Rare Plant and Vegetation Survey of Clallam Bay Spit County Park

Pacific Biodiversity Institute

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Introduction

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

Survey Routes

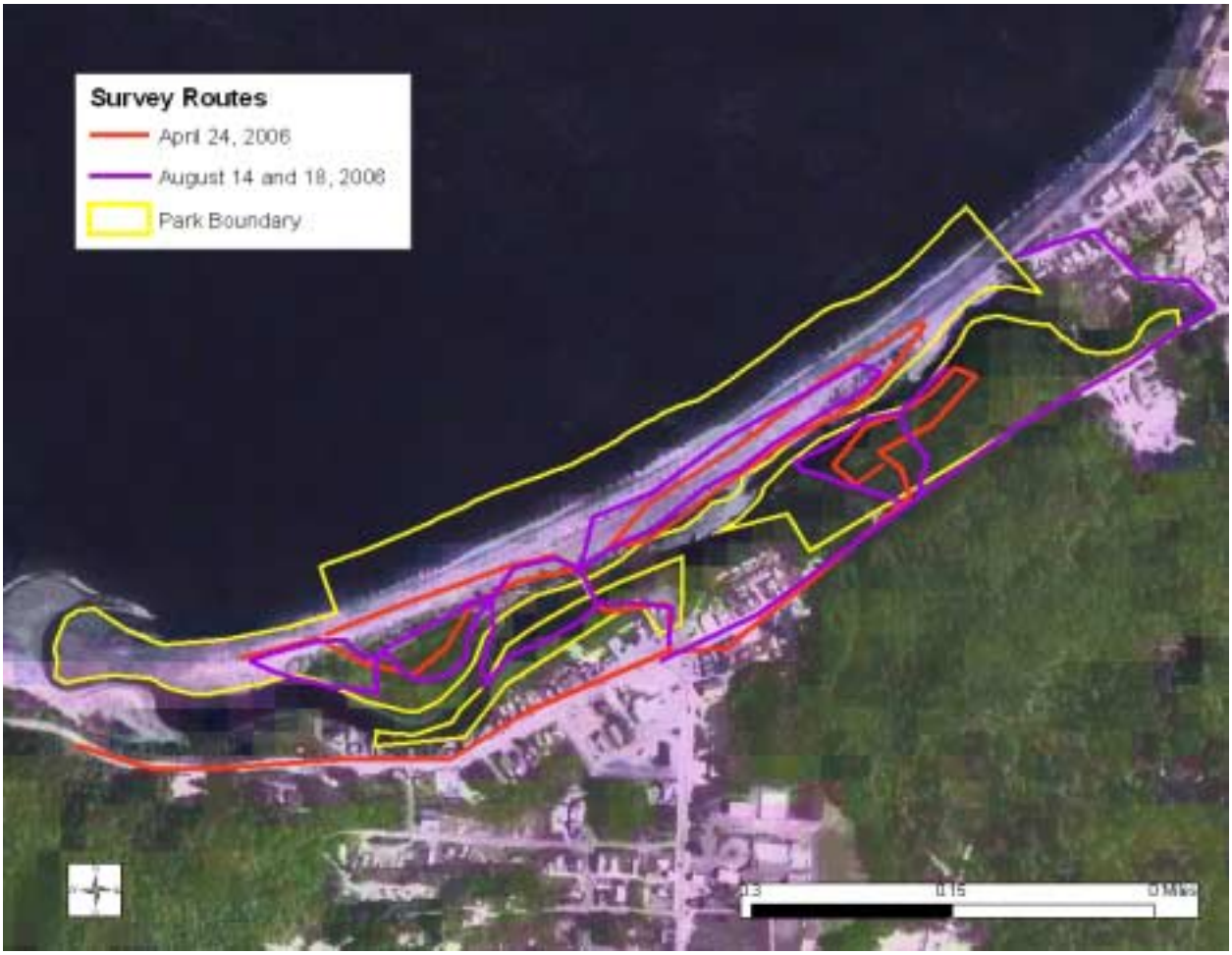

Figure 1. Survey routes for the vegetation community mapping and rare and endangered plant surveys conducted by PBI in 2006.

Vegetation Communities

Methods

Vegetation communities within Clallam Bay Spit County Park were delineated and classified using a combination of field survey and remote sensing techniques. We relied on descriptions from the Draft Guide to Plant Associations on the Olympic Experimental Forest (Bigley and Hull, 1995), Ecological classification of low-elevation riparian vegetation on the Olympic Experimental State Forest (Chappell, 1999), Forested Plant Associations of the Olympic National Forest (Henderson et al., 1985) and Baseline Inventory of Rare, Threatened and Endangered Plant Species/Communities along Washington's Pacific Coast (Kunze and Cornelius, 1982) to make final vegetation community assignments. In some cases, the descriptions provided by these authorities were not adequate in describing existing vegetation associations. In these cases, alternative vegetation communities or plant associations were created by PBI or found in alternative reference material.

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

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

Results

We mapped and surveyed 11 vegetation community polygons, comprised of 12 vegetation community types, within Clallam Bay Spit County Park. Vegetation community polygons are either stand-alone plant associations or mosaics of multiple plant associations. Table 1 lists the plant associations and/or cover types found in Clallam Bay Spit County Park. See Appendix B for interpretation of "Status" codes. Figures 2 and 3 illustrate the location of the vegetation community polygons. Note that Figure 3 only shows the primary plant associations in each polygon (PA1 in the database). A printout of the complete set of data we collected for each polygon is attached in Appendix D. The ecological condition of each polygon was evaluated according to a simple ranking system described in Appendix C.

Table 1. Vegetation Community Types Encountered in Clallam Bay Spit County Park.

Abbreviation	Association Name	English Name	Reference	Status
ALRU2/RUSP	*Alnus rubra / Rubus spectabilis*	red alder / salmonberry	Chappell 1999	G4G5
CALY3 Community	*Carex lyngbyei* Community	Lyngbye's sedge community	Kunze and Cornelius 1982	G4
DECA18-AGAL3-JUBA-POPA23 Community	*Deschampsia caespitosa - Agrostis alba -Juncus balticus - Potentilla pacifica* Community	tufted hairgrass - redtop - Baltic rush - Pacific silverweed Community	Kunze and Cornelius 1982	??
ELMO9 Community	*Elymus mollis* Community	American dunegrass community	Kunze and Cornelius 1982	G2?
LAJA (PBI)	*Lathyrus japonicus*	beach pea	PBI	
Mixed Shrub Community	Mixed Shrub Community	Mixed Shrub Community	PBI	
PISI/CAOB3-LYAM3	*Picea sitchensis / Carex obnupta - Lysichiton americanus*	Sitka spruce / slough sedge - American skunkcabbage	Chappell 1999	G2G3
PISI/GASH	*Picea sitchensis / Gaultheria shallon*	Sitka spruce / salal	Bigley and Hull 1995	G3
PISI/OXOR	*Picea sitchensis / Oxalis oregana*	Sitka spruce / redwood-sorrel	Bigley and Hull 1995	G3
Developed				
Beach				
Water				

Figure 2. Layout of the vegetation community polygons overlaying a 1998 digital ortho-photo combined with TM7 spectral imagery.

Figure 3. The primary vegetation community types within Clallam Bay Spit County Park.

Examples of Vegetation Community Types

Alnus rubra / Rubus spectabilis forest (ALRU2/RUSP)

This is not a dominant plant association within the park, though it is very common within the greater area. A history of intensive logging and saturated soils combine to influence the generation of this community.

Carex lyngbyei Community (CALY3 Community)

This association occurs in brackish water in sloughs and estuaries where it is constantly inundated by the high tide. It occurs in places where spits, dunes, and/or gravel bars create a barrier from the direct surf which protect the vegetation and substrate from being quickly eroded away. River otters and shore birds were seen actively using this community during our surveys.

Deschampsia caespitosa - Agrostis alba -Juncus balticus - Potentilla pacifica Community (DECA18-AGAL3-JUBA-POPA23 Community)

This association occurs as a small graminoid dominated patch along the inside of Clallam Bay Spit. This patch may become periodically inundated by the highest tides and has a high number of grass and forb species present with almost no shrubs or trees. Intensive wildlife use by shorebirds, predatory birds, and river otters was apparent during our field surveys.

Elymus mollis Community (ELMO9 Community)

The ELMO9 Community occurs along the top and river side portions of Clallam Bay Spit, where direct surf influence periodically occurs (at a relatively low frequency), leading to substrate instability and driftwood deposits. However, these areas are out of the way of persistent daily surf influence, hence vegetation can become successfully established. American dunegrass (*Elymus mollis*) tends to be the dominant plant in this community, although beach pea (*Lathyrus japonicus*), seaside sandplant (*Honckenya peploides*), and a variety of other grasses occur in high amounts as well.

Lathyrus japonicus (LAJA) Community

This plant community has not been described before. Pacific Biodiversity Institute decided that it was a unique community that warranted a name and description. This community is typified by the complete dominance and high amount of cover of beach pea (*Lathyrus japonicus*) with little to no other vegetation present. Its occurrence is similar to the ELMO9 Community, in that it occurs along the top and river side portions of Clallam Bay Spit, where direct surf influence periodically occurs (at a relatively low frequency), leading to substrate instability and driftwood deposits.

Mixed Shrub Community

This plant community has not been described before. Pacific Biodiversity Institute decided that it was a unique community that warranted a name and description. The mixed shrub community in Clallam Bay Spit County Park is composed of nutka rose (*Rosa nutkana*), twinberry (*Lonicera involucrata*), and salal (*Gaultheria shallon*). It occurs as a small patch around the DECA18-AGAL3-JUBA-POPA23 Community. Shrub cover is near 100%.

Picea sitchensis / Carex obnupta - Lysichiton americanus forest (PISI/CAOB3-LYAM3)

This association occurs in small patches within the park. It mosaics with the PISI/OXOR and PISI/GASH associations, occurring within depressions with highly saturated soils. Slough sedge (*Carex obnupta*) dominates the understory.

Picea sitchensis / Gaultheria shallon forest (PISI/GASH)

The PISI/GASH association mosaics with the PISI/OXOR and PISI/CAOB3/LYAM3 associations. It occurs on better-drained sites within the Sitka spruce forest alliance. The ecological condition of this association varies widely within the park, depending on its proximity to development. In the western portion of the park, this association contains infestations of English ivy (*Hedera helix*) and English holly (*Ilex aquifolium*) among other exotic plants. Off trail hiking and past development including clearings for picnic areas and an old road have displaced and are influencing the vegetation. In the eastern portion of the park, this association is relatively exotic species free, and very little direct human influence is apparent.

Picea sitchensis / Oxalis oregana forest (PISI/OXOR)

This association is the matrix plant association within the large forested polygon in the eastern part of the park. Redwood-sorrel (*Oxalis oregana*) occurs throughout the understory, although many other understory plants occur in abundance as well, including salmon berry (*Rubus spectabilis*) and swordfern (*Polystichum munitum*). This is an old-growth forest with relatively little disturbance seen within the patch, albeit the patch size is very small and heavily developed areas immediately surround the forest.

Rare Plant Surveys

Methods

We visited Clallam Bay Spit multiple times during the 2006 field season to conduct a rare plant survey. We used the Washington Department of Natural Resources Natural Heritage Program's (DNR NHP) rare plant list to determine the conservation status of vascular plants encountered in the field. When a plant from the DNR NHP list was located, we used the standard DNR NHP rare plant sighting form to complete field descriptions for the observation.

Specific dates of field surveys for each park can be found in Appendix A of this report. During the field surveys, we were equipped with reference literature, rare plant lists for the area, maps showing rare plant locations from previous surveys, and a portable plant identification lab. We looked for rare plants in habitats previously identified as being likely occurrence sites. So as not to miss a rare plant, all vascular plant species encountered during the inventory were identified on site, at base camp in the portable laboratory, or back at our office.

Survey routes were determined based on the desire to efficiently cover a large proportion of the park's area throughout the field season. We surveyed habitats of the park where we felt rare plants were more likely to occur more intensively. Survey routes for the rare plant inventory and rare plant locations were recorded either by hand, on a hardcopy topographic map, or as GPS waypoints and trackpoints, all of which were later compiled into a single GIS data layer (Figure 1).

Results

Rare Plants

We did not locate any vascular plants currently listed in the WA DNR NHP rare plant list within Clallam Bay Spit County Park. No previous state or federally listed vascular plants had been documented within the park prior to our 2006 surveys.

Vascular Plant List for Clallam Bay Spit County Park

A total of 113 vascular plant species were identified during the 2006 surveys at Clallam Bay Spit. Of these, 34 of the plant species are non-native, accounting for 30% of the total. Table 2 contains the full plant list.

Key to Vascular Plant Species List

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

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

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

Table 2. Vascular Plant List for Clallam Bay Spit County Park

num	Code	Scientific Name	Common Name/Accepted Synonym	Family	alien?
1	ACMI2	Achillea millefolium L.	yarrow	Asteraceae	
2	AGAE	Agrostis aequivalvis (Trin.) Trin.	arctic bentgrass	Poaceae	
3	AGAL3	Agrostis alba auct. non L. [misapplied]	>>Agrostis gigantea	Poaceae	a
4	AGDI	Agrostis diegoensis Vasey	>>Agrostis pallens	Poaceae	
5	ALRU2	Alnus rubra Bong.	red alder	Betulaceae	
6	ALGE2	Alopecurus geniculatus L.	water foxtail	Poaceae	a
7	AMAL2	Amelanchier alnifolia (Nutt.) Nutt. ex M. Roemer	Saskatoon serviceberry	Rosaceae	
8	ANMA	Anaphalis margaritacea (L.) Benth.	western pearly everlasting	Asteraceae	
9	ANAR3	Angelica arguta Nutt.	Lyall's angelica	Apiaceae	
10	ARSU4	Artemisia suksdorfii Piper	coastal wormwood	Asteraceae	
11	ASSU4	Aster subspicatus Nees	>>Symphyotrichum subspicatum var. subspicatum	Asteraceae	
12	ATFI	Athyrium filix-femina (L.) Roth	common ladyfern	Dryopteridaceae	
13	BEPE2	Bellis perennis L.	lawn daisy	Asteraceae	a
14	BLSP	Blechnum spicant (L.) Sm.	deer fern	Blechnaceae	
15	BRPA3	Bromus pacificus Shear	Pacific brome	Poaceae	
16	BRVU	Bromus vulgaris (Hook.) Shear	Columbia brome	Poaceae	
17	CAED	Cakile edentula (Bigelow) Hook.	American searocket	Brassicaceae	
18	CANU	Calamagrostis nutkaensis (J. Presl) J. Presl ex Steud.	Pacific reedgrass	Poaceae	
19	CAHE3	Callitriche heterophylla Pursh	twoheaded water-starwort	Callitrichaceae	
20	CAAN5	Cardamine angulata Hook.	seaside bittercress	Brassicaceae	
21	CABR6	Cardamine breweri S. Wats.	Brewer's bittercress	Brassicaceae	
22	CAOL	Cardamine oligosperma Nutt.	little western bittercress	Brassicaceae	
23	CALY3	Carex lyngbyei Hornem.	Lyngbye's sedge	Cyperaceae	
24	CAOB3	Carex obnupta Bailey	slough sedge	Cyperaceae	
25	CEAR4	Cerastium arvense L.	field chickweed	Caryophyllaceae	a
26	CHAL7	Chenopodium album L.	lambsquarters	Chenopodiaceae	
27	CHLE80	Chrysanthemum leucanthemum L.	>>Leucanthemum vulgare	Asteraceae	a
28	CIAR4	Cirsium arvense (L.) Scop.	Canada thistle	Asteraceae	a
29	COTON	Cotoneaster Medik.	cotoneaster	Rosaceae	a
30	DAGL	Dactylis glomerata L.	orchardgrass	Poaceae	a
31	DECA18	Deschampsia caespitosa (L.) Beauv.	tufted hairgrass	Poaceae	
32	DIPU	Digitalis purpurea L.	purple foxglove	Scrophulariaceae	a
33	DIHOO	Disporum hookeri (Torr.) Nichols. var. oreganum (S. Wats.) Q. Jones	>>Prosartes hookeri var. oregana	Liliaceae	
34	DRAUS2	Dryopteris austriaca (Jacq.) Woynar ex Schinz & Thellung var. spinulosa (O.F. Muell.) Fisch.	>>Dryopteris carthusiana	Dryopteridaceae	
35	ELMO9	Elymus mollis Trin.	>>Leymus mollis ssp. mollis	Poaceae	
36	EPAN2	Epilobium angustifolium L.	>>Chamerion angustifolium ssp. angustifolium	Onagraceae	
37	EPWA3	Epilobium watsonii Barbey	>>Epilobium ciliatum ssp. watsonii	Onagraceae	
38	EQAR	Equisetum arvense L.	field horsetail	Equisetaceae	
39	EQTE	Equisetum telmateia Ehrh.	giant horsetail	Equisetaceae	
40	FRCH	Fragaria chiloensis (L.) P. Mill.	beach strawberry	Rosaceae	
41	GAAP2	Galium aparine L.	stickywilly	Rubiaceae	a
42	GATR2	Galium trifidum L.	threepetal bedstraw	Rubiaceae	

43	GASH	Gaultheria shallon Pursh	salal	Ericaceae	
44	GEMA4	Geum macrophyllum Willd.	largeleaf avens	Rosaceae	
45	HEHE	Hedera helix L.	English ivy	Araliaceae	a
46	HELA4	Heracleum lanatum Michx.	>>Heracleum maximum	Apiaceae	
47	HIAL2	Hieracium albiflorum Hook.	white hawkweed	Asteraceae	
48	HOLA	Holcus lanatus L.	common velvetgrass	Poaceae	a
49	HOPE	Honkenya peploides (L.) Ehrh.	seaside sandplant	Caryophyllaceae	
50	HOBR2	Hordeum brachyantherum Nevski	meadow barley	Poaceae	a
51	HYRA3	Hypochaeris radicata L.	hairy cat's ear	Asteraceae	a
52	ILAQ80	Ilex aquifolium L.	English ivy	Aquifoliaceae	a
53	IMGL	Impatiens glandulifera Royle	ornamental jewelweed	Balsaminaceae	a
54	JUEF	Juncus effusus L.	common rush	Juncaceae	
55	JUPA2	Juncus patens E. Mey.	spreading rush	Juncaceae	
56	JUTE	Juncus tenuis Willd.	poverty rush	Juncaceae	
57	LAMU	Lactuca muralis (L.) Fresen.	>>Mycelis muralis	Asteraceae	a
58	LAJA	Lathyrus japonicus Willd.	beach pea	Fabaceae	
59	LOIN5	Lonicera involucrata (Richards.) Banks ex Spreng.	twinberry honeysuckle	Caprifoliaceae	
60	LYAM3	Lysichiton americanus Hultén & St. John	American skunkcabbage	Araceae	
61	MADI	Maianthemum dilatatum (Wood) A. Nels. & J.F. Macbr.	false lily of the valley	Liliaceae	
62	MIOV	Mitella ovalis Greene	coastal miterwort	Saxifragaceae	
63	MOPE3	Montia perfoliata (Donn ex Willd.) T.J. Howell	>>Claytonia perfoliata ssp. perfoliata	Caryophyllaceae	
64	MOSI2	Montia sibirica (L.) T.J. Howell	>>Claytonia sibirica var. sibirica	Portulacaceae	
65	OECE	Oemleria cerasiformis (Torr. & Gray ex Hook. & Arn.) Landon	Indian plum	Rosaceae	
66	OESA	Oenanthe sarmentosa K. Presl ex DC.	water parsely	Apiaceae	
67	OSCH	Osmorhiza chilensis Hook. & Arn.	>>Osmorhiza berteroi	Apiaceae	
68	OXOR	Oxalis oregana Nutt.	redwood-sorrel	Oxalidaceae	
69	PEPA31	Petasites palmatus (Ait.) Gray	>>Petasites frigidus var. palmatus	Asteraceae	
70	PHAR3	Phalaris arundinacea L.	reed canarygrass	Poaceae	a
71	PISI	Picea sitchensis (Bong.) Carr.	Sitka spruce	Pinaceae	
72	PLLA	Plantago lanceolata L.	narrowleaf plantain	Plantaginaceae	
73	PLMA3	Plantago maritima L.	goose tongue	Plantaginaceae	
74	POAN	Poa annua L.	annual bluegrass	Poaceae	a
75	POFO2	Polygonum fowleri B.L. Robins.	Fowler's knotweed	Polygonaceae	
76	POGL8	Polypodium glycyrrhiza D.C. Eat.	licorice fern	Polypodiaceae	
77	POMU	Polystichum munitum (Kaulfuss) K. Presl	swordfern	Polypodiaceae	
78	POPA23	Potentilla pacifica T.J. Howell	>>Argentina egedii ssp. egedii	Rosaceae	
79	PSME	Pseudotsuga menziesii (Mirbel) Franco	Douglas-fir	Pinaceae	
80	PUPA3	Puccinellia pauciflora (J. Presl) Munz	>>Torreyochloa pallida var. pauciflora	Poaceae	
81	PYFU	Pyrus fusca Raf.	>>Malus fusca	Rosaceae	
82	RAAC3	Ranunculus acris L.	tall buttercup	Ranunculaceae	a
83	RARE3	Ranunculus repens L.	creeping buttercup	Ranunculaceae	a
84	RISA	Ribes sanguineum Pursh	redflower currant	Grossulariaceae	
85	RONU	Rosa nutkana K. Presl	Nootka rose	Asteraceae	
86	RUDI2	Rubus discolor Weihe & Nees	>>Rubus armeniacus	Rosaceae	a
87	RULA	Rubus laciniatus Willd.	cutleaf blackberry	Rosaceae	a
88	RUPA	Rubus parviflorus Nutt.	thimbleberry	Rosaceae	
89	RUSP	Rubus spectabilis Pursh	salmonberry	Rosaceae	
90	RUUR	Rubus ursinus Cham. & Schlecht.	California blackberry	Rosaceae	

91	RUCR	Rumex crispus L.	curly dock	Polygonaceae	a
92	RUSA	Rumex salicifolius Weinm.	willow dock	Polygonaceae	a
93	SAPR	Sagina procumbens L.	birdeye pearlwort	Caryophyllaceae	a
94	SARA2	Sambucus racemosa L.	red elderberry	Caprifoliaceae	
95	SEJA	Senecio jacobaea L.	stinking willie	Asteraceae	a
96	SOCA6	Solidago canadensis L.	Canada goldenrod	Asteraceae	
97	SOAS	Sonchus asper (L.) Hill	spiny sowthistle	Asteraceae	a
98	SOAU	Sorbus aucuparia L.	European mountain ash	Rosaceae	a
99	STCO14	Stachys cooleyae Heller	>>Stachys chamissonis var. cooleyae	Lamiaceae	
100	STME2	Stellaria media (L.) Vill.	common chickweed	Caryophyllaceae	a
101	STAM2	Streptopus amplexifolius (L.) DC.	claspleaf twistedstalk	Liliaceae	
102	TAOF	Taraxacum officinale G.H. Weber ex Wiggers	dandelion	Asteraceae	a
103	TEGR2	Tellima grandiflora (Pursh) Dougl. ex Lindl.	bigflower tellima	Saxifragaceae	
104	TITR	Tiarella trifoliata L.	threeleaf foamflower	Saxifragaceae	
105	TRRE3	Trifolium repens L.	white clover	Fabaceae	a
106	TROV2	Trillium ovatum Pursh	Pacific trillium	Liliaceae	
107	TSHE	Tsuga heterophylla (Raf.) Sarg.	western hemlock	Pinaceae	
108	VAPA	Vaccinium parvifolium Sm.	red huckleberry	Ericaceae	
109	VESE	Veronica serpyllifolia L.	thymeleaf speedwell	Scrophulariaceae	a
110	VIGI	Vicia gigantea Hook.	>>Vicia nigricans ssp. gigantea	Fabaceae	
111	VIGL	Viola glabella Nutt.	pioneer violet	Violaceae	
112	VUBR	Vulpia bromoides (L.) S.F. Gray	brome fescue	Poaceae	a

Ecological Condition of Clallam Bay Spit County Park

Clallam Bay Spit County Park is a small park tucked up against residential and commercial development in the town of Clallam Bay (Figure 4). The largest forested portion of the park contains some late-successional Sitka spruce (Picea sitchensis) forest with very little exotic species presence within the forest interior. This patch, however, is geographically isolated from any similar conditioned forest stands except for some patches of second generation mostly deciduous forest on the inland side. The patch is a nice remnant of the giant Sitka spruce forests that used to reign over this part of the Olympic Peninsula, but its overall ecological value is greatly diminished by its small size and isolation.

Figure 4. An aerial view of Clallam Bay Spit County Park and surrounding area (1994 photo from WA Dept. of Ecology).

The park's beach and some of the upper spit environment provide habitat to native ocean-side plant communities, although exotic plants can be found growing throughout the spit area where other vegetation occurs. Plant communities along the Clallam River channel are also inundated with exotic plants, but these communities support local estuarine wildlife with nesting and feeding habitat. We have no suggestions on dealing with exotic plants within the park given the current circumstances, except that continued monitoring of plant community conditions should take place to insure that large-scale exotic plant invasions do not occur.

Historic human development in the park has diminished the ecological condition of some areas by removing native vegetation and allowing exotic plants to become established. An old paved road along the spit still remains in places with cracked pavement giving way to exotic grass patches. Recreation in the park probably affects the shoreline vegetation via pedestrian trampling, but most

recreation use seems to take place in the non-vegetated areas in the park or in the designated picnic areas so the effects on native vegetation are not substantial. Interpretive signage indicating the value of native vegetation to local wildlife like shorebirds and river otters, and the negative affects of trampling such vegetation may help to keep pedestrian use of the vegetated areas low.

GIS Products Produced

Associated with this report is a polygon layer created by PBI depicting the vegetation community types mapped in Clallam Bay Spit County 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.

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Appendix A – Field Survey Schedule

April 24, 2006

Field Staff: Dana Visalli, Phyllis Murra

August 14 and 18, 2006

Field Staff: Hans Smith

Appendix B – Description of Rare Element Status Codes

Global Rank (GRank)

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

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

State Rank (SRank)

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

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

State Status (StStat)

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

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

Federal Status

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

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

Appendix C – Ecological Condition Ranking System

Ecological Condition Ranks

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

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

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

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

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

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

Appendix D – Vegetation Survey Data

Legend:

Site = name of locality of map project

Polygon = number you put on map

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

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

Survey intensity
1 = walked or could see most of polygon (high confidence in survey data)
2 = walked or could see part of polygon interior (moderate confidence)
3 = walked perimeter or could see part of polygon interior (low confidence)
4 = photo interpretation or other remote survey

VEGETATION COVER
This is canopy cover, i.e. the space between leaves/branches is included in "cover". Each Life form category canopy cover must be 0-100%. Therefore, the sum of all life forms (layers) can exceed 100%. List most abundant species in each life form category; when trees are cored, note DBH, species, length of core, number of rings counted.

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

SOIL SURFACE estimate to nearest **%** the following, the sum of the categories adds to 100%
Rock outcrop = exposed bedrock including detached boulders over 1m across
Gravel/cobble = large fragments between sand and boulder
Bareground = exposed mineral soil
Mosses/lichens = nonvascular plant cover on soil
Litter = includes logs, branches, and basal area of plants
Describe in comments if there is wide variation in any category; note % standing water if it is persistent or characteristic of site.

LAND USE - put 0 (zero) if not applicable to site.

Logging
1 = unlogged, no evidence of past logging or occasional cut stumps not part of systematic harvest of trees, no or very little impact on stand composition
2 = selectively logged: frequent cut stumps but origin of dominant or co-dominant cohort appears to be natural disturbance
3 = heavy logging disturbance with natural regeneration: many cut stumps that predate the dominant or co-dominant cohort with no tree planting
4 = tree plantation: dominant cohort appears to be planted after clearcutting

Stand Age
1 = very young 0-40 yr
2 = young 40-90 yr
3 = mature 90-200 yr
4 = old-growth 200+ yr
5 = young with scattered old trees (2-10 old trees per acre)
6 = mature with scattered old trees

Agriculture
1 = active annual cropping
2 = active perennial herbaceous cropping
3 = active woody plant cultivation
4 = fallow, plowed no crops this yr
5 = Federal CRP
6 = other

Livestock
1 = active heavy grazing (most forage used to ground soil compaction or churning)
2 = active moderate grazing (25-75% forage used)
3 = active light grazing (lots of last year's litter left)
4 = no current, heavy past grazing
5 = no current, light past grazing
6 = no obvious sign of grazing

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

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

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

Recreation Use Primary Type
1 = wheeled
2 = hoofed
3 = pedestrian
4 = combination of above
5 = other

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

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

Condition Rank of PA in key or estimate

% of Polygon = your estimate

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

Exotic = primary species observed; secondary species observed.

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

Vegetation Polygon Data

Polygon Number	**1**
Survey Intensity	2
Observer	HS
Date	8/18/2006
Specific Location	
Total Vegetation	0
Trees Total	0
Dominant Trees	
emergent	0
maincanopy	0
subcanopy	0
Shrubs Total	0
Dominant Shrubs	
> 1.5' tall	0
< 1.5' tall	0
Graminoids Total	0
Dominant Graminoids	
Graminoids Perennial	0
Graminoids Annual	0
Forbs Total	0
Dominant Forbs	
Forbs Perennial	0
Forbs Annual	0
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	0
Exotics Perennial	0
Exotics Annual	0
Water	
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss Lichen	0
Litter	0
Logging	
Stand Age	
Agriculture	
Livestock	
Development	
Wildlife	
Recreation Severity	
Recreation Type	
Hydrology	

Exotic Species

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

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

Notes:

Polygon Number	**10**
Survey Intensity	1
Observer	HS
Date	8/18/2006
Specific Location	
Total Vegetation	0
Trees Total	0
Dominant Trees	
emergent	0
maincanopy	0
subcanopy	0
Shrubs Total	0
Dominant Shrubs	
> 1.5' tall	0
< 1.5' tall	0
Graminoids Total	0
Dominant Graminoids	
Graminoids Perennial	0
Graminoids Annual	0
Forbs Total	0
Dominant Forbs	
Forbs Perennial	0
Forbs Annual	0
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	0
Exotics Perennial	0
Exotics Annual	0
Water	
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss Lichen	0
Litter	0
Logging	
Stand Age	
Agriculture	
Livestock	
Development	
Wildlife	
Recreation Severity	
Recreation Type	
Hydrology	

Exotic Species

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

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

Notes:

Polygon Number	**11**
Survey Intensity	1
Observer	HS
Date	8/18/2006
Specific Location	W end of park.
Total Vegetation	4
Trees Total	0
Dominant Trees	
emergent	0
maincanopy	0
subcanopy	0
Shrubs Total	1
Dominant Shrubs	
> 1.5' tall	1
< 1.5' tall	1
Graminoids Total	3
Dominant Graminoids	ELMO9
Graminoids Perennial	3
Graminoids Annual	1
Forbs Total	3
Dominant Forbs	LAJA, HOPE
Forbs Perennial	3
Forbs Annual	1
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	2
Exotics Perennial	2
Exotics Annual	1
Water	
Rock Outcrop	0
Gravel	60
Bare Ground	0
Moss Lichen	0
Litter	40
Logging	0
Stand Age	0
Agriculture	0
Livestock	0
Development	0
Wildlife	3
Recreation Severity	2
Recreation Type	3
Hydrology	1

Exotic Species

Primary Exotic
DAGL
Secondary Exotic
HOLA
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. ELMO9 Community (KUNZE)	100	Matrix	2
2.	0		0
3.	0		0

Notes:

Polygon Number	**13**
Survey Intensity	1
Observer	HS
Date	8/14/2006
Specific Location	Just W of foot bridge.
Total Vegetation	6
Trees Total	5
Dominant Trees	ALRU2, PISI
emergent	2
maincanopy	5
subcanopy	2
Shrubs Total	5
Dominant Shrubs	RUSP, LOIN5
> 1.5' tall	5
< 1.5' tall	2
Graminoids Total	3
Dominant Graminoids	
Graminoids Perennial	3
Graminoids Annual	1
Forbs Total	3
Dominant Forbs	
Forbs Perennial	3
Forbs Annual	1
Ferns Total	2
Ferns Evergreen	2
Ferns Deciduous	1
ExoticsTotal	3
Exotics Perennial	3
Exotics Annual	1
Water	
Rock Outcrop	0
Gravel	0
Bare Ground	2
Moss Lichen	0
Litter	98
Logging	0
Stand Age	3
Agriculture	0
Livestock	0
Development	3
Wildlife	0
Recreation Severity	2
Recreation Type	3
Hydrology	1

Exotic Species

Primary Exotic
ILAQ80
Secondary Exotic
RUDI2
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PISI/CAOB3-LYAM3 (CHAPPELL)	60	Matrix	1
2. ALRU2/RUSP (CHAPPELL)	35	Large	2
3. CALY3 Community (KUNZE)	5	other	2

Notes:

Polygon Number	**2**
Survey Intensity	1
Observer	HS
Date	8/18/2006
Specific Location	W side of park.
Total Vegetation	6
Trees Total	0
Dominant Trees	
emergent	0
maincanopy	0
subcanopy	0
Shrubs Total	3
Dominant Shrubs	RONU, LOIN5, GASH
> 1.5' tall	3
< 1.5' tall	2
Graminoids Total	5
Dominant Graminoids	DECA18, ELMO9, AGAL
Graminoids Perennial	5
Graminoids Annual	2
Forbs Total	4
Dominant Forbs	VIGI, CHAL7, POPA23
Forbs Perennial	4
Forbs Annual	1
Ferns Total	1
Ferns Evergreen	1
Ferns Deciduous	1
ExoticsTotal	4
Exotics Perennial	4
Exotics Annual	1
Water	
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss Lichen	0
Litter	100
Logging	0
Stand Age	0
Agriculture	0
Livestock	0
Development	0
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Primary Exotic
AGAL
Secondary Exotic
Hordeum?
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. DECA18-AGAL3-JUBA-POPA23 Community	75	Matrix	2
2. Mixed Shrub Undescribed (PBI)	20	Large	2
3. ELMO9 Community (KUNZE)	5	Small	2

Notes:

Polygon Number	**3**
Survey Intensity	1
Observer	PRM
Date	4/24/2006
Specific Location	Forested area in southwest corner along river.
Total Vegetation	4
Trees Total	4
Dominant Trees	PISI, ALRU, TSHE
emergent	2
maincanopy	4
subcanopy	1
Shrubs Total	3
Dominant Shrubs	OECE, GASH, RUSP, RUUR
> 1.5' tall	3
< 1.5' tall	2
Graminoids Total	2
Dominant Graminoids	
Graminoids Perennial	2
Graminoids Annual	0
Forbs Total	1
Dominant Forbs	POMU
Forbs Perennial	1
Forbs Annual	0
Ferns Total	2
Ferns Evergreen	2
Ferns Deciduous	1
ExoticsTotal	3
Exotics Perennial	3
Exotics Annual	1
Water	
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss Lichen	2
Litter	98
Logging	2
Stand Age	3
Agriculture	0
Livestock	0
Development	3
Wildlife	3
Recreation Severity	2
Recreation Type	3
Hydrology	1

Exotic Species

Primary Exotic
ILAQ
Secondary Exotic
HEHE
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PISI/GASH (BIGLEY)	40	Large	2
2. ALRU2/RUSP (CHAPPELL)	30	Large	2
3. PISI/CAOB3-LYAM3 (CHAPPELL)	30	Large	2

Notes:

Polygon Number	**4**
Survey Intensity	1
Observer	HS
Date	8/18/2006
Specific Location	W side of park.
Total Vegetation	5
Trees Total	4
Dominant Trees	PISI, PSME, ALRU2, TSHE
emergent	2
maincanopy	4
subcanopy	1
Shrubs Total	5
Dominant Shrubs	GASH, RONU, LOIN5
> 1.5' tall	5
< 1.5' tall	3
Graminoids Total	2
Dominant Graminoids	
Graminoids Perennial	2
Graminoids Annual	1
Forbs Total	2
Dominant Forbs	
Forbs Perennial	2
Forbs Annual	1
Ferns Total	2
Ferns Evergreen	2
Ferns Deciduous	1
ExoticsTotal	2
Exotics Perennial	2
Exotics Annual	1
Water	
Rock Outcrop	0
Gravel	0
Bare Ground	5
Moss Lichen	1
Litter	94
Logging	1
Stand Age	2
Agriculture	0
Livestock	0
Development	3
Wildlife	3
Recreation Severity	2
Recreation Type	3
Hydrology	1

Exotic Species

Primary Exotic
RULA
Secondary Exotic
HOLA
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PISI/GASH (BIGLEY)	70	Matrix	1
2. developed	30	Large	1
3.	0		0

Notes:

Polygon Number	**5**
Survey Intensity	1
Observer	DV
Date	4/24/2006
Specific Location	
Total Vegetation	6
Trees Total	5
Dominant Trees	PISI, ALRU
emergent	2
maincanopy	5
subcanopy	2
Shrubs Total	5
Dominant Shrubs	RUSP, GASH
> 1.5' tall	5
< 1.5' tall	2
Graminoids Total	2
Dominant Graminoids	
Graminoids Perennial	2
Graminoids Annual	0
Forbs Total	5
Dominant Forbs	POMU
Forbs Perennial	5
Forbs Annual	0
Ferns Total	4
Ferns Evergreen	4
Ferns Deciduous	0
ExoticsTotal	1
Exotics Perennial	1
Exotics Annual	0
Water	
Rock Outcrop	0
Gravel	0
Bare Ground	5
Moss Lichen	1
Litter	94
Logging	0
Stand Age	4
Agriculture	0
Livestock	0
Development	0
Wildlife	3
Recreation Severity	0
Recreation Type	0
Hydrology	1

Exotic Species

Primary Exotic
RARE3
Secondary Exotic
ILAQ
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PISI/OXOR (BIGLEY)	70	Matrix	2
2. PISI/GASH (BIGLEY)	15	Small	2
3. PISI/CAOB3-LYAM3 (CHAPPELL)	15	Small	2

Notes: A few old growth PISI (>30"DBH) in this forest fragment. Adjoins Clallam Bay but there is no sign of recent human visitation.

Polygon Number	**7**
Survey Intensity	1
Observer	HS
Date	8/18/2006
Specific Location	E end of park
Total Vegetation	5
Trees Total	1
Dominant Trees	ALRU
emergent	0
maincanopy	1
subcanopy	0
Shrubs Total	1
Dominant Shrubs	
> 1.5' tall	1
< 1.5' tall	0
Graminoids Total	3
Dominant Graminoids	ELMO9, DECA18
Graminoids Perennial	3
Graminoids Annual	1
Forbs Total	4
Dominant Forbs	LAJA, HOPE, POTPAC
Forbs Perennial	4
Forbs Annual	1
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	2
Exotics Perennial	2
Exotics Annual	1
Water	
Rock Outcrop	0
Gravel	20
Bare Ground	0
Moss Lichen	0
Litter	80
Logging	0
Stand Age	0
Agriculture	0
Livestock	0
Development	0
Wildlife	3
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Primary Exotic
PHAARU
Secondary Exotic
CIRARV
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. LAJA (PBI)	70	Matrix	2
2. ELMO9 Community (KUNZE)	20	Large	2
3. DECA18-AGAL3-JUBA-POPA23 Community	10	Small	2

Notes:

Polygon Number	**8**
Survey Intensity	2
Observer	HS
Date	8/18/2006
Specific Location	
Total Vegetation	0
Trees Total	0
Dominant Trees	
emergent	0
maincanopy	0
subcanopy	0
Shrubs Total	0
Dominant Shrubs	
> 1.5' tall	0
< 1.5' tall	0
Graminoids Total	0
Dominant Graminoids	
Graminoids Perennial	0
Graminoids Annual	0
Forbs Total	0
Dominant Forbs	
Forbs Perennial	0
Forbs Annual	0
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	0
Exotics Perennial	0
Exotics Annual	0
Water	
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss Lichen	0
Litter	0
Logging	
Stand Age	
Agriculture	
Livestock	
Development	
Wildlife	
Recreation Severity	
Recreation Type	
Hydrology	

Exotic Species

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

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

Notes:

Polygon Number	**9**
Survey Intensity	2
Observer	HS
Date	8/18/2006
Specific Location	
Total Vegetation	0
Trees Total	0
Dominant Trees	
emergent	0
maincanopy	0
subcanopy	0
Shrubs Total	0
Dominant Shrubs	
> 1.5' tall	0
< 1.5' tall	0
Graminoids Total	0
Dominant Graminoids	
Graminoids Perennial	0
Graminoids Annual	0
Forbs Total	0
Dominant Forbs	
Forbs Perennial	0
Forbs Annual	0
Ferns Total	0
Ferns Evergreen	0
Ferns Deciduous	0
ExoticsTotal	0
Exotics Perennial	0
Exotics Annual	0
Water	
Rock Outcrop	0
Gravel	0
Bare Ground	0
Moss Lichen	0
Litter	0
Logging	
Stand Age	
Agriculture	
Livestock	
Development	
Wildlife	
Recreation Severity	
Recreation Type	
Hydrology	

Exotic Species

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

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

Notes: