

Rare Plant and Vegetation Survey of Saint Edward State Park



Pacific Biodiversity Institute

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Table of Contents

Introduction	5
Survey Routes	5
Vegetation Communities	6
Methods.....	6
Results.....	6
Examples of Vegetation Community Types.....	10
Rare Plant Surveys.....	18
Methods.....	18
Results.....	18
<i>Rare Plants</i>	18
<i>Vascular Plant List for Saint Edward State Park</i>	18
<i>Discussion</i>	22
Ecological Condition of Saint Edward State Park	23
GIS Products Produced	24
References	24
Appendix A – Field Survey Schedule	25
Appendix B – Description of Rare Element Status Codes.....	26
Appendix C – Ecological Condition Ranking System	27
Appendix D – Vegetation Survey Data	29

Introduction

Under contract with the Washington State Parks and Recreation Commission Saint Edward State Park, located in King County, was surveyed for rare plant occurrences and mapped according to vegetation communities by Pacific Biodiversity Institute (PBI). Vegetation data was collected for all the mapped vegetation types. This report summarizes the activities and findings of the contracted work.

Survey Routes

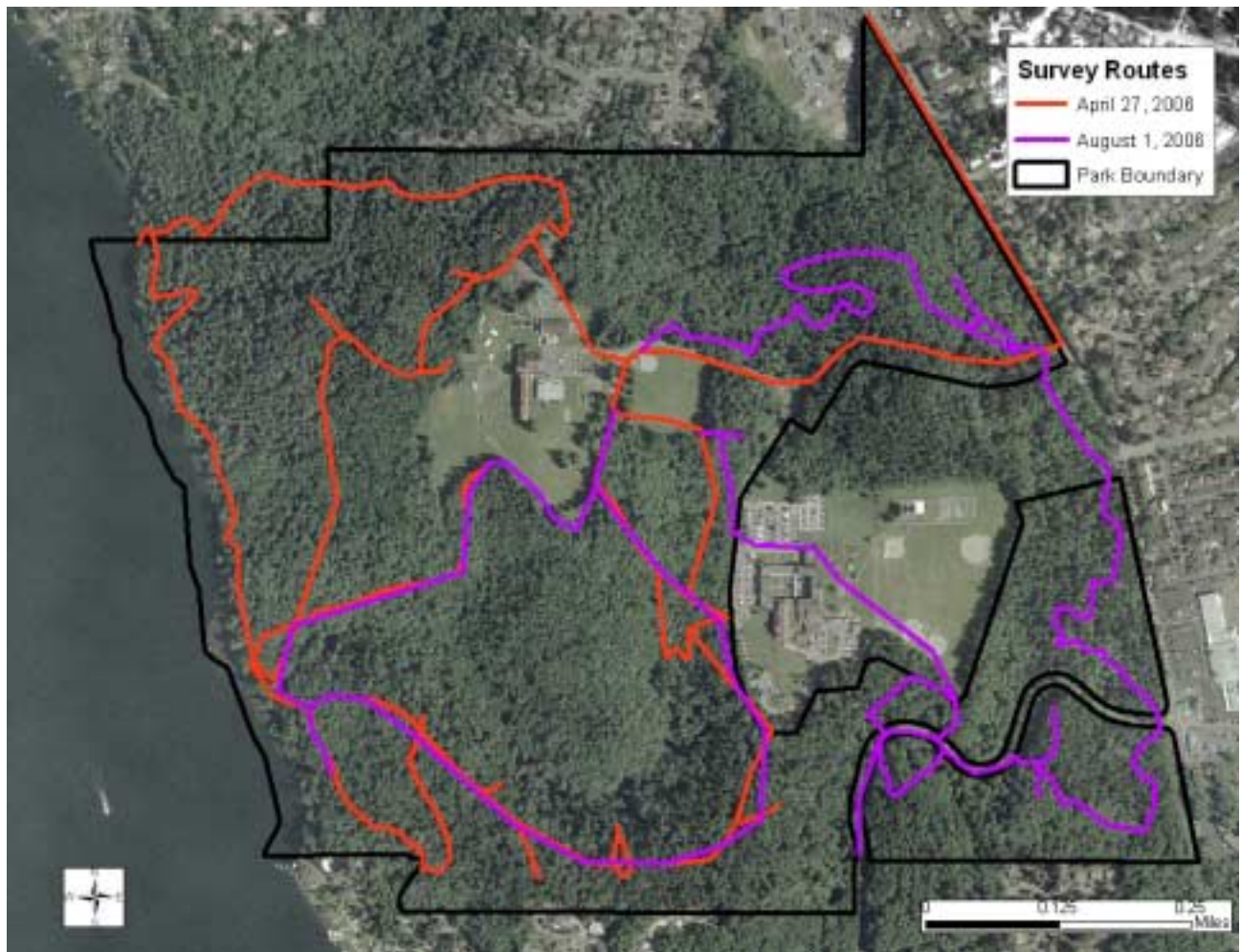


Figure 1. Survey routes for the vegetation community mapping and rare and endangered plant surveys conducted by PBI in 2006.

Vegetation Communities

Methods

Vegetation communities within Saint Edward State Park were delineated and classified using a combination of field survey and remote sensing techniques. We relied on descriptions from the Washington State Department of Natural Resources (WADNR) late-seral forested plant associations of the Puget Lowland (Chappell 2004) and freshwater wetland vegetation (Kunze 1994). In some cases, the WADNR descriptions were not adequate in describing existing vegetation associations. In these cases, alternative vegetation communities or plant associations were created by PBI or found in alternative reference material.

Remote sensing techniques consisted of manually delineating plant associations or mosaics of plant associations in a digital environment. We reviewed orthorectified aerial photography from the 1990s and recent ASTER and LANDSAT Thematic Mapper satellite images for discernable vegetation or landform patterns. When available, we also used high resolution true color orthorectified aerial photography. Topographic maps, digital elevation models (DEMs), and light detection and ranging imagery (LIDAR) were also employed to assist the process of vegetation community delineation. The final vegetation polygons were created by hand in a GIS by ocular assessment.

Field surveys consisted of visiting sites located within the vegetation polygons created during the remote sensing process. At representative sites within a polygon, vegetation data and site descriptions were recorded in a fashion consistent with the “plant community polygon” format provided by the Washington State Parks and Recreation Commission. Further refinements and editing of the drafted vegetation polygon layers were done by hand on hardcopy maps in the field, and later edited digitally in a GIS.

Results

We mapped and surveyed 27 vegetation community polygons, comprised of 10 vegetation community types, within Saint Edward State Park. Vegetation community polygons are either stand-alone plant associations or mosaics of multiple plant associations. Table 1 lists the plant associations and/or cover types found in Saint Edward State Park. See Appendix B for interpretation of “Status” codes. Figures 3 and 4 illustrate the location of the vegetation community polygons. Note that Figure 4 only shows the primary plant associations in each polygon (PA1 in the database). A printout of the complete set of data we collected for each polygon is attached in Appendix D. The ecological condition of each polygon was evaluated according to a simple ranking system described in Appendix C.

Table 1. Vegetation Community Types Encountered in Saint Edward State Park.

Abbreviation	Association Name	English Name	Reference	Status
ACMA3-ALRU2/POMU-TEGR2	<i>Acer macrophyllum</i> – <i>Alnus rubra</i> / <i>Polystichum munitum</i> - <i>Tellima grandiflora</i>	Bigleaf maple – red alder / sword fern – fringecup	Chappell 2004	G2G3
ALRU2/POMU	<i>Alnus rubra</i> / <i>Polystichum munitum</i>	red alder / sword fern	Chappell 2004	G4S4
ALRU2/RUSP c.t.	<i>Alnus rubra</i> / <i>Rubus spectabilis</i> cover type	red alder / salmonberry cover type	Kunze 1994	G4G5
POTR15-ALRU2/RUSP	<i>Populus trichocarpa</i> - <i>Alnus rubra</i> / <i>Rubus spectabilis</i>	black cottonwood - red alder / salmonberry	Chappell 2002	G2G3
PSME-ARME/GASH	<i>Pseudotsuga menziesii</i> - <i>Arbutus menziesii</i> / <i>Gaultheria shallon</i>	Douglas-fir - pacific madrone / salal	Chappell 2004	G3
PSME-TSHE/GASH/POMU	<i>Pseudotsuga menziesii</i> - <i>Tsuga heterophylla</i> / <i>Gaultheria shallon</i> / <i>Polystichum munitum</i>	Douglas-fir - western hemlock / salal / sword fern	Chappell 2004	G4
PSME-TSHE/MANE2/POMU	<i>Pseudotsuga menziesii</i> - <i>Tsuga heterophylla</i> / <i>Mahonia nervosa</i> / <i>Polystichum munitum</i>	Douglas-fir - western hemlock / dwarf Oregongrape / sword fern	Chappell 2004	G4S3
TSHE-PSME/POMU-DREX2	<i>Tsuga heterophylla</i> - <i>Pseudotsuga menziesii</i> / <i>Polystichum munitum</i> - <i>Dryopteris expansa</i>	western hemlock - Douglas-fir / sword fern - spreading woodfern	Chappell 2004	G3S3
Water	Water	Water	PBI	
Developed area	Developed area	Developed area	PBI	



Figure 2. Layout of the vegetation community polygons overlaying a 2002 color orthophoto.

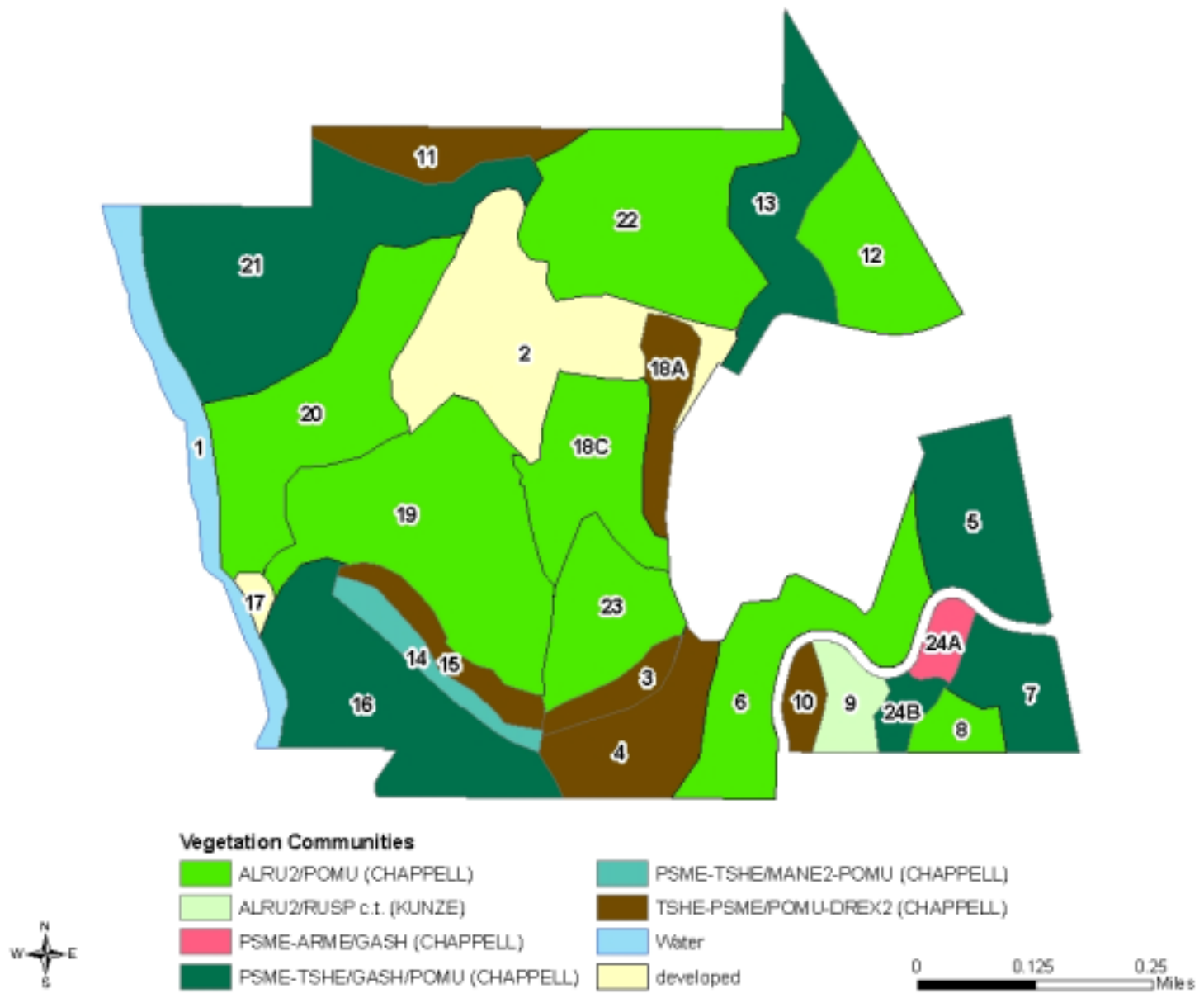


Figure 3. The primary vegetation community types within Saint Edward State Park.

Examples of Vegetation Community Types

Acer macrophyllum – *Alnus Rubra* / *Polystichum munitum* - *Tellima grandiflora* forest (ACMA3-ALRU2/POMU-TEGR2)

This plant association is limited to the steepest slopes in polygon 19, which is dominated by the ALRU2/POMU plant association. Historical logging has greatly impacted the vegetation of this community.



***Alnus Rubra / Polystichum munitum* forest (ALRU2/POMU)**

The ALRU2/POMU plant association is very common on old clear-cut sites in the Puget Trough Lowlands. In the case of Saint Edwards State Park, it is one of the dominant plant communities, illustrating the historical logging practices that took place on the land prior to it becoming a State Park. In some areas of this community, conifer regeneration appears to be slowly taking place, while in other areas, no conifer regeneration is apparent.



***Alnus Rubra / Rubus spectabilis* cover type (ALRU2/RUSP c.t.)**



This plant association occurs in some of the flatter regions of the park, and in the bottom of some ravines and drainages. ALRU2/RUSP c.t. is a wetland cover type, typically associated with seasonally flooded or saturated soils. Like ALRU2/POMU, it is common in previously logged areas, and is quite common in the Puget Trough Lowlands.

***Populus trichocarpa* - *Alnus rubra* / *Rubus spectabilis* forest (POTR15-ALRU2/RUSP)**

This association occurs in a thin band along the lake shoreline of the park. It is highly disturbed by previous logging, fluctuating lake levels, and frequent recreation use. Many sanctioned paths, as well as numerous renegade paths, permeate the area of this plant association, and large infestations of invasive plants, such as English ivy and bigleaf periwinkle, are abundant.



***Pseudotsuga menziesii* - *Arbutus menziesii* / *Gaultheria shallon* forest (PSME-ARME/GASH)**

The PSME-ARME/GASH association only occurs in one small polygon within the park. It is closely related to the PSME-TSHE/GASH/POMU association, which is a dominant association within the park. The absence of conifer species besides *Pseudotsuga menziesii* in the overstory and understory, and the ample presence of *Arbutus menziesii* and *Gaultheria shallon* distinguish this association from the more dominant matrix association. The polygon in which PSME-ARME/GASH occurs is a steep, well-drained slope, with almost complete understory cover of *Gaultheria shallon*.



***Pseudotsuga menziesii* - *Tsuga heterophylla* / *Gaultheria shallon* / *Polystichum munitum* forest (PSME-TSHE/GASH/POMU)**



This is one of the dominant plant associations with the park. The ecological condition, age classes, and species composition of this association vary greatly within the park from patch to patch. Historic logging, and roads and trails development have impacted much of this association throughout the park. Some regions are relatively free of alien plants, while other areas contain large infestations of exotics, especially English ivy. Off trail recreation use is impacting the vegetation in some patches of this association. Protecting large areas of this plant association that are free of invasive species infestations and off-trail recreation use may be a conservation priority.



***Pseudotsuga menziesii* - *Tsuga heterophylla* / *Mahonia nervosa* / *Polystichum munitum* forest (PSME-TSHE/MANE2/POMU)**

This association was found to occur as a small patch along the top of one specific ridge in the southwest section of the park. It is surrounded by PSME-TSHE/GASH/POMU and THSE-PSME/POMU/DREX2 forests on the downhill sides of the ridge. One of the park's main trails passes through the center of this small patch, impacting the understory vegetation via hiker trampling.



***Tsuga heterophylla* - *Pseudotsuga menziesii* / *Polystichum munitum* - *Dryopteris expansa* forest (TSHE-PSME/POMU/DREX2)**



This is a common plant association throughout the park, although it is less common than the PSME-TSHE/GASH/POMU and ALRU2/POMU associations. This association differs from the two more dominant types by having almost no *Gaultheria shallon* in the understory while still having a tree canopy dominated by mixed conifers. *Polystichum munitum* cover in the understory is typically quite high in TSHE-PSME/POMU/DREX2 patches. The ecological condition, age classes, and species composition of this association vary greatly within the park from patch to patch.



Rare Plant Surveys

Methods

We visited Saint Edward State Park multiple times during the 2006 field season to conduct a rare plant survey. We 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. When a plant from the DNR NHP list was located, we used the standard DNR NHP rare plant sighting form to complete field descriptions for the observation.

Specific dates of field surveys for each park can be found in Appendix A of this report. During the field surveys, we were equipped with reference literature, rare plant lists for the area, maps showing rare plant locations from previous surveys, and a portable plant identification lab. We looked for rare plants in habitats previously identified as being likely occurrence sites. 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. We surveyed habitats of the park where we felt rare plants were more likely to occur more intensively. 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 (Figure 1).

Results

Rare Plants

We found no plants listed on the DNR NHP rare plant list in Saint Edward State Park. According to NHP GIS datasets, no known occurrences of listed plants have been recorded in or near the park.

Vascular Plant List for Saint Edward State Park

A total of 110 vascular plant species were identified during the 2006 surveys at Saint Edward State Park. Of these, 37 of the plant species are non-native, accounting for 34% of the total encountered vascular plants.

Key to Vascular Plant Species List

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

“Alien?”: species that are not native to the park are indicated with an “a”

“Common Name / Accepted Synonym”: The species list uses Hitchcock and Cronquist, *Flora of the Pacific Northwest* as the taxonomic authority, as this is still the standard reference for our area. Updated nomenclature or general common names are shown in this column when they exist.

num	Code	Scientific Name	Common Name/Accepted Synonym	Family	Alien?
1	ACMA3	<i>Acer macrophyllum</i> Pursh	bigleaf maple	Aceraceae	
2	ACTR	<i>Achlys triphylla</i> (Sm.) DC.	sweet after death	Berberidaceae	
3	ADBI	<i>Adenocaulon bicolor</i> Hook.	pathfinder	Asteraceae	
4	ALRU2	<i>Alnus rubra</i> Bong.	red alder	Betulaceae	
5	ARME	<i>Arbutus menziesii</i> Pursh	madrone	Ericaceae	
6	ATFI	<i>Athyrium filix-femina</i> (L.) Roth	common ladyfern	Dryopteridaceae	
7	BEPE2	<i>Bellis perennis</i> L.	lawn daisy	Asteraceae	a
8	BRPA3	<i>Bromus pacificus</i> Shear	Pacific brome	Poaceae	
9	BRR18	<i>Bromus rigidus</i> Roth	>>Bromus diandrus ssp. rigidus	Poaceae	a
10	BRVU	<i>Bromus vulgaris</i> (Hook.) Shear	Columbia brome	Poaceae	
11	CAOC	<i>Cardamine occidentalis</i> (S. Wats. ex B.L. Robins.) T.J. Howell	big western bittercress	Brassicaceae	
12	CAOL	<i>Cardamine oligosperma</i> Nutt.	little western bittercress	Brassicaceae	
13	CADE9	<i>Carex deweyana</i> Schwein.	Dewey sedge	Cyperaceae	
14	CAHE7	<i>Carex hendersonii</i> Bailey	Henderson's sedge	Cyperaceae	
15	CAOB3	<i>Carex obnupta</i> Bailey	slough sedge	Cyperaceae	
16	CIAL	<i>Circaea alpina</i> L.	small enchanter's nightshade	Onagraceae	
17	CIAR4	<i>Cirsium arvense</i> (L.) Scop.	Canada thistle	Asteraceae	a
18	CLEMA	<i>Clematis</i> L.	leather flower	Ranunculaceae	a
19	CONU4	<i>Cornus nuttallii</i> Audubon ex Torr. & Gray	Pacific dogwood	Cornaceae	
20	COCO6	<i>Corylus cornuta</i> Marsh.	California hazelnut	Betulaceae	
21	COTON	<i>Cotoneaster</i> Medik.	cotoneaster	Rosaceae	a
22	CRMO3	<i>Crataegus monogyna</i> Jacq.	oneseed hawthorn	Rosaceae	a
23	CYSC4	<i>Cytisus scoparius</i> (L.) Link	scotchbroom	Fabaceae	a
24	DAGL	<i>Dactylis glomerata</i> L.	orchardgrass	Poaceae	a
25	DIFO	<i>Dicentra formosa</i> (Haw.) Walp.	Pacific bleeding heart	Fumariaceae	
26	DIPU	<i>Digitalis purpurea</i> L.	purple foxglove	Scrophulariaceae	a
27	DREX2	<i>Dryopteris expansa</i> (K. Presl) Fraser-Jenkins & Jermy	spreading woodfern	Dryopteridaceae	
28	ELGL	<i>Elymus glaucus</i> Buckl.	blue wildrye	Poaceae	
29	EPAN2	<i>Epilobium angustifolium</i> L.	>>Chamerion angustifolium ssp. angustifolium	Onagraceae	
30	EPCIW	<i>Epilobium ciliatum</i> Raf. ssp. watsonii (Barbey) Hoch & Raven	fringed willowherb	Onagraceae	
31	EQAR	<i>Equisetum arvense</i> L.	field horsetail	Equisetaceae	
32	EQHY	<i>Equisetum hyemale</i> L.	scouringrush horsetail	Equisetaceae	
33	GAAP2	<i>Galium aparine</i> L.	stickywilly	Rubiaceae	a
34	GATR3	<i>Galium triflorum</i> Michx.	fragrant bedstraw	Rubiaceae	
35	GASH	<i>Gaultheria shallon</i> Pursh	salal	Ericaceae	
36	GERO	<i>Geranium robertianum</i> L.	Robert geranium	Geraniaceae	a
37	GEMA4	<i>Geum macrophyllum</i> Willd.	largeleaf avens	Rosaceae	
38	HEHE	<i>Hedera helix</i> L.	English ivy	Araliaceae	a
39	HOLA	<i>Holcus lanatus</i> L.	common velvetgrass	Poaceae	a
40	HODI	<i>Holodiscus discolor</i> (Pursh) Maxim.	Indian plum	Rosaceae	
41	HYTE	<i>Hydrophyllum tenuipes</i> Heller	Pacific waterleaf	Hydrophyllaceae	
42	HYRA3	<i>Hypochaeris radicata</i> L.	hairy cat's ear	Asteraceae	a
43	ILAQ80	<i>Ilex aquifolium</i> L.	English ivy	Aquifoliaceae	a
44	LAMU	<i>Lactuca muralis</i> (L.) Fresen.	>>Mycelis muralis	Asteraceae	a
45	LACO3	<i>Lapsana communis</i> L.	common nipplewort	Asteraceae	a
46	LALA4	<i>Lathyrus latifolius</i> L.	perennial pea	Fabaceae	

47	LEMI3	<i>Lemna minor</i> L.	common duckweed	Lemnaceae	
48	LOPE	<i>Lolium perenne</i> L.	perennial ryegrass	Poaceae	a
49	LOCI3	<i>Lonicera ciliosa</i> (Pursh) Poir. ex DC.	orange honeysuckle	Caprifoliaceae	
50	LUAN	<i>Lunaria annua</i> L.	annual honesty	Brassicaceae	a
51	LUCA*	<i>Luzula campestris</i> (L.) DC.	field woodrush	Juncaceae	
52	LYAM3	<i>Lysichiton americanus</i> Hultén & St. John	American skunkcabbage	Araceae	
53	MANE2	<i>Mahonia nervosa</i> (Pursh) Nutt.	Cascade barberry	Berberidaceae	
54	MADI	<i>Maianthemum dilatatum</i> (Wood) A. Nels. & J.F. Macbr.	false lily of the valley	Liliaceae	
55	MAMA11	<i>Matricaria matricarioides</i> auct. non (Less.) Porter [misapplied]	>>Matricaria discoidea	Asteraceae	a
56	MELU	<i>Medicago lupulina</i> L.	black medick	Fabaceae	a
57	MOSI2	<i>Montia sibirica</i> (L.) T.J. Howell	>>Claytonia sibirica var. sibirica	Portulacaceae	
58	NEPA	<i>Nemophila parviflora</i> Dougl. ex Benth.	smallflower nemophila	Hydrophyllaceae	
59	OECE	<i>Oemleria cerasiformis</i> (Torr. & Gray ex Hook. & Arn.) Landon	Indian plum	Rosaceae	
60	OESA	<i>Oenanthe sarmentosa</i> K. Presl ex DC.	water parsely	Apiaceae	
61	OPHO	<i>Oplopanax horridus</i> Miq.	devilsclub	Araliaceae	
62	OSCH	<i>Osmorhiza chilensis</i> Hook. & Arn.	>>Osmorhiza berteroi	Apiaceae	
63	PHAR3	<i>Phalaris arundinacea</i> L.	reed canarygrass	Poaceae	a
64	POAN	<i>Poa annua</i> L.	annual bluegrass	Poaceae	a
65	POPR	<i>Poa pratensis</i> L.	Kentucky bluegrass	Poaceae	a
66	POGL8	<i>Polypodium glycyrrhiza</i> D.C. Eat.	licorice fern	Polypodiaceae	
67	POMU	<i>Polystichum munitum</i> (Kaulfuss) K. Presl	swordfern	Polypodiaceae	
68	POBAT	<i>Populus balsamifera</i> L. ssp. <i>trichocarpa</i> (Torr. & Gray ex Hook.) Brayshaw	black cottonwood	Salicaceae	
69	PRLA5	<i>Prunus laurocerasus</i> L.	cherry laurel	Rosaceae	a
70	PSME	<i>Pseudotsuga menziesii</i> (Mirbel) Franco	Douglas-fir	Pinaceae	
71	PTAQ	<i>Pteridium aquilinum</i> (L.) Kuhn	bracken fern	Dennstaedtiaceae	
72	RARE3	<i>Ranunculus repens</i> L.	creeping buttercup	Ranunculaceae	a
73	RHPU	<i>Rhamnus purshiana</i> DC.	>>Frangula purshiana	Rhamnaceae	
74	RILA	<i>Ribes lacustre</i> (Pers.) Poir.	prickly currant	Grossulariaceae	
75	RISA	<i>Ribes sanguineum</i> Pursh	redflower currant	Grossulariaceae	
76	ROGY	<i>Rosa gymnocarpa</i> Nutt.	dwarf rose	Rosaceae	
77	RONU	<i>Rosa nutkana</i> K. Presl	Nootka rose	Asteraceae	
78	RUDI2	<i>Rubus discolor</i> Weihe & Nees	>>Rubus armeniacus	Rosaceae	a
79	RULA	<i>Rubus laciniatus</i> Willd.	cutleaf blackberry	Rosaceae	a
80	RULE	<i>Rubus leucodermis</i> Dougl. ex Torr. & Gray	whitebark raspberry	Rosaceae	
81	RUPA	<i>Rubus parviflorus</i> Nutt.	thimbleberry	Rosaceae	
82	RUSP	<i>Rubus spectabilis</i> Pursh	salmonberry	Rosaceae	
83	RUUR	<i>Rubus ursinus</i> Cham. & Schlecht.	California blackberry	Rosaceae	
84	RUAC3	<i>Rumex acetosella</i> L.	common sheep sorrel	Polygonaceae	a
85	RUOB	<i>Rumex obtusifolius</i> L.	bitter dock	Polygonaceae	a
86	SARA2	<i>Sambucus racemosa</i> L.	red elderberry	Caprifoliaceae	
87	SODU	<i>Solanum dulcamara</i> L.	climbing nightshade	Solanaceae	a
88	SOAU	<i>Sorbus aucuparia</i> L.	European mountain ash	Rosaceae	a
89	STCO14	<i>Stachys cooleyae</i> Heller	>>Stachys chamissonis var. cooleyae	Lamiaceae	
90	STME2	<i>Stellaria media</i> (L.) Vill.	common chickweed	Caryophyllaceae	a
91	STAM2	<i>Streptopus amplexifolius</i> (L.) DC.	claspleaf twistedstalk	Liliaceae	
92	SYAL	<i>Symphoricarpos albus</i> (L.) Blake	common snowberry	Caprifoliaceae	
93	TAOF	<i>Taraxacum officinale</i> G.H. Weber ex Wiggers	dandelion	Asteraceae	a
94	TABR2	<i>Taxus brevifolia</i> Nutt.	Pacific yew	Taxaceae	

95	TEGR2	<i>Tellima grandiflora</i> (Pursh) Dougl. ex Lindl.	bigflower tellima	Saxifragaceae	
96	THPL	<i>Thuja plicata</i> Donn ex D. Don	western red cedar	Cupressaceae	
97	TITR	<i>Tiarella trifoliata</i> L.	threeleaf foamflower	Saxifragaceae	
98	TOME	<i>Tolmiea menziesii</i> (Pursh) Torr. & Gray	youth on age	Saxifragaceae	
99	TRLA6	<i>Trientalis latifolia</i> Hook.	>>Trientalis borealis ssp. latifolia	Primulaceae	
100	TRPR2	<i>Trifolium pratense</i> L.	red clover	Fabaceae	a
101	TRRE3	<i>Trifolium repens</i> L.	white clover	Fabaceae	a
102	TROV2	<i>Trillium ovatum</i> Pursh	Pacific trillium	Liliaceae	
103	TRCA21	<i>Trisetum canescens</i> Buckl.	tall trisetum	Poaceae	
104	TSHE	<i>Tsuga heterophylla</i> (Raf.) Sarg.	western hemlock	Pinaceae	
105	URDI	<i>Urtica dioica</i> L.	nettle	Urticaceae	
106	VAOV2	<i>Vaccinium ovatum</i> Pursh	California huckleberry	Ericaceae	
107	VAPA	<i>Vaccinium parvifolium</i> Sm.	red huckleberry	Ericaceae	
108	VEAM2	<i>Veronica americana</i> Schwein. ex Benth.	American speedwell	Scrophulariaceae	
109	VIMA	<i>Vinca major</i> L.	bigleaf periwinkle	Apocynaceae	a
110	VIGL	<i>Viola glabella</i> Nutt.	pioneer violet	Violaceae	

Discussion

Previous to Pacific Biodiversity Institute's 2006 surveys, no state or federally listed vascular plants had been documented within Saint Edward State Park. Our 2006 project did not locate any new populations of rare plants.



Figure 4. English ivy climbing trees in the park.

We encountered few sites within Saint Edward State Park that had not been disturbed or impacted by resource extraction or recreational activities. Roads and trails, both maintained and abandoned, permeate the diversity of habitats within the park, indicating a high intensity of human influence on the park's ecosystems. Invasive plant infestations are common occurrences throughout the park, especially near the roads and trails infrastructure. English ivy (*Hedera Helix*), Himalayan blackberry (*Rubus discolor*), and bigflowered perrywinkle (*Vinca major*) were all found to have exceptionally large infestations in the park (Figures 4 and 5). Eradication of these invasive plants is extremely difficult once established. Controlling the spread of these plants may be possible, however, through manual cutting of above ground vines, and pulling of the below ground new rhizomes. Such treatments are extremely labor intensive and complete removal of the dislodged plant parts from the park premises is necessary to prohibit further infestations that might occur via vegetative propagation of the cuttings. Without control efforts, unmitigated infestations will continue to expand into new areas of the park, threatening the native vegetation and plant communities.

The significance of Saint Edward State Park in providing a "natural" setting for recreational use and enjoyment of nature in an otherwise urbanized environment cannot be overstated. During our field work in the park, we encountered a high density of trail users and sight seers. The neighboring Bastyr University was using the park for field classes identifying locally available medicinal herbs and edible plants. The park is a hotspot for urbanites wanting to get away from the built environment, but not wanting to drive significant distances out of town to do so. Although the intensity of recreation in the park is contributing to degraded plant community conditions, the popularity of the park may garner user support for volunteer labor campaigns to administer invasive species control efforts.



Figure 5. *Vinca major* infestation along the park's shoreline.

Ecological Condition of Saint Edward State Park

Saint Edward State Park exists as an island of forest in one of the most highly urbanized landscapes in Washington State (Figure 6). Because of this, it is not surprising that the ecological condition of the park is being negatively affected by threats of increased edge development, aggressive recreation use (off trail hiking, plant destruction, unauthorized fires), invasive species infestations, and hillside erosion and landslides. Given these setbacks, the condition of the park is in surprisingly good ecological condition relative to the immediate surrounding landscape, and when compared to other sizable urban parks within the same region. The park is unique within the urban matrix in that plant association patches of native vegetation exist, relatively exotic species free, nearing the more mature phases of forest succession. Limiting disturbances, ranging from road and trail construction to off trail hiking, will be instrumental in protecting the last intact native plant communities within the park. Limiting the expansion of invasive plant infestations through control efforts, as discussed earlier, as well as conducting native plant plantings (especially of native conifers in the ALRU2/POMU forests) could contribute to improved ecological conditions within the more disturbed regions of the park.

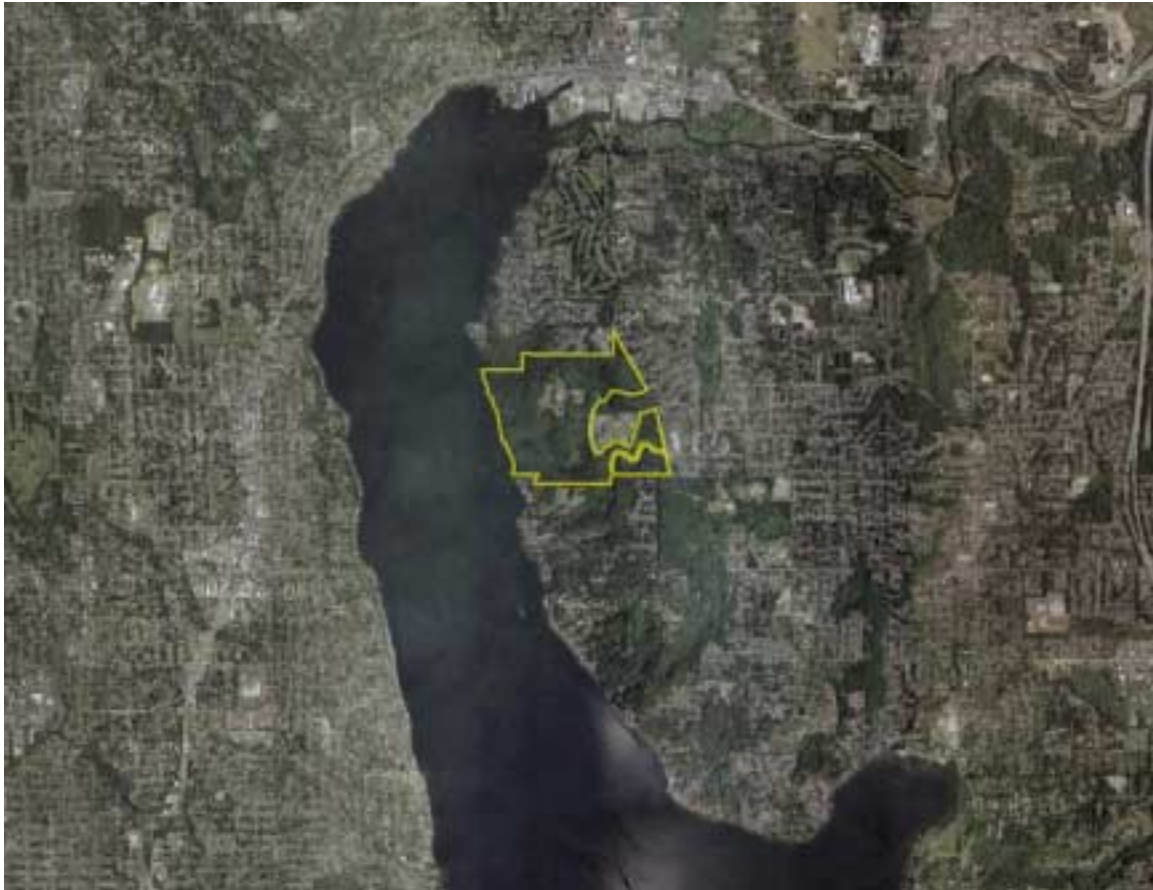


Figure 6. Photo of the urbanized landscape surrounding Saint Edward State Park (outlined in yellow).

GIS Products Produced

Associated with this report is a polygon layer created by PBI depicting the vegetation community types mapped in Saint Edward State Park. The dataset has been converted into ESRI shapefile format and provided to the Washington State Parks and Recreation Commission. The spatial dataset is 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 – Field Survey Schedule

April 27, 2006

Field Staff: Hans Smith, Scott Heller

August 1, 2006

Field Staff: Hans Smith, Scott Heller

Appendix B – Description of Rare Element Status Codes

Global Rank (GRank)

Global Rank characterizes the relative rarity or endangerment of the element world-wide. Two codes (e.g. G1G2) represent an intermediate rank.

G1 = Critically imperiled globally (5 or fewer occurrences).
G2 = Imperiled globally (6 to 20 occurrences).
G3 = Either very rare and local throughout its range or found locally in a restricted range (21 to 100 occurrences).
G4 = Apparently secure globally.
G5 = Demonstrably secure globally.
GH = Of historical occurrence throughout its range.
GU = Possibly in peril range-wide but status uncertain.
GX = Believed to be extinct throughout former range.
GNR = Not yet ranked.
Tn = Rarity of an infraspecific taxon. Numbers and codes similar to those for Gn ranks above.
Q = Questionable.

State Rank (SRank)

State Rank characterizes the relative rarity or endangerment within the state of Washington. Two codes (e.g. S1S2) represents an intermediate rank.

S1 = Critically imperiled (5 or fewer occurrences).
S2 = Imperiled (6 to 20 occurrences), very vulnerable to extirpation.
S3 = Rare or uncommon (21 to 100 occurrences).
S4 = Apparently secure, with many occurrences.
S5 = Demonstrably secure in state.
SA = Accidental in state.
SE = An exotic established in state.
SH = Historical occurrences only but still expected to occur.
SN = Regularly occurring, usually migratory, nonbreeding animals.
SU = Unrankable; need more information.
SX = Apparently extirpated from the state.
SP = Likely to occur or to have occurred but without documentation.
SZ = Not of conservation concern (not SE or SA).
SNR = Not yet ranked.
"B" and "N" qualifiers are used to indicate breeding and nonbreeding status, respectively, of migrant species whose nonbreeding status (rank) may be quite different from their breeding status in the state (e.g. S1B, S4N for a very rare breeder that is a common winter resident).

State Status (StStat)

State Status of plant species is determined by the Washington Natural Heritage Program. Factors considered include abundance, occurrence patterns, vulnerability, threats, existing protection, and taxonomic distinctness. Values include:

E = Endangered. In danger of becoming extinct or extirpated from Washington.
T = Threatened. Likely to become Endangered in Washington.
S = Sensitive. Vulnerable or declining and could become Endangered or Threatened in the state.
X = Possibly extinct or Extirpated from Washington.
P1 = Priority 1. Rare nonvascular plant but with insufficient information to assign another rank.
P2 = Priority 2. Nonvascular plant of concern but with insufficient information to assign another rank.
R1 = Review group 1. Of potential concern but needs more field work to assign another rank.
R2 = Review group 2. Of potential concern but with unresolved taxonomic questions.
W = Watch. More abundant and/or less threatened than previously thought.

Federal Status

Federal Status under the U.S. Endangered Species Act (USESAs) as published in the Federal Register:

LE = Listed Endangered. In danger of extinction.
LT = Listed Threatened. Likely to become endangered.
PE = Proposed Endangered.
PT = Proposed Threatened.
C = Candidate species. Sufficient information exists to support listing as Endangered or Threatened.
SC = Species of Concern. An unofficial status, the species appears to be in jeopardy, but insufficient information to support listing.
NL = Not Listed. Used when two portions of a taxon have different federal status.

Appendix C – 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:

Condition Rank 1. This condition class represents areas that have been altered to the point where the ecological condition often deviates dramatically from baseline conditions found in areas where stressors are much less prevalent. Areas characterized by Condition Class 1 often have high amounts of bare ground and/or non-native plant cover. The structure is often significantly altered from baseline conditions. Often one or more of the structural layers (trees, shrubs, herbs, grasses, mosses & lichens, biotic crust) may be significantly altered or even missing from the community. The composition of native vegetation is skewed toward species that can survive despite regular disturbance. Species diversity of native plants is usually low and native grass species are usually absent or in very low abundance (for a given community type). Evidence of accelerated erosion and soil compaction may be present. Hydrologic alteration may also be present. Significant direct evidence of various stress factors is usually abundant. Rare plant and animal species generally do not occur in this condition class.

Condition Rank 2. This condition class represents areas that show a fairly broad range of stress ranging from high to moderately low impact from a variety of stressors. Areas characterized by Condition Class 2 usually have moderate levels of non-native plant cover. The structure of the natural community present in Condition Class 2 areas is often relatively intact when compared to baseline conditions. Usually all structural layers are present, but form and stature may be altered from baseline conditions. Soil surface conditions are often intermediate between those in Condition Class 1 and Condition Class 3. Species diversity of native plants is often moderate for that community. Non-native species are usually present, but not as common or abundant as in Condition Class 1. Native grass species are often present, but usually in low abundance for that community type. Diversity of native grass species is relatively low when compared to baseline conditions. Evidence of accelerated erosion and soil compaction may be present in isolated areas, but is not dramatic or widespread. Hydrologic alteration is absent. Direct signs of stressors may be present, but not widespread or abundant. Rare plant and animal species may be found in this condition class, but are not common. Rare species that are found in this condition class are relatively tolerant of the stressors that are present.

Condition Rank 3. This condition class represents areas that show the least stress in the project area and are the closest to representing baseline conditions. Areas characterized by Condition Class 3 have little evidence of non-native plant invasion. The composition and

structure of native vegetation in this condition class correspond to the natural ranges of variation characteristic to this habitat type. Old-growth conditions may exist. Species diversity of native plants is often high relative to the community under consideration. Native grass species are usually present and often fairly abundant for the community type. Species diversity of native grass species is also often high. Soil compaction, accelerated erosion and hydrologic alteration are absent. Direct signs of stressors are usually absent. Certain rare species may only exist within this condition class and rare species are generally more common than in the lower condition classes.

Appendix D – 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

This is canopy cover, i.e. the space between leaves/branches is included in “cover”. 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.

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

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

Bareground = 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 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

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.

Vegetation Polygon Data

Polygon Number 1
 Survey Intensity 1
 Observer HS
 Date 8/1/2006
 Specific Location

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
 Exotics Total 0
 Exotics Perennial 0
 Exotics Annual 0
 Water 0
 Rock Outcrop 0
 Gravel 0
 Bare Ground 0
 Moss Lichen 0
 Litter 0
 Logging
 Stand Age
 Agriculture
 Livestock
 Development
 Wildlife
 Recreation Severity
 Recreation Type
 Hydrology

Exotic Species

Primary Exotic
 Secondary Exotic
 Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. Water	100	Matrix	3
2.	0		0
3.	0		0

Notes:

Polygon Number 10
Survey Intensity 1
Observer HS
Date 8/1/2006
Specific Location SE corner of park.

Total Vegetation 6
Trees Total 5
Dominant Trees PSME, ACMA3, THPL
emergent 2
maincanopy 5
subcanopy 2
Shrubs Total 5
Dominant Shrubs COCO6, RUUR, GASH
> 1.5' tall 5
< 1.5' tall 3
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 3
Dominant Forbs URDI
Forbs Perennial 3
Forbs Annual 1
Ferns Total 5

Exotic Species

Ferns Evergreen 5
Ferns Deciduous 2
Exotics Total 2
Exotics Perennial 2
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 1
Litter 99
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 0
Wildlife 3
Recreation Severity 0
Recreation Type 0
Hydrology 1

Primary Exotic
 ILAQ80
Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. TSHE-PSME/POMU-DREX2 (CHAPPELL)	70	Matrix	2
2. PSME-TSHE/GASH/POMU (CHAPPELL)	30	Large	2
3.	0		0

Notes:

Polygon Number 11
Survey Intensity 1
Observer HS
Date 4/27/2006
Specific Location N side of park - N of buildings,

Total Vegetation 6
Trees Total 5
Dominant Trees TSHE, THPL, ACMA3, PSME
emergent 3
maincanopy 5
subcanopy 2
Shrubs Total 5
Dominant Shrubs RUSP, VAPA, OECE
> 1.5' tall 5
< 1.5' tall 1
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs POMU
Forbs Perennial 2
Forbs Annual 0
Ferns Total 4

Exotic Species

Ferns Evergreen 4
Ferns Deciduous 2
Exotics Total 1
Exotics Perennial 1
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 4
Moss Lichen 3
Litter 93
Logging 3
Stand Age 3
Agriculture 0
Livestock 0
Development 3
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic
 HEHE
Secondary Exotic
 ILAQ80
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. TSHE-PSME/POMU-DREX2 (CHAPPELL)	92	Matrix	2
2. ALRU2/RUSP c.t. (KUNZE)	5	linear	2
3. PSME-TSHE/GASH/POMU (CHAPPELL)	3	Small	2

Notes:

Polygon Number 12
Survey Intensity 1
Observer HS
Date 8/1/2006
Specific Location NE CORNER OF PARK.

Total Vegetation 6
Trees Total 5
Dominant Trees ALRU2, THPL, ACMA3, PSME
emergent 2
maincanopy 5
subcanopy 3
Shrubs Total 5
Dominant Shrubs RUSP, VAPA, COCO6
> 1.5' tall 5
< 1.5' tall 3
Graminoids Total 2
Dominant Graminoids
Graminoids Perennial 2
Graminoids Annual 0
Forbs Total 2
Dominant Forbs
Forbs Perennial 2
Forbs Annual 1
Ferns Total 4

Exotic Species

Ferns Evergreen 3
Ferns Deciduous 3
Exotics Total 2
Exotics Perennial 2
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 3
Litter 97
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 3
Recreation Severity 3
Recreation Type 4
Hydrology 1

Primary Exotic
 ILAQ80
Secondary Exotic
 HEHE
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. ALRU2/POMU (CHAPPELL)	70	Matrix	2
2. TSHE-PSME/POMU-DREX2 (CHAPPELL)	20	Small	2
3. ALRU2/RUSP c.t. (KUNZE)	10	Small	2

Notes:

Polygon Number 13
Survey Intensity 1
Observer SH
Date 4/26/2006
Specific Location NE boundary of park.

Total Vegetation 6
Trees Total 5
Dominant Trees PSME, TSHE, ACMA3
emergent 1
maincanopy 5
subcanopy 1
Shrubs Total 5
Dominant Shrubs GASH, MANE2, VAPA
> 1.5' tall 5
< 1.5' tall 3
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs URDI, POMU
Forbs Perennial 2
Forbs Annual 0
Ferns Total 3

Exotic Species

Ferns Evergreen 3
Ferns Deciduous 1
Exotics Total 2
Exotics Perennial 2
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 2
Moss Lichen 1
Litter 97
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 0
Recreation Severity 3
Recreation Type 4
Hydrology 1

Primary Exotic
 ILAQ80
Secondary Exotic
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/GASH/POMU (CHAPPELL)	100	Matrix	2
2.	0		0
3.	0		0

Notes:

Polygon Number 14
Survey Intensity 1
Observer HS
Date 4/27/2006
Specific Location SW section of park.

Total Vegetation 6
Trees Total 6
Dominant Trees PSME, TSHE, THPL
emergent 3
maincanopy 5
subcanopy 3
Shrubs Total 4
Dominant Shrubs MANE2, ILAQ80
> 1.5' tall 3
< 1.5' tall 3
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 1
Dominant Forbs POMU
Forbs Perennial 1
Forbs Annual 0
Ferns Total 3

Exotic Species

Ferns Evergreen 3
Ferns Deciduous 0
Exotics Total 2
Exotics Perennial 2
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 2
Moss Lichen 1
Litter 97
Logging 3
Stand Age 3
Agriculture 0
Livestock 0
Development 3
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic
 ILAQ80
Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/MANE2-POMU (CHAPPELL)	90	Matrix	2
2. TSHE-PSME/POMU-DREX2 (CHAPPELL)	10	Small	2
3.	0		0

Notes:

Polygon Number 15
Survey Intensity 1
Observer HS
Date 4/27/2006
Specific Location SW region of park.

Total Vegetation 6
Trees Total 6
Dominant Trees THPL, PSME, ACMA3, TSHE
emergent 2
maincanopy 6
subcanopy 3
Shrubs Total 3
Dominant Shrubs COCO6, MANE2, VAPA
> 1.5' tall 3
< 1.5' tall 1
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 1
Dominant Forbs POMU
Forbs Perennial 1
Forbs Annual 0
Ferns Total 5

Exotic Species

Ferns Evergreen 5
Ferns Deciduous 2
Exotics Total 2
Exotics Perennial 2
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 1
Litter 99
Logging 3
Stand Age 3
Agriculture 0
Livestock 0
Development 3
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic
 ILAQ80
Secondary Exotic
 HEHE
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. TSHE-PSME/POMU-DREX2 (CHAPPELL)	100	Matrix	2
2.	0		0
3.	0		0

Notes: MANE2/POMU along ridge.

Polygon Number 16
Survey Intensity 1
Observer HS
Date 4/27/2006
Specific Location SW corner of park.

Total Vegetation 6
Trees Total 5
Dominant Trees ACMA3, THPL, TSHE, PSME, ARME
emergent 3
maincanopy 5
subcanopy 3
Shrubs Total 5
Dominant Shrubs GASH, COCO6, MANE2
> 1.5' tall 5
< 1.5' tall 2
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs
Forbs Perennial 2
Forbs Annual 0
Ferns Total 0

Exotic Species

Ferns Evergreen 0
Ferns Deciduous 0
Exotics Total 2
Exotics Perennial 2
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 1
Litter 99
Logging 3
Stand Age 3
Agriculture 0
Livestock 0
Development 3
Wildlife 0
Recreation Severity 2
Recreation Type 3
Hydrology 1

Primary Exotic
 HEHE
Secondary Exotic
 ILAQ80
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/GASH/POMU (CHAPPELL)	100	Matrix	2
2.	0		0
3.	0		0

Notes:

Polygon Number 17
 Survey Intensity 1
 Observer HS
 Date 8/1/2006
 Specific Location

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
 Bare Ground 0
 Moss Lichen 0
 Litter 0
 Logging
 Stand Age
 Agriculture
 Livestock
 Development
 Wildlife
 Recreation Severity
 Recreation Type
 Hydrology

Exotic Species

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. developed	100	Matrix	1
2.	0		0
3.	0		0

Notes:

Polygon Number 18A
Survey Intensity 1
Observer HS
Date 8/1/2006
Specific Location CENTER OF PARK.

Total Vegetation 6
Trees Total 6
Dominant Trees ACMA3, THPL, ALRU2, TSHE
emergent 1
maincanopy 6
subcanopy 3
Shrubs Total 4
Dominant Shrubs OECE, BENE2
> 1.5' tall 4
< 1.5' tall 2
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs
Forbs Perennial 2
Forbs Annual 1
Ferns Total 4

Exotic Species

Ferns Evergreen 4
Ferns Deciduous 2
Exotics Total 2
Exotics Perennial 2
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 1
Litter 99
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 3
Recreation Severity 2
Recreation Type 4
Hydrology 1

Primary Exotic
 ILAQ80
Secondary Exotic
 HEHE
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. TSHE-PSME/POMU-DREX2 (CHAPPELL)	60	Matrix	2
2. PSME-TSHE/MANE2/POMU (CHAPPELL)	40	Large	2
3.	0		0

Notes:

Polygon Number 18C
Survey Intensity 1
Observer SH
Date 4/27/2006
Specific Location NW portion of polygon 18

Total Vegetation 6
Trees Total 6
Dominant Trees ACMA3, ALRU2, THPL
emergent 1
maincanopy 6
subcanopy 1
Shrubs Total 5
Dominant Shrubs
> 1.5' tall 5
< 1.5' tall 1
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs
Forbs Perennial 2
Forbs Annual 0
Ferns Total 3

Exotic Species

Ferns Evergreen 2
Ferns Deciduous 1
Exotics Total 1
Exotics Perennial 1
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 1
Litter 99
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 2

Primary Exotic
 ILAQ80
Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. ALRU2/POMU (CHAPPELL)	60	Matrix	2
2. ALRU2/RUSP c.t. (KUNZE)	40	Small	2
3.	0		0

Notes: Hydrology--culvert. Wetland consumes middle portion of polygon.

Polygon Number 19
Survey Intensity 1
Observer HS
Date 4/27/2006
Specific Location SW of buildings

Total Vegetation 6
Trees Total 6
Dominant Trees ACMA3, ALRU2, THPL
emergent 1
maincanopy 6
subcanopy 2
Shrubs Total 3
Dominant Shrubs OECE
> 1.5' tall 3
< 1.5' tall 1
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 4
Dominant Forbs URDI, TEGR2, POMU
Forbs Perennial 4
Forbs Annual 0
Ferns Total 4

Exotic Species

Ferns Evergreen 4
Ferns Deciduous 2
Exotics Total 1
Exotics Perennial 1
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 1
Litter 99
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic
 HEHE
Secondary Exotic
 ILAQ80
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. ALRU2/POMU (CHAPPELL)	60	Matrix	2
2. ACMA3-ALRU2/POMU-TEGR2 (CHAPPELL)	30	Large	2
3. ALRU2/RUSP c.t. (KUNZE)	10	Small	2

Notes:

Polygon Number 2
 Survey Intensity 1
 Observer HS
 Date 8/1/2006
 Specific Location

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
 Bare Ground 0
 Moss Lichen 0
 Litter 0
 Logging
 Stand Age
 Agriculture
 Livestock
 Development
 Wildlife
 Recreation Severity
 Recreation Type
 Hydrology

Exotic Species

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. developed	100	Matrix	1
2.	0		0
3.	0		0

Notes:

Polygon Number 20
Survey Intensity 1
Observer HS
Date 4/27/2006
Specific Location W side of park.

Total Vegetation 6
Trees Total 5
Dominant Trees
emergent 1
maincanopy 5
subcanopy 2
Shrubs Total 6
Dominant Shrubs OECE, RUSP, COCO6
> 1.5' tall 6
< 1.5' tall 1
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 3
Dominant Forbs URDI
Forbs Perennial 3
Forbs Annual 0
Ferns Total 4

Exotic Species

Ferns Evergreen 4
Ferns Deciduous 2
Exotics Total 2
Exotics Perennial 2
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 2
Litter 98
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 0
Recreation Severity 3
Recreation Type 4
Hydrology 1

Primary Exotic
 HEHE
Secondary Exotic
 ILAQ80
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. ALRU2/POMU (CHAPPELL)	92	Matrix	2
2. TSHE-PSME/POMU-DREX2 (CHAPPELL)	5	Small	2
3. POTR15-ALRU2/RUSP (CHAPPELL)	3	linear	1

Notes: Bad HEHE and development

Polygon Number 21
Survey Intensity 1
Observer HS
Date 4/27/2006
Specific Location NW side of park.

Total Vegetation 6
Trees Total 5
Dominant Trees PSME, TSHE, THPL, ACMA3, ARME
emergent 2
maincanopy 5
subcanopy 3
Shrubs Total 6
Dominant Shrubs GASH, COCO6, MANE2
> 1.5' tall 6
< 1.5' tall 2
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 1
Dominant Forbs POMU
Forbs Perennial 1
Forbs Annual 0
Ferns Total 3

Exotic Species

Ferns Evergreen 3
Ferns Deciduous 2
Exotics Total 1
Exotics Perennial 1
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 1
Litter 99
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 0
Recreation Severity 3
Recreation Type 4
Hydrology 1

Primary Exotic
 SOAU
Secondary Exotic
 ILAQ80
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/GASH/POMU (CHAPPELL)	88	Matrix	2
2. TSHE-PSME/POMU-DREX2 (CHAPPELL)	10	Large	2
3. POTR15-ALRU2/RUSP (CHAPPELL)	2	linear	2

Notes:

Polygon Number 22
Survey Intensity 1
Observer SH
Date 4/27/2006
Specific Location N central section of park.

Total Vegetation 6
Trees Total 6
Dominant Trees ACMA3, ALRU2, PSME
emergent 2
maincanopy 6
subcanopy 2
Shrubs Total 5
Dominant Shrubs RUSP, SARA2
> 1.5' tall 5
< 1.5' tall 3
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs URDI, TEGR2, DIFO
Forbs Perennial 2
Forbs Annual 0
Ferns Total 4

Exotic Species

Ferns Evergreen 3
Ferns Deciduous 3
Exotics Total 3
Exotics Perennial 3
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 5
Moss Lichen 4
Litter 91
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 0
Recreation Severity 3
Recreation Type 4
Hydrology 2

Primary Exotic
 HEHE
Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. ALRU2/POMU (CHAPPELL)	100	Matrix	2
2.	0		0
3.	0		0

Notes: Oemlaria abundant understory shrub. Rec users--hiking and biking.
 Hydrology, culvert. Trail goes over stream; drainage area.

Polygon Number 23
Survey Intensity 1
Observer HS
Date 4/27/2006
Specific Location W of Bastyr U. Ravine

Total Vegetation 6
Trees Total 6
Dominant Trees ACMA3, THPL, TSHE
emergent 1
maincanopy 5
subcanopy 3
Shrubs Total 4
Dominant Shrubs OECE, RUSP, VAPA
> 1.5' tall 4
< 1.5' tall 2
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs TEGR2, POMU
Forbs Perennial 2
Forbs Annual 0
Ferns Total 4

Exotic Species

Ferns Evergreen 4
Ferns Deciduous 2
Exotics Total 1
Exotics Perennial 1
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 1
Moss Lichen 3
Litter 96
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic
 ILAQ80
Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. ALRU2/POMU (CHAPPELL)	80	Matrix	2
2. TSHE-PSME/POMU-DREX2 (CHAPPELL)	15	Large	2
3. ALRU2/RUSP c.t. (KUNZE)	5	linear	2

Notes:

Polygon Number 24A
Survey Intensity 1
Observer HS
Date 8/1/2006
Specific Location SE corner of park.

Total Vegetation 6
Trees Total 5
Dominant Trees PSME, ARME, ALRU2, THPL
emergent 1
maincanopy 5
subcanopy 2
Shrubs Total 6
Dominant Shrubs
> 1.5' tall 6
< 1.5' tall 3
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 1
Dominant Forbs
Forbs Perennial 1
Forbs Annual 0
Ferns Total 2

Exotic Species

Ferns Evergreen 2
Ferns Deciduous 2
Exotics Total 2
Exotics Perennial 2
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 0
Litter 100
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 0
Recreation Severity 2
Recreation Type 3
Hydrology 1

Primary Exotic
 ILAQ80
Secondary Exotic
 SOAU
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-ARME/GASH (CHAPPELL)	90	Matrix	2
2. PSME-TSHE/GASH/POMU (CHAPPELL)	10	Small	2
3.	0		0

Notes: Old mine shaft.

Polygon Number 24B
Survey Intensity 1
Observer HS
Date 8/1/2006
Specific Location SE corner of park.

Total Vegetation 6
Trees Total 6
Dominant Trees PSME, ALRU2, TSHE
emergent 1
maincanopy 6
subcanopy 2
Shrubs Total 5
Dominant Shrubs GASH, COCO6, RUUR
> 1.5' tall 5
< 1.5' tall 2
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs
Forbs Perennial 2
Forbs Annual 1
Ferns Total 3

Exotic Species

Ferns Evergreen 3
Ferns Deciduous 2
Exotics Total 2
Exotics Perennial 2
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 1
Litter 99
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 3
Recreation Severity 2
Recreation Type 4
Hydrology 1

Primary Exotic
 ILAQ80
Secondary Exotic
 SOAU
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/GASH/POMU (CHAPPELL)	90	Matrix	2
2. TSHE-PSME/POMU-DREX2 (CHAPPELL)	10	Small	2
3.	0		0

Notes: Ferns: POMU.

Polygon Number 3
Survey Intensity 1
Observer HS
Date 4/27/2006
Specific Location S side of park.

Total Vegetation 6
Trees Total 6
Dominant Trees TSHE, TSME, ACMA3, THPL
emergent 3
maincanopy 5
subcanopy 3
Shrubs Total 3
Dominant Shrubs VAPA, SARA2, MANE2
> 1.5' tall 3
< 1.5' tall 1
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 1
Dominant Forbs POMU
Forbs Perennial 1
Forbs Annual 0
Ferns Total 4

Exotic Species

Ferns Evergreen 4
Ferns Deciduous 1
Exotics Total 1
Exotics Perennial 1
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 2
Litter 98
Logging 3
Stand Age 3
Agriculture 0
Livestock 0
Development 3
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic
 ILAQ80
Secondary Exotic
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. TSHE-PSME/POMU-DREX2 (CHAPPELL)	100	Matrix	2
2.	0		0
3.	0		0

Notes:

Polygon Number 4
Survey Intensity 1
Observer HS
Date 4/27/2006
Specific Location

Total Vegetation 6
Trees Total 6
Dominant Trees THPL, PSME, TSHE, ACMA3
emergent 2
maincanopy 5
subcanopy 3
Shrubs Total 3
Dominant Shrubs GASH, MANE2, VAPA
> 1.5' tall 3
< 1.5' tall 1
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs
Forbs Perennial 2
Forbs Annual 0
Ferns Total 4

Exotic Species

Ferns Evergreen 4
Ferns Deciduous 1
Exotics Total 2
Exotics Perennial 2
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 2
Moss Lichen 2
Litter 96
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 0
Recreation Severity 2
Recreation Type 3
Hydrology 1

Primary Exotic
 ILAQ80
Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. TSHE-PSME/POMU-DREX2 (CHAPPELL)	70	Matrix	2
2. PSME-TSHE/GASH/POMU (CHAPPELL)	30	Small	2
3.	0		0

Notes:

Polygon Number 5
Survey Intensity 1
Observer HS
Date 8/1/2006
Specific Location SE CORNER OF PARK.

Total Vegetation 6
Trees Total 5
Dominant Trees PSME, TSHE, ALRU2, ACMA3
emergent 2
maincanopy 5
subcanopy 2
Shrubs Total 6
Dominant Shrubs RUUR, GASH, RUSP
> 1.5' tall 5
< 1.5' tall 4
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 3
Dominant Forbs URDI
Forbs Perennial 3
Forbs Annual 1
Ferns Total 4

Exotic Species

Ferns Evergreen 4
Ferns Deciduous 2
Exotics Total 2
Exotics Perennial 2
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 2
Litter 98
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 3
Recreation Severity 2
Recreation Type 4
Hydrology 1

Primary Exotic
 ILAQ80
Secondary Exotic
 SOAU
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/GASH/POMU (CHAPPELL)	100	Matrix	2
2.	0		0
3.	0		0

Notes: Ferns: POMU. HEHE climbing along road.

Polygon Number 6
Survey Intensity 1
Observer HS
Date 8/1/2006
Specific Location S boundary of park.

Total Vegetation 6
Trees Total 5
Dominant Trees ALRU2, ACMA3, THPL, PSME
emergent 1
maincanopy 5
subcanopy 3
Shrubs Total 5
Dominant Shrubs RUSP, COCO6, RUUR
> 1.5' tall 4
< 1.5' tall 3
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs
Forbs Perennial 2
Forbs Annual 1
Ferns Total 4

Exotic Species

Ferns Evergreen 4
Ferns Deciduous 2
Exotics Total 1
Exotics Perennial 1
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 3
Litter 97
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 6
Wildlife 3
Recreation Severity 3
Recreation Type 4
Hydrology 2

Primary Exotic
 SOAU
Secondary Exotic
 HEHE
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. ALRU2/POMU (CHAPPELL)	80	Matrix	2
2. TSHE-PSME/POMU-DREX2 (CHAPPELL)	15	Small	2
3. ALRU2/RUSP c.t. (KUNZE)	5	Small	2

Notes: (STRUCTURE, ROAD, TRAILS, POWERLINES)

Polygon Number 7
Survey Intensity 1
Observer HS
Date 8/1/2006
Specific Location SE corner of park.

Total Vegetation 6
Trees Total 5
Dominant Trees PSME, ALRU2, THPL
emergent 1
maincanopy 5
subcanopy 2
Shrubs Total 6
Dominant Shrubs GASH, VAPA, OECE
> 1.5' tall 5
< 1.5' tall 3
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 1
Dominant Forbs
Forbs Perennial 1
Forbs Annual 0
Ferns Total 2

Exotic Species

Ferns Evergreen 2
Ferns Deciduous 2
Exotics Total 3
Exotics Perennial 3
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 0
Bare Ground 1
Moss Lichen 1
Litter 98
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 3
Recreation Severity 2
Recreation Type 4
Hydrology 1

Primary Exotic
 HEHE
Secondary Exotic
 ILAQ80
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/GASH/POMU (CHAPPELL)	100	Matrix	2
2.	0		0
3.	0		0

Notes: HEHE Climbing throughout polygon.

Polygon Number 8
Survey Intensity 1
Observer HS
Date 8/1/2006
Specific Location SE corner of park.

Total Vegetation 6
Trees Total 5
Dominant Trees ALRU2, PSME, THPL, TSHE, ACMA3
emergent 1
maincanopy 5
subcanopy 3
Shrubs Total 5
Dominant Shrubs RULA, GASH, OECE, COCO6
> 1.5' tall 5
< 1.5' tall 3
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs
Forbs Perennial 2
Forbs Annual 1
Ferns Total 3

Exotic Species

Ferns Evergreen 3
Ferns Deciduous 2
Exotics Total 3
Exotics Perennial 3
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 1
Litter 99
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 3
Recreation Severity 3
Recreation Type 4
Hydrology 1

Primary Exotic
 HEHE
Secondary Exotic
 ILAQ80
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. ALRU2/POMU (CHAPPELL)	55	Matrix	2
2. PSME-TSHE/GASH/POMU (CHAPPELL)	45	Large	2
3.	0		0

Notes: Ferns: POMU.

Polygon Number 9
Survey Intensity 1
Observer HS
Date 8/1/2006
Specific Location SE CORNER OF PARK

Total Vegetation 6
Trees Total 5
Dominant Trees ALRU2, THPL
emergent 1
maincanopy 5
subcanopy 3
Shrubs Total 6
Dominant Shrubs RUSP, RUUR, ACCI, OPHO
> 1.5' tall 6
< 1.5' tall 3
Graminoids Total 2
Dominant Graminoids
Graminoids Perennial 2
Graminoids Annual 0
Forbs Total 2
Dominant Forbs
Forbs Perennial 2
Forbs Annual 1
Ferns Total 4

Exotic Species

Ferns Evergreen 4
Ferns Deciduous 2
Exotics Total 1
Exotics Perennial 1
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 15
Litter 85
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 0
Wildlife 3
Recreation Severity 0
Recreation Type 0
Hydrology 2

Primary Exotic
 RUDI2
Secondary Exotic
 SOAU
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. ALRU2/RUSP c.t. (KUNZE)	70	Matrix	2
2. ALRU2/POMU (CHAPPELL)	30	Large	2
3.	0		0

Notes: