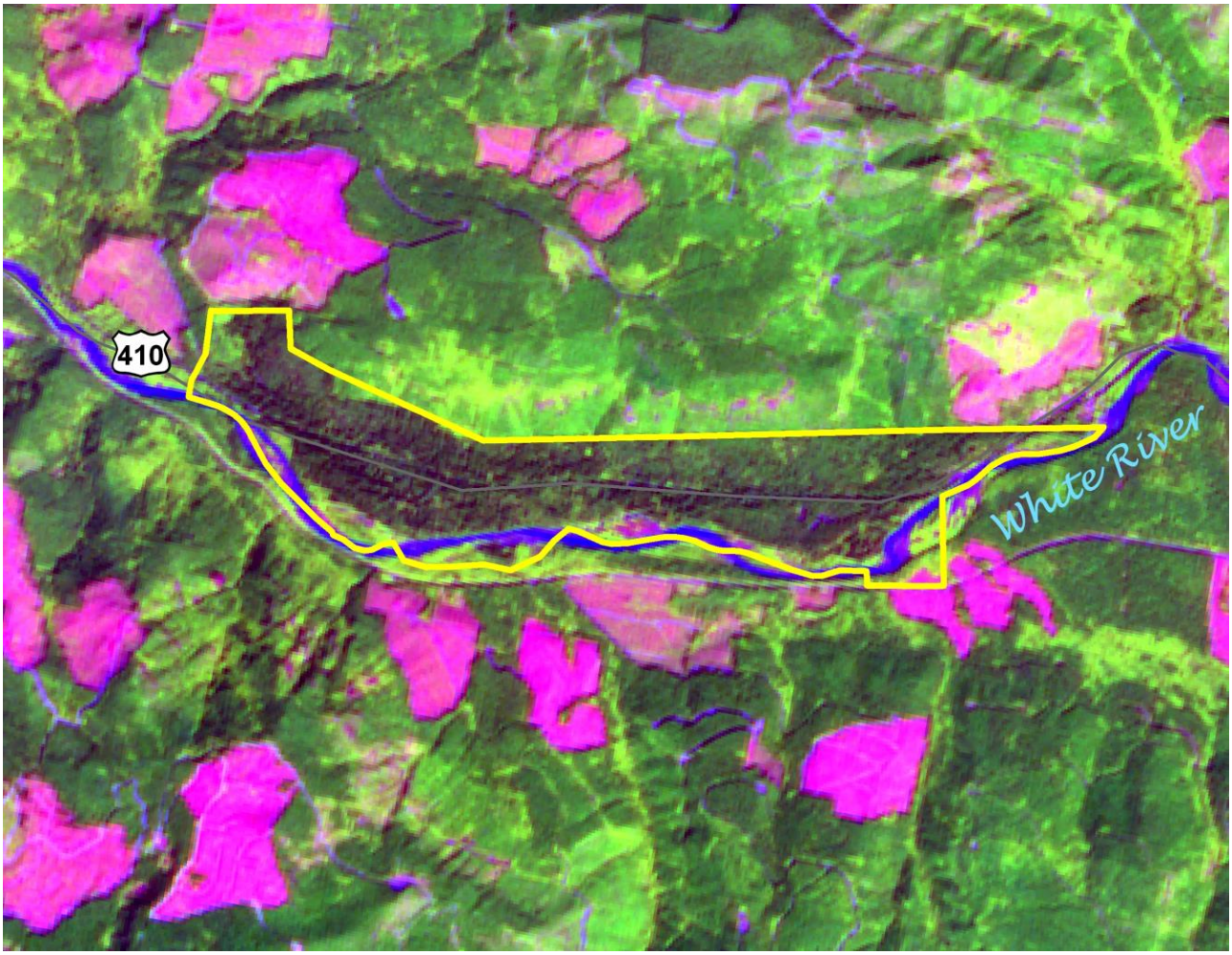
Rare Plant and Vegetation Survey of Federation Forest State Park



Pacific Biodiversity Institute

Rare Plant and Vegetation Survey of Federation Forest State Park

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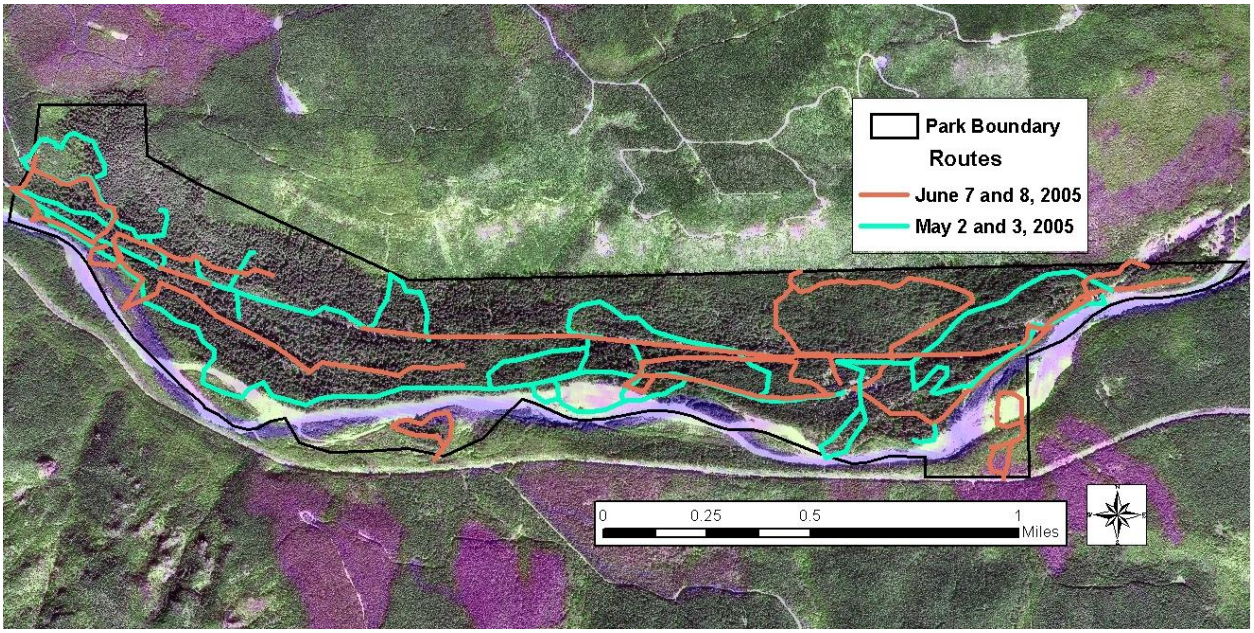
Introduction

Pacific Biodiversity Institute (PBI) surveyed Federation Forest State Park for rare plant occurrences and mapped according to vegetation communities under two contracts with the Washington State Parks and Recreation Commission. Federation Forest is located in King County, Washington. The primary work agreement between PBI and the Washington State Parks and Recreation Commission expired in late June 2005, which did not allow for middle and late summer blooming plants to be adequately surveyed. A subsequent service contract was granted in late July that extended the survey season into the late summer. Vegetation data was collected for all the mapped vegetation types during the course of both contracts. This report summarizes the activities and findings of the contracted work under both work agreements.

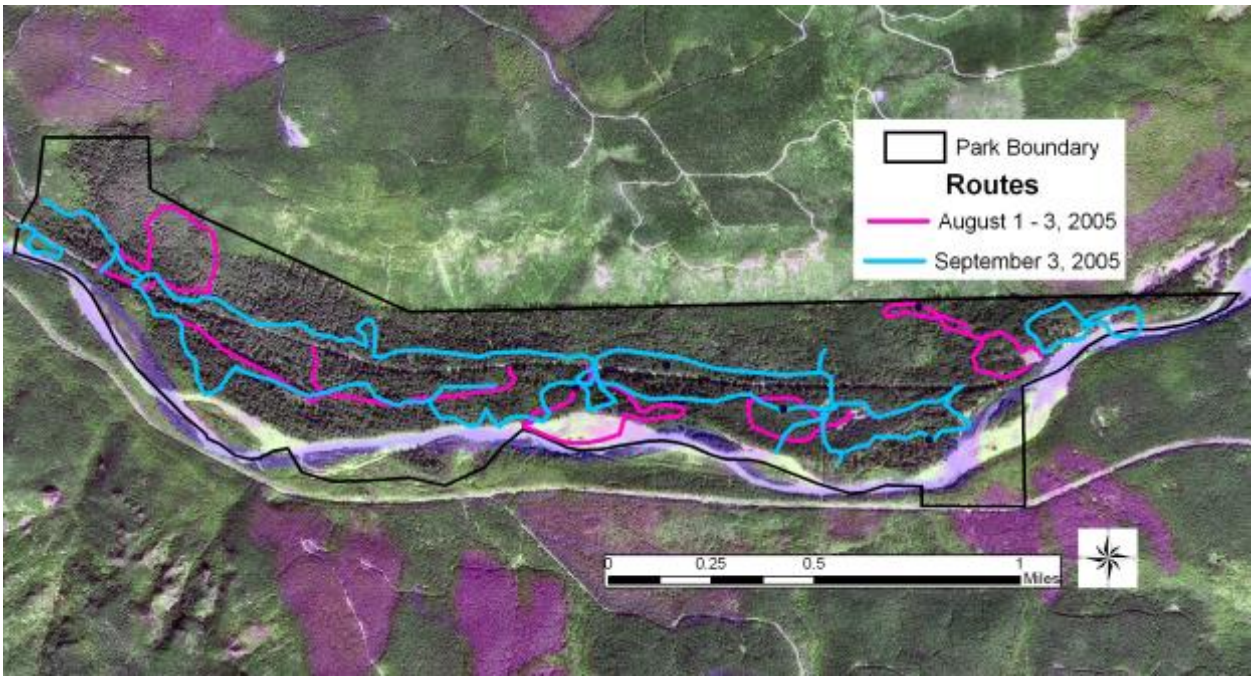
Survey Conditions and Survey Routes

The survey conditions were good in most parts of Federation Forest. In some areas the vegetation was quite dense, making travel difficult, but the extensive trail system enabled us to access much of the park. Access to the park parcels on the south side of the White River necessitated going through locked gates on private logging roads (temporarily open).

Map 1. Survey routes for the vegetation community mapping and rare and endangered plant surveys conducted by PBI in 2005 under the primary contract which expired in June.



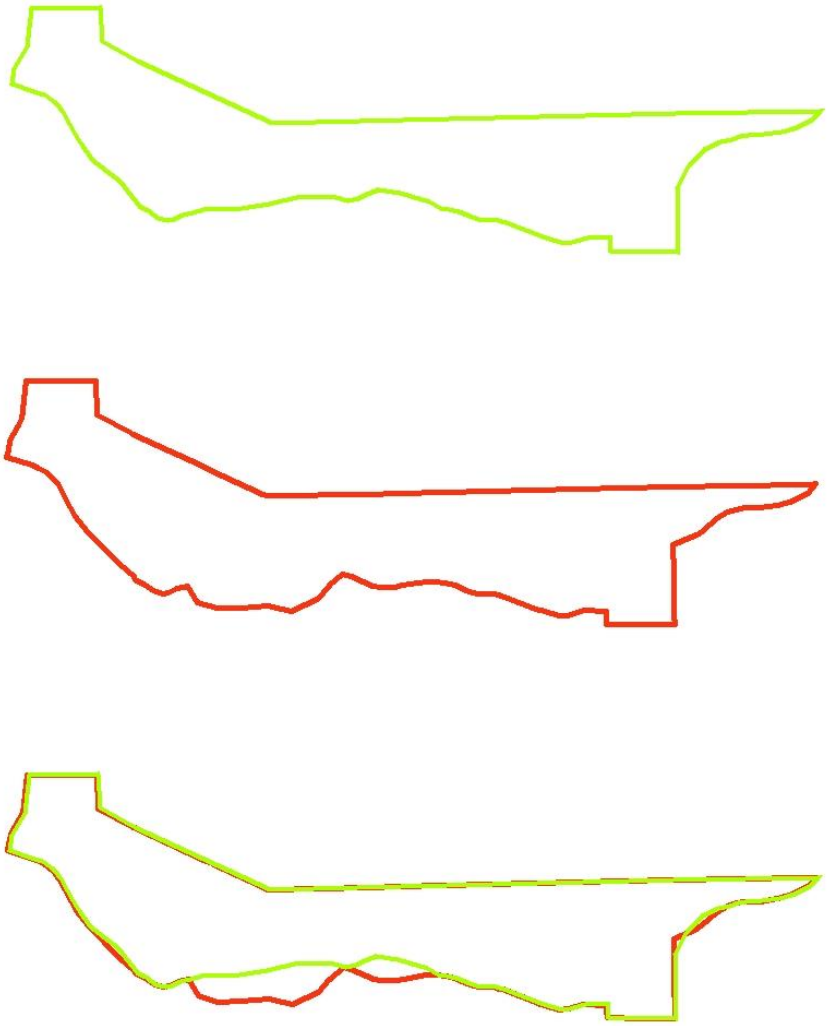
Map 2. Survey routes for the vegetation community mapping and rare and endangered plant surveys conducted by PBI in 2005 under the secondary contract.



Notes about Boundary Discrepancies

The actual boundary of Federation Forest State Park was a bit difficult to discern. We began our surveys using the 2004 Washington State Department of Natural Resources Major Public Lands GIS data (MPL), but found that there were lingering questions about accuracy, especially around the White River boundary and possible parcels on the south side of the White River. Paper maps reviewed at the office at Federation Forest also showed two potential park boundaries. Washington State Parks provided us an updated 2005 park boundary map which differed somewhat dramatically from the MPL layer in the southern section of the Park. In the end, we decided to stay with the MPL layer because we had already surveyed some of the polygons associated with the layer and we felt it would be more valuable to keep that information in.

Figure 1. From top to bottom – the WA State Parks 2005 park boundary, the 2004 MPL boundary, and both the previous layers overlaid one another.



Vegetation Communities

Methods

Vegetation communities within Federation Forest State Park were delineated and classified using a combination of field survey and remote sensing techniques. We relied on descriptions from the United States Forest Service Mount Baker Snoqualmie National Forest Plant Associations Guide (Henderson et al. 1992), Washington State Department of Natural Resources (WADNR) late-seral forested plant associations of the Puget Lowland (Chappell 2004), and freshwater wetland vegetation (Kunze 1994) to make final vegetation community assignments. In some cases, these references were not adequate in describing existing vegetation associations. In these cases, alternative vegetation communities or plant associations were created by PBI.

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 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. The draft 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 draft vegetation polygon layers were done by hand on hardcopy maps in the field, and later edited digitally in a GIS environment.

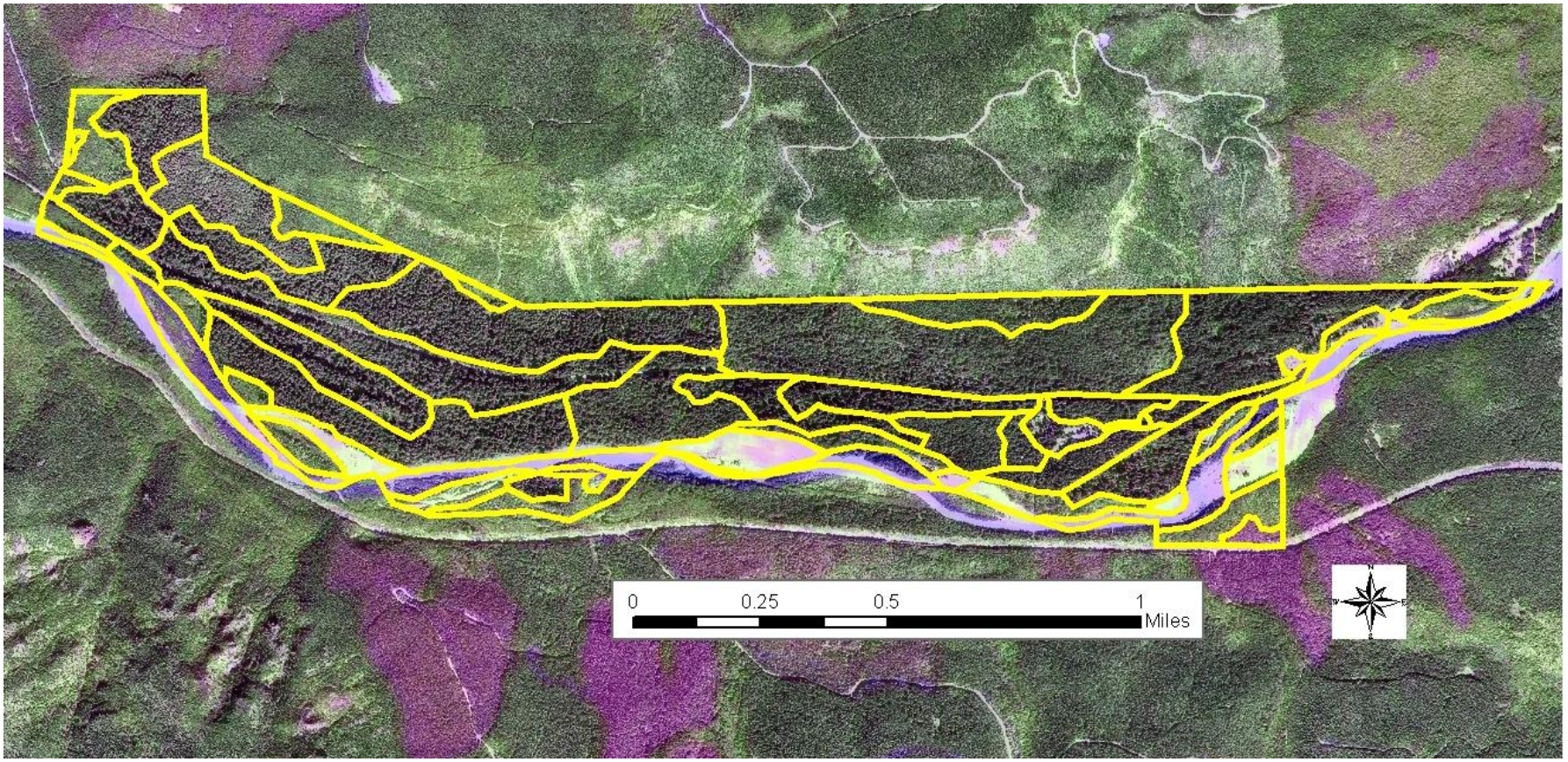
Results

We mapped and surveyed 50 vegetation polygons, comprised of 16 plant community types, within Federation Forest State Park. Vegetation community types are either stand-alone plant associations or mosaics of multiple plant associations. The following table lists the vegetation community types mapped. Maps 3 and 4 on the following pages illustrate the location of these vegetation community types. Note that Map 4 only shows the primary plant associations (PA1 in the database).

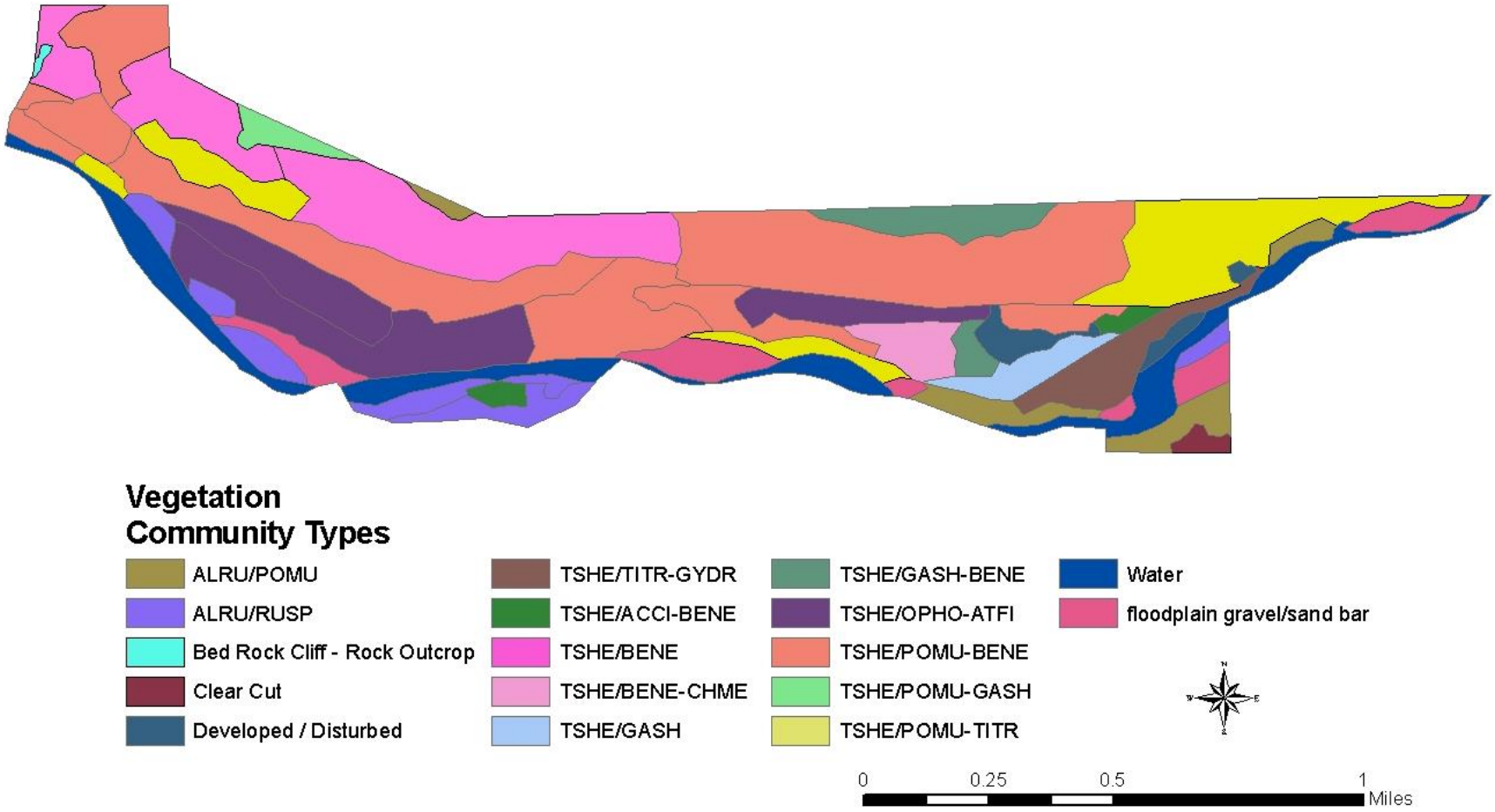
Vegetation Community Types Encountered in Federation Forest State Park

Abbreviation	Association Name	English Name	Reference	Status
ALRU/POMU	*Alnus rubra / Polystichum munitum*	red alder / sword fern	Chappell 2004	G4S4
TSHE/BENE	*Tsuga heterophylla / Berberis nervosa*	western hemlock / Oregongrape	Henderson et al. 1992	G4
TSHE/POMU-BENE	*Tsuga heterophylla / Polystichum munitum - Berberis nervosa*	western hemlock / swordfern – Oregongrape	Henderson et al. 1992	G4
TSHE/POMU-GASH	*Tsuga heterophylla / Polystichum munitum - Gaultheria shallon*	western hemlock / swordfern - salal	Henderson et al. 1992	G4
TSHE/ACCI-BENE	*Tsuga heterophylla / Acer circinatum - Berberis nervosa*	western hemlock / vinemaple - Oregongrape	Henderson et al. 1992	G4
TSHE/GASH-BENE	*Tsuga heterophylla / Gaultheria shallon - Berberis nervosa*	western hemlock / salal - Oregongrape	Henderson et al. 1992	G4
TSHE/GASH	*Tsuga heterophylla / Gaultheria shallon*	western hemlock / salal	Henderson et al. 1992	G4
TSHE/BENE-CHME	*Tsuga heterophylla / Berberis nervosa - Corallorhiza mertensiana*	western hemlock / Oregongrape – western coralroot	Henderson et al. 1992	??
TSHE/OPHO-ATFI	*Tsuga heterophylla / Oplopanax horridus – Athyrium filix-femina*	western hemlock / devil's club – ladyfern	Henderson et al. 1992	G4
TSHE/POMU-TITR	*Tsuga heterophylla / Polystichum munitum – Tiarella trifoliata*	western hemlock / swordfern – foamflower	Henderson et al. 1992	G3
TSHE/LYAM	*Tsuga heterophylla / Lysichitum americanum*	western hemlock / skunk cabbage	Henderson et al. 1992	
TSHE/TITR-GYDR	*Tsuga heterophylla / Tiarella trifoliata - Gymnocarpium dryopteris*	western hemlock / foamflower - oak fern	Henderson et al. 1992	G3
ALRU/RUSP	*Alnus rubra / Rubus spectabilis.*	red alder / salmonberry	Kunze 1994	G4G5
DEVELOPED / DISTURBED	developed / disturbed site	developed or disturbed site	PBI	
FLOODPLAIN GRAVEL/SAND BAR	floodplain gravel/sand bar	floodplain gravel/sand bar	PBI	
BEDROCK CLIFF – ROCK OUTCROP	non-forested bedrock cliff – rock outcrop	non-forested bedrock cliff – rock outcrop	PBI	

Map 3. Layout of the vegetation community polygons overlaying a 1998 digital ortho-photo combined with TM7 spectral imagery.



Map 4. The primary vegetation community types represented by each polygon.



Examples of Vegetation Community Types

Alnus rubra / Polystichum munitum forest (ALRU/POMU)

There is very little ALRU/POMU forest in Federation Forest State Park. Occurrences are typically small margins along the park boundary associated with large scale timber harvest operations on adjacent private lands. Over time, seed influences from the adjacent conifer forests will probably establish successful conifer regeneration in these patches. Hand planting of native conifer seedlings such as Douglas-fir or western hemlock might help to more quickly re-establish a conifer dominated canopy.

In some of the conifer forests along the White River, along the lowest forested benches above the floodplain, small to large patches of ALRU/POMU can be found in a mosaic with TSHE/POMU-TITR and TSHE/OPHO-ATFI. These ALRU/POMU forests differ from the ones associated with recent logging along the park boundary. *Populus trichocarpa* (black cottonwood) is commonly a canopy dominant in these forests, which illustrates that the river floodplain once existed in these spots. Flooding disturbances and a high water table influence and maintain these ALRU/POMU forests.

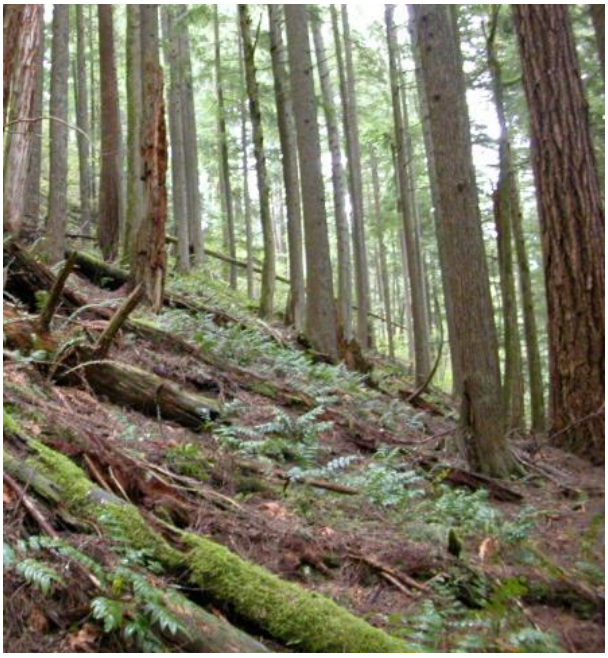
Alnus rubra / Rubus spectabilis (ALRU/RUSP)

ALRU/RUSP occurs frequently along the floodplain of the White River in small even aged stands typically covered completely by red alder. Understory vegetation varies depending on the age of the alder overstory. In younger stands, little to no understory vegetation occurs. In older stands, understory vegetation can be thick and shrubby, typically dominated by *Rubus spectabilis*. Frequent flooding and channel migration by the White River keeps the distribution and structure of these patches dynamic. ALRU/RUSP occurs in a mosaic with the floodplain gravel/sand bar community, as both communities are frequently shifting and replacing each other as the river floods and meanders.

Floodplain gravel/sand bar

Common along the White River primary channel is the floodplain gravel/sand bar community. This community is typified by having a lot of exposed rounded river rock and coarse woody debris scattered about on the soil surface. Various young willows, cottonwoods, and alders may be colonizing small patches of sand or gravel bar, and Scot's broom (*Cytisus scoparius*) occurs in scattered clumps in the higher, less frequently flooded, parts of the gravel bars. Seasonal flooding and channel meandering frequently disturbs the vegetation in this community, constantly altering its structure and distribution along the main river channel. This community intergrades with the ALRU/RUSP community type. This community contains a high percentage of alien, invasive plants.

Tsuga heterophylla / Berberis nervosa forest (TSHE/BENE)



The TSHE/BENE plant association is common along the south facing slopes of the north boundary hillside of Federation Forest State Park. *Berberis nervosa* is the dominant understory shrub, with little to no *Polystichum munitum* present. Age-class diversity and canopy layer complexity tends to be relatively simple in TSHE/BENE areas compared to other mixed conifer forests in the Park, possibly indicating the historic occurrence of a stand replacing fire in these patches. It is possible that historic logging and associated post-logging burning took place in these areas.

Tsuga heterophylla / Polystichum munitum – Berberis nervosa forest (TSHE/POMU-BENE)

The TSHE/POMU-BENE plant association occurs frequently throughout Federation Forest State Park. This plant association frequently grades into the TSHE/BENE plant association along the north border hillside, typically being below the TSHE/BENE patches on less steep slopes. TSHE/POMU-BENE has more complex overstory and understory canopy structures and higher age-class diversity than what is seen in the adjacent TSHE/BENE forests. TSHE/POMU-BENE also frequently grades into the TSHE/OPHO-ATFI forest on the valley bottom flats. TSHE/POMU-BENE tends to occur on the more well drained soils where as TSHE/OPHO-ATFI occurs on more saturated soils.

Tsuga heterophylla / Gaultheria shallon forest (TSHE/GASH)

TSHE/GASH mostly occurs around the visitor's center, and is probably the result of a severe fire that burned on the site. This plant association is typified in the park by having a young even-aged closed canopy conifer forest cover with between 70 – 100% salal cover in the understory. This plant association grades into TSHE/GASH-BENE plant association.

Tsuga heterophylla / Gaultheria shallon – Berberis nervosa forest (TSHE/GASH-BENE)

This forest type was mapped along the northern boundary of the park, where the adjacent private forest lands that were logged via clear-cutting abut the remnant old-growth and late successional forests. The juxtaposition of old natural forests versus young industrial Douglas-fir plantations has created an artificial "edge" effect in the older forests along the clear-cut boundary. Along with the primary edge effect of letting in more light to the understory, the higher rates of wind-throw and steeper rocky hillsides common along the northern border seem to have resulted in a much more open forest canopy structure that allows an assortment of understory shrubs to thrive. TSHE/GASH-BENE is a frequent association found along these open canopy edges, though TSHE/ACCI-BENE and TSHE/POMU-GASH occur frequently as well.

TSHE/GASH-BENE is also found around the visitor's center, somewhat in a mosaic with the TSHE/GASH plant association. The occurrence here is probably related to a historical fire that severely burned the forest where the visitor's center sits today.

Tsuga heterophylla / Polystichum munitum - Gaultheria shallon forest (TSHE/POMU-GASH)

This plant association exists in the clear-cut region of the northwest part of the park. An even age cohort of mostly Douglas-fir is regenerating in this area, with a thick understory of salal and swordfern. This plant association does begin to grade into the TSHE/GASH-BENE and TSHE/POMU-BENE plant associations as you move away from the clear-cut and into the older forest's interiors.

Tsuga heterophylla / Acer circinatum - Berberis nervosa forest (TSHE/ACCI-BENE)

A few small patches of TSHE/ACCI-BENE occur within Federation Forest State Park, both on the hillside along the northern boundary of the park and in the picnic area near the visitor's center. Vine maple (*Acer circinatum*) creates a nice emerald ceiling underneath the darker coniferous upper-canopy in these forests. *Berberis nervosa* is the dominant shrub cover underneath the vine maple. A remnant old-growth patch of TSHE/ACCI-BENE was mapped on the south side of the White River, but this patch may or may not be within the park boundary (see Notes about Boundary Discrepancies).

Tsuga heterophylla / Berberis nervosa - Corallorhiza mertensiana forest (TSHE/BENE-CHME)

West of the visitor's center, the same historic fire that seems to have favored the establishment of the TSHE/GASH plant association led to the establishment of a TSHE/BENE-CHME association in a large contiguous patch. The nearly complete lack of understory vegetation, save for a few Oregongrape here and there are characteristic of this association. Many saprophytes were seen growing in this forest patch, including western coralroot (*Corallorhiza mertensiana*), spotted coralroot (*Corallorhiza maculata*), candystick (*Allotropa virgata*), and pinesap (*Hypopitys monotropa*). As this closed canopy forest continues to self-thin its stem density, canopy openings caused by tree mortality and wind-throw may open up the dark understory for establishment of more light sensitive plants, allowing a new plant association to become established.

Tsuga heterophylla / Oplopanax horridum – Athyrium filix-femina forest (TSHE/OPHO-ATFI)

The TSHE/OPHO-ATFI plant association occurs frequently throughout the forested valley bottom flats of Federation Forest State Park. This plant association occurs where soils tend to be more saturated than in areas of the TSHE/POMU-DREX plant association. Understory vegetation diversity is relatively higher in this community than in the other plant association types found in the park. In some areas, logging or road / trail development has disturbed the soils and canopies of this plant association, resulting in patch fragmentation and structural alterations. However a majority of the TSHE/OPHO-ATFI patches are in good ecological condition, with few exotics plant infestations and complex multiple storied canopy structures made up of a diversity of plant growth forms (trees, shrubs, ferns, herbs, and graminoids).

Tsuga heterophylla / Polystichum munitum – Tiarella trifoliata forest (TSHE/POMU-TITR)

TSHE/POMU-TITR occurs frequently in small patches throughout Federation Forest State Park. The plant association seems to favor slightly more saturated soils than the TSHE/POMU-BENE association, and slightly less saturated soils than the TSHE/OPHO-ATFI association. It is constantly in a mosaic with these two other plant associations throughout the valley bottom flats away from the White River. Near the White River, on some of the lower terraces above the floodplain, some larger patches of this association stand out. ALRU/POMU mosaics with this association in these areas, and a few large black cottonwood (*Populus trichocarpa*) trees peak through the forest overstory.

Tsuga heterophylla / Lysichitum americanum forest (TSHE/LYAM)

Small and large patches of the TSHE/LYAM association are found throughout the valley bottom flats in the old-growth forests of the park. Saturated soils characterized the location where TSHE/LYAM occurred. Western corydalis (*Corydalis scouleri*) frequently grew in such abundance and at such a height that in many of the TSHE/LYAM patches, it was the only visible understory plant besides vine maple, in effect covering the *Lysichitum americanum* and other lower growing understory plants. This plant association frequently mosaics with the TSHE/OPHO-ATFI and TSHE/POMU-TITR associations. This is the wettest plant association in the park.

Tsuga heterophylla / Tiarella trifoliata - Gymnocarpium dryopteris forest (TSHE/TITR-GYDR)

Some small patches of TSHE/TITR-GYDR occur within the park, confined to the valley bottom flats where the soils are more mesic. This association is found in mosaic with the TSHE/OPHO-ATFI and TSHE/LYAM associations. Foamflower (*Tiarella trifoliata*) and oakfern (*Gymnocarpium dryopteris*) are among the dominant understory plants, most of which are herbs. There is a notable absence of swordfern and/or Oregongrape.

Non-Forested Bedrock Cliff – Rock Outcrop

Above the private timberland access road in the far northwestern section of the park, a steep rocky outcrop forms a series of cliffs with no forest overstory. This is a unique type of habitat for Federation Forest State Park, since most of the rest of the park is either heavily forested or in the floodplain. Service berry (*Amelanchier alnifolia*), varileaf phacelia (*Phacelia heterophylla var. pseudohispida*), and chickweed monkeyflower (*Mimulus alsinoides*), which hardly occur elsewhere within the park, are all well established on these rocky exposures. Historic logging has impacted the forests surrounding this rocky cliff area, and the logging road abuts the lower end of the westernmost cliff just outside the park boundary.

Rare Plant Surveys

Methods

We visited Federation Forest State Park multiple times during the 2005 field season to conduct a rare plant survey. Field surveys were conducted on May 2 and 3, and again on June 7 and 8 under the primary contract. Additional surveys were performed from August 1 to August 3, and again on September 3 under the second contract. 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 (Maps 1 and 2).

Results

A total of 261 vascular plant species were identified during the contracted plant surveys at Federation State Park. Of these, 62 of the plant species are non-native, accounting for 24% of the total. In terms of abundance, one alien species earned rating of 1 (abundant in multiple habitats), *Myosotis scripoides*, and one species earned level 2 (abundant in specific habitats, *Geranium robertianum*. There are 22 species with a rating of 3 (common in specific habitats), 24 species are in group 4 (these species were rare in the park) and 14 of group 5 (rare, 5 or fewer sightings).

Listed Plants in Federation Forest State Park

Four vascular plant species found in Federation State Park are on the Washington Natural Heritage Program "Watch" list, *Eburophyton austiniae* (phantom orchid, now known as *Cephalanthera austiniae* (Gray) Heller), *Hemitomes congestum* (gnome plant), *Pleuricospora fimbriolata* (fringed pine-sap), and *Platanthera orbiculata (*round-leaved rein-orchid). Watch List plants are characterized by the WNHP as species that were previously listed as sensitive, and remain under scrutiny.

Eburophyton austiniae: **Phantom Orchid**
Phantom orchid is a saprophyte; it contains no photosynthetic chlorophyll. It is a species of moist, dense, coniferous forests, with a range extending from the Olympic and Cascade Mountains in Washington to southern California, and east to Idaho.

Hemitomes congestum: **Gnome Plant**

Gnome plant is in the family *Ericaceae* and is another saprophyte, lacking chlorophyll and therefore lacking any green color. It grows in older forests in the Cascades and Olympic mountains and is quite uncommon in Washington State.

Pleuricospora fimbriolata: **Fringed Pine-sap**

Fringed pine-sap is also in the family *Ericaceae* and is a saprophyte. It inhabits dense coniferous forests from the Cascades and the Olympics in Washington south the Sierra Nevada in northwest California.

Platanthera orbiculata: **Round-Leaved Rein-Orchid**

Round-leaved rein-orchid is in the family *Orchidaceae*. It is found on both sides of the Cascades in Washington and Oregon from moist woods to swamps.

Vascular Plant List for Federation Forest State Park

Key to Vascular Plant Species List

Field 2, "Ab": Abundance. An abundance rating system has been used to indicate how common each species is in the park. There are 5 rating levels, as follows:

1—Abundant in multiple plant communities
2—Common in multiple plant communities
3—Common in specific plant communities
4—Uncommon in specific plant associations
5—Rare, five or fewer sightings in the park.

Field 3, "Code": Four-letter plant code as shown on the USDA PLANTS database.
Field 6, "Rank": Any species classified by the WNHP as endangered, threatened, sensitive or "watch" will have a letter in this field indicating its rank.
Field 9, "Type": t= tree, s= shrub, p= perennial, a= annual, g= graminoid, f= fern
Field 10, "Alien": species that are not native to the park are indicated with a "a"
Field 11, "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 when it exists is shown in this column.

Asterisked species: The fern species *Dryopteris expansa* is shown in the species list with this updated nomenclature because this name is now in such wide circulation. *D. expansa* was not recognized by Hitchcock and Cronquist.

The list of species identified during this project is below. Note: An asterisk (*) in the species code indicates that the species was not identified to variety and no official USDA 4-letter code exists for the species.

Vascular Plants of Federation Forest State Park

#	Ab	Code	Scientific Name	Common Name	Rank	Family- Scientific	Family- Common	Type	Alien?	Synonym
1	4	ABGR	Abies grandis	grand fir		Pinaceae	Pine	t		
2	4	ABLA	Abies lasiocarpa	subalpine fir		Pinaceae	Pine	t		
3	5	ABPR	Abies procera	noble fir		Pinaceae	Pine	t		
4	2	ACCI	Acer circinatum	vine maple		Aceraceae	Maple	s		
5	3	ACMA3	Acer macrophyllum	bigleaf maple		Aceraceae	Maple	t		
6	3	ACTR	Achlys triphylla	vanillaleaf		Ranunculaceae	Buttercup	p		
7	4	ACRU2	Actaea rubra	baneberry		Ranunculaceae	Buttercup	p		
8	4	ADBI	Adenocaulon bicolor	pathfinder		Compositae	Composite	p		
9	5	ADPE	Adiantum pedatum	northern maidenhair fern		Polypodiaceae	Common Fern	f		Adianum aleuticum
10	4	AGRE2	Agropyron repens	quackgrass		Gramineae	Grass	g	a	
11	3	AICA	Aira caryophyllea	silver hairgrass		Gramineae	Grass	g	a	
12	3	AIPR	Aira praecox	little hairgrass		Gramineae	Grass	g	a	
13	5	ALVI2	Allotropa virgata	candystick		Ericaceae	Heather	p		
14	2	ALRU2	Alnus rubra	red alder		Betulaceae	Birch	t		
15	5	ALSI	Alnus sinuata	Sitka alder		Betulaceae	Birch	s		Alnus viridis ssp. sinuata
16	3	ALAE	Alopecurus aequalis	little meadow-foxtail		Gramineae	Grass	p		
17	4	AMAL2	Amelanchier alnifolia	serviceberry		Rosaceae	Rose	s		
18	5	ANMA	Anaphalis margaritacea	pearly everlasting		Compositae	Composite	p		
19	4	ANAR3	Angelica arguta	sharptooth angelica		Umbelliferaceae	Parsley	p		
20	5	ANMI3	Antennaria microphylla	rosy pussytoes		Compositae	Composite	p		
21	4	ANOD5	Anthoxanthum odoratum	sweet vernalgrass		Gramineae	Grass	g	a	
22	5	AQFO	Aquilegia formosa	red columbine		Ranunculaceae	Buttercup	p		
23	5	ARFU	Arabis furcata	Cascade rockcress		Cruciferae	Mustard	p		
24	4	ARNE	Arctostaphylos nevadensis	kinnikinnick		Ericaceae	Heather	s		
25	4	ARMA18	Arenaria macrophylla	big-leaved sandwort		Caryophyllaceae	Pink	p		Moehringia macrophylla
26	4	AREL3	Arrhenatherum elatius	oatgrass		Gramineae	Grass	g	a	
27	5	ARAB3	Artemisia absinthium	wormwood		Compositae	Composite	p	a	
28	4	ARDO3	Artemisia douglasiana	Douglas sagebrush		Compositae	Composite	p		
29	4	ARSY	Aruncus sylvester	goatsbeard		Rosaceae	Rose	s		Aruncus dioicus var. acuminatus
30	4	ASCA	Asarum caudatum	wild ginger		Aristolochiaceae	Birthwort	p		
31	3	ATFI	Athyrium filix-femina	lady-fern		Polypodiaceae	Common Fern	f		
32	3	BENE	Berberis nervosa	Cascade Oregongrape		Berberidaceae	Barberry	s		Mahonia nervosa
33	4	BLSP	Blechnum spicant	deer-fern		Polypodiaceae	Common Fern	f		

34	3	BRCO4	Bromus commutatus	hairy brome		Gramineae	Grass	g	a	
35	3	BRPA3	Bromus pacificus	Pacific brome		Gramineae	Grass	g		
36	4	BRTE	Bromus tectorum	cheatgrass		Gramineae	Grass	g	a	
37	5	CAHE3	Callitriche heterophylla	water starwort		Callitrichaceae	Water-starwort	p		
38	5	CABU	Calypso bulbosa	fairyslipper		Orchidaceae	Orchid	p		
39	4	CAAN5	Cardamine angulata	seaside bittercress		Cruciferae	Mustard	p		
40	4	CAOC	Cardamine occidentalis	western bittercress		Cruciferae	Mustard	p		
41	3	CAOLO	Cardamine oligosperma var. oligosperma	little western bittercress		Cruciferae	Mustard	a		
42	4	CAAM10	Carex amplifolia	big-leaf sedge		Cyperaceae	Sedge	g		
43	4	CAAQ	Carex aquatilis	water sedge		Cyperaceae	Sedge	g		
44	5	CACU5	Carex cusickii	Cusick's sedge		Cyperaceae	Sedge	g		
45	4	CADE9	Carex deweyana	Dewey's sedge		Cyperaceae	Sedge	g		
46	4	CAHE7	Carex hendersonii	Henderson's sedge		Cyperaceae	Sedge	g		
47	4	CALA13	Carex laeviculmis	smoothstem sedge		Cyperaceae	Sedge	g		
48	4	CALI6	Carex limnophila	pond sedge		Cyperaceae	Sedge	g		Carex microptera
49	4	CAME6	Carex mertensii	Merten's sedge		Cyperaceae	Sedge	g		
50	3	CAPA58	Carex pachystachya	thick-headed sedge		Cyperaceae	Sedge	g		
51	4	CARO5	Carex rossii	Ross sedge		Cyperaceae	Sedge	g		
52	4	CEMA4	Centaurea maculosa	spotted knapweed		Compositae	Composite	b	a	
53	5	CEMO	Centaurea montana	perennial cornflower		Compositae	Composite	p	a	
54	4	CEVI3	Cerastium viscosum	sticky chickweed		Caryophyllaceae	Pink	a	a	Cerastium glomeratum
55	4	CHME	Chimaphila menziesii	little pipsissiwa		Ericaceae	Heather	p		
56	5	CHUM	Chimaphila umbellata	pipsissewa		Ericaceae	Heather	p		
57	3	CHLE80	Chrysanthemum leucanthemum	oxeye daisy		Compositae	Composite	p	a	Leucanthemum vulgare
58	5	CHOR4	Chrysopsis oregona	Oregon false goldenaster		Compositae	Composite	s		Heterotheca oregona var. oregona
59	3	CIAL	Circaea alpina	enchanter's nightshade		Onagraceae	Evening-primrose	p		
60	4	CIAR4	Cirsium arvense	Canada thistle		Compositae	Composite	p	a	
61	4	CIVU	Cirsium vulgare	bull thistle		Compositae	Composite	b	a	
62	3	CLUN2	Clintonia uniflora	beadlily		Liliaceae	Lily	p		
63	3	COPA3	Collinsia parviflora	blue-eyed Mary		Scrophulariaceae	Figwort	a		
64	4	COHE2	Collomia heterophylla	varied-leaved collomia		Polemoniaceae	Phlox	a		
65	4	COMA4	Corallorhiza maculata	spotted coralroot		Orchidaceae	Orchid	p		
66	4	COME4	Corallorhiza mertensiana	western coralroot		Orchidaceae	Orchid	p		
67	4	COCA13	Cornus canadensis	bunchberry dogwood		Cornaceae	Dogwood	p		
68	3	COST4	Cornus stolonifera	redosier dogwood		Cornaceae	Dogwood	s		Cornus sericea ssp sericea
69	3	COSC4	Corydalis scouleri	western corydalis		Fumariaceae	Fumitory	p		

70	4	CRAC2	Crepis acuminata	long-leaved hawksbeard		Compositae	Composite	p		
71	5	CRCR	Cryptogramma crispa	parsley-fern		Polypodiaceae	Common Fern	f		
72	4	CYFR2	Cystopteris fragilis	fragile fern		Polypodiaceae	Common Fern	f		
73	3	CYSC4	Cytisus scoparius	Scot's broom		Leguminosae	Pea	s	a	
74	3	DACA6	Daucus carota	Queen Anne's lace		Umbelliferaceae	Parsley	b	a	
75	5	DAST	*Datura stramonium*	jimsonweed		Solanaceae	Nightshade	a	a	
76	3	DEDA	Deschampsia danthonioides	annual hairgrass		Gramineae	Grass	g		
77	3	DIFO	Dicentra formosa	Pacific bleedingheart		Fumariaceae	Fumitory	p		
78	4	DIPU	Digitalis purpurea	foxglove		Scrophulariaceae	Figwort	a	a	
79	3	DIHO3	Disporum hookeri	Hooker's fairybells		Liliaceae	Lily	p		
80	4	DRVEV	Draba verna var. verna	spring whitlowgrass		Cruciferae	Mustard	a		
81	3	DREX2	Dryopteris expansa	spreading wood-fern		Polypodiaceae	Common Fern	f		
82	5	EBAU	Eburophyton austinae	phantom orchid	W	Orchidaceae	Orchid	p		Cephalanthera austiniae
83	3	ELGL	Elymus glaucus	blue wild rye		Gramineae	Grass	g		
84	4	EPAN2	Epilobium angustifolium	fireweed		Onagraceae	Evening-primrose	p		Chamerion angustifolium
85	4	EPMI	Epilobium minutum	small-flowered willow-herb		Onagraceae	Evening-primrose	a		
86	3	EPWA	Epilobium watsonii	Watson's willow-herb		Onagraceae	Evening-primrose	p		Epilobium ciliatum spp. grlandulosum
87	3	EQAR	Equisetum arvense	field horsetail		Equisetaceae	Horsetail	p		
88	3	EQSC	Equisetum scirpoides	sedgelike horsetail		Equisetaceae	Horsetail	p		
89	3	EQTE	Equisetum telmateia	giant horsetail		Equisetaceae	Horsetail	p		
90	4	FEMY2	Festuca myuros	rat-tail fescue		Gramineae	Grass	g	a	Vulpia myuros, V. megalura
91	3	FEOC	Festuca occidentalis	western fescue		Gramineae	Grass	g		
92	3	FERU	Festuca rubra	red fescue		Gramineae	Grass	g		
93	4	FESU	Festuca subuliflora	Coast Range fescue		Gramineae	Grass	g		
94	5	FIAR2	Filago arvensis	field filago		Compositae	Composite	a	a	Logfia arvensis
95	4	FRVE	Fragaria vesca	woods strawberry		Rosaceae	Rose	p		
96	3	FRVI	Fragaria virginiana	wild strawberry		Rosaceae	Rose	p		
97	3	GAAP2	Galium aparine	cleavers		Rubiaceae	Madder	a	a	
98	3	GASH	Gaultheria shallon	salal		Ericaceae	Heather	s		
99	5	GEDI	Geranium dissectum	cutleaf geranium		Geraniaceae	Geranium	a	a	Geranium laxum
100	2	GERO	Geranium robertianum	Robert geranium		Geraniaceae	Geranium	a	a	
101	4	GEMA4	Geum macrophyllum	large-leaved avens		Rosaceae	Rose	p		
102	4	GLHE2	Glecoma hederacea	ground ivy		Labiate	Mint	p	a	
103	3	GLEL	Glyceria elata	tall mannagrass		Gramineae	Grass	g		
104	4	GLGR	Glyceria grandis	western mannagrass		Gramineae	Grass	g		
105	3	GLLE2	Glyceria leptostachya	reed mannagrass		Gramineae	Grass	g		

106	4	GNUL	Gnaphalium uliginosum	marsh cudweed		Compositae	Composite	a	a	
107	4	GOOB2	Goodyera oblongifolia	rattlesnake plantain		Orchidaceae	Orchid	p		
108	3	GYDR	Gymnocarpium dryopteris	oak fern		Polypodiaceae	Common Fern	f		
109	5	HECO6	Hemitomes congestum	gnome-plant	W	Ericaceae	Heather	p		
110	4	HELA4	Heracleum lanatum	cow parsnip		Umbelliferaceae	Parsley	p		
111	3	HEMI	Heuchera micrantha	smallflowered alumroot		Saxifragaceae	Saxifrage	p		
112	4	HIAL2	Hieracium albiflorum	white-flowered hawkweed		Compositae	Composite	p		
113	3	HISA4	Hieracium sabaudum	New England hawkweed		Compositae	Composite	p	a	not in Hitchcock
114	3	HOLA	Holcus lanatus	common velvetgrass		Gramineae	Grass	g	a	
115	4	HODI	Holodiscus discolor	oceanspray		Rosaceae	Rose	s		
116	3	HYTE	Hydrophyllum tenuipes	slender-stem waterleaf		Hydrophyllaceae	Waterleaf	p		
117	3	HYPE	Hypericum perforatum	St. John's-wort		Hypericaceae	St. John's-wort	p	a	
118	3	HYRA3	Hypocharis radicata	hairy cat's-ear		Compositae	Composite	a	a	
119	3	HYMO3	Hypopitys monotropa	pinesap		Ericaceae	Heather	p		
120	4	JUBU	Juncus bufonius	toad rush		Juncaceae	Rush	g		
121	3	JUEF	Juncus effusus	common rush		Juncaceae	Rush	g		
122	4	JUEN	Juncus ensifolius	dagger-leaved rush		Juncaceae	Rush	g		
123	3	LAMU	Lactuca muralis	wall lettuce		Compositae	Composite	a	a	Mycelis muralis
124	5	LAPU2	Lamium purpureum	purple deadnettle		Labiate	Mint	a	a	
125	4	LANE3	Lathyrus nevadensis	Nuttall's peavine		Leguminosae	Pea	p		
126	5	LASY	Lathyrus sylvestris	narrow-leaved peavine		Leguminosae	Pea	p	a	
127	3	LECA5	Lepidium campestre	field pepperwort		Cruciferae	Mustard	a	a	
128	4	LICA	Ligusticum canbyi	licoriceroot		Umbelliferaceae	Parsley	p		
129	5	LICO	Lilium columbianum	tiger lily		Liliaceae	Lily	p		
130	3	LIBO3	Linnaea borealis	twinflower		Scrophulariaceae	Figwort	p		
131	4	LICA	Listera caurina	northwest twayblade		Orchidaceae	Orchid	p		
132	4	LICO6	Listera cordata	heartleaf twayblade		Orchidaceae	Orchid	p		
133	3	LOCI3	Lonicera ciliosa	orange honeysuckle		Caprifoliaceae	Honeysuckle	s		
134	4	LOIN5	Lonicera involucrata	black twinberry		Caprifoliaceae	Honeysuckle	s		
135	5	LOCO6	Lotus corniculatus	birdsfoot trefoil		Leguminosae	Pea	p	a	
136	4	LODE	Lotus denticulatus	meadow lotus		Leguminosae	Pea	a		
137	4	LOMI	Lotus micranthus	small-flowered deervetch		Leguminosae	Pea	a		
138	4	LOPU3	Lotus purshiana	Spanish clover		Leguminosae	Pea	a		
139	5	LULAL	Lupinus latifolius var. latifolius	broadleaf lupine		Leguminosae	Pea	p		
140	4	LUPO2	Lupinus polyphyllus	many-leaved lupine		Leguminosae	Pea	p		
141	4	LUCA2	Luzula campestris	field woodrush		Juncaceae	Rush	g		

142	3	LUPA	Luzula parviflora	small-flowered woodrush		Juncaceae	Rush	g		
143	5	LYSE	Lycopodium selago	fir clubmoss		Lycopodiaceae	Clubmoss	cm		
144	3	LYAM3	Lysichitum americanum	skunk cabbage		Araceae	Arum	p		Lysichiton americanus
145	2	MADI	Maianthemum dilatatum	may-lily		Liliaceae	Lily	p		
146	4	MAMA11	Matricaria matricarioides	pineapple weed		Compositae	Composite	a	a	Matricaria discoidea
147	4	MELU	Medicago lupulina	black medic		Leguminosae	Pea	p	a	
148	4	MESM	Melica smithii	Smith's melic		Gramineae	Grass	g		
149	3	MESU	Melica subulata	Alaska oniongrass		Gramineae	Grass	g		
150	5	MEFE	Menziesia ferruginea	fool's huckleberry		Ericaceae	Heather	s		
151	3	MIGR	Microsteris gracilis	pink-eyed Mary		Polemoniaceae	Phlox	a		
152	4	MIAL3	Mimulus alsinoides	chickweed monkeyflower		Scrophulariaceae	Figwort	p		
153	3	MIGU	Mimulus guttatus	yellow monkeyflower		Scrophulariaceae	Figwort	p		
154	3	MIPE	Mitella pentandra	alpine mitrewort		Saxifragaceae	Saxifrage	p		
155	5	MOUN3	Monatropa uniflora	Indian pipe		Ericaceae	Heather	p		
156	4	MOPA5	Montia parvifolia	littleleaf montia		Caryophyllaceae	Pink	p		
157	1	MOSI2	Montia sibirica	Siberian miner's lettuce		Caryophyllaceae	Pink	a		Claytonia siberica
158	5	MYDI	Myosotis discolor	yellow and blue forgetmenot		Boraginaceae	Borage	a		
159	4	MYLA	Myosotis laxa	small-flowered forgetmenot		Boraginaceae	Borage	p		
160	1	MYSC	Myosotis scirpoides	common forgetmenot		Boraginaceae	Borage	a	a	
161	4	NEPA	Nemophila parviflora	small-flowered nemophila		Hydrophyllaceae	Waterleaf	a		
162	5	NONE3	Nothochelone nemorosa	woodland beard-tongue		Scrophulariaceae	Figwort	p		
163	3	OECE	Oemleria cerasiformis	Indian plum		Rosaceae	Rose	s		
164	3	OESA	Oenanthe sarmentosa	water-parsley		Umbelliferaceae	Parsley	p		
165	3	OPHO	Oplopanax horridum	devil's club		Araliaceae	Ginseng	s		
166	4	OSCH	Osmorhiza chilensis	mountain sweet-cicely		Umbelliferaceae	Parsley	p		Osmorhiza berteroi
167	4	PESE5	Penstemon serrulatus	Cascade penstemon		Scrophulariaceae	Figwort	s		
168	3	PEFRP	Petasites frigidus var. plamatus	sweet coltsfoot		Compositae	Composite	p		
169	4	PHHEP	Phacelia heterophylla var. pseudohispida	varileaf phacelia		Hydrophyllaceae	Waterleaf	p		
170	4	PHAR3	Phalaris arundinacea	reed canarygrass		Gramineae	Grass	p	a	
171	4	PISI	Picea sitchensis	Sitka spruce		Pinaceae	Pine	t		
172	5	PICOC	Pinus contorta	lodgepole pine		Pinaceae	Pine	t		
173	5	PIPOP	Pinus ponderosa	ponderosa pine		Pinaceae	Pine	t		
174	3	PLLA	Plantago lanceolata	narrowleaf plantain		Plantaginaceae	Plantain	p	a	
175	4	PLMA2	Plantago major	common plantain		Plantaginaceae	Plantain	p	a	
176	5	PLOR4	Platanthera orbiculata	roundleaved rein-orchid	W	Orchidaceae	Orchid	p		
177	5	PLFI2	Pleuricospora fimbriolata	fringed-pinesap	W	Ericaceae	Heather	p		

178	3	POAN	Poa annua	annual bluegrass		Gramineae	Grass	g	a	
179	4	POCO	Poa compressa	Canada bluegrass		Gramineae	Grass	g		
180	4	POLE2	Poa leptocoma	bog bluegrass		Gramineae	Grass	g		
181	4	POPR	Poa pratensis	Kentucky bluegrass		Gramineae	Grass	g	a	
182	3	POTR2	Poa trivialis	rough bluegrass		Gramineae	Grass	g	a	
183	5	PODO4	Polygonum douglasii	Douglas' knotweed		Polygonaceae	Buckwheat	a		
184	3	POGL8	Polypodium glycyrrhiza	licorice fern		Polypodiaceae	Common Fern	f		
185	1	POMU	Polystichum munitum	sword-fern		Polypodiaceae	Common Fern	f		
186	4	POTR15	Populus trichocarpa	black cottonwood		Salicaceae	Willow	t		Populus balsamifera ssp. trichocarpa
187	4	PRVU	Prunella vulgaris	self-heal		Labiatae	Mint	p		
188	4	PREMM	Prunus emarginata var. mollis	bittercherry		Rosaceae	Rose	s		
189	1	PSME	Pseudotsuga menziesii	Douglas fir		Pinaceae	Pine	t		
190	4	PTAQ	Pteridium aquilinum	bracken fern		Polypodiaceae	Common Fern	f		
191	4	PYUN	Pyrola uniflora	woodnymph		Ericaceae	Heather	p		Moneses uniflora
192	3	RAOC	Ranunculus occidentalis	western buttercup		Ranunculaceae	Buttercup	p		
193	3	RARER	Ranunculus repens var. repens	creeping buttercup		Ranunculaceae	Buttercup	p	a	
194	4	RAUN	Ranunculus uncinatus	woodland buttercup		Ranunculaceae	Buttercup	p		
195	5	RHMA3	Rhododendron macrophyllum	western rhododendron		Ericaceae	Heather	s		
196	3	RIBR	Ribes bracteosum	stink currant		Grossulariaceae	Current	s		
197	5	RIHU	Ribes hudsonianum	stinking currant		Grossulariaceae	Current	s		
198	4	RILA	Ribes lacustre	swamp currant		Grossulariaceae	Current	s		
199	3	RISA2	Ribes sanguineum	red-flowered currant		Grossulariaceae	Current	s		
200	4	ROGY	Rosa gymnocarpa	baldhip rose		Rosaceae	Rose	s		
201	5	RUDI2	Rubus discolor	Himalayan blackberry		Rosaceae	Rose	s	a	
202	4	RULA	Rubus laciniatus	evergreen blackberry		Rosaceae	Rose	s	a	
203	4	RULE	Rubus leucodermis	black raspberry		Rosaceae	Rose	s		
204	4	RUPA	Rubus parviflorus	thimbleberry		Rosaceae	Rose	s		
205	4	RUPE	Rubus pedatus	fiveleaved bramble		Rosaceae	Rose	s		
206	1	RUSP	Rubus spectabilis	salmonberry		Rosaceae	Rose	s		
207	3	RUUR	Rubus ursinus	trailing blackberry		Rosaceae	Rose	s		
208	3	RUAC3	Rumex acetosella	sheep sorrel		Polygonaceae	Buckwheat	a	a	
209	3	RUOC3	Rumex occidentalis	western dock		Polygonaceae	Buckwheat	p		
210	5	SASA	Sagina saginoides	alpine pearlwort		Caryophyllaceae	Pink	p		
211	4	SABA	Salix barclayi	Barclay's willow		Salicaceae	Willow	s		
212	5	SALA5	Salix lasiandra	pacific willow		Salicaceae	Willow	s		Salix lucida
213	4	SAME2	Salix melanopsis	dusky willow		Salicaceae	Willow	s		

214	4	SAPS	Salix pseudomonticola	false mountain willow		Salicaceae	Willow	s		
215	3	SASI2	Salix sitchensis	Sitka willow		Salicaceae	Willow	t		
216	3	SARA2	Sambucus racemosa	red elderberry		Caprifoliaceae	Honeysuckle	s		
217	4	SCCY	Scirpus cyperinus	woolgrass		Cyperaceae	Sedge	g		
218	4	SEJA	Senecio jacobaea	tansy ragwort		Compositae	Composite	a	a	
219	4	SEVU	Senecio vulgaris	common groundsel		Compositae	Composite	p	a	
220	5	SIAN2	Silene antirrhina	sleepy cat		Caryophyllaceae	Pink	p	a	
221	3	SMST	Smilacina stellata	star-flowered solomon's seal		Liliaceae	Lily	p		Maianthemum stellatum
222	5	SONIV3	Solanum nigrum var. virginicum	American black nightshade		Solanaceae	Nightshade	p	a	Solanum americanum
223	4	SOCA6	Solidago canadensis	Canada goldenrod		Compositae	Composite	p		
224	5	SPRU	Spergularia rubra	red sandspurry		Caryophyllaceae	Pink	a	a	
225	4	SPDE	Spiraea densiflora	subalpine spiraea		Rosaceae	Rose	s		
226	5	SPRO	Spiranthes romanzoffiana	hooded ladie's tress		Orchidaceae	Orchid	p		
227	3	STCO14	Stachys cooleyae	cooley's hedge-nettle		Labiatae	Mint	p		Stachys chamissonis var. cooleyae
228	3	STCA	Stellaria calycantha	northern starwort		Caryophyllaceae	Pink	a		
229	3	STCR2	Stellaria crispa	crisped starwort		Caryophyllaceae	Pink	p		
230	4	STME2	Stellaria media	chickweed		Caryophyllaceae	Pink	a	a	
231	3	STUM	Stellaria umbellata	umbellate starwort		Caryophyllaceae	Pink	a		
232	4	STST3	Streptopus streptopoides	twisted-stalk		Liliaceae	Lily	p		
233	4	SYAL	Symphoricarpos albus	common snowberry		Caprifoliaceae	Honeysuckle	s		
234	3	TAOF	Taraxacum officinale	common dandelion		Compositae	Composite	b	a	
235	4	TABR2	Taxus brevifolia	Pacific yew		Taxaceae	Yew	s		
236	4	TENU	Teesdalia nudicaulis	teesdalia		Cruciferae	Mustard	a	a	
237	5	TEGR2	Tellima grandiflora	fringecup		Saxifragaceae	Saxifrage	p		
238	3	THPL	Thuja plicata	western redcedar		Cupressaceae	Cyperess	t		
239	3	TITR	Tiarella trifoliata	foamflower		Saxifragaceae	Saxifrage	p		
240	2	TOME	Tolmiea menziesii	youth-on-age		Saxifragaceae	Saxifrage	p		
241	5	TRCAO	Trautvetteria caroliniensis var. occidentalis	false bugbane		Ranunculaceae	Buttercup	p		
242	4	TRLA6	Trientalis latifolia	western starflower		Primulaceae	Primrose	p		Trientalis borealis ssp. latifolia
243	3	TRPR2	Trifolium pratense	red clover		Leguminosae	Pea	p	a	
244	3	TRRE3	Trifolium repens	white clover		Leguminosae	Pea	p	a	
245	3	TROV	Trillium ovatum	white trillium		Liliaceae	Lily	p		
246	1	TSHE	Tsuga heterophylla	Pacific hemlock		Pinaceae	Pine	t		
247	5	TYLA	Typha latifolia	common cattail		Typhaceae	Cat-tail	p		
248	5	URDI	Urtica dioica	stinging nettle		Urticaceae	Nettle	p		
249	3	VAPA	Vaccinium parvifolium	red huckleberry		Ericaceae	Heather	s		

250	5	VALER	Valeriana sp.	valerian		Valerianaceae	Valerian	p		
251	4	VETH	Verbascum thapsus	common mullein		Scrophulariaceae	Figwort	b	a	
252	4	VEAM2	Veronica americana	American brooklime		Scrophulariaceae	Figwort	p		
253	4	VEAR	Veronica arvensis	field speedwell		Scrophulariaceae	Figwort	a	a	
254	4	VEBI2	Veronica biloba	bilobed speedwell		Scrophulariaceae	Figwort	a	a	
255	3	VECH	Veronica chamaedrys	Germander speedwell		Scrophulariaceae	Figwort	p	a	
256	4	VEWO	Veronica wormskjoldii	alpine speedwell		Scrophulariaceae	Figwort	p		
257	4	VIAM	Vicia americana	American vetch		Leguminosae	Pea	p		
258	5	VIHI	Vicia hirsuta	Hairy Vetch		Leguminosae	Pea	p	a	
259	3	VIGL	Viola glabella	pioneer violet		Violaceae	Violet	p		
260	3	VIOR	Viola orbiculata	darkwoods violet		Violaceae	Violet	p		
261	3	VISE3	Viola sempervirens	evergreen violet		Violaceae	Violet	p		

Discussion

Previous to our 2005 survey, no state or federally listed vascular plants had been documented within Federation Forest State Park. Our 2005 project did not locate any new populations of listed sensitive, threatened or endangered plants. The four Watch List plant species may at some future time become listed. The State Parks should work to protect these rare species. Maintaining a healthy population of these species in Federation Forest will help avoid a state or federal listing.

Ecological Condition of Federation Forest State Park

Some of the forest stands in Federation Forest State Park represent some of the best low-elevation old-growth forests remaining in the Puget Sound and Western Cascades regions. Although there was limited selective cutting many years ago in some of the old-growth stands, the stands are now in remarkably good ecological condition. In most cases, recreational impacts have been low and non-native plant invasions are limited to road and trail borders. Old growth structure is often remarkable. Excellent examples of large (over 1 meter DBH) Sitka spruce (*Picea sitchensis*) can be found. Specimens of this species in this size class are exceedingly rare in Washington State at this time. Very large Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*) and western red cedar (*Thuja plicata*) are abundant. A few large, old noble fir (*Abies procera*) are found in the park.

The mature forests within the park represent regeneration from logging during the past 60 to 80 years. Many of these stands are now in good condition and will develop old-growth characteristics in another 100 years. Most sites in the park are quite productive, so late-successional structure will develop relatively rapidly in most places. There are a few places along the northern border of the park where it appears that clear-cuts on adjacent private lands ended up slopping over into the park. These areas are in an early successional condition now.

The river flood plain contains good examples of deciduous forest dominated by red alder (*Alnus rubra*), black cottonwood (*Populus tricocarpa*) and bigleaf maple (*Acer macrophyllum*) and several willow species (*Salix*). These stands are fairly young, representing regeneration from past flood events. Nearly all the gravel bars along the White River have very early successional vegetation, often dominated by Scot's broom (*Cytisus scoparius*). Many other invasive alien plants are found within the floodplain area. It appears that seeds and other propagules are spread downstream by the river during flood events. The floodplain ecosystems have been significantly altered by non-native species invasions. Unfortunately, without elimination of alien species throughout the watershed above the park, efforts to control alien species in the park will be pointless.

Recommendations

In general, the ecological condition of Federation Forest State Park is quite good. The older forests have the best condition while the river floodplain areas and areas near roads and trails have high levels of non-native plant cover. Maintenance of the condition of the late-successional forests should be a prime emphasis for this park, as many of the stands are exemplary for Washington State. Likewise, the mature forests are well on their way to becoming old-growth. With wise management, they will approach the condition that many old-growth stands have today.

Control of non-native plants should be confined to the sides of roads and trails. These are the primary areas where problems exist. Mowing is probably the best option, as it will cause the least harm to native plants growing next to the roads and trails. The soils in this park are saturated much of the year and herbicide movement can be rapid and adversely affect native plants outside of the project area. Control of invasive alien plants in the river floodplain will be futile, unless massive efforts are undertaken upstream.

GIS Products Produced

Associated with this report is a polygon layer created by PBI depicting the vegetation community types mapped in Federation Forest State Park. The dataset has been converted into ESRI shapefile format 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.

References

Chappell C.B. 2004. *Terrestrial plant associations of the Puget trough ecoregion*, Washington. Washington Natural Heritage Program. Washington Department of Natural Resources. Olympia WA.

Henderson, J.A., R. D. Lesher, D.H. Peter, and D.C. Shaw. 1992. *Field Guide to the forest plant associations of the Mt. Baker-Snoqualmie National Forest*. USDA Forest Service Technical Paper. R6-Ecol-TP-028-91.

Kunze. L.M. 1994. *Preliminary classification of native, low elevation, freshwater wetland vegetation in western Washington*. Washington Natural Heritage Program. Washington Department of Natural Resources. Olympia WA.

Appendix A - Field Survey Schedule

Primary Contract Survey Dates

May 2 and 3, 2005
Dana Visalli
Hans Smith
Peter Morrison

June 7 and 8, 2005
Dana Visalli
Hans Smith
Katherine Beck (June 7 only)
Peter Morrison

Secondary Contract Survey Dates

August 1 - 3, 2005
Hans Smith

September 3, 2005
Peter Morrison

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
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 clear-cutting

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

Polgyon Number	16
Survey Intensity	1
Observer	PM
Date	5/2/05
Specific Location	gravel bar at east end of Federation Forest
Total Vegetation	40
Trees Total	6
Dominant Tree Sp	
emergent	0
main canopy	0
subcanopy	6
Shrubs Total	26
Dominant Shrub Sp	
> 1.5' tall	22
< 1.5' tall	4
Graminoids Total	2
Dominant Graminoid Sp	
Graminoids perennial	2
Graminoids annual	0
Forbs Total	6
Dominant Forb Sp	
Forbs perennial	4
Forbs annual	2
Ferns - evergreen	
Ferns - deciduous	
Exotics Total	25
Exotics perennial	22
Exotics annual	3
Rock Outcrop	0
Gravel	40
Bare Ground	15
Moss-Lichen	5
Litter	40
Logging	0
Stand Age	1
Agriculture	0
Livestock	0
Development	0
Wildlife	0
Recreation Severity	2
Recreation Type	3
Hydrology	1

Exotic Species

primary spp

Cytisus scoparius

secondary spp

Hypocharis radicata

Plant Associations

		Percent	Pattern
1.	floodplain gravel/sand bar	100	Matrix
2.			
3.			

Note:

Polgyon Number	21
Survey Intensity	1
Observer	PM
Date	5/2/05
Specific Location	picnic areas along White River at eastern part of park
Total Vegetation	90
Trees Total	20
Dominant Tree Sp	
emergent	
main canopy	
subcanopy	
Shrubs Total	
Dominant Shrub Sp	
> 1.5' tall	
< 1.5' tall	
Graminoids Total	
Dominant Graminoid Sp	
Graminoids perennial	
Graminoids annual	
Forbs Total	
Dominant Forb Sp	
Forbs perennial	
Forbs annual	
Ferns - evergreen	
Ferns - deciduous	
Exotics Total	
Exotics perennial	
Exotics annual	
Rock Outcrop	
Gravel	
Bare Ground	
Moss-Lichen	
Litter	
Logging	
Stand Age	
Agriculture	
Livestock	
Development	
Wildlife	
Recreation Severity	
Recreation Type	
Hydrology	2

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	Developed / Disturbed	100	Matrix
2.			
3.			

Note: developed area - lawns and picnic tables and roads, trails and some native veg.

Polgyon Number	22
Survey Intensity	4
Observer	Hans
Date	6/20/05
Specific Location	
Total Vegetation	
Trees Total	
Dominant Tree Sp	
emergent	
main canopy	
subcanopy	
Shrubs Total	
Dominant Shrub Sp	
> 1.5' tall	
< 1.5' tall	
Graminoids Total	
Dominant Graminoid Sp	
Graminoids perennial	
Graminoids annual	
Forbs Total	
Dominant Forb Sp	
Forbs perennial	
Forbs annual	
Ferns - evergreen	
Ferns - deciduous	
Exotics Total	
Exotics perennial	
Exotics annual	
Rock Outcrop	
Gravel	
Bare Ground	
Moss-Lichen	
Litter	
Logging	
Stand Age	
Agriculture	
Livestock	
Development	
Wildlife	
Recreation Severity	
Recreation Type	
Hydrology	

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	**Pattern**
1.	Water	100	Matrix
2.			
3.			

Note:

Polgyon Number	28
Survey Intensity	1
Observer	HS
Date	6/7/05
Specific Location	Just W of Visitor Center
Total Vegetation	100
Trees Total	98
Dominant Tree Sp	PSME/TSHE
emergent	3
main canopy	89
subcanopy	6
Shrubs Total	50
Dominant Shrub Sp	GASH/BENE
> 1.5' tall	30
< 1.5' tall	20
Graminoids Total	0
Dominant Graminoid Sp	
Graminoids perennial	0
Graminoids annual	0
Forbs Total	3
Dominant Forb Sp	LIBO
Forbs perennial	3
Forbs annual	0
Ferns - evergreen	1
Ferns - deciduous	4
Exotics Total	0
Exotics perennial	0
Exotics annual	0
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss-Lichen	95
Litter	5
Logging	3
Stand Age	2
Agriculture	0
Livestock	0
Development	3
Wildlife	3
Recreation Severity	2
Recreation Type	3
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/GASH-BENE	100	Matrix
2.			
3.			

Note:

Polgyon Number	30
Survey Intensity	2
Observer	Hans
Date	5/2/05
Specific Location	Alder filled steep drainage N of Hwy 410 along N border of Park
Total Vegetation	100
Trees Total	95
Dominant Tree Sp	ALRU
emergent	5
main canopy	86
subcanopy	4
Shrubs Total	3
Dominant Shrub Sp	ACCI
> 1.5' tall	2
< 1.5' tall	1
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	
Forbs Total	4
Dominant Forb Sp	
Forbs perennial	4
Forbs annual	
Ferns - evergreen	20
Ferns - deciduous	2
Exotics Total	
Exotics perennial	
Exotics annual	
Rock Outcrop	
Gravel	
Bare Ground	
Moss-Lichen	15
Litter	85
Logging	3
Stand Age	1
Agriculture	0
Livestock	0
Development	0
Wildlife	3
Recreation Severity	0
Recreation Type	0
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	ALRU/POMU	60	Scattered,
2.	TSHE/POMU-BENE	40	Scattered,
3.			

Note:

Polgyon Number	39
Survey Intensity	1
Observer	PM
Date	5/2/05
Specific Location	river bottom forest between road and river on east side of park
Total Vegetation	100
Trees Total	90
Dominant Tree Sp	THPL, TSHE, PSME
emergent	25
main canopy	60
subcanopy	5
Shrubs Total	55
Dominant Shrub Sp	ACCI, BENE, RUPA
> 1.5' tall	50
< 1.5' tall	5
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	0
Forbs Total	75
Dominant Forb Sp	LYAM, TITR, HYTE, CIAL, DIFO
Forbs perennial	74
Forbs annual	1
Ferns - evergreen	5
Ferns - deciduous	10
Exotics Total	1
Exotics perennial	1
Exotics annual	0
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss-Lichen	15
Litter	85
Logging	2
Stand Age	4
Agriculture	0
Livestock	0
Development	3
Wildlife	0
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

primary spp

Cytisus scoparius on edge

secondary spp

Geranium robertianum

Plant Associations

		Percent	Pattern
1.	TSHE/TITR-GYDR	40	Matrix
2.	TSHE/OPHO-ATFI	30	Small
3.	TSHE/LYAM	30	Small

Note: river is riprapped in places - so some alteration of flood regime is possible; Ferns: POMU, GYDR,

Polgyon Number	44
Survey Intensity	2
Observer	DV
Date	6/8/05
Specific Location	S side of river, small old growth forest plot
Total Vegetation	95
Trees Total	90
Dominant Tree Sp	PSME, THPL, PISI
emergent	20
main canopy	60
subcanopy	10
Shrubs Total	5
Dominant Shrub Sp	ACCI
> 1.5' tall	5
< 1.5' tall	0
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	0
Forbs Total	5
Dominant Forb Sp	
Forbs perennial	5
Forbs annual	0
Ferns - evergreen	5
Ferns - deciduous	0
Exotics Total	1
Exotics perennial	0
Exotics annual	1
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss-Lichen	5
Litter	95
Logging	1
Stand Age	4
Agriculture	0
Livestock	6
Development	5
Wildlife	3
Recreation Severity	3
Recreation Type	0
Hydrology	1

Exotic Species

primary spp

Geranium robertianum

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/ACCI-BENE	100	Matrix
2.			
3.			

Note:

Polgyon Number	45
Survey Intensity	2
Observer	DV
Date	6/8/05
Specific Location	S side of river W unit, alders around old growth
Total Vegetation	100
Trees Total	80
Dominant Tree Sp	ALRU
emergent	0
main canopy	70
subcanopy	10
Shrubs Total	15
Dominant Shrub Sp	OMCE, RUSP
> 1.5' tall	10
< 1.5' tall	5
Graminoids Total	20
Dominant Graminoid Sp	
Graminoids perennial	20
Graminoids annual	0
Forbs Total	15
Dominant Forb Sp	
Forbs perennial	5
Forbs annual	10
Ferns - evergreen	2
Ferns - deciduous	0
Exotics Total	10
Exotics perennial	0
Exotics annual	10
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss-Lichen	5
Litter	95
Logging	3
Stand Age	1
Agriculture	0
Livestock	6
Development	5
Wildlife	3
Recreation Severity	3
Recreation Type	6
Hydrology	1

Exotic Species

primary spp

Geranium robertianum

secondary spp

Plant Associations

		Percent	Pattern
1.	ALRU/RUSP	100	Matrix
2.			
3.			

Note: river terrace

Polgyon Number	49
Survey Intensity	1
Observer	Hans
Date	5/2/05
Specific Location	E of ALRU patch on N Park hillside - N of Hwy 410
Total Vegetation	100
Trees Total	98
Dominant Tree Sp	TSHE
emergent	10
main canopy	80
subcanopy	8
Shrubs Total	15
Dominant Shrub Sp	BENE
> 1.5' tall	2
< 1.5' tall	13
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	
Forbs Total	1
Dominant Forb Sp	
Forbs perennial	1
Forbs annual	
Ferns - evergreen	5
Ferns - deciduous	1
Exotics Total	
Exotics perennial	
Exotics annual	
Rock Outcrop	
Gravel	
Bare Ground	1
Moss-Lichen	10
Litter	89
Logging	1
Stand Age	3
Agriculture	0
Livestock	0
Development	0
Wildlife	3
Recreation Severity	0
Recreation Type	0
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/BENE	80	Matrix
2.	TSHE/POMU-BENE	20	Large
3.			

Note: Stand replacement logging and associated slash fire probable on site - could be reason why there is no

Polgyon Number	53
Survey Intensity	1
Observer	Hans
Date	5/3/05
Specific Location	N of mid Park trailhead, N of Hwy 410
Total Vegetation	100
Trees Total	98
Dominant Tree Sp	PSME / TSHE
emergent	15
main canopy	78
subcanopy	5
Shrubs Total	15
Dominant Shrub Sp	BENE
> 1.5' tall	5
< 1.5' tall	10
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	
Forbs Total	2
Dominant Forb Sp	MADI
Forbs perennial	2
Forbs annual	
Ferns - evergreen	30
Ferns - deciduous	1
Exotics Total	1
Exotics perennial	1
Exotics annual	
Rock Outcrop	
Gravel	
Bare Ground	
Moss-Lichen	15
Litter	85
Logging	2
Stand Age	3
Agriculture	0
Livestock	0
Development	3
Wildlife	3
Recreation Severity	2
Recreation Type	3
Hydrology	2

Exotic Species

primary spp

Geranium robertianum

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/POMU-BENE	63	Matrix
2.	TSHE/BENE	33	Large
3.	TSHE/BENE-CHME	4	Small

Note: Old abondoned roads evident in polygon. ALRU/POMU patch is related to a landslide at the bottom

Polgyon Number	56
Survey Intensity	2
Observer	DV
Date	6/7/05
Specific Location	small polygon at E end of park, acress road from riprap
Total Vegetation	100
Trees Total	85
Dominant Tree Sp	PSME(5), THPL(1),
emergent	10
main canopy	65
subcanopy	10
Shrubs Total	10
Dominant Shrub Sp	
> 1.5' tall	10
< 1.5' tall	0
Graminoids Total	2
Dominant Graminoid Sp	
Graminoids perennial	2
Graminoids annual	0
Forbs Total	30
Dominant Forb Sp	
Forbs perennial	30
Forbs annual	0
Ferns - evergreen	3
Ferns - deciduous	0
Exotics Total	2
Exotics perennial	1
Exotics annual	1
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss-Lichen	10
Litter	90
Logging	3
Stand Age	1
Agriculture	0
Livestock	6
Development	4
Wildlife	3
Recreation Severity	2
Recreation Type	3
Hydrology	3

Exotic Species

primary spp

Lactuca muralis

secondary spp

Plant Associations

		Percent	Pattern
1.	ALRU/POMU	100	Matrix
2.			
3.			

Note: deciduous after logging; pics

Polgyon Number	59
Survey Intensity	1
Observer	PM
Date	5/3/05
Specific Location	forest in NE section of park, above road
Total Vegetation	95
Trees Total	90
Dominant Tree Sp	TSHE 50/PSME
emergent	10
main canopy	70
subcanopy	10
Shrubs Total	15
Dominant Shrub Sp	ACCI, BENE, RUSP,
> 1.5' tall	10
< 1.5' tall	5
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	0
Forbs Total	40
Dominant Forb Sp	TITR, CLUN2, VIGL,
Forbs perennial	40
Forbs annual	0
Ferns - evergreen	10
Ferns - deciduous	3
Exotics Total	0
Exotics perennial	0
Exotics annual	0
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss-Lichen	10
Litter	90
Logging	1
Stand Age	6
Agriculture	0
Livestock	0
Development	3
Wildlife	2
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/POMU-TITR	90	Matrix
2.	TSHE/OPHO-ATFI	10	Small
3.			

Note:

Polgyon Number	61
Survey Intensity	1
Observer	PM
Date	5/3/05
Specific Location	rock quarry
Total Vegetation	45
Trees Total	35
Dominant Tree Sp	PSME, POTR
emergent	0
main canopy	15
subcanopy	20
Shrubs Total	5
Dominant Shrub Sp	CYSC4, HODI
> 1.5' tall	3
< 1.5' tall	2
Graminoids Total	2
Dominant Graminoid Sp	
Graminoids perennial	2
Graminoids annual	0
Forbs Total	10
Dominant Forb Sp	
Forbs perennial	7
Forbs annual	3
Ferns - evergreen	
Ferns - deciduous	
Exotics Total	15
Exotics perennial	10
Exotics annual	5
Rock Outcrop	5
Gravel	35
Bare Ground	10
Moss-Lichen	5
Litter	45
Logging	1
Stand Age	1
Agriculture	0
Livestock	0
Development	6
Wildlife	0
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

primary spp

Chrysanthemum leucanthemum

secondary spp

Cytisus scoparius

Plant Associations

		Percent	Pattern
1.	Developed / Disturbed	100	Matrix
2.			
3.			

Note: unusual site; lots of rock, signs of cat/excavation activity

Polgyon Number	62
Survey Intensity	4
Observer	Hans
Date	6/20/05
Specific Location	
Total Vegetation	
Trees Total	
Dominant Tree Sp	
emergent	
main canopy	
subcanopy	
Shrubs Total	
Dominant Shrub Sp	
> 1.5' tall	
< 1.5' tall	
Graminoids Total	
Dominant Graminoid Sp	
Graminoids perennial	
Graminoids annual	
Forbs Total	
Dominant Forb Sp	
Forbs perennial	
Forbs annual	
Ferns - evergreen	
Ferns - deciduous	
Exotics Total	
Exotics perennial	
Exotics annual	
Rock Outcrop	
Gravel	
Bare Ground	
Moss-Lichen	
Litter	
Logging	
Stand Age	
Agriculture	
Livestock	
Development	
Wildlife	
Recreation Severity	
Recreation Type	
Hydrology	

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	**Pattern**
1.	Water	100	Matrix
2.			
3.			

Note:

Polgyon Number	64
Survey Intensity	4
Observer	Hans
Date	6/20/05
Specific Location	
Total Vegetation	
Trees Total	
Dominant Tree Sp	
emergent	
main canopy	
subcanopy	
Shrubs Total	
Dominant Shrub Sp	
> 1.5' tall	
< 1.5' tall	
Graminoids Total	
Dominant Graminoid Sp	
Graminoids perennial	
Graminoids annual	
Forbs Total	
Dominant Forb Sp	
Forbs perennial	
Forbs annual	
Ferns - evergreen	
Ferns - deciduous	
Exotics Total	
Exotics perennial	
Exotics annual	
Rock Outcrop	
Gravel	
Bare Ground	
Moss-Lichen	
Litter	
Logging	
Stand Age	
Agriculture	
Livestock	
Development	
Wildlife	
Recreation Severity	
Recreation Type	
Hydrology	

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	**Pattern**
1.	Clear Cut	100	Matrix
2.			
3.			

Note:

Polgyon Number	65
Survey Intensity	1
Observer	HS
Date	6/7/05
Specific Location	SE section across river from day-use area
Total Vegetation	100
Trees Total	100
Dominant Tree Sp	ALRU/PSME
emergent	1
main canopy	94
subcanopy	5
Shrubs Total	75
Dominant Shrub Sp	RUSP/ACCI/BENE
> 1.5' tall	65
< 1.5' tall	10
Graminoids Total	2
Dominant Graminoid Sp	
Graminoids perennial	2
Graminoids annual	0
Forbs Total	10
Dominant Forb Sp	SMST, Mianthemum,
Forbs perennial	10
Forbs annual	0
Ferns - evergreen	15
Ferns - deciduous	4
Exotics Total	1
Exotics perennial	1
Exotics annual	0
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	2
Recreation Type	3
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	ALRU/POMU	90	Matrix
2.	TSHE/ACCI-BENE	10	linear
3.			

Note: Pattern 2: linear (along ridge); Photos: 4396-403

Polgyon Number	66
Survey Intensity	1
Observer	DV
Date	6/7/05
Specific Location	across the river, east unit floodplain
Total Vegetation	30
Trees Total	10
Dominant Tree Sp	
emergent	0
main canopy	8
subcanopy	2
Shrubs Total	15
Dominant Shrub Sp	
> 1.5' tall	10
< 1.5' tall	5
Graminoids Total	3
Dominant Graminoid Sp	
Graminoids perennial	3
Graminoids annual	0
Forbs Total	2
Dominant Forb Sp	
Forbs perennial	1
Forbs annual	1
Ferns - evergreen	0
Ferns - deciduous	0
Exotics Total	15
Exotics perennial	15
Exotics annual	0
Rock Outcrop	0
Gravel	30
Bare Ground	55
Moss-Lichen	5
Litter	10
Logging	1
Stand Age	1
Agriculture	0
Livestock	6
Development	5
Wildlife	3
Recreation Severity	3
Recreation Type	0
Hydrology	1

Exotic Species

primary spp

Cytisus scoparius

secondary spp

Plant Associations

		Percent	Pattern
1.	floodplain gravel/sand bar	70	Matrix
2.	ALRU/RUSP	30	large patch
3.			

Note:

Polgyon Number	67
Survey Intensity	4
Observer	Hans
Date	6/20/05
Specific Location	
Total Vegetation	60
Trees Total	60
Dominant Tree Sp	ALRU
emergent	
main canopy	60
subcanopy	
Shrubs Total	
Dominant Shrub Sp	
> 1.5' tall	
< 1.5' tall	
Graminoids Total	
Dominant Graminoid Sp	
Graminoids perennial	
Graminoids annual	
Forbs Total	
Dominant Forb Sp	
Forbs perennial	
Forbs annual	
Ferns - evergreen	
Ferns - deciduous	
Exotics Total	
Exotics perennial	
Exotics annual	
Rock Outcrop	
Gravel	
Bare Ground	
Moss-Lichen	
Litter	
Logging	
Stand Age	
Agriculture	
Livestock	
Development	
Wildlife	
Recreation Severity	
Recreation Type	
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	ALRU/RUSP	95	Matrix
2.	floodplain gravel/sand bar	5	small
3.			

Note:

Polgyon Number	68
Survey Intensity	4
Observer	Hans
Date	6/20/05
Specific Location	
Total Vegetation	40
Trees Total	20
Dominant Tree Sp	ALRU
emergent	
main canopy	20
subcanopy	
Shrubs Total	20
Dominant Shrub Sp	
> 1.5' tall	18
< 1.5' tall	2
Graminoids Total	3
Dominant Graminoid Sp	
Graminoids perennial	3
Graminoids annual	
Forbs Total	3
Dominant Forb Sp	
Forbs perennial	3
Forbs annual	
Ferns - evergreen	
Ferns - deciduous	
Exotics Total	10
Exotics perennial	10
Exotics annual	
Rock Outcrop	
Gravel	90
Bare Ground	
Moss-Lichen	
Litter	10
Logging	
Stand Age	
Agriculture	
Livestock	
Development	
Wildlife	
Recreation Severity	
Recreation Type	
Hydrology	1

Exotic Species

primary spp

Cytisus scoparius

secondary spp

Plant Associations

		Percent	Pattern
1.	floodplain gravel/sand bar	100	Matrix
2.			
3.			

Note:

Polgyon Number	71
Survey Intensity	1
Observer	HS
Date	6/7/05
Specific Location	Along river - mid of park
Total Vegetation	100
Trees Total	95
Dominant Tree Sp	THPL/ACMA/POTR/PISI
emergent	28
main canopy	60
subcanopy	7
Shrubs Total	60
Dominant Shrub Sp	ACCI/RUSP/OPHO
> 1.5' tall	59
< 1.5' tall	1
Graminoids Total	1
Dominant Graminoid Sp	CIAL/Hydrophyllum/Mai
Graminoids perennial	1
Graminoids annual	0
Forbs Total	50
Dominant Forb Sp	
Forbs perennial	50
Forbs annual	0
Ferns - evergreen	30
Ferns - deciduous	5
Exotics Total	0
Exotics perennial	0
Exotics annual	0
Rock Outcrop	0
Gravel	0
Bare Ground	1
Moss-Lichen	3
Litter	96
Logging	1
Stand Age	3
Agriculture	0
Livestock	0
Development	3
Wildlife	3
Recreation Severity	2
Recreation Type	3
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/POMU-TITR	60	Matrix
2.	TSHE/OPHO-ATFI	25	Small
3.	ALRU/POMU	15	scattered,

Note:

Polgyon Number	72
Survey Intensity	1
Observer	PM
Date	5/3/05
Specific Location	POTR, ALRU forest along White River south of Visitor Center
Total Vegetation	97
Trees Total	80
Dominant Tree Sp	(POTR, ALRU, PISI)
emergent	2
main canopy	55
subcanopy	23
Shrubs Total	40
Dominant Shrub Sp	(CYSC4, RILA, BENE,
> 1.5' tall	35
< 1.5' tall	5
Graminoids Total	26
Dominant Graminoid Sp	
Graminoids perennial	25
Graminoids annual	1
Forbs Total	25
Dominant Forb Sp	
Forbs perennial	23
Forbs annual	2
Ferns - evergreen	5
Ferns - deciduous	
Exotics Total	15
Exotics perennial	14
Exotics annual	1
Rock Outcrop	0
Gravel	5
Bare Ground	5
Moss-Lichen	3
Litter	87
Logging	1
Stand Age	2
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

primary spp

Cytisus scoparius

secondary spp

Glecoma hederacea

Plant Associations

		Percent	Pattern
1.	ALRU/POMU	100	Matrix
2.			
3.			

Note: trails to power distribution line crosses polygon; Ferns (evergreen): POMU

Polgyon Number	73
Survey Intensity	4
Observer	Hans
Date	6/20/05
Specific Location	
Total Vegetation	40
Trees Total	20
Dominant Tree Sp	ALRU
emergent	
main canopy	20
subcanopy	
Shrubs Total	20
Dominant Shrub Sp	
> 1.5' tall	18
< 1.5' tall	2
Graminoids Total	3
Dominant Graminoid Sp	
Graminoids perennial	3
Graminoids annual	
Forbs Total	3
Dominant Forb Sp	
Forbs perennial	3
Forbs annual	
Ferns - evergreen	
Ferns - deciduous	
Exotics Total	10
Exotics perennial	10
Exotics annual	
Rock Outcrop	
Gravel	90
Bare Ground	
Moss-Lichen	
Litter	10
Logging	
Stand Age	
Agriculture	
Livestock	
Development	
Wildlife	
Recreation Severity	
Recreation Type	
Hydrology	1

Exotic Species

primary spp

Cytisus scoparius

secondary spp

Plant Associations

		Percent	Pattern
1.	floodplain gravel/sand bar	100	Matrix
2.			
3.			

Note:

Polgyon Number	75
Survey Intensity	2
Observer	DV
Date	5/2/05
Specific Location	site is in river spring floodway
Total Vegetation	70
Trees Total	35
Dominant Tree Sp	ALRU (35)
emergent	0
main canopy	30
subcanopy	5
Shrubs Total	10
Dominant Shrub Sp	SASI (10)
> 1.5' tall	5
< 1.5' tall	5
Graminoids Total	2
Dominant Graminoid Sp	
Graminoids perennial	2
Graminoids annual	0
Forbs Total	23
Dominant Forb Sp	
Forbs perennial	23
Forbs annual	0
Ferns - evergreen	0
Ferns - deciduous	0
Exotics Total	1
Exotics perennial	1
Exotics annual	0
Rock Outcrop	0
Gravel	10
Bare Ground	10
Moss-Lichen	0
Litter	80
Logging	0
Stand Age	1
Agriculture	0
Livestock	6
Development	5
Wildlife	3
Recreation Severity	0
Recreation Type	0
Hydrology	1

Exotic Species

primary spp

Cirsium arvense

secondary spp

Plant Associations

		Percent	Pattern
1.	ALRU/RUSP	100	Matrix
2.			
3.			

Note:

Polgyon Number	76
Survey Intensity	2
Observer	DV
Date	5/2/05
Specific Location	site is in river spring floodway
Total Vegetation	70
Trees Total	40
Dominant Tree Sp	ALRU (40)
emergent	0
main canopy	35
subcanopy	5
Shrubs Total	20
Dominant Shrub Sp	SASI (20)
> 1.5' tall	15
< 1.5' tall	5
Graminoids Total	10
Dominant Graminoid Sp	
Graminoids perennial	5
Graminoids annual	5
Forbs Total	5
Dominant Forb Sp	
Forbs perennial	3
Forbs annual	2
Ferns - evergreen	0
Ferns - deciduous	0
Exotics Total	2
Exotics perennial	2
Exotics annual	0
Rock Outcrop	0
Gravel	20
Bare Ground	0
Moss-Lichen	60
Litter	20
Logging	0
Stand Age	1
Agriculture	0
Livestock	6
Development	5
Wildlife	3
Recreation Severity	0
Recreation Type	0
Hydrology	1

Exotic Species

primary spp

Cytisus scoparius

secondary spp

Hypocharis radicata

Plant Associations

		Percent	Pattern
1.	ALRU/RUSP	100	Matrix
2.			
3.			

Note:

Polgyon Number	77
Survey Intensity	4
Observer	Hans
Date	6/20/05
Specific Location	
Total Vegetation	40
Trees Total	20
Dominant Tree Sp	ALRU
emergent	
main canopy	20
subcanopy	
Shrubs Total	20
Dominant Shrub Sp	
> 1.5' tall	18
< 1.5' tall	2
Graminoids Total	3
Dominant Graminoid Sp	
Graminoids perennial	3
Graminoids annual	
Forbs Total	3
Dominant Forb Sp	
Forbs perennial	3
Forbs annual	
Ferns - evergreen	
Ferns - deciduous	
Exotics Total	10
Exotics perennial	10
Exotics annual	
Rock Outcrop	
Gravel	90
Bare Ground	
Moss-Lichen	
Litter	10
Logging	
Stand Age	
Agriculture	
Livestock	
Development	
Wildlife	
Recreation Severity	
Recreation Type	
Hydrology	1

Exotic Species

primary spp

Cytisus scoparius

secondary spp

Plant Associations

		Percent	Pattern
1.	floodplain gravel/sand bar	100	Matrix
2.			
3.			

Note:

Polgyon Number	78
Survey Intensity	4
Observer	Hans
Date	6/20/05
Specific Location	
Total Vegetation	60
Trees Total	60
Dominant Tree Sp	ALRU
emergent	
main canopy	60
subcanopy	
Shrubs Total	
Dominant Shrub Sp	
> 1.5' tall	
< 1.5' tall	
Graminoids Total	
Dominant Graminoid Sp	
Graminoids perennial	
Graminoids annual	
Forbs Total	
Dominant Forb Sp	
Forbs perennial	
Forbs annual	
Ferns - evergreen	
Ferns - deciduous	
Exotics Total	
Exotics perennial	
Exotics annual	
Rock Outcrop	
Gravel	
Bare Ground	
Moss-Lichen	
Litter	
Logging	
Stand Age	
Agriculture	
Livestock	
Development	
Wildlife	
Recreation Severity	
Recreation Type	
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	ALRU/RUSP	95	Matrix
2.	floodplain gravel/sand bar	5	small
3.			

Note:

Polgyon Number	84
Survey Intensity	1
Observer	Hans
Date	5/2/05
Specific Location	N of Hwy 410 in W side of Park - flats
Total Vegetation	98
Trees Total	90
Dominant Tree Sp	TSHE
emergent	30
main canopy	30
subcanopy	30
Shrubs Total	25
Dominant Shrub Sp	ACCI
> 1.5' tall	23
< 1.5' tall	2
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	
Forbs Total	25
Dominant Forb Sp	MADI
Forbs perennial	24
Forbs annual	1
Ferns - evergreen	25
Ferns - deciduous	4
Exotics Total	1
Exotics perennial	1
Exotics annual	
Rock Outcrop	
Gravel	
Bare Ground	1
Moss-Lichen	59
Litter	40
Logging	2
Stand Age	4
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	2
Recreation Type	3
Hydrology	2

Exotic Species

primary spp

Galium aparine

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/POMU-TITR	85	Matrix
2.	TSHE/OPHO-ATFI	15	Clumped,
3.			

Note: Development is trails and roads.

Polgyon Number	86
Survey Intensity	1
Observer	HS
Date	6/8/05
Specific Location	below & E of north central clearcut
Total Vegetation	100
Trees Total	80
Dominant Tree Sp	
emergent	20
main canopy	50
subcanopy	10
Shrubs Total	50
Dominant Shrub Sp	
> 1.5' tall	39
< 1.5' tall	11
Graminoids Total	1
Dominant Graminoid Sp	Melica sp.
Graminoids perennial	1
Graminoids annual	0
Forbs Total	8
Dominant Forb Sp	mixed
Forbs perennial	8
Forbs annual	0
Ferns - evergreen	10
Ferns - deciduous	2
Exotics Total	0
Exotics perennial	0
Exotics annual	0
Rock Outcrop	1
Gravel	0
Bare Ground	1
Moss-Lichen	23
Litter	75
Logging	2
Stand Age	2
Agriculture	0
Livestock	0
Development	0
Wildlife	2
Recreation Severity	0
Recreation Type	0
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/GASH-BENE	47	Small
2.	TSHE/POMU-BENE	43	Small
3.	TSHE/BENE	10	Small

Note: Ferns (evergreen): POMU; Photos: 4464-75; windthrow opening canopy in heavy GASH & BENE

Polgyon Number	90
Survey Intensity	1
Observer	Hans
Date	5/2/05
Specific Location	Above tight curve of logging road in W side of Park - N of Hwy 410
Total Vegetation	100
Trees Total	90
Dominant Tree Sp	TSHE
emergent	15
main canopy	65
subcanopy	10
Shrubs Total	15
Dominant Shrub Sp	ACCI
> 1.5' tall	12
< 1.5' tall	3
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	
Forbs Total	4
Dominant Forb Sp	MADI
Forbs perennial	3
Forbs annual	1
Ferns - evergreen	40
Ferns - deciduous	2
Exotics Total	1
Exotics perennial	1
Exotics annual	
Rock Outcrop	1
Gravel	
Bare Ground	
Moss-Lichen	20
Litter	79
Logging	2
Stand Age	4
Agriculture	0
Livestock	0
Development	2
Wildlife	3
Recreation Severity	0
Recreation Type	0
Hydrology	2

Exotic Species

primary spp

Digitalis purpurea

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/POMU-BENE	98	Matrix
2.	TSHE/POMU-TITR	2	linear
3.			

Note:

Polgyon Number	94
Survey Intensity	1
Observer	PM
Date	6/7/05
Specific Location	Polygon on west edge of park, immediately north of road
Total Vegetation	97
Trees Total	90
Dominant Tree Sp	TSHE, PSME, ALRU
emergent	20
main canopy	50
subcanopy	20
Shrubs Total	15
Dominant Shrub Sp	ACCI, RUSP, SARA
> 1.5' tall	4
< 1.5' tall	11
Graminoids Total	0
Dominant Graminoid Sp	
Graminoids perennial	0
Graminoids annual	0
Forbs Total	18
Dominant Forb Sp	
Forbs perennial	18
Forbs annual	0
Ferns - evergreen	55
Ferns - deciduous	5
Exotics Total	1
Exotics perennial	0
Exotics annual	1
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss-Lichen	35
Litter	65
Logging	0
Stand Age	6
Agriculture	0
Livestock	0
Development	0
Wildlife	0
Recreation Severity	3
Recreation Type	3
Hydrology	0

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/POMU-BENE	100	Matrix
2.			
3.			

Note: Ferns (evergreen): POMU, BLSP, POGL; (deciduous): DREX; multiage - some old growth - some 30-

Polgyon Number	99
Survey Intensity	1
Observer	Hans
Date	5/2/05
Specific Location	NE of logging road entrance in W side of Park (N of Hwy 410)
Total Vegetation	99
Trees Total	85
Dominant Tree Sp	TSHE
emergent	20
main canopy	55
subcanopy	10
Shrubs Total	85
Dominant Shrub Sp	BENE
> 1.5' tall	10
< 1.5' tall	75
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	
Forbs Total	3
Dominant Forb Sp	
Forbs perennial	3
Forbs annual	
Ferns - evergreen	5
Ferns - deciduous	1
Exotics Total	
Exotics perennial	
Exotics annual	
Rock Outcrop	1
Gravel	
Bare Ground	
Moss-Lichen	70
Litter	29
Logging	1
Stand Age	3
Agriculture	0
Livestock	0
Development	0
Wildlife	3
Recreation Severity	0
Recreation Type	0
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/BENE	98	Matrix
2.	TSHE/POMU-BENE	2	Small
3.			

Note: Stand replacement logging and associated slash fire probable on site - could be reason why there is no

Polgyon Number	103
Survey Intensity	2
Observer	DV
Date	5/3/05
Specific Location	
Total Vegetation	40
Trees Total	20
Dominant Tree Sp	(ALRU (15), SASC (5),
emergent	0
main canopy	20
subcanopy	0
Shrubs Total	20
Dominant Shrub Sp	
> 1.5' tall	20
< 1.5' tall	0
Graminoids Total	5
Dominant Graminoid Sp	
Graminoids perennial	2
Graminoids annual	3
Forbs Total	5
Dominant Forb Sp	
Forbs perennial	2
Forbs annual	3
Ferns - evergreen	0
Ferns - deciduous	0
Exotics Total	25
Exotics perennial	20
Exotics annual	5
Rock Outcrop	0
Gravel	20
Bare Ground	10
Moss-Lichen	70
Litter	0
Logging	1
Stand Age	0
Agriculture	0
Livestock	5
Development	5
Wildlife	3
Recreation Severity	3
Recreation Type	0
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	floodplain gravel/sand bar	60	Matrix
2.	ALRU/RUSP	40	Large
3.			

Note: Photos: Yes; high water floodway

Polgyon Number	104
Survey Intensity	2
Observer	DV
Date	6/7/05
Specific Location	Visitor center area
Total Vegetation	50
Trees Total	50
Dominant Tree Sp	PSME
emergent	0
main canopy	45
subcanopy	5
Shrubs Total	40
Dominant Shrub Sp	
> 1.5' tall	40
< 1.5' tall	0
Graminoids Total	2
Dominant Graminoid Sp	
Graminoids perennial	2
Graminoids annual	0
Forbs Total	5
Dominant Forb Sp	
Forbs perennial	4
Forbs annual	1
Ferns - evergreen	3
Ferns - deciduous	2
Exotics Total	1
Exotics perennial	0
Exotics annual	1
Rock Outcrop	0
Gravel	0
Bare Ground	50
Moss-Lichen	5
Litter	45
Logging	2
Stand Age	2
Agriculture	0
Livestock	6
Development	1
Wildlife	3
Recreation Severity	1
Recreation Type	1
Hydrology	2

Exotic Species

primary spp

Geranium robertianum

secondary spp

Plant Associations

		Percent	Pattern
1.	Developed / Disturbed	100	Matrix
2.			
3.			

Note: 50% tree cover - the rest is developed

Polgyon Number	109
Survey Intensity	2
Observer	Hans
Date	6/8/05
Specific Location	N of Visitors area, S of Hwy 410
Total Vegetation	100
Trees Total	99
Dominant Tree Sp	TSHE/PSME
emergent	6
main canopy	85
subcanopy	8
Shrubs Total	15
Dominant Shrub Sp	BENE/GASH
> 1.5' tall	8
< 1.5' tall	7
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	
Forbs Total	20
Dominant Forb Sp	Smilacina stellata,
Forbs perennial	20
Forbs annual	
Ferns - evergreen	5
Ferns - deciduous	1
Exotics Total	
Exotics perennial	
Exotics annual	
Rock Outcrop	
Gravel	
Bare Ground	
Moss-Lichen	40
Litter	60
Logging	2
Stand Age	3
Agriculture	
Livestock	
Development	2
Wildlife	3
Recreation Severity	2
Recreation Type	3
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/POMU-BENE	70	large patch
2.	TSHE/POMU-GASH	30	small
3.			

Note:

Polgyon Number	113
Survey Intensity	1
Observer	Hans
Date	5/3/05
Specific Location	Just W of visitor's center
Total Vegetation	100
Trees Total	98
Dominant Tree Sp	TSHE/ PSME
emergent	10
main canopy	81
subcanopy	7
Shrubs Total	5
Dominant Shrub Sp	BENE
> 1.5' tall	1
< 1.5' tall	4
Graminoids Total	1
Dominant Graminoid Sp	LUPA
Graminoids perennial	1
Graminoids annual	
Forbs Total	2
Dominant Forb Sp	SMST
Forbs perennial	2
Forbs annual	
Ferns - evergreen	1
Ferns - deciduous	1
Exotics Total	
Exotics perennial	
Exotics annual	
Rock Outcrop	
Gravel	
Bare Ground	
Moss-Lichen	95
Litter	5
Logging	1
Stand Age	1
Agriculture	0
Livestock	0
Development	3
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/BENE-CHME	90	Matrix
2.	TSHE/BENE	5	Small
3.	TSHE/GASH-BENE	5	Small

Note: Even aged stand in self-thinning successional phase - very little understory vegetation.

Polgyon Number	115
Survey Intensity	1
Observer	PM
Date	5/3/05
Specific Location	stand south of visitor center parking lot
Total Vegetation	95
Trees Total	95
Dominant Tree Sp	PSME, TSHE
emergent	2
main canopy	90
subcanopy	3
Shrubs Total	80
Dominant Shrub Sp	GASH, BENE, ACCI
> 1.5' tall	50
< 1.5' tall	30
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	0
Forbs Total	3
Dominant Forb Sp	CLUN, VIGL
Forbs perennial	3
Forbs annual	0
Ferns - evergreen	3
Ferns - deciduous	0
Exotics Total	1
Exotics perennial	1
Exotics annual	0
Rock Outcrop	0
Gravel	2
Bare Ground	3
Moss-Lichen	50
Litter	45
Logging	2
Stand Age	3
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	2
Recreation Type	3
Hydrology	1

Exotic Species

primary spp

Glecoma hederacea

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/GASH	50	Large
2.	TSHE/GASH-BENE	50	Large
3.			

Note: Ferns: POMU

Polgyon Number	116
Survey Intensity	2
Observer	DV
Date	5/3/05
Specific Location	
Total Vegetation	95
Trees Total	90
Dominant Tree Sp	PSME (30), THPL (5)/
emergent	35
main canopy	35
subcanopy	20
Shrubs Total	5
Dominant Shrub Sp	ACCI (4), RILA (1),
> 1.5' tall	5
< 1.5' tall	0
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	0
Forbs Total	5
Dominant Forb Sp	ACTR (4)
Forbs perennial	5
Forbs annual	0
Ferns - evergreen	8
Ferns - deciduous	2
Exotics Total	1
Exotics perennial	0
Exotics annual	1
Rock Outcrop	0
Gravel	0
Bare Ground	5
Moss-Lichen	45
Litter	50
Logging	2
Stand Age	4
Agriculture	0
Livestock	6
Development	5
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/POMU-BENE	90	Matrix
2.	TSHE/LYAM	10	Small patch
3.			

Note: Ferns (evergreen): POMU; (deciduous): GYDR; Photos: Yes

Polgyon Number	117
Survey Intensity	1
Observer	HS
Date	6/7/05
Specific Location	W of Visitor Center, just S of 410
Total Vegetation	100
Trees Total	90
Dominant Tree Sp	THPL/TSHE/PISI
emergent	32
main canopy	54
subcanopy	4
Shrubs Total	70
Dominant Shrub Sp	ACCI/OPHO/RUSP
> 1.5' tall	68
< 1.5' tall	2
Graminoids Total	1
Dominant Graminoid Sp	LUCA/CA??
Graminoids perennial	1
Graminoids annual	0
Forbs Total	25
Dominant Forb Sp	Cordalys/Listera sp./SMST
Forbs perennial	24
Forbs annual	1
Ferns - evergreen	5
Ferns - deciduous	5
Exotics Total	0
Exotics perennial	0
Exotics annual	0
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss-Lichen	80
Litter	20
Logging	2
Stand Age	5
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	2
Recreation Type	3
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/OPHO-ATFI	50	Scattered,
2.	TSHE/LYAM	42	Scattered,
3.	TSHE/POMU-BENE	8	linear

Note: Ferns (evergreen): POMU; (deciduous): ATFE/Dryopteris

Polgyon Number	120
Survey Intensity	1
Observer	Hans
Date	5/2/05
Specific Location	W border N of Hwy 410
Total Vegetation	100
Trees Total	85
Dominant Tree Sp	TSHE
emergent	30
main canopy	30
subcanopy	25
Shrubs Total	15
Dominant Shrub Sp	ACCI
> 1.5' tall	13
< 1.5' tall	2
Graminoids Total	1
Dominant Graminoid Sp	LUPA
Graminoids perennial	1
Graminoids annual	
Forbs Total	10
Dominant Forb Sp	TEGR
Forbs perennial	10
Forbs annual	
Ferns - evergreen	40
Ferns - deciduous	10
Exotics Total	2
Exotics perennial	1
Exotics annual	1
Rock Outcrop	
Gravel	
Bare Ground	
Moss-Lichen	50
Litter	50
Logging	1
Stand Age	4
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	2
Recreation Type	4
Hydrology	2

Exotic Species

primary spp

Geranium robertianum

secondary spp

Galium aparine

Plant Associations

		Percent	Pattern
1.	TSHE/POMU-BENE	60	Matrix
2.	TSHE/OPHO-ATFI	20	Small
3.	TSHE/BENE	20	Small

Note: Development = roads / trails. Big OG trees!

Polgyon Number	122
Survey Intensity	1
Observer	PM
Date	6/8/05
Specific Location	south of road, between river & road at west end of park
Total Vegetation	95
Trees Total	90
Dominant Tree Sp	
emergent	33
main canopy	38
subcanopy	19
Shrubs Total	15
Dominant Shrub Sp	
> 1.5' tall	10
< 1.5' tall	5
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	0
Forbs Total	15
Dominant Forb Sp	
Forbs perennial	15
Forbs annual	0
Ferns - evergreen	30
Ferns - deciduous	20
Exotics Total	0
Exotics perennial	0
Exotics annual	0
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss-Lichen	30
Litter	70
Logging	2
Stand Age	4
Agriculture	0
Livestock	0
Development	0
Wildlife	0
Recreation Severity	3
Recreation Type	3
Hydrology	0

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/POMU-TITR	60	Matrix
2.	TSHE/TITR-GYDR	35	Large
3.	TSHE/POMU-BENE	5	Small

Note: Ferns (evergreen): POMU, POGL; (deciduous): ATFI, DREX; exotics along road, but not included in

Polgyon Number	123
Survey Intensity	2
Observer	DV
Date	5/2/05
Specific Location	
Total Vegetation	100
Trees Total	70
Dominant Tree Sp	TSHE (35), PSME (35)
emergent	5
main canopy	60
subcanopy	5
Shrubs Total	10
Dominant Shrub Sp	
> 1.5' tall	5
< 1.5' tall	5
Graminoids Total	2
Dominant Graminoid Sp	
Graminoids perennial	2
Graminoids annual	0
Forbs Total	30
Dominant Forb Sp	
Forbs perennial	25
Forbs annual	5
Ferns - evergreen	8
Ferns - deciduous	2
Exotics Total	2
Exotics perennial	0
Exotics annual	2
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss-Lichen	10
Litter	90
Logging	3
Stand Age	2
Agriculture	6
Livestock	6
Development	2
Wildlife	2
Recreation Severity	3
Recreation Type	1
Hydrology	1

Exotic Species

primary spp

Geranium robertianum

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/POMU-BENE	100	Matrix
2.			
3.			

Note: Ferns (evergreen): POMU

Polgyon Number	124
Survey Intensity	2
Observer	DV
Date	5/3/05
Specific Location	
Total Vegetation	100
Trees Total	80
Dominant Tree Sp	PSME (35), TSHE (35)
emergent	20
main canopy	50
subcanopy	10
Shrubs Total	20
Dominant Shrub Sp	ACCI (5), VAPA (5)
> 1.5' tall	20
< 1.5' tall	0
Graminoids Total	2
Dominant Graminoid Sp	
Graminoids perennial	2
Graminoids annual	0
Forbs Total	25
Dominant Forb Sp	MIDI (10), VIGL (5)
Forbs perennial	25
Forbs annual	0
Ferns - evergreen	10
Ferns - deciduous	2
Exotics Total	2
Exotics perennial	0
Exotics annual	2
Rock Outcrop	0
Gravel	0
Bare Ground	5
Moss-Lichen	40
Litter	55
Logging	2
Stand Age	4
Agriculture	0
Livestock	6
Development	5
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/POMU-BENE	100	Matrix
2.			
3.			

Note: Ferns (evergreen): POMU; (deciduous): GYDR; many trees > 3' DBH

Polgyon Number	126
Survey Intensity	1
Observer	PM
Date	6/7/05
Specific Location	on trail through park
Total Vegetation	100
Trees Total	85
Dominant Tree Sp	THPL, TSHE, PISI,
emergent	30
main canopy	30
subcanopy	25
Shrubs Total	80
Dominant Shrub Sp	ACCI, OPHO
> 1.5' tall	70
< 1.5' tall	10
Graminoids Total	0
Dominant Graminoid Sp	
Graminoids perennial	0
Graminoids annual	0
Forbs Total	30
Dominant Forb Sp	MADI, DIFO, LYAM,
Forbs perennial	30
Forbs annual	0
Ferns - evergreen	8
Ferns - deciduous	15
Exotics Total	0
Exotics perennial	0
Exotics annual	0
Rock Outcrop	0
Gravel	0
Bare Ground	
Moss-Lichen	
Litter	
Logging	0
Stand Age	4
Agriculture	0
Livestock	0
Development	0
Wildlife	0
Recreation Severity	3
Recreation Type	3
Hydrology	0

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/OPHO-ATFI	50	Matrix
2.	TSHE/TITR-GYDR	20	Small
3.	TSHE/LYAM	30	Small

Note: Ferns (evergreen): POMU; (deciduous): ATFE, DREX, GYDR; moderate variability understory cover;

Polgyon Number	127
Survey Intensity	1
Observer	Hans
Date	5/2/05
Specific Location	N of Hwy 410 in middle of Park
Total Vegetation	100
Trees Total	98
Dominant Tree Sp	TSHE
emergent	20
main canopy	60
subcanopy	18
Shrubs Total	20
Dominant Shrub Sp	ACCI
> 1.5' tall	15
< 1.5' tall	5
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	
Forbs Total	20
Dominant Forb Sp	HYTE
Forbs perennial	18
Forbs annual	2
Ferns - evergreen	15
Ferns - deciduous	7
Exotics Total	1
Exotics perennial	1
Exotics annual	
Rock Outcrop	
Gravel	
Bare Ground	
Moss-Lichen	45
Litter	55
Logging	2
Stand Age	4
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	2
Recreation Type	3
Hydrology	2

Exotic Species

primary spp

Geranium robertianum

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/POMU-BENE	70	Matrix
2.	TSHE/OPHO-ATFI	15	Clumped,
3.	TSHE/LYAM	15	Small

Note: Development is trails and roads.

Polgyon Number	128
Survey Intensity	1
Observer	Hans
Date	5/2/05
Specific Location	On hill above Hwy 410 - W side of Park
Total Vegetation	100
Trees Total	90
Dominant Tree Sp	PSME
emergent	1
main canopy	80
subcanopy	9
Shrubs Total	45
Dominant Shrub Sp	BENE
> 1.5' tall	3
< 1.5' tall	42
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	
Forbs Total	1
Dominant Forb Sp	
Forbs perennial	1
Forbs annual	
Ferns - evergreen	2
Ferns - deciduous	1
Exotics Total	1
Exotics perennial	1
Exotics annual	
Rock Outcrop	1
Gravel	
Bare Ground	
Moss-Lichen	3
Litter	96
Logging	3
Stand Age	1
Agriculture	0
Livestock	0
Development	2
Wildlife	3
Recreation Severity	3
Recreation Type	0
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/BENE	93	Matrix
2.	TSHE/GASH-BENE	5	Small
3.	TSHE/ACCI-BENE	2	Small

Note: Old abandoned road evident in polygon

Polgyon Number	129
Survey Intensity	1
Observer	HS, DV
Date	5/3/05
Specific Location	
Total Vegetation	60
Trees Total	10
Dominant Tree Sp	PSME
emergent	1
main canopy	8
subcanopy	1
Shrubs Total	32
Dominant Shrub Sp	AMAL-LOCI-HODI-
> 1.5' tall	25
< 1.5' tall	7
Graminoids Total	3
Dominant Graminoid Sp	Holcus sp.
Graminoids perennial	3
Graminoids annual	0
Forbs Total	12
Dominant Forb Sp	GAAP2, Fragaria sp.
Forbs perennial	10
Forbs annual	2
Ferns - evergreen	1
Ferns - deciduous	2
Exotics Total	1
Exotics perennial	0
Exotics annual	1
Rock Outcrop	10
Gravel	0
Bare Ground	0
Moss-Lichen	70
Litter	20
Logging	2
Stand Age	1
Agriculture	0
Livestock	0
Development	0
Wildlife	0
Recreation Severity	0
Recreation Type	0
Hydrology	1

Exotic Species

primary spp

secondary spp

Cerastium sp.

Plant Associations

		Percent	Pattern
1.	Bed Rock Cliff - Rock Outcrop	95	Small
2.	TSHE/GASH-BENE	5	Small
3.			

Note:

Polgyon Number	213
Survey Intensity	1
Observer	PM
Date	5/3/05
Specific Location	forest and picnic area east of (?) from visitor center
Total Vegetation	99
Trees Total	97
Dominant Tree Sp	PSME, TSHE, THPL
emergent	5
main canopy	85
subcanopy	7
Shrubs Total	25
Dominant Shrub Sp	ACCI, BENE
> 1.5' tall	20
< 1.5' tall	5
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	0
Forbs Total	60
Dominant Forb Sp	SMST, ACTR, MYDI,
Forbs perennial	60
Forbs annual	0
Ferns - evergreen	5
Ferns - deciduous	3
Exotics Total	1
Exotics perennial	0
Exotics annual	1
Rock Outcrop	0
Gravel	5
Bare Ground	2
Moss-Lichen	10
Litter	83
Logging	2
Stand Age	6
Agriculture	0
Livestock	0
Development	6
Wildlife	3
Recreation Severity	2
Recreation Type	4
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/ACCI-BENE	100	Matrix
2.			
3.			

Note: Ferns (evergreen): POMU, DREX; picnic area, roads and trails in area

Polgyon Number	214
Survey Intensity	1
Observer	PM
Date	6/7/05
Specific Location	along trail through park
Total Vegetation	100
Trees Total	85
Dominant Tree Sp	TSHE, PISI, PSME,
emergent	30
main canopy	30
subcanopy	25
Shrubs Total	65
Dominant Shrub Sp	ACCI, RUSP, OPHO,
> 1.5' tall	60
< 1.5' tall	5
Graminoids Total	0
Dominant Graminoid Sp	
Graminoids perennial	0
Graminoids annual	0
Forbs Total	35
Dominant Forb Sp	DIFO, TITR
Forbs perennial	35
Forbs annual	0
Ferns - evergreen	10
Ferns - deciduous	10
Exotics Total	0
Exotics perennial	0
Exotics annual	0
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss-Lichen	10
Litter	90
Logging	0
Stand Age	4
Agriculture	0
Livestock	0
Development	0
Wildlife	0
Recreation Severity	3
Recreation Type	3
Hydrology	0

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/OPHO-ATFI	50	Large
2.	TSHE/POMU-BENE	50	Large
3.			

Note: Ferns (evergreen): POMU; (deciduous): ATFI; quite variable understory cover; trail through but no

Polgyon Number	216
Survey Intensity	2
Observer	DV
Date	6/8/05
Specific Location	S side of river, W unit, bar along river
Total Vegetation	50
Trees Total	7
Dominant Tree Sp	ALRU
emergent	0
main canopy	7
subcanopy	0
Shrubs Total	33
Dominant Shrub Sp	CYSC
> 1.5' tall	22
< 1.5' tall	11
Graminoids Total	5
Dominant Graminoid Sp	
Graminoids perennial	3
Graminoids annual	2
Forbs Total	5
Dominant Forb Sp	
Forbs perennial	3
Forbs annual	2
Ferns - evergreen	0
Ferns - deciduous	0
Exotics Total	32
Exotics perennial	30
Exotics annual	2
Rock Outcrop	0
Gravel	30
Bare Ground	50
Moss-Lichen	10
Litter	10
Logging	1
Stand Age	1
Agriculture	0
Livestock	6
Development	5
Wildlife	3
Recreation Severity	3
Recreation Type	0
Hydrology	1

Exotic Species

primary spp

Cytisus scoparius

secondary spp

Plant Associations

		Percent	Pattern
1.	ALRU/RUSP	100	Matrix
2.			
3.			

Note:

Polgyon Number	250
Survey Intensity	2
Observer	Hans
Date	6/8/05
Specific Location	logged area Northwestern area of park
Total Vegetation	100
Trees Total	98
Dominant Tree Sp	PSME
emergent	0
main canopy	98
subcanopy	0
Shrubs Total	89
Dominant Shrub Sp	GASH
> 1.5' tall	88
< 1.5' tall	1
Graminoids Total	1
Dominant Graminoid Sp	
Graminoids perennial	1
Graminoids annual	
Forbs Total	3
Dominant Forb Sp	
Forbs perennial	3
Forbs annual	
Ferns - evergreen	3
Ferns - deciduous	2
Exotics Total	
Exotics perennial	
Exotics annual	
Rock Outcrop	1
Gravel	
Bare Ground	1
Moss-Lichen	49
Litter	49
Logging	4
Stand Age	1
Agriculture	0
Livestock	0
Development	0
Wildlife	3
Recreation Severity	0
Recreation Type	0
Hydrology	1

Exotic Species

primary spp

secondary spp

Plant Associations

		Percent	Pattern
1.	TSHE/POMU-GASH	96	matrix
2.	TSHE/GASH-BENE	2	along
3.	TSHE/ACCI-BENE	2	along

Note: