominated by rubber rabbitbrush with occasional other shrub species interspersed. It has a sparse to moderate cover of several grass species including needle and thread grass, Indian ricegrass and cheatgrass. There is a sparse herbaceous cover, with tarragon (*Artemisia dracunculus*) often the most common element (Figure 7). This community occurs on sandy soils and also covers stabilized sand dunes in the survey area. This plant community is not described in existing literature, but Pacific Biodiversity Institute decided that it was a unique vegetation association that warranted its own name and description. This community is quite similar to the *Ericameria nauseosa* – *Chrysothamnus viscidiflorus* – *Eriogonum niveum* community type described in sand dune environments by Hallock et al (2007) and may well be a variant of that community.

Some areas within this community type have dense shrub cover, while in others the shrub cover is sparse. This appears largely a response to past disturbances and soil conditions, to some extent. Non-native plant

cover is often high in the more disturbed sites, but undisturbed sites have mostly native vegetation. Cheatgrass and Dalmatian toadflax often occur abundantly on disturbed sites.

Significant areas of this community type burned in a wildfire in the west camp survey area during the summer of 2007. This area is recovering from this disturbance at this time.

***Chrysothamnus vicidiflorus* – *Ericameria nauseosa* - *Eriogonum niveum* /
Pseudoroegneria spicata- *Balsamorhiza careyana***



Figure 8. Photograph of portion of proposed sewage lagoon expansion site.

This community is dominated by yellow rabbitbrush, rubber rabbitbrush, snow buckwheat, bluebunch wheatgrass and Carey's balsamroot (Figure 8). Occasional other shrub species interspersed. There is a sparse grass and herbaceous cover of other species. This plant community is not described in existing literature, but Pacific Biodiversity Institute decided that it was a unique vegetation association that warranted its own name and description. This community bears some similarities to the *Ericameria nauseosa* – *Chrysothamnus viscidiflorus* – *Eriogonum niveum* community type described in sand dune environments by Hallock et al (2007) and may well be a variant of that community, however I found this community growing on less sandy and very stable soils.

Some areas within this community type have denser shrub cover, while in others the shrub cover is sparse and the grass and herbaceous cover is denser. This variation appears largely a response to soil conditions. This community occurred as a secondary community in part of the survey area near the sewage lagoons. It occurs on moderate slopes with less sand in the soil than the previous community. The site where this community occurs has not been disturbed by recent development activities. Non-native plant cover is low in most of the area, but would increase dramatically with disturbance. Cheatgrass and Dalmatian toadflax often occur abundantly on disturbed sites.

Artemesia tridentata* - *Ericameria nauseosa* - *Eriogonum niveum* / *Poa secunda* - *Pseudoroegneria spicata* - *Aristida purpurea* var. *longiseta



Figure 9. Photograph of most of the proposed water tank expansion site.

This community is dominated by big sagebrush, rubber rabbitbrush and snow buckwheat. It has a sparse to moderate cover of several grass species including Sandberg's bluegrass, bluebunch wheatgrass, and Fendler's three awn grass. There is a sparse herbaceous cover, with Carey's balsamroot common. This plant community is not described in existing literature, but Pacific Biodiversity Institute decided that it was a unique vegetation association that warranted its own name and description.

This community type occurred primarily around the water tank survey area. Most of the survey area was substantially disturbed and devegetated by roads and the existing water tank (Figure 9). There is a moderately dense dense shrub cover in the places that have not been disturbed by roads and development activities. Non-native plant cover is moderate in this area because of the amount of human disturbances in the area. Away from the disturbances, non-native plant cover is low.

Sand deposits and dunes



Figure 10. Photograph of the sand dune portion of northern proposed campground expansion site.

There are areas of sand dunes and deposits in the two proposed campground expansion areas. These sand deposits are highly disturbed by human activity and also appear to represent areas that have been substantially altered by past development activities related to the existing campgrounds, facilities and the Banks Lake reservoir. There are scattered shrubs, herbs and grasses in these sand areas, but a fine, white sand covers over 90% of the surface area (Figure 10). Since these open sand areas were very disturbed by previous development and recreation I did not attempt to classify them to a vegetation community type. However, they probably represent disturbance variants of the *Ericameria nauseosa* – *Chrysothamnus viscidiflorus* – *Eriogonum niveum* community type, the *Hesperostipa comata* community type or the *Achnatherum hymenoides* - *Psoralidium lanceolatum* association described in sand dune environments by Hallock et al (2007).

Banks Lake shoreline artificial wetland community



Figure 11. Photograph of a portion of the Banks Lake shoreline in the survey area.

This wetland community occurs along the shoreline of Banks Lake. It is composed of a complex mixture of several plant communities characteristic of artificial wetlands and disturbed wet areas (Figure 11). This wetland is created by Banks Lake and areas influenced by the raised watertable of the reservoir. Parts of it are dominated by the invasive, non-native reed canarygrass (*Phalaris arundinacea*). This grass occurs in shallow water and mucky shorelines in the project area. However, many other native and non-native wetland graminoid and herbaceous species may occur interspersed with it. Some of the wetland community has a tree overstory of black cottonwood (*Populus balsamifera* ssp. *trichocarpa*). There are areas dominated by rushes (*Juncus arcticus*) and other areas dominated by hardstem bulrush (*Schoenoplectus acutus*). Other wetland species also occur in this area. This area has an overall high vegetation cover. It was rated as a Class III wetland by The Watershed Company (2007).

Rare Plant Surveys

Methods - Rare Plants

I visited the project area of the Steamboat Rock State Park proposed campground expansion areas three times during the 2008 field season to conduct rare plant surveys. I used the Washington Department of Natural Resources Natural Heritage Program's (DNR NHP) rare plant list to determine the conservation status of vascular plants encountered in the field.

Field surveys were conducted on: May 5-7, June 5, and July 27. During the field surveys, I was equipped with reference literature; rare plant lists for the area, maps showing rare plant locations from previous surveys, and a portable plant identification lab. I looked for rare plants in habitats previously identified as being likely occurrence sites. I also looked intensively over most of the area to be impacted by the proposed development activities. So as not to miss a rare plant, 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 desire to efficiently cover a large proportion of the park's area throughout the field season. I surveyed areas of the park more intensively where rare plants are more likely to occur. Survey routes for the rare plant inventory and rare plant locations were recorded either by hand, on a hardcopy topographic map, or as GPS waypoints and trackpoints, all of which were later compiled into a single GIS data layer, depicted in Figure 3.

Results - Rare Plants

No plant species listed as threatened, endangered or sensitive were encountered in the project area. One species of cactus, *Opuntia fragilis*, was encountered frequently in the area around the sewage lagoons and in the middle proposed campground expansion area. This species was on the WA DNR NHP "watch" list, but has recently been removed because it is more common than previously thought. I collected data about many of the locations where this plant was found, and have included a map in this report (Figure 12). I also encountered one species of onion, (*Allium sp.*), that was not possible to identify (because it never bloomed), despite three visits to the site between May and the end of July. There is an onion species (*Allium biseptum*) that is listed by the State as a sensitive plant that is encountered in Steamboat Rock State Park. Usually, this onion grows in swales in the lithosol soil type, such as encountered at the top of Steamboat Rock. The area where I encountered patches of the yet to be identified onion were in fine, sandy soils. It is quite likely that the species of onion that I encountered is not *Allium biseptum*, although it was impossible to determine in a definitive manner. A map is included of the location of the onion patches that I located for further evaluation and consideration in development planning (Figure 13).

Rare plant info redacted. Contact Washington State Parks and Recreation Commission for further information.

Figure 12. Location of patches of *Opuntia fragilis*).

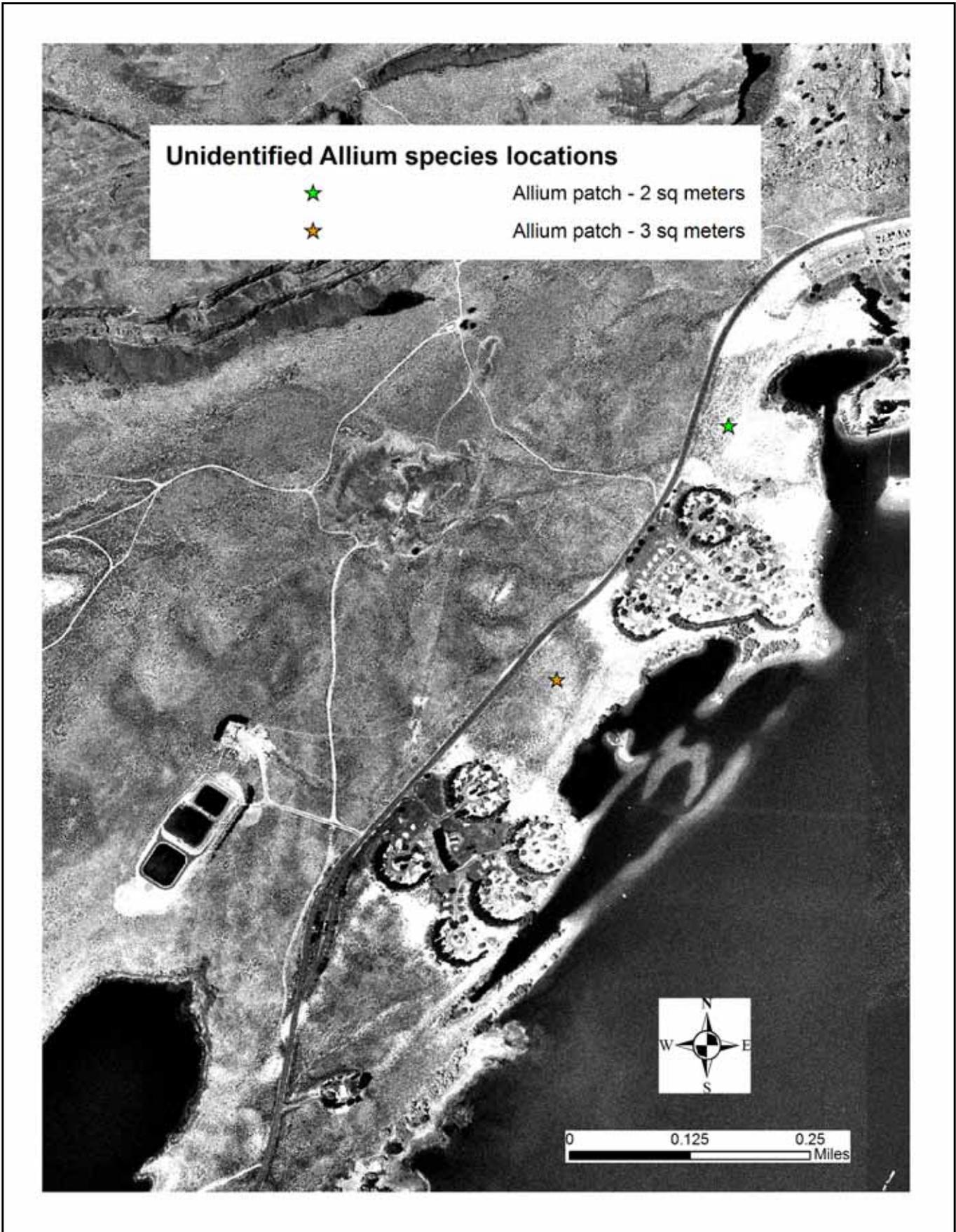


Figure 13. Location of patches of unidentified onion (*Allium* species).

Vascular Plant List for the 2008 Project Area

Key to Vascular Plant Species Lists

Column 1: “#”: number of plant at this site

Column 2: “Code”: Four-letter plant code as shown on the USDA PLANTS database.

Column 3: Scientific name as shown on the USDA PLANTS database.

Column 4: Common name as shown on the USDA PLANTS database.

Vascular Plant Species of the Proposed Water Tank Expansion Area

#	Symbol	Scientific Name with Author	National Common Name
1	ACMI2	<i>Achillea millefolium</i> L.	common yarrow
2	ANDI2	<i>Antennaria dimorpha</i> (Nutt.) Torr. & A. Gray var. <i>integra</i> L.F. Hend.	
3	ARPUL	<i>Aristida purpurea</i> Nutt. var. <i>longiseta</i> (Steud.) Vasey	Fendler threeawn
4	ARTR2	<i>Artemisia tridentata</i> Nutt.	big sagebrush
5	ASPU9	<i>Astragalus purshii</i> Douglas ex Hook.	woollypod milkvetch
6	BACAC	<i>Balsamorhiza careyana</i> A. Gray var. <i>careyana</i>	Carey's balsamroot
7	BRAR5	<i>Bromus arvensis</i> L.	field brome
8	BRHOH	<i>Bromus hordeaceus</i> L. ssp. <i>hordeaceus</i>	soft brome
9	BRRA2	<i>Bromus racemosus</i> L.	bald brome
10	BRTE	<i>Bromus tectorum</i> L.	cheatgrass
11	CAMA5	<i>Calochortus macrocarpus</i> Douglas	sagebrush mariposa lily
12	CAFI	<i>Carex filifolia</i> Nutt. var. <i>filifolia</i>	
13	CASTI2	<i>Castilleja Mutis</i> ex L. f.	Indian paintbrush
14	CEST8	<i>Centaurea stoebe</i> L. <i>Crepis atribarba</i> A. Heller ssp. <i>originalis</i> (Babc. & Stebbins) Babc. & Stebbins	spotted knapweed slender hawkbeard
15	CRATO		
16	DELPH	<i>Delphinium</i> L.	larkspur
17	ERNA10	<i>Ericameria nauseosa</i> (Pall. ex Pursh) G.L. Nesom & Baird	rubber rabbitbrush
18	ERFI2	<i>Erigeron filifolius</i> (Hook.) Nutt. <i>Erigeron pumilus</i> Nutt. ssp. <i>intermedius</i> Cronquist var. <i>intermedius</i> (Cronquist) Cronquist	threadleaf fleabane shaggy fleabane
19	ERPUI2		
20	ERNI2	<i>Eriogonum niveum</i> Douglas ex Benth.	snow buckwheat
21	FRPU2	<i>Fritillaria pudica</i> (Pursh) Spreng.	yellow fritillary
22	HAWH	<i>Halimolobos whitedii</i> (Piper) Rollins	Whited's fissurewort
23	HECOC8	<i>Hesperostipa comata</i> (Trin. & Rupr.) Barkworth ssp. <i>comata</i>	needle and thread
24	HOUM	<i>Holosteum umbellatum</i> L.	jagged chickweed
25	LIPU11	<i>Leptodactylon pungens</i> (Torr.) Torr. ex Nutt.	
26	LOMA3	<i>Lomatium macrocarpum</i> (Nutt. ex Torr. & A. Gray) J.M. Coult. & Rose var. <i>artemisiarum</i> Piper	
27	PHHA	<i>Phacelia hastata</i> Douglas ex Lehm.	silverleaf phacelia
28	POSE	<i>Poa secunda</i> J. Presl	Sandberg bluegrass
29	PSSP6	<i>Pseudoroegneria spicata</i> (Pursh) A. Löve	bluebunch wheatgrass
30	SAKA	<i>Salsola kali</i> L.	Russian thistle
31	TECA2	<i>Tetradymia canescens</i> DC.	spineless horsebrush
32	TRDU	<i>Tragopogon dubius</i> Scop.	yellow salsify
33	ZIVE	<i>Zigadenus venenosus</i> S. Watson	meadow deathcamas

Vascular Plant Species of the Proposed Sewage Lagoon Expansion Area

#	Symbol	Scientific Name with Author	National Common Name
1	ACHY	<i>Achnatherum hymenoides</i> (Roem. & Schult.) Barkworth	Indian ricegrass
2	AGCR	<i>Agropyron cristatum</i> (L.) Gaertn.	crested wheatgrass
3	AMMEM2	<i>Amsinckia menziesii</i> (Lehm.) A. Nelson & J.F. Macbr. var. <i>menziesii</i>	Menzies' fiddleneck
4	APIN	<i>Apera interrupta</i> (L.) P. Beauv.	dense silkybent
5	ARPUL	<i>Aristida purpurea</i> Nutt. var. <i>longiseta</i> (Steud.) Vasey	Fendler threeawn
6	ARDR4	<i>Artemisia dracunculus</i> L.	tarragon
7	ARTR2	<i>Artemisia tridentata</i> Nutt.	big sagebrush
8	ARTR4	<i>Artemisia tripartita</i> Rydb.	threetip sagebrush
9	BACAC	<i>Balsamorhiza careyana</i> A. Gray var. <i>careyana</i>	Carey's balsamroot
10	BRHOH	<i>Bromus hordeaceus</i> L. ssp. <i>hordeaceus</i>	soft brome
11	BRTE	<i>Bromus tectorum</i> L.	cheatgrass
12	CEDI3	<i>Centaurea diffusa</i> Lam.	diffuse knapweed
13	CEST8	<i>Centaurea stoebe</i> L.	spotted knapweed
14	CHTH	<i>Chaenactis thompsonii</i> Cronquist	Thompson's pincushion
15	CHVIL4	<i>Chrysothamnus viscidiflorus</i> (Hook.) Nutt. ssp. <i>lanceolatus</i> (Nutt.) H.M. Hall & Clem.	yellow rabbitbrush
16	CIVU	<i>Cirsium vulgare</i> (Savi) Ten.	bull thistle
17	COLI2	<i>Collomia linearis</i> Nutt.	tiny trumpet
18	COUM	<i>Comandra umbellata</i> (L.) Nutt.	bastard toadflax
19	DELPH	<i>Delphinium</i> L.	larkspur
20	DESO2	<i>Descurainia sophia</i> (L.) Webb ex Prantl	herb sophia
21	ERNA10	<i>Ericameria nauseosa</i> (Pall. ex Pursh) G.L. Nesom & Baird	rubber rabbitbrush
22	ERIGE2	<i>Erigeron</i> L.	fleabane
23	ERLI	<i>Erigeron linearis</i> (Hook.) Piper	desert yellow fleabane
24	ERHE2	<i>Eriogonum heracleoides</i> Nutt.	parsnipflower buckwheat
25	ERNI2	<i>Eriogonum niveum</i> Douglas ex Benth.	snow buckwheat
26	FESTU	<i>Festuca</i> L.	fescue
27	HECOC8	<i>Hesperostipa comata</i> (Trin. & Rupr.) Barkworth ssp. <i>comata</i>	needle and thread
28	HOUM	<i>Holosteum umbellatum</i> L.	jagged chickweed
29	LIPU11	<i>Linanthus pungens</i> (Torr.) J.M. Porter & L.A. Johnson	granite prickly phlox
30	LIDA	<i>Linaria dalmatica</i> (L.) Mill.	Dalmatian toadflax
31	LITHO2	<i>Lithophragma</i> (Nutt.) Torr. & A. Gray	woodland-star
32	LOGR	<i>Lomatium grayi</i> (J.M. Coult. & Rose) J.M. Coult. & Rose	Gray's biscuitroot
33	LOMA3	<i>Lomatium macrocarpum</i> (Nutt. ex Torr. & A. Gray) J.M. Coult. & Rose var. <i>artemisiarum</i> Piper	
34	LUPIN	<i>Lupinus</i> L.	lupine
35	MEOF	<i>Melilotus officinalis</i> (L.) Lam.	yellow sweetclover
36	OPFR	<i>Opuntia fragilis</i> (Nutt.) Haw. var. <i>fragilis</i>	
37	PHHA	<i>Phacelia hastata</i> Douglas ex Lehm.	silverleaf phacelia
38	PHLI	<i>Phacelia linearis</i> (Pursh) Holz.	threadleaf phacelia
39	POSE	<i>Poa secunda</i> J. Presl	Sandberg bluegrass
40	PODO4	<i>Polygonum douglasii</i> Greene	Douglas' knotweed
41	PSSP6	<i>Pseudoroegneria spicata</i> (Pursh) A. Löve	bluebunch wheatgrass
42	SAKA	<i>Salsola kali</i> L.	Russian thistle
43	SIAL2	<i>Sisymbrium altissimum</i> L.	tall tumbledustard
44	VETH	<i>Verbascum thapsus</i> L.	common mullein
45	XAST	<i>Xanthium strumarium</i> L.	rough cocklebur
46	ZIVE	<i>Zigadenus venenosus</i> S. Watson	meadow deathcamas

Vascular Plant Species of the Middle Proposed Campground Expansion Area

#	Symbol	Scientific Name with Author	National Common Name
1	ACMI2	<i>Achillea millefolium</i> L.	common yarrow
2	ACHY	<i>Achnatherum hymenoides</i> (Roem. & Schult.) Barkworth	Indian ricegrass
3	AGCR	<i>Agropyron cristatum</i> (L.) Gaertn.	crested wheatgrass
4	ALLIU	<i>Allium</i> L.	onion
5	AMBRO	<i>Ambrosia</i> L.	ragweed
6	AMMEM2	<i>Amsinckia menziesii</i> (Lehm.) A. Nelson & J.F. Macbr. var. <i>menziesii</i>	Menzies' fiddleneck
7	APIN	<i>Apera interrupta</i> (L.) P. Beauv.	dense silkybent
8	ARPUL	<i>Aristida purpurea</i> Nutt. var. <i>longiseta</i> (Steud.) Vasey	Fendler threeawn
9	ARDR4	<i>Artemisia dracunculus</i> L.	tarragon
10	ARTR2	<i>Artemisia tridentata</i> Nutt.	big sagebrush
11	ARTR4	<i>Artemisia tripartita</i> Rydb.	threetip sagebrush
12	ASSP	<i>Asclepias speciosa</i> Torr.	showy milkweed
13	BACAC	<i>Balsamorhiza careyana</i> A. Gray var. <i>careyana</i>	Carey's balsamroot
14	BRHOH	<i>Bromus hordeaceus</i> L. ssp. <i>hordeaceus</i>	soft brome
15	BRTE	<i>Bromus tectorum</i> L.	cheatgrass
16	CAPE42	<i>Carex pellita</i> Muhl. ex Willd.	woolly sedge
17	CEDI3	<i>Centaurea diffusa</i> Lam.	diffuse knapweed
18	CESTM	<i>Centaurea stoebe</i> L. ssp. <i>micranthos</i> (Gugler) Hayek	spotted knapweed
19	CHTH	<i>Chaenactis thompsonii</i> Cronquist	Thompson's pincushion
20	CHVIL4	<i>Chrysothamnus viscidiflorus</i> (Hook.) Nutt. ssp. <i>lanceolatus</i> (Nutt.) H.M. Hall & Clem.	yellow rabbitbrush
21	CIVU	<i>Cirsium vulgare</i> (Savi) Ten.	bull thistle
22	COLI2	<i>Collomia linearis</i> Nutt.	tiny trumpet
23	DELPH	<i>Delphinium</i> L.	larkspur
24	DESO2	<i>Descurainia sophia</i> (L.) Webb ex Prantl	herb sophia
25	ELAN	<i>Elaeagnus angustifolia</i> L.	Russian olive
26	EQHY	<i>Equisetum hyemale</i> L.	scouringrush horsetail
27	ERNA10	<i>Ericameria nauseosa</i> (Pall. ex Pursh) G.L. Nesom & Baird	rubber rabbitbrush
28	ERFI2	<i>Erigeron filifolius</i> (Hook.) Nutt.	threadleaf fleabane
29	ERLI	<i>Erigeron linearis</i> (Hook.) Piper	desert yellow fleabane
30	ERHE2	<i>Eriogonum heracleoides</i> Nutt.	parsnipflower buckwheat
31	ERNI2	<i>Eriogonum niveum</i> Douglas ex Benth.	snow buckwheat
32	ERUM	<i>Eriogonum umbellatum</i> Torr.	sulphur-flower buckwheat
33	HAWH	<i>Halimolobos whitedii</i> (Piper) Rollins	Whited's fissurewort
34	HECOC8	<i>Hesperostipa comata</i> (Trin. & Rupr.) Barkworth ssp. <i>comata</i>	needle and thread
35	HOUH	<i>Holosteum umbellatum</i> L.	jagged chickweed
36	JUAR2	<i>Juncus arcticus</i> Willd.	arctic rush
37	LACTU	<i>Lactuca</i> L.	lettuce
38	LEPID	<i>Lepidium</i> L.	pepperweed
39	LIPU11	<i>Linanthus pungens</i> (Torr.) J.M. Porter & L.A. Johnson	granite prickly phlox
40	LIDA	<i>Linaria dalmatica</i> (L.) Mill.	Dalmatian toadflax
41	LITHO2	<i>Lithophragma</i> (Nutt.) Torr. & A. Gray	woodland-star
42	LOGR	<i>Lomatium grayi</i> (J.M. Coult. & Rose) J.M. Coult. & Rose	Gray's biscuitroot
43	LOMA3	<i>Lomatium macrocarpum</i> (Nutt. ex Torr. & A. Gray) J.M. Coult. & Rose	bigseed biscuitroot
44	LUPIN	<i>Lupinus</i> L.	lupine
45	MEOF	<i>Melilotus officinalis</i> (L.) Lam.	yellow sweetclover
46	OEPAP	<i>Oenothera pallida</i> Lindl. ssp. <i>pallida</i>	pale evening primrose

47	OPFR	<i>Opuntia fragilis</i> (Nutt.) Haw.	brittle pricklypear
48	PHHA	<i>Phacelia hastata</i> Douglas ex Lehm.	silverleaf phacelia
49	PHLI	<i>Phacelia linearis</i> (Pursh) Holz.	threadleaf phacelia
50	PHAR3	<i>Phalaris arundinacea</i> L.	reed canarygrass
51	PIPO	<i>Pinus ponderosa</i> C. Lawson	ponderosa pine
52	POBU	<i>Poa bulbosa</i> L.	bulbous bluegrass
53	POSE	<i>Poa secunda</i> J. Presl	Sandberg bluegrass
54	PODO4	<i>Polygonum douglasii</i> Greene	Douglas' knotweed
55	POBAT	<i>Populus balsamifera</i> L. ssp. <i>trichocarpa</i> (Torr. & A. Gray ex Hook.) Brayshaw	black cottonwood
56	RICE	<i>Ribes cereum</i> Douglas	wax currant
57	RUCR	<i>Rumex crispus</i> L.	curly dock
58	SAEX	<i>Salix exigua</i> Nutt.	narrowleaf willow
59	SAKA	<i>Salsola kali</i> L.	Russian thistle
60	SCAC3	<i>Schoenoplectus acutus</i> (Muhl. ex Bigelow) A. Löve & D. Löve	hardstem bulrush
61	SIAL2	<i>Sisymbrium altissimum</i> L.	tall tumbledustard
62	SOCA6	<i>Solidago canadensis</i> L.	Canada goldenrod
63	TAOF	<i>Taraxacum officinale</i> F.H. Wigg.	common dandelion
64	TORY	<i>Toxicodendron rydbergii</i> (Small ex Rydb.) Greene	western poison ivy
65	TRDU	<i>Tragopogon dubius</i> Scop.	yellow salsify
66	VETH	<i>Verbascum thapsus</i> L.	common mullein
67	ZIVE	<i>Zigadenus venenosus</i> S. Watson	meadow deathcamas

Vascular Plant Species of the Northern Proposed Campground Expansion Area

#	Symbol	Scientific Name with Author	National Common Name
1	ACMI2	<i>Achillea millefolium</i> L.	common yarrow
2	ACHY	<i>Achnatherum hymenoides</i> (Roem. & Schult.) Barkworth	Indian ricegrass
3	AGCR	<i>Agropyron cristatum</i> (L.) Gaertn.	crested wheatgrass
4	AMBRO	<i>Ambrosia</i> L.	ragweed
5	AMAL2	<i>Amelanchier alnifolia</i> (Nutt.) Nutt. ex M. Roem.	Saskatoon serviceberry
6	APIN	<i>Apera interrupta</i> (L.) P. Beauv.	dense silkybent
7	ARPUL	<i>Aristida purpurea</i> Nutt. var. <i>longiseta</i> (Steud.) Vasey	Fendler threeawn
8	ARDR4	<i>Artemisia dracunculus</i> L.	tarragon
9	ARTR2	<i>Artemisia tridentata</i> Nutt.	big sagebrush
10	ARTR4	<i>Artemisia tripartita</i> Rydb.	threetip sagebrush
11	ASSP	<i>Asclepias speciosa</i> Torr.	showy milkweed
12	ATRIP	<i>Atriplex</i> L.	saltbush
13	BACAC	<i>Balsamorhiza careyana</i> A. Gray var. <i>careyana</i>	Carey's balsamroot
14	BRHOH	<i>Bromus hordeaceus</i> L. ssp. <i>hordeaceus</i>	soft brome
15	BRTE	<i>Bromus tectorum</i> L.	cheatgrass
16	CAPE42	<i>Carex pellita</i> Muhl. ex Willd.	woolly sedge
17	CEDI3	<i>Centaurea diffusa</i> Lam.	diffuse knapweed
18	CESTM	<i>Centaurea stoebe</i> L. ssp. <i>micranthos</i> (Gugler) Hayek	spotted knapweed
19	CHAEN	<i>Chaenactis</i> DC.	pincushion
20	CHVIL4	<i>Chrysothamnus viscidiflorus</i> (Hook.) Nutt. ssp. <i>lanceolatus</i> (Nutt.) H.M. Hall & Clem.	yellow rabbitbrush
21	CIAR4	<i>Cirsium arvense</i> (L.) Scop.	Canada thistle
22	CIUN	<i>Cirsium undulatum</i> (Nutt.) Spreng.	wavyleaf thistle
23	CIVU	<i>Cirsium vulgare</i> (Savi) Ten.	bull thistle
24	COUM	<i>Comandra umbellata</i> (L.) Nutt.	bastard toadflax
25	CREPI	<i>Crepis</i> L.	hawksbeard
26	DESO2	<i>Descurainia sophia</i> (L.) Webb ex Prantl	herb sophia
27	ELAN	<i>Elaeagnus angustifolia</i> L.	Russian olive

28	ELAN	<i>Elaeagnus angustifolia</i> L.	Russian olive
29	EQHY	<i>Equisetum hyemale</i> L.	scouringrush horsetail
30	ERNA10	<i>Ericameria nauseosa</i> (Pall. ex Pursh) G.L. Nesom & Baird	rubber rabbitbrush
31	ERNI2	<i>Eriogonum niveum</i> Douglas ex Benth.	snow buckwheat
32	ERCAC	<i>Erysimum capitatum</i> (Douglas ex Hook.) Greene var. <i>capitatum</i>	sanddune wallflower
33	GYPA	<i>Gypsophila paniculata</i> L.	baby's breath
34	HAWH	<i>Halimolobos whitedii</i> (Piper) Rollins	Whited's fissurewort
35	HECOC8	<i>Hesperostipa comata</i> (Trin. & Rupr.) Barkworth ssp. <i>comata</i>	needle and thread
36	HOUM	<i>Holosteum umbellatum</i> L.	jagged chickweed
37	JUAR2	<i>Juncus arcticus</i> Willd.	arctic rush
38	LIPU11	<i>Linanthus pungens</i> (Torr.) J.M. Porter & L.A. Johnson	granite prickly phlox
39	LIDA	<i>Linaria dalmatica</i> (L.) Mill.	Dalmatian toadflax
40	LITHO2	<i>Lithophragma</i> (Nutt.) Torr. & A. Gray	woodland-star
41	LOGR	<i>Lomatium grayi</i> (J.M. Coult. & Rose) J.M. Coult. & Rose	Gray's biscuitroot
42	LOMA3	<i>Lomatium macrocarpum</i> (Nutt. ex Torr. & A. Gray) J.M. Coult. & Rose	bigseed biscuitroot
43	LOTR2	<i>Lomatium triternatum</i> (Pursh) J.M. Coult. & Rose	nineleaf biscuitroot
44	LUSE4	<i>Lupinus sericeus</i> Pursh	silky lupine
45	MEOF	<i>Melilotus officinalis</i> (L.) Lam.	yellow sweetclover
46	OEPAP	<i>Oenothera pallida</i> Lindl. ssp. <i>pallida</i>	pale evening primrose
47	OPFR	<i>Opuntia fragilis</i> (Nutt.) Haw.	brittle pricklypear
48	PHHA	<i>Phacelia hastata</i> Douglas ex Lehm.	silverleaf phacelia
49	PHLI	<i>Phacelia linearis</i> (Pursh) Holz.	threadleaf phacelia
50	PHAR3	<i>Phalaris arundinacea</i> L.	reed canarygrass
51	PHLO2	<i>Phlox longifolia</i> Nutt.	longleaf phlox
52	PIPO	<i>Pinus ponderosa</i> C. Lawson	ponderosa pine
53	POSE	<i>Poa secunda</i> J. Presl	Sandberg bluegrass
54	PODO4	<i>Polygonum douglasii</i> Greene	Douglas' knotweed
55	POBAT	<i>Populus balsamifera</i> L. ssp. <i>trichocarpa</i> (Torr. & A. Gray ex Hook.) Brayshaw	black cottonwood
56	PSSP6	<i>Pseudoroegneria spicata</i> (Pursh) A. Löve	bluebunch wheatgrass
57	RICE	<i>Ribes cereum</i> Douglas	wax currant
58	SAEX	<i>Salix exigua</i> Nutt.	narrowleaf willow
59	SAKA	<i>Salsola kali</i> L.	Russian thistle
60	SCAC3	<i>Schoenoplectus acutus</i> (Muhl. ex Bigelow) A. Löve & D. Löve	hardstem bulrush
61	SIAL2	<i>Sisymbrium altissimum</i> L.	tall tumbledustard
62	SOCA6	<i>Solidago canadensis</i> L.	Canada goldenrod
63	TAOFC	<i>Taraxacum officinale</i> F.H. Wigg. ssp. <i>ceratophorum</i> (Ledeb.) Schinz ex Thell.	common dandelion
64	TRDU	<i>Tragopogon dubius</i> Scop.	yellow salsify
65	TYLA	<i>Typha latifolia</i> L.	broadleaf cattail
66	VETH	<i>Verbascum thapsus</i> L.	common mullein
67	XAST	<i>Xanthium strumarium</i> L.	rough cocklebur

Ecological Condition of the Project Area and Recommendations

The ecological condition of the proposed campground expansion areas vary from poor to good according to the four ecological condition classes that I used to rate the vegetation communities (Figure 15). Much of the area has been subject to past disturbances related to park and reservoir development activities.

Most of the proposed water tank and sewage lagoon expansion areas both had poor ecological condition, primarily because of the extensive disturbances that have occurred in these areas in the past. There is a large infestation of Dalmation toadflax mixed with other exotic and native plants at the proposed sewage lagoon expansion site (Figure 14). However, in the westernmost portion of the proposed sewage lagoon expansion area, a gentle hillside is covered with a native bunchgrass community which is in good ecological condition (Figure 8), but only comprises a small part of the polygon (less than 2 acres in size). It is listed as a secondary plant association for this community; therefore the ecological condition of this small area is not illustrated in Figure 15. I recommend that this area be protected from development and disturbance activities when the sewage lagoon is expanded. It is also not an ideal area for the proposed sewage lagoon expansion because of the hillside. A more suitable location for the proposed sewage lagoon expansion occurs on relatively flat and more disturbed land to the east of this hillside. The Dalmation toadflax infestation in the eastern portion of polygon 10A can be taken care of during the proposed sewage lagoon construction activities. Some of the infestation would be destroyed due to the the extensive grading, excavation and construction involved in building the proposed sewage lagoon. The rest of the infestation could be treated with mechanical or chemical control measures.



Figure 14. Dalmation toadflax infestation at proposed sewage lagoon expansion site.

The proposed water tank expansion should be easy to accomplish at the proposed site adjacent to the existing water tank. This area is already significantly disturbed (Figure 8).

The middle proposed campground expansion area is currently largely in poor ecological condition, in part due to a wildfire that burned much of the area during the late summer of 2007. The area of the wildfire is confined to Polygon 3A (Figure 6). The unburned portions of this proposed campground expansion area are generally in good ecological condition. The area burned by the 2007 wildfire is recovering remarkably well and the ecological condition of this area may return to a good condition in a decade if it is left undisturbed.

The northern proposed campground expansion area is currently largely in good ecological condition except for parts that get very high recreational use and areas that appear to have been excavated or scrapped during park development or reservoir development activities in the past decades. There are a few ponderosa pines growing on the north side of a sand dune in this area (Polygon 8). These were probably planted during park development in the past decades as they would not normally be found on this site.

The exposed sand areas in the two proposed campground expansion areas do not appear to be natural features and the open sand condition is maintained in part due to high recreational use (Figure 10). Vegetation may have been removed from these areas during park development activities.

The wetlands along the shore of Banks Lake are artificial wetlands created as a result of the high water table from the reservoir. Although they provide a pleasant visual and recreational atmosphere, they do not have a high ecological value (Figure 11). These wetlands were rated as Class III wetlands by The Watershed Company (2007).

A map of the overall ecological condition is presented in Figure 15.



Figure 15. Ecological condition ranks of vegetation polygons.

GIS Products Produced

Associated with this report are polygon layers created by Pacific Biodiversity Institute depicting the vegetation community types mapped in the project area of within Steamboat Rock State Park. The datasets have been converted into ESRI shapefile formats and provided to the Washington State Parks and Recreation Commission. The spatial datasets are complete with metadata meeting FGDC standards. Refer to the associated metadata for descriptions and attribute definitions for each spatial dataset.

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Appendix A – 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 following 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 is 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 impact the area. Direct signs of human-induced ecological stress are infrequent. Some rare plant and animal species may exist within this condition class.

■ Marginal 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 high 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 impact 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 impact the area. Direct signs of human-induced ecological stress are frequent. Rare plant and animal species are seldom encountered within this condition class.

Appendix B – Vegetation Survey Data

Legend:

Site = name of locality of map project

Polygon = number you put on map

Name/Date = your name / day-month-year completed polygon survey

Photo roll/number = number of roll (on canister) and number of shot

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

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

TOTAL VEGETATION COVER includes all vascular plants, mosses, lichens and foliose lichens (crustose lichens excluded they are considered rock); this never exceeds 100%.

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.

SOIL SURFACE estimate to nearest % the following, the sum of the categories adds to 100%

Rock outcrop = exposed bedrock including detached boulders over 1m across

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

Describe in comments if there is wide variation in any category; note % standing water if it is persistent or characteristic of site.

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

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 to ground soil compaction or churning)
- 2 = active moderate grazing (25-75% forage used)
- 3 = active light grazing (lots of last years 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

Plant Association (PA) = list all PAs encountered in polygon survey, in comments list source of name if not on provided key.

Condition Rank of PA in key or estimate

% of Polygon = your estimate

Pattern = how PA is distributed in polygon

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

Exotic = primary species observed; secondary species observed.

Plot Number = number of any plots established for EO (element occurrence), or other more detail sheets within polygon.

Polygon Number 1

Survey Intensity 1
 Observer PM
 Date 6/5/2008
 Specific Location SW campground expansion area

Total Vegetation 3
 Trees Total 2
 Dominant Trees domestic popular-plant I.D.
 emergent 0
 maincanopy 0
 subcanopy 2
 Shrubs Total 2
 Dominant Shrubs ERNA10, ERNI2
 > 1.5' tall 2
 < 1.5' tall 1
 Graminoids Total 2
 Dominant Graminoids BRTE, HECOC8, PSSPS, FEID
 Graminoids Perennial 2
 Graminoids Annual 2
 Forbs Total 2
 Dominant Forbs ARDR4, OEPAP, LOGR, PHLI, PHHA
 Forbs Perennial 2
 Forbs Annual 1
 Ferns Total 0
 Ferns Evergreen 0
 Ferns Deciduous 0
 Exotics Total 2
 Exotics Perennial 0
 Exotics Annual 2
 Water 0
 Rock Outcrop 0
 Gravel 0
 Logging 0
 Fire: 0
 Stand Age 1
 Agriculture 0
 Livestock 0
 Development 6
 Wildlife 0
 Recreation Severity 1
 Recreation Type 3 Lots of foot traffic
 Hydrology 1

Exotic Species

Noxious Exotic Plants

Other Exotic Plants
 BTRE

Bare Ground 92
 Moss Lichen 0
 Litter 8

Existing Vegetation Types	Percent	Pattern	Rank
1. SAND	95	Matrix	Poor
2. ERNAN3-ERNI2/perennial grasses and forbs	5	Small patch	Poor
3.	0		

Notes:

Polygon Number 10A

Survey Intensity 1
 Observer PM
 Date 6/5/2008
 Specific Location sewage lagoon expansion - main part

Total Vegetation 5
 Trees Total 0
 Dominant Trees
 emergent 0
 maincanopy 0
 subcanopy 0
 Shrubs Total 3
 Dominant Shrubs CHVI, ARTR2
 > 1.5' tall 3
 < 1.5' tall 2
 Graminoids Total 4
 Dominant Graminoids BRTE, HECOC8
 Graminoids Perennial 3
 Graminoids Annual 4
 Forbs Total 3
 Dominant Forbs ARDR4, LIDAD, BACAC, LUSE, ACMI2, PHLI
 Forbs Perennial 3
 Forbs Annual 2
 Ferns Total 0
 Ferns Evergreen 0
 Ferns Deciduous 0
 Exotics Total 4
 Exotics Perennial 3
 Exotics Annual 4
 Water 0
 Rock Outcrop 0
 Gravel 0
 Logging 0
 Fire: 0
 Stand Age 1
 Agriculture 0
 Livestock 0
 Development 6
 Wildlife 0
 Recreation Severity 3
 Recreation Type 3
 Hydrology 1

Exotic Species

Noxious Exotic Plants
 LIDAD
Other Exotic Plants
 BRTE, ARDR4

Bare Ground 15
Moss Lichen 0
Litter 85

Existing Vegetation Types

	Percent	Pattern	Rank
1. <i>Ericameria nauseosa</i> – <i>Chrysothamnus</i>	90	Matrix	Poor
2. <i>Chrysothamnus vicidiflorus</i> - <i>Ericameria</i>	10	Small patch	Good
3.	0		

Notes:

Polygon Number 10B

Survey Intensity 1
Observer PM
Date 6/5/2008
Specific Location sewage lagoon expansion - previously disturbed part

Total Vegetation 4
Trees Total 0
Dominant Trees
 emergent 0
 maincanopy 0
 subcanopy 0
Shrubs Total 3
Dominant Shrubs CHVI, ARTR2
 > 1.5' tall 3
 < 1.5' tall 3
Graminoids Total 4
Dominant Graminoids BRTE, HECOC8
Graminoids Perennial 3
Graminoids Annual 4
Forbs Total 3
Dominant Forbs ARDR4, LIDAD, BACAC, LUSE, ACMI2, PHLI
Forbs Perennial 2
Forbs Annual 2
Ferns Total 0
Ferns Evergreen 0
Ferns Deciduous 0
Exotics Total 4
Exotics Perennial 3
Exotics Annual 4
Water 0
Rock Outcrop 0
Gravel 0
Logging 0
Fire: 0
Stand Age 1
Agriculture 0
Livestock 0
Development 6
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 1

Exotic Species

Noxious Exotic Plants
 LIDAD
Other Exotic Plants
 BRTE, ARDR4

Bare Ground 25
Moss Lichen 0
Litter 75

Existing Vegetation Types

	Percent	Pattern	Rank
1. <i>Ericameria nauseosa</i> – <i>Chrysothamnus</i>	100	Matrix	Poor
2.	0		
3.	0		

Notes: This area is more disturbed than 10A. It was disturbed during construction of the existing lagoons.

Polygon Number 11

Survey Intensity 1
Observer PM
Date 6/5/2008
Specific Location unburned area in SW campground expansion

Total Vegetation 5
Trees Total 0
Dominant Trees
 emergent 0
 maincanopy 0
 subcanopy 0
Shrubs Total 4
Dominant Shrubs ERNA10, CHVI, ERNI2, ARTR2
 > 1.5' tall 4
 < 1.5' tall 3
Graminoids Total 4
Dominant Graminoids BRTE, POBU, HERCOC8, PSSPS
Graminoids Perennial 3
Graminoids Annual 4
Forbs Total 3
Dominant Forbs BACAC, LUSE, PHLI, DESO, ARDR4
Forbs Perennial 3
Forbs Annual 2
Ferns Total 0
Ferns Evergreen 0
Ferns Deciduous 0
Exotics Total 4
Exotics Perennial 2
Exotics Annual 4
Water 0
Rock Outcrop 0
Gravel 0
Logging 0
Fire: 0
Stand Age 1
Agriculture 0
Livestock 0
Development 0
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 1

Exotic Species

Noxious Exotic Plants
 LIDA
Other Exotic Plants
 POBU, BRTE, ARDR4

Bare Ground 12
Moss Lichen 0
Litter 88

Existing Vegetation Types

	Percent	Pattern	Rank
1. <i>Ericameria nauseosa</i> – <i>Chrysothamnus</i>	100	Matrix	Good
2.	0		
3.	0		

Notes:

Polygon Number 12

Survey Intensity 1
 Observer PM
 Date 6/5/2008
 Specific Location water tank expansion area

Total Vegetation 4
 Trees Total 0
 Dominant Trees
 emergent 0
 maincanopy 0
 subcanopy 0
 Shrubs Total 3
 Dominant Shrubs ARTR2, ERNA10, LIPU11, ERNI2
 > 1.5' tall 3
 < 1.5' tall 2
 Graminoids Total 3
 Dominant Graminoids POSE, BRTE, BRAR5, PSSP6, ARPUL, POBU, HECOC8
 Graminoids Perennial 2
 Graminoids Annual 2
 Forbs Total 3
 Dominant Forbs BACAC, CRATO, ACMI2, PHHA, ZIVE
 Forbs Perennial 2
 Forbs Annual 1
 Ferns Total 0
 Ferns Evergreen 0
 Ferns Deciduous 0
 Exotics Total 3
 Exotics Perennial 2
 Exotics Annual 2
 Water 0
 Rock Outcrop 0
 Gravel 30
 Logging 0
 Fire: 0
 Stand Age 1
 Agriculture 0
 Livestock 0
 Development 6
 Wildlife 0
 Recreation Severity 1
 Recreation Type 4
 Hydrology 1

Exotic Species

Noxious Exotic Plants
 CEST8, SAKA
Other Exotic Plants
 BRTE, POBU

Bare Ground 28
Moss Lichen 2
Litter 40

Existing Vegetation Types

Existing Vegetation Types	Percent	Pattern	Rank
1. Artemesia tridentata - Ericameria nauseosa	100	Matrix	Poor
2.	0		
3.	0		

Notes: water tank area is highly disturbed by previous development and existing roads

Polygon Number 2

Survey Intensity 1
 Observer PM
 Date 6/5/2008
 Specific Location unburned area in SW campground expansion

Total Vegetation 5
 Trees Total 0
 Dominant Trees
 emergent 0
 maincanopy 0
 subcanopy 0
 Shrubs Total 4
 Dominant Shrubs ERNA10, CHVI, ERNI2, ARTR2
 > 1.5' tall 4
 < 1.5' tall 3
 Graminoids Total 4
 Dominant Graminoids BRTE, POBU, HERCOC8, PSSPS
 Graminoids Perennial 3
 Graminoids Annual 4
 Forbs Total 3
 Dominant Forbs BACAC, LUSE, PHLI, DESO, ARDR4
 Forbs Perennial 3
 Forbs Annual 2
 Ferns Total 0
 Ferns Evergreen 0
 Ferns Deciduous 0
 Exotics Total 4
 Exotics Perennial 2
 Exotics Annual 4
 Water 0
 Rock Outcrop 0
 Gravel 0
 Logging 0
 Fire: 0
 Stand Age 1
 Agriculture 0
 Livestock 0
 Development 0
 Wildlife 0
 Recreation Severity 3
 Recreation Type 3
 Hydrology 1

Exotic Species

Noxious Exotic Plants

Other Exotic Plants

POBU, BRTE, ARDR4

Bare Ground 12
 Moss Lichen 0
 Litter 88

Existing Vegetation Types

	Percent	Pattern	Rank
1. <i>Ericameria nauseosa</i> – <i>Chrysothamnus</i>	100	Matrix	Good
2.	0		
3.	0		

Notes:

Polygon Number 3A

Survey Intensity 1
 Observer PM
 Date 6/5/2008
 Specific Location SW campground expansion, burned area

 Total Vegetation 4
 Trees Total 0
 Dominant Trees
 emergent 0
 maincanopy 0
 subcanopy 0
 Shrubs Total 2
 Dominant Shrubs CHVI, ERNA10, ERN12
 > 1.5' tall 1
 < 1.5' tall 2
 Graminoids Total 3
 Dominant Graminoids HERCOC8, BRTE,
 Graminoids Perennial 2
 Graminoids Annual 3
 Forbs Total 3
 Dominant Forbs BACAC, LUSE, ADMI2, ARDR4, PHLI, DESO2, OPFR, LOGR
 Forbs Perennial 3
 Forbs Annual 2
 Ferns Total 0

 Ferns Evergreen 0
 Ferns Deciduous 0
 Exotics Total 3
 Exotics Perennial 2
 Exotics Annual 3
 Water 0
 Rock Outcrop 0
 Gravel 0
 Logging 0
 Fire: burned in 2007
 Stand Age 1
 Agriculture 0
 Livestock 0
 Development 0
 Wildlife 0
 Recreation Severity 3
 Recreation Type 3
 Hydrology 1

Exotic Species

Noxious Exotic Plants

LIDAD

Other Exotic Plants

BRTE, ARDR4, DESO,

Bare Ground 60
Moss Lichen 0
Litter 40

Existing Vegetation Types

	Percent	Pattern	Rank
1. <i>Ericameria nauseosa</i> – <i>Chrysothamnus</i>	100	Matrix	Poor
2.	0		
3.	0		

Notes: Good regeneration of fords and some native grasses after fire; lots of BRTE; most of shrubs burned and dead so cover low.

Polygon Number 3B

Survey Intensity 1
 Observer PM
 Date 6/5/2008
 Specific Location shoreline in SW campground expansion area

Total Vegetation 5
 Trees Total 2
 Dominant Trees POBAT
 emergent 1
 maincanopy 2
 subcanopy 1
 Shrubs Total 2
 Dominant Shrubs SAEX, Salix, TORY
 > 1.5' tall 2
 < 1.5' tall 1
 Graminoids Total 5
 Dominant Graminoids JUAR, CAPE42, SCAC3, PHAR3, BRTE
 Graminoids Perennial 5
 Graminoids Annual 1
 Forbs Total 2
 Dominant Forbs CESTM, SOCA6, VETH, MEOF
 Forbs Perennial 2
 Forbs Annual 2
 Ferns Total 0
 Ferns Evergreen 0
 Ferns Deciduous 0
 Exotics Total 3
 Exotics Perennial 3
 Exotics Annual 1
 Water 0
 Rock Outcrop 0
 Gravel 0
 Logging 0
 Fire: unburned in 2007
 Stand Age 1
 Agriculture 0
 Livestock 0
 Development 6
 Wildlife 0
 Recreation Severity 2
 Recreation Type 3
 Hydrology 2

Exotic Species

Noxious Exotic Plants
 CESTM, PHAR3
Other Exotic Plants
 VETH, BRTE, MEOF

Bare Ground 3
Moss Lichen 0
Litter 97

Existing Vegetation Types

	Percent	Pattern	Rank
1. Banks Lake shoreline artificial wetland	100	Matrix	Fair
2.	0		
3.	0		

Notes: This is the reservoir with riparian vegetation and/or wetland. Lots of alien plants; this is on artificial, created wetland area due to reservoir inundation.

Polygon Number 4

Survey Intensity 1
 Observer PM
 Date 6/5/2008
 Specific Location SW campground expansion area

Total Vegetation 3
 Trees Total 2
 Dominant Trees
 emergent 0
 maincanopy 0
 subcanopy 2
 Shrubs Total 2
 Dominant Shrubs ERNA10, ERNI2
 > 1.5' tall 2
 < 1.5' tall 1
 Graminoids Total 2
 Dominant Graminoids BRTE, HECOC8, PSSPS, FEID, ACHY
 Graminoids Perennial 2
 Graminoids Annual 2
 Forbs Total 2
 Dominant Forbs ARDR4, OEPAP, LOGR, PHLI, PHHA
 Forbs Perennial 2
 Forbs Annual 1
 Ferns Total 0

Exotic Species

Ferns Evergreen 0
 Ferns Deciduous 0
 Exotics Total 2
 Exotics Perennial 0
 Exotics Annual 2

Noxious Exotic Plants

Other Exotic Plants
 BTRE

Water 0
 Rock Outcrop 0
 Gravel 0
 Logging 0
 Fire: 0
 Stand Age 1
 Agriculture 0
 Livestock 0
 Development 6
 Wildlife 0
 Recreation Severity 1
 Recreation Type 3
 Hydrology 1

Bare Ground 92
 Moss Lichen 0
 Litter 8

Existing Vegetation Types

Existing Vegetation Types	Percent	Pattern	Rank
1. SAND	95	Matrix	Poor
2. ERNAN3-ERNI2/perennial grasses and forbs	5	Small patch	Poor
3.	0		

Notes:

Polygon Number 5

Survey Intensity 1
 Observer PM
 Date 7/27/2008
 Specific Location Sandy area on NE side of east camp expansion

Total Vegetation 3
 Trees Total 0
 Dominant Trees
 emergent 0
 maincanopy 0
 subcanopy 0
 Shrubs Total 3
 Dominant Shrubs ERNA10, ERNI2, CHVI
 > 1.5' tall 3
 < 1.5' tall 2
 Graminoids Total 3
 Dominant Graminoids BRTE, ACHY, HECOC8, PSSPS
 Graminoids Perennial 2
 Graminoids Annual 2
 Forbs Total 2
 Dominant Forbs PHHA, OEPAP, ARDR4, LUSE, CHDO
 Forbs Perennial 2
 Forbs Annual 1
 Ferns Total 0
 Ferns Evergreen 0
 Ferns Deciduous 0
 Exotics Total 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 6 Stripped during
 Wildlife 3
 Recreation Severity 3
 Recreation Type 3
 Hydrology 1

Exotic Species

Noxious Exotic Plants

Other Exotic Plants
 BRTE, ARDR4, POBU

Bare Ground 80
 Moss Lichen 3
 Litter 17

Existing Vegetation Types

Existing Vegetation Types	Percent	Pattern	Rank
1. SAND	60	Matrix	Fair
2. ERNAN3-ERNI2-CHVI/HECO-ACHY-OEPA	40	Small patch	Good
3.	0		

Notes:

Polygon Number 6A

Survey Intensity 1
 Observer PM
 Date 7/27/2008
 Specific Location main portion of east campground expansion area

Total Vegetation 4
 Trees Total 0
 Dominant Trees
 emergent 0
 maincanopy 0
 subcanopy 0
 Shrubs Total 4
 Dominant Shrubs ERNA10, CHVI, LIPU11
 > 1.5' tall 3
 < 1.5' tall 2
 Graminoids Total 3
 Dominant Graminoids BRTE, ACHY, HECOC8, PSSPS
 Graminoids Perennial 3
 Graminoids Annual 2
 Forbs Total 3
 Dominant Forbs PHHA, OEPAP, LIDAD, ARDR4
 Forbs Perennial 3
 Forbs Annual 1
 Ferns Total 0

Exotic Species

Ferns Evergreen 0
 Ferns Deciduous 0
 Exotics Total 2
 Exotics Perennial 2
 Exotics Annual 0
 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

Noxious Exotic Plants
 LIDAD
Other Exotic Plants
 BRTE

Bare Ground 35
Moss Lichen 5
Litter 60

Existing Vegetation Types

	Percent	Pattern	Rank
1. Ericameria nauseosa – Chrysothamnus	100	Matrix	Good
2.	0		
3.	0		

Notes: The main part of the polygon has some dense shrubs, some areas are more sparse and sandy. A fair bit of biotic crust in places.

Polygon Number 6B

Survey Intensity 1
Observer PM
Date 7/27/2008
Specific Location Developed area on eastern edge of east campground expansion survey area
Total Vegetation 5
Trees Total 3
Dominant Trees exotics
emergent 0
maincanopy 3
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 10
Logging 0
Fire: 0
Stand Age 2
Agriculture 0
Livestock 0
Development 6
Wildlife 0
Recreation Severity 1
Recreation Type 4
Hydrology 2

Exotic Species

Noxious Exotic Plants

Other Exotic Plants

Bare Ground 5
Moss Lichen 0
Litter 85

Existing Vegetation Types

	Percent	Pattern	Rank
1. Developed Area	100	Matrix	Poor
2.	0		
3.	0		

Notes: Developed portion of existing park developments - did not survey.

Polygon Number 7

Survey Intensity 1
 Observer PM
 Date 7/27/2008
 Specific Location shoreline in east campground expansion area

Total Vegetation 5
 Trees Total 3
 Dominant Trees POBAT
 emergent 0
 maincanopy 3
 subcanopy 0
 Shrubs Total 2
 Dominant Shrubs ERNA10, ELAN
 > 1.5' tall 2
 < 1.5' tall 0
 Graminoids Total 4
 Dominant Graminoids PHAR3, JUAR2, BRTE, APIN
 Graminoids Perennial 4
 Graminoids Annual 2
 Forbs Total 4
 Dominant Forbs ARDR4, MEOF, SOCA6, VETH, CEDI3, EQHY, TYLA
 Forbs Perennial 4
 Forbs Annual 1
 Ferns Total 0
 Ferns Evergreen 0
 Ferns Deciduous 0
 Exotics Total 3
 Exotics Perennial 3
 Exotics Annual 2
 Water 1
 Rock Outcrop 0
 Gravel 0
 Logging 0
 Fire: 0
 Stand Age 1
 Agriculture 0
 Livestock 0
 Development 6 EDGE OF
 Wildlife 3
 Recreation Severity 2
 Recreation Type 3
 Hydrology 2

Exotic Species

Noxious Exotic Plants
 CIAR4, LIDAD, CEDI3, CIVU
Other Exotic Plants
 VETH BRTE, PHAR3

Bare Ground 25
Moss Lichen 0
Litter 74

Existing Vegetation Types

	Percent	Pattern	Rank
1. Banks Lake shoreline artificial wetland	100	Matrix	Fair
2.	0		
3.	0		

Notes: This is the reservoir with riparian vegetation and/or wetland. Lots of alien plants; this is on artificial, created wetland area due to reservoir inundation.

Polygon Number 8

Survey Intensity 1
 Observer PM
 Date 7/27/2008
 Specific Location NE of campground

Total Vegetation 4
 Trees Total 2
 Dominant Trees PIPO
 emergent 0
 maincanopy 2
 subcanopy 0
 Shrubs Total 4
 Dominant Shrubs CHVI, ERNA10, ERNI2
 > 1.5' tall 3
 < 1.5' tall 3
 Graminoids Total 3
 Dominant Graminoids BRTE, ACHY, POBU
 Graminoids Perennial 2
 Graminoids Annual 3
 Forbs Total 3
 Dominant Forbs LOGR, BACAC, ARDR4, LUPIN, ACMI2, PHLI
 Forbs Perennial 3
 Forbs Annual 1
 Ferns Total 0
 Ferns Evergreen 0
 Ferns Deciduous 0
 Exotics Total 3
 Exotics Perennial 1
 Exotics Annual 3
 Water 0
 Rock Outcrop 0
 Gravel 0
 Logging 0
 Fire: 0
 Stand Age 2
 Agriculture 0
 Livestock 0
 Development 6
 Wildlife 3
 Recreation Severity 1
 Recreation Type 3
 Hydrology 1

Exotic Species

Noxious Exotic Plants

Other Exotic Plants
 POBU, BRTE

Bare Ground 35
 Moss Lichen 0
 Litter 65

Existing Vegetation Types

	Percent	Pattern	Rank
1. Ericameria nauseosa – Chrysothamnus	95	Matrix	Good
2. PIPO/CHVI-ERNAN3/BACAC-LOGR-ACHY	5	Small patch	Good
3.	0		

Notes: Sand dune; In good to fair condition, but lots of BRTE, moderate pedestrian traffic

Polygon Number 9

Survey Intensity 1
Observer PM
Date 7/27/2008
Specific Location exposed sand dune in east campground expansion area

Total Vegetation 3
Trees Total 0
Dominant Trees
 emergent 0
 maincanopy 0
 subcanopy 0
Shrubs Total 2
Dominant Shrubs ERNA10, CHVI, ERN12
 > 1.5' tall 2
 < 1.5' tall 2
Graminoids Total 2
Dominant Graminoids BRTE, ACHY
Graminoids Perennial 1
Graminoids Annual 2
Forbs Total 2
Dominant Forbs LOGR, PHHA, PHLI, OEPAP
Forbs Perennial 1
Forbs Annual 1
Ferns Total 0

Exotic Species

Ferns Evergreen 0
Ferns Deciduous 0
Exotics Total 2
Exotics Perennial 0
Exotics Annual 2
Water 0
Rock Outcrop 0
Gravel 0
Logging 0
Fire: 0
Stand Age 1
Agriculture 0
Livestock 0
Development 6
Wildlife 3
Recreation Severity 1
Recreation Type 3
Hydrology 1

Noxious Exotic Plants
 SAKA
Other Exotic Plants
 BRTE
Bare Ground 95
Moss Lichen 0
Litter 5

Existing Vegetation Types

Existing Vegetation Types	Percent	Pattern	Rank
1. SAND	95	Matrix	Poor
2. ERNAN3-ERN12-CHVI/LOGR-BRTE-ACHY	5	Small patch	Poor
3.	0		

Notes: This is an open sand play area adjacent to campground and it gets a lot of use.