

Rare Plant and Vegetation Surveys of Belfair and Twanoh State Parks



Pacific Biodiversity Institute



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February 2007

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Recommended Citation

Morrison, P.H., H.M. Smith IV and D Visalli. 2007. Rare Plant and Vegetation Survey of Belfair and Twanoh State Parks. Pacific Biodiversity Institute, Winthrop, Washington. 95 p.

Acknowledgements

The photographs in this report are by Peter Morrison and Scott Heller. Dana Visalli and Scott Heller assisted with field surveys. Scott Heller and Juliet Rhodes assisted with data entry and Juliet Rhodes worked on checking data integrity.

Project Funding

This project was conducted under a contract with the Washington State Parks and Recreation Commission.

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Introduction

Pacific Biodiversity Institute (PBI) surveyed Belfair and Twanoh State Parks for rare plant occurrences and vegetation under contract with the Washington State Parks and Recreation Commission. These parks are located in Mason County. This report summarizes the activities and findings of the contracted work.

Survey Conditions and Survey Routes

Belfair and Twanoh State Parks were surveyed by two botanists from May 9 - 11, 2006 and then revisited by one more botanist on August 8 and August 28, 2006. Details on personnel and survey dates are provided in Appendix A. Our routes from these surveys are illustrated in Figures 1 and 2. All the units were accessible by maintained roads and trails, however access to the interior of some of the polygons at Twanoh State Park was difficult in places due to extremely dense shrub thickets, dense second-growth forests, and very steep topography.

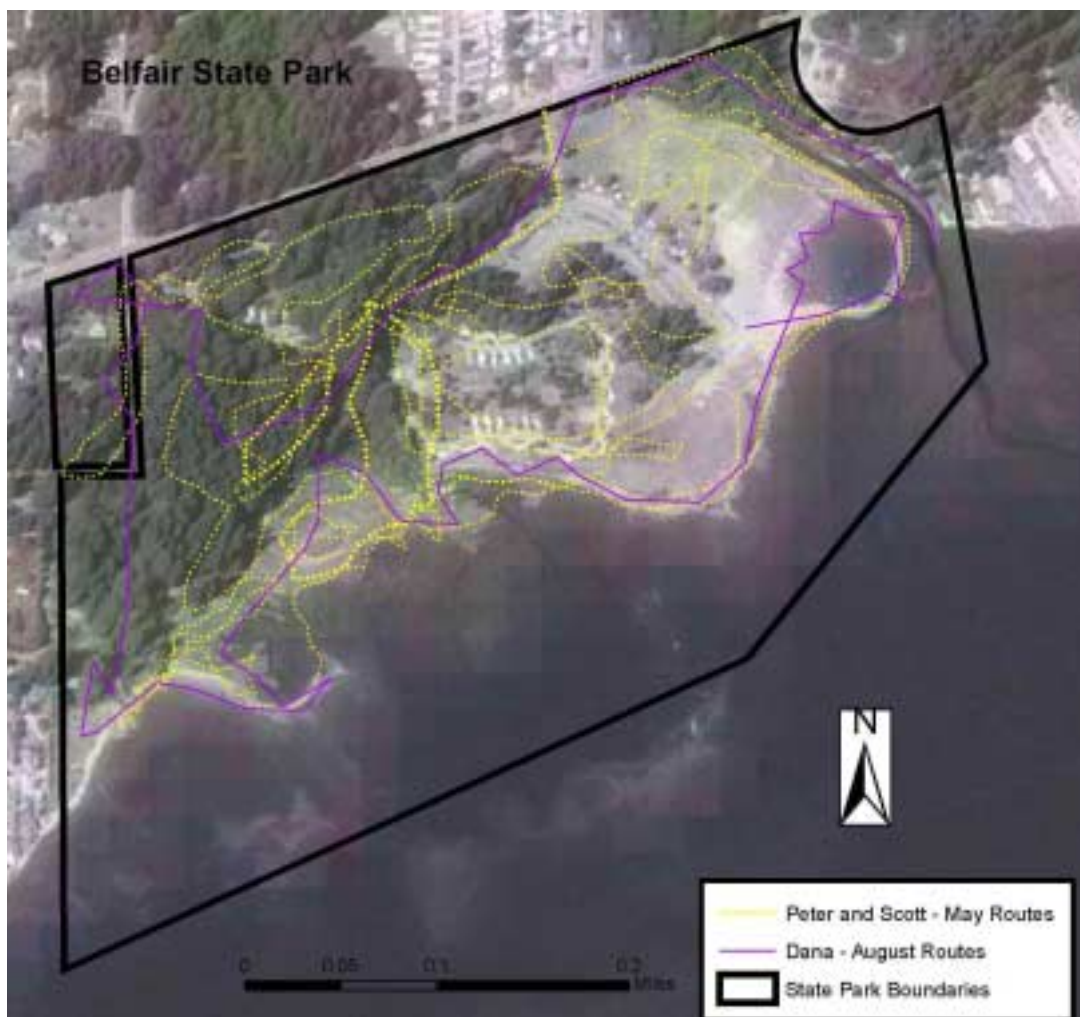


Figure 1. Survey routes for the vegetation community mapping and rare and endangered plant surveys conducted by PBI in 2006 for Belfair State Park.

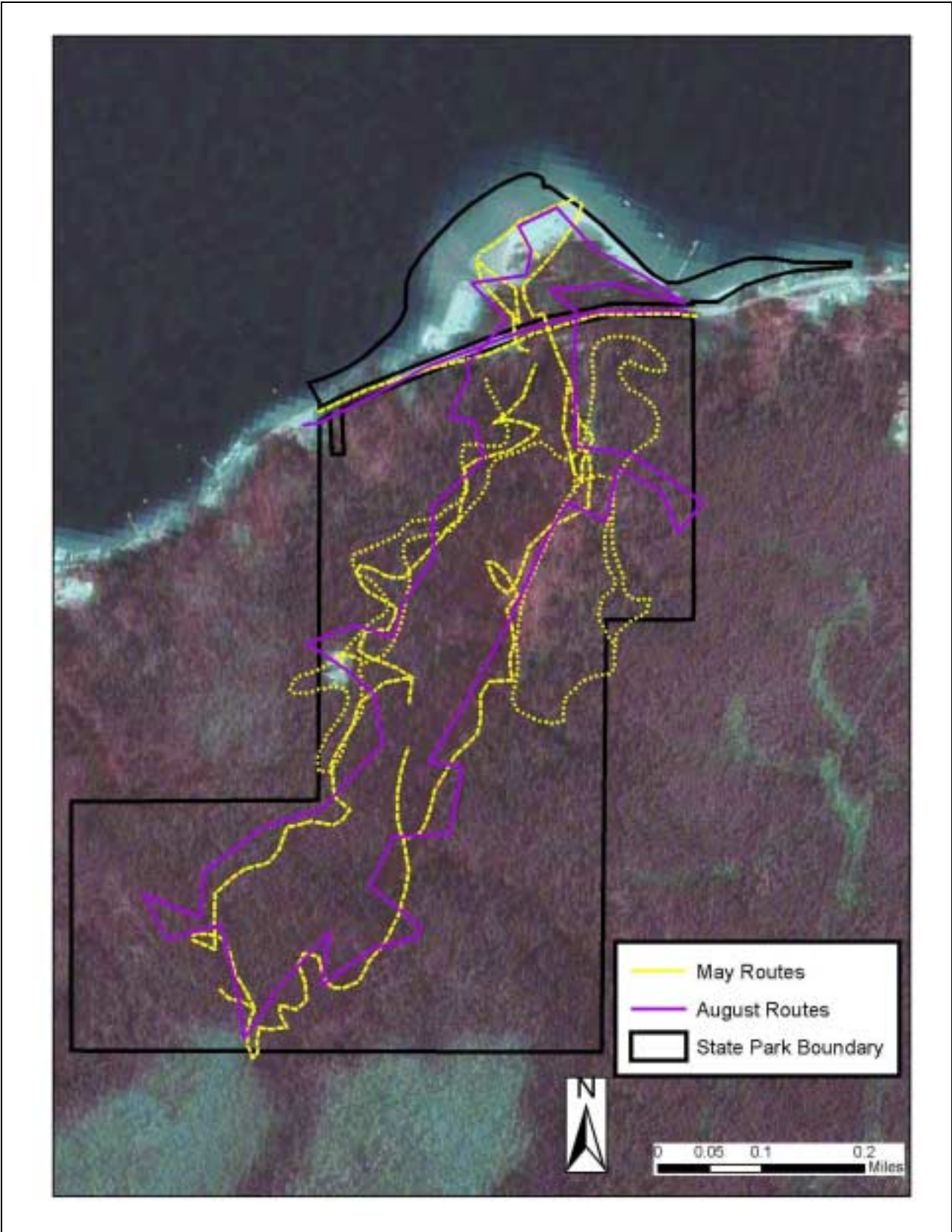


Figure 2. Survey routes for the vegetation community mapping and rare and endangered plant surveys conducted by PBI in 2006 for Twanoh State Park.

Vegetation Communities

Methods – Vegetation Surveys

Vegetation communities within Belfair and Twanoh State Parks were delineated and classified using a combination of field survey and remote sensing techniques. We relied on descriptions from the Washington State Department of Natural Resources (WADNR) late-seral forested plant associations of the Puget Lowland (Chappell 2005), freshwater wetland vegetation (Kunze 1994), and intertidal vegetation (Kunze and Cornelius 1982) to make final vegetation community assignments. In some cases, the WADNR descriptions were not adequate in describing existing vegetation associations. In these cases, alternative vegetation communities or plant associations were created by PBI.

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 LANDSAT Thematic Mapper satellite images for discernable vegetation or landform patterns. When available, we also used high-resolution true color orthorectified aerial photography. Topographic maps, digital elevation models (DEMs), and light detection and ranging imagery (LIDAR) were also employed (where available) to assist the process of vegetation community delineation. The 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 initial vegetation polygon layers were done by hand on hardcopy maps in the field, and later edited digitally in a GIS to create the final vegetation polygon layers.

Results – Vegetation Surveys

We mapped and surveyed 20 vegetation community polygons, comprised of 14 vegetation community types, within Belfair State Park. We mapped and surveyed 27 vegetation community polygons, comprised of 14 vegetation community types, within Twanoh State Park. The vegetation in the two parks was quite different, despite their relative proximity. Vegetation community polygons are either stand-alone plant associations or mosaics of multiple plant associations. Tables 1 and 2 list the plant associations and/or cover types found in Belfair and Twanoh State Parks. See Appendix C for interpretation of “Status” codes. Figures 3 and 4 on the following pages illustrate the location of the vegetation community polygons in each park. Figures 5 and 6 on the following pages illustrate the primary plant association in each polygon for each park. Note that secondary and tertiary primary plant associations are also often present, but not shown on these maps. This additional information is contained 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 B.

Table 1. Vegetation Community Types Encountered at Belfair State Park.

Abbreviation	Association Name	English Name	Reference	Status
ALRU2/RUSP	<i>Acer macrophyllum</i> – <i>Alnus rubra</i> / <i>Rubus spectabilis</i>	red alder / salmonberry	Kunze 1994	G2G3S2
AGAL3-JUBA-POPA23	<i>Agrostis alba</i> - <i>Juncus balticus</i> – <i>Potentilla pacifica</i>	creeping bentgrass-Baltic rush- Pacific silverweed	Kunze and Cornelius 1982	G3G4
CALY-TRMA20	<i>Carex lyngbyei</i> – <i>Triglochin maritima</i> community	Lyngbye's sedge – seaside arrowgrass community	Kunze and Cornelius 1982	G4
CANU-AGAL3-JUBA-POPA23	<i>Calamagrostis nutkaensis</i> - <i>Agrostis alba</i> - <i>Juncus balticus</i> – <i>Potentilla pacifica</i>	Pacific reedgrass- creeping bentgrass-Baltic rush- Pacific silverweed	Kunze and Cornelius 1982	G1
DECA18-CALY3-TRMA20	<i>Deschampsia caespitosa</i> - <i>Carex lyngbyei</i> – <i>Triglochin maritima</i> community	Tufted hairgrass- Lyngbye's sedge – seaside arrowgrass community	Kunze and Cornelius 1982	G3G4
DISP community	<i>Distichlis spicata</i> community	Saltgrass community	Kunze and Cornelius 1982	G5
MAAQ2-RONU	<i>Mahonia aquifolium</i> - <i>Rosa nutkana</i>	holly-leaved barberry - Nootka rose	PBI	
PSME/GASH/POMU	<i>Pseudotsuga menziesii</i> / <i>Gaultheria shallon</i> / <i>Polystichum munitum</i>	Douglas-fir / salal / sword fern	Chappell 2005	G3S2
PSME-ARME/GASH	<i>Pseudotsuga menziesii</i> – <i>Arbutus menziesii</i> / <i>Gaultheria shallon</i>	Douglas-fir - madrone/ salal	Chappell 2005	G3S2
SAVI-JACA4-DISP-TRMA20	<i>Salicornia virginica</i> - <i>Jaumea carnosa</i> - <i>Distichlis spicata</i> - <i>Triglochin maritima</i>	Virginia glasswort - marsh jaumea - saltgrass - seaside arrow-grass	Kunze and Cornelius 1982	G3
SCMA community	<i>Scirpus maritimus</i> community	cosmopolitan bulrush community	Kunze and Cornelius 1982	G4
beach	Beach	Beach	PBI	
developed	Developed area	Developed area	PBI	
saltwater	<i>Saltwater body</i>	<i>Saltwater body</i>	PBI	

Table 2. Vegetation Community Types Encountered at Twanoh State Park.

Abbreviation	Association Name	English Name	Reference	Status
ACMA3-ALRU2/POMU-TEGR2	<i>Acer macrophyllum</i> – <i>Alnus rubra</i> / <i>Polystichum munitum</i> - <i>Tellima grandiflora</i>	Bigleaf maple – red alder / sword fern – fringedcup	Chappell 2005	G2G3
ALRU2/POMU	<i>Alnus rubra</i> / <i>Polystichum munitum</i>	red alder / sword fern	Chappell 2005	G4S4
PSME/GASH/POMU	<i>Pseudotsuga menziesii</i> / <i>Gaultheria shallon</i> / <i>Polystichum munitum</i>	Douglas-fir / salal / sword fern	Chappell 2005	GNRS3S5Q
PSME-ARME/VAOV2	<i>Pseudotsuga menziesii</i> – <i>Arbutus menziesii</i> / <i>Vaccinium ovatum</i>	Douglas-fir - madrone/ evergreen huckleberry	Chappell 2005	GNRS1
PSME-THPL/OXOR	<i>Pseudotsuga menziesii</i> – <i>Thuja plicata</i> / <i>Oxalis oregana</i>	Douglas-fir - western redcedar / Oregon oxalis	Chappell 2005	G3G4S3
PSME-TSHE/GASH/POMU	<i>Pseudotsuga menziesii</i> - <i>Tsuga heterophylla</i> / <i>Gaultheria shallon</i> / <i>Polystichum munitum</i>	Douglas-fir - western hemlock / salal / sword fern	Chappell 2005	G4G5S4
PSME-TSHE/RHMA3-VAOV2	<i>Pseudotsuga menziesii</i> - <i>Tsuga heterophylla</i> / <i>Rhododendron macrophyllum</i> - <i>Vaccinium ovatum</i>	Douglas-fir - western hemlock / Pacific rhododendron evergreen huckleberry	Chappell 2005	G2S2
PSME-TSHE/VAOV2	<i>Pseudotsuga menziesii</i> - <i>Tsuga heterophylla</i> / <i>Vaccinium ovatum</i>	Douglas-fir - western hemlock / evergreen huckleberry	Chappell 2005	G2S2
PSME-TSHE/VAOV2/POMU	<i>Pseudotsuga menziesii</i> - <i>Tsuga heterophylla</i> / <i>Vaccinium ovatum</i> / <i>Polystichum munitum</i>	Douglas-fir - western hemlock / evergreen huckleberry / sword fern	Chappell 2005	G3S1
SAVI community	<i>Salicornia virginica</i> community	Virginia glasswort community	Kunze and Cornelius 1982	G3G4
THPL-TSHE/OPHO/POMU	<i>Thuja plicata</i> - <i>Tsuga heterophylla</i> / <i>Oplopanax horridus</i> / <i>Polystichum munitum</i>	Red cedar - western hemlock / devil's club / sword fern	Chappell 2005	G4S4
TSHE-PSME/POMU-DREX2	<i>Tsuga heterophylla</i> - <i>Pseudotsuga menziesii</i> / <i>Polystichum munitum</i> - <i>Dryopteris expansa</i>	western hemlock - Douglas-fir / sword fern - spreading woodfern	Chappell 2005	G3S3
developed	Developed area	Developed area	PBI	
saltwater	<i>saltwater</i>	Saltwater body	PBI	
Tidal mud and gravel	Tidal mud and gravel	Tidal mud and gravel	PBI	

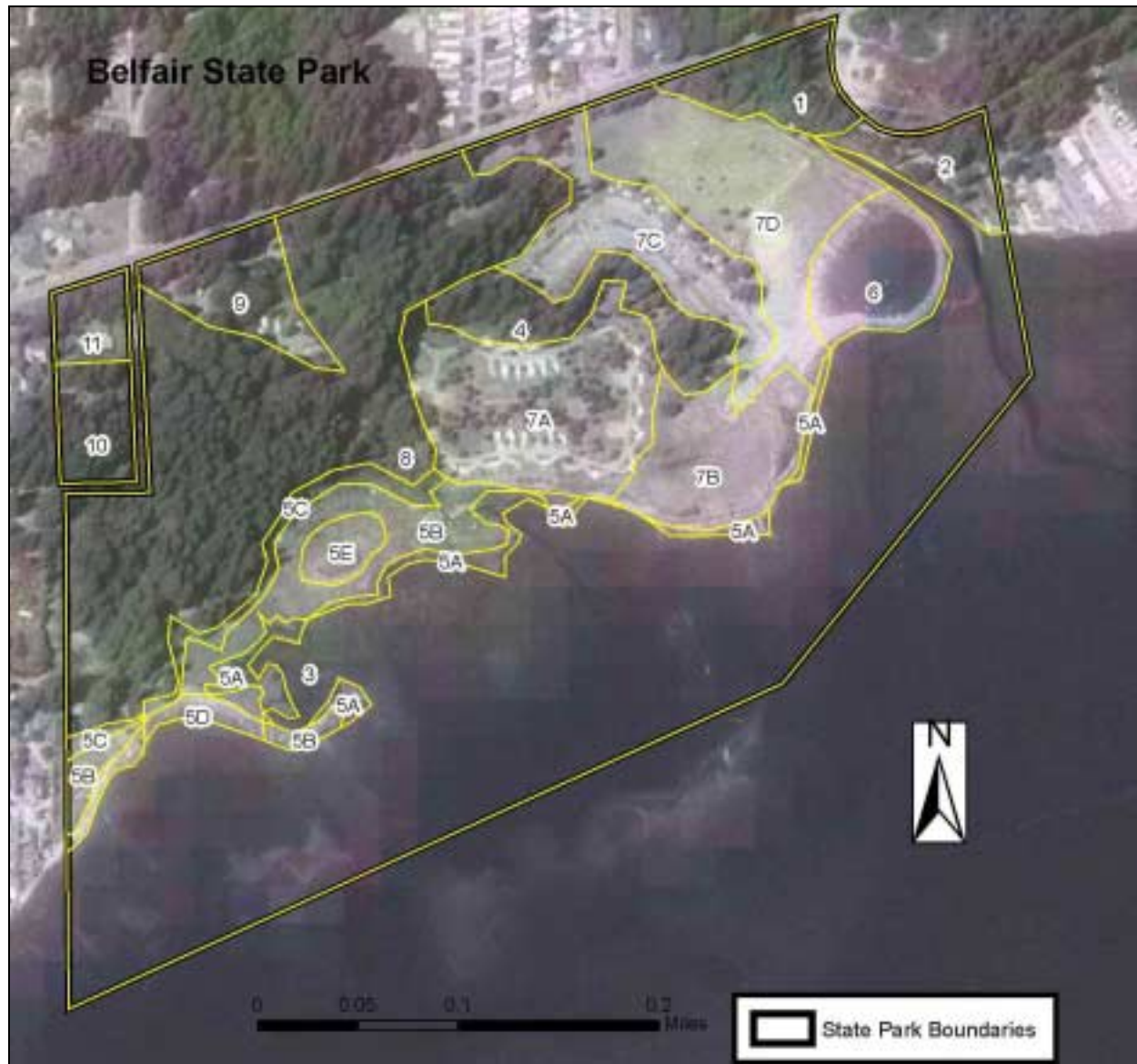


Figure 3. Layout of the vegetation community polygons in Belfair State Park, overlaying a 1990 digital orthophoto combined with TM7 spectral imagery.

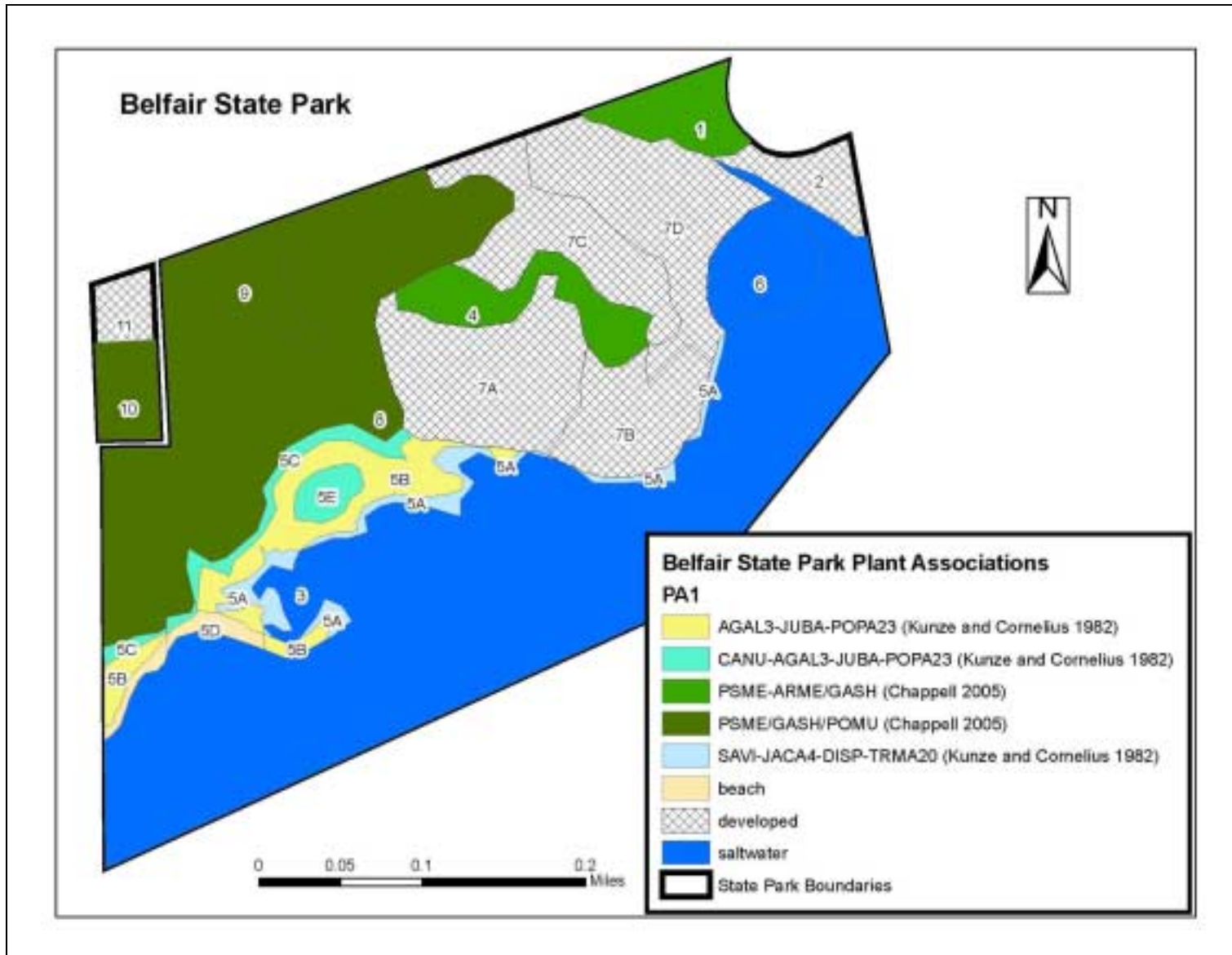


Figure 4. The primary vegetation community types within Belfair State Park.

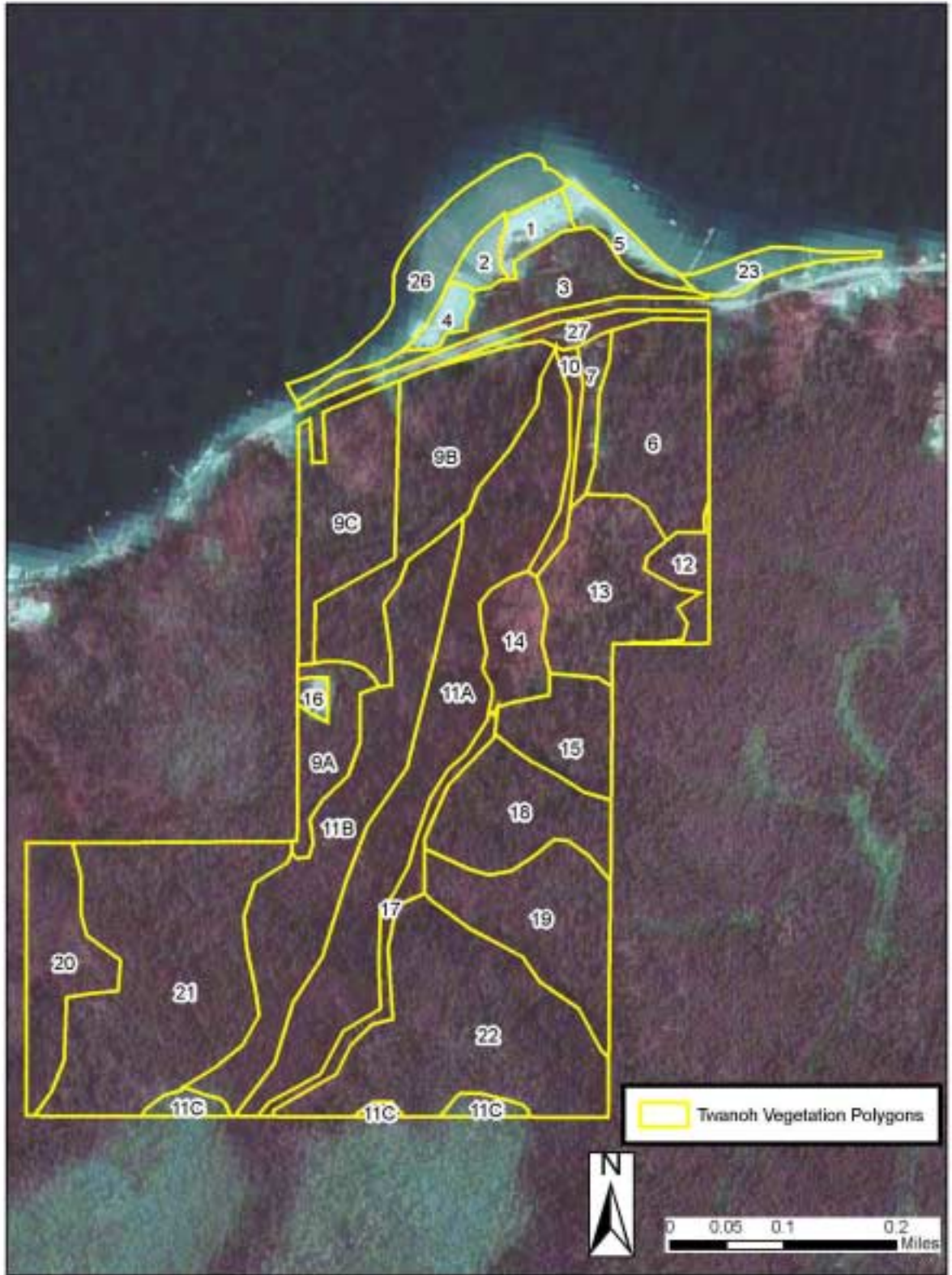


Figure 5. Layout of the vegetation community polygons in Twanoh State Park, overlaying a 1990 digital orthophoto combined with ASTER satellite imagery from 2006.

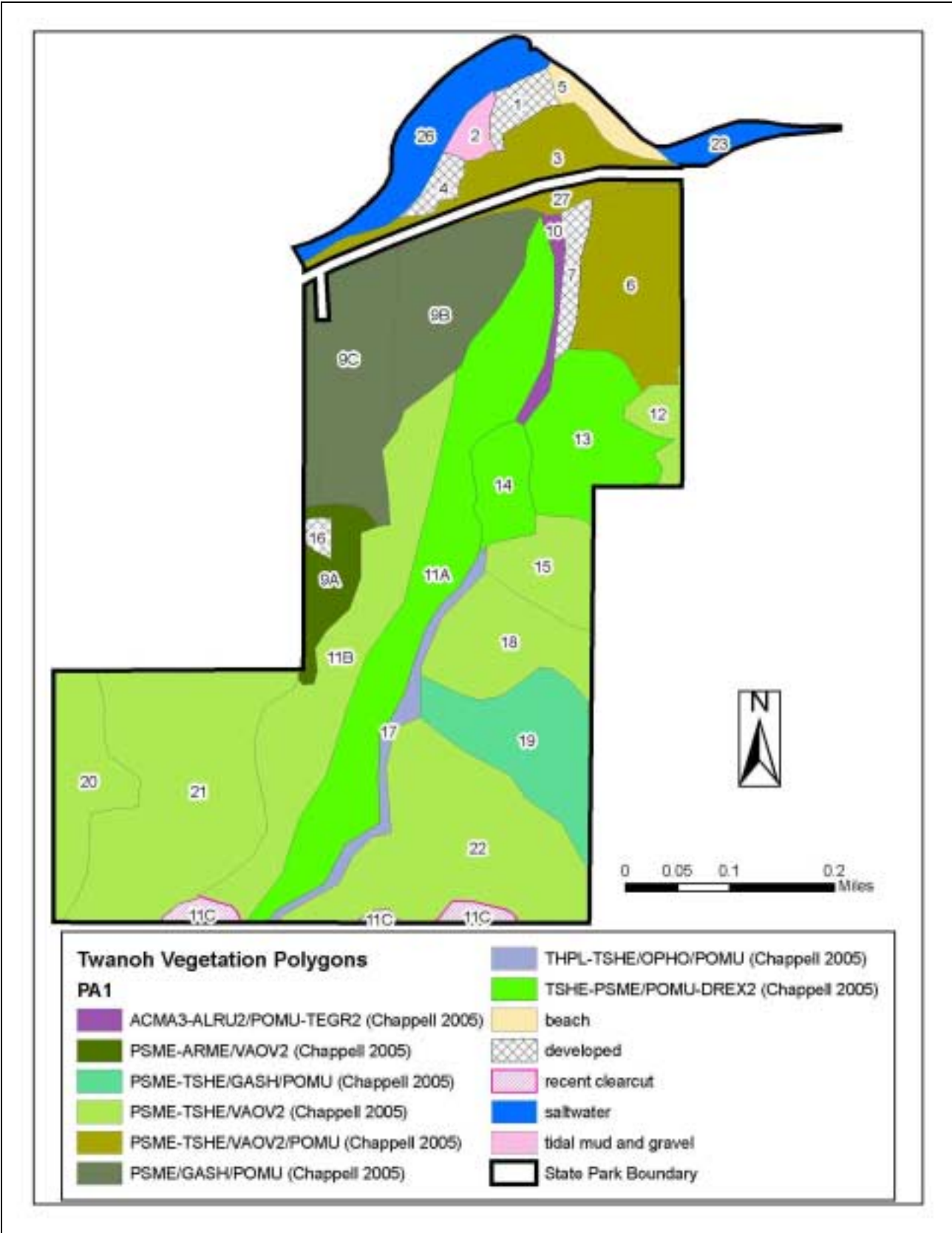


Figure 6. The primary vegetation community types within Twanoh State Park.

Examples of Vegetation Community Types

Acer macrophyllum – *Alnus Rubra* / *Polystichum munitum* – *Tellima grandiflora*
forest (ACMA3-ALRU2/POMU-TEGR3)



This plant community was described by Chappell (2005). It is found primarily in the Puget Sound region, often on steep slopes, and typically not far from salt water. The steepness of the slope favors these broadleaf trees, bigleaf maple (*Acer macrophyllum*) and red alder (*Alnus rubra*) over coniferous species, in part because of soil creep and landslides down the slope. Bigleaf maple has the capacity to sprout from damaged stems after soil movement, and red alder is a nitrogen-fixing species, which gives it the ability to colonize disturbed soils where the nitrogen content of the soil is low. This plant community is found on some of the steep side-slopes near the stream at Twanoh State Park.

***Agrostis alba – Juncus balticus – Potentilla pacifica* (AGAL3-JUBA-POPA23)**



This plant community was described by Kunze and Cornelius (1982). This plant community is a common high marsh community in the Puget Sound. It occurs on silt beds that have little dissection by tidal channels. This community mosaics with the SAVI-JACA4-DISP-TRMA20 marsh community, a common low-marsh community. The *Agrostis alba – Juncus balticus – Potentilla pacifica* community is one of the most common intertidal communities at Belfair State Park.

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



This plant community was described by Chappell (2005). Because of its ability to fix nitrogen from the atmosphere, Red alder (*Alnus rubra*) is an early-seral, colonizer species of disturbed soil. Accordingly, this is an early- to mid-seral association that can regenerate after fire, windthrow, or timber harvest. Red alder is prolific after disturbance that exposes mineral soil, and it has therefore thrived on productive sites where conifer forest have been harvested and herbicides were not applied. Alder is short-lived (about 100 years). If conifers establish in the understory, then they are expected to dominate after the alder dies in the absence of further disturbance.

ALRU2/POMU is a typical plant association in the Puget Trough lowlands, occurring where clear-cut logging has taken place within the last century. Both parks experienced high levels of logging prior to State Park's ownership, and hence both parks have this association as a dominant vegetative community.

***Alnus rubra* / *Rubus spectabilis* community type (ALRU2/RUSP)**



This plant community was described by Kunze (1994). This is a wetland plant association that is found along some of the streams at Belfair State Park. Like ALRU2/POMU, the ALRU2/RUSP c.t. wetland association is common on wetland sites in the Puget Trough lowlands where significant logging has occurred in recent history. Creeping buttercup (*Ranunculus repens*) is a common exotic invader of ALRU2/RUSP wetlands. Himalayan blackberry (*Rubus discolor*) is also a common invader in some areas.

***Carex lyngbyei* - *Triglochin maritima* Community (CALY3-TRMA20)**



The CALY3-TRMA20 plant community was described by Kunze and Cornelius (1982). This association occurs in brackish water in sloughs and estuaries where it is constantly inundated by the high tide. The community occurs in the intertidal areas of Belfair State Park.

***Deschampsia caespitosa* - *Carex lyngbyei* - *Triglochin maritima* community
(DECA18-CALY3-TRMA20 community)**



This plant community was described by Kunze and Cornelius (1982). It occurs in some of the brackish, silty intertidal areas at Belfair State Park often along the tidal channels.

***Pseudotsuga menziesii* - *Arbutus menziesii* / *Gaultheria shallon* forest
(PSME-ARME/GASH) and
Pseudotsuga menziesii - *Arbutus menziesii* / *Vaccinium ovatum* forest
(PSME-ARME/VAOV2)**



These plant communities were described by Chappell (2005). They occur along the ridges and some upper slopes at Twanoh State Park and at Belfair State Park.

Species in the genus *Arbutus* (Ericaceae) generally inhabit warm winter, dry summer (Mediterranean) climate areas in the Northern Hemisphere. Madrone is by far the most northerly broadleaf evergreen tree on the North American continent. For it to survive in the cool, wet climate of the Pacific Northwest, it only grows on sites with good soil drainage and bright sun. It is a fire-adapted species, resprouting after fires that will kill one of its local competitors, Douglas fir (*Pseudotsuga menziesii*). Douglas-fir is likely to increase in abundance without disturbance, but does not appear to be excluding or out-competing madrone, even when madrone is overtopped, because the canopy of fir remains relatively open on these dry sites.

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



This plant community was described by Chappell (2005). This is often post-logging association in dry to moderately moist soils. Douglas-fir (*Pseudotsuga menziesii*) can displace colonizer broadleaf trees over time, but once a dense canopy is established it cannot germinate and grow in its own shade. In the absence of recurring disturbance it will eventually be replaced by more shade-tolerant species. Salal (*Gaultheria shallon*) is a drought-tolerant, nitrogen-fixing species of acid soils and thus a common colonizer after logging. The light, wind-borne spores of swordfern (*Polystichum munitum*) enables this species to swiftly colonize new sites, however this capacity is limited by the specie's sensitivity to water stress. It is less drought tolerant than the other two species in this association and its presence indicates either deep soil or a site that accumulates sub-surface moisture. This is a common association at Twanoh State Park.

***Pseudotsuga menziesii* - *Tsuga heterophylla* / *Rhododendron macrophyllum* - *Vaccinium ovatum* forest (PSME-THPL/RHMA3-VAOV2)**



This plant community was described by Chappell (2005). It occurs in patches on the ridges of Twanoh State Park. Its distribution seems to be limited to well-drained areas with a degree of southern exposure. Patch sizes are small, no greater than several acres in size, within PSME-TSHE/VAOV2 matrix.

***Pseudotsuga menziesii* – *Tsuga heterophylla* / *Vaccinium ovatum* / *Polystichum munitum* (PSME-TSHE/VAOV2/POMU) and
Pseudotsuga menziesii – *Tsuga heterophylla* / *Vaccinium ovatum* (PSME-TSHE/VAOV2) forests**



These plant communities were described by Chappell (2005). *Pseudotsuga menziesii* – *Tsuga heterophylla* / *Vaccinium ovatum* forms the matrix on the ridges of Twanoh State Park. *Pseudotsuga menziesii* – *Tsuga heterophylla* / *Vaccinium ovatum*/*Polystichum munitum* sometimes occurs immediately below the PSME-TSHE/VAOV2 association where there is a little more moisture.

***Mahonia aquifolium* - *Rosa nutkana* (MAAQ2-RONU)**



This plant community has not been described before. Pacific Biodiversity Institute decided that it was a unique association that warranted a name and description. It was found in small patches at Belfair State Park. This plant community is found only near saltwater shorelines above the high tide line. It is characterized by a mixture of *Mahonia aquifolium* and *Rosa nutkana*.

Salicornia virginica Community (SAVI)



This plant community was described by Kunze and Cornelius (1982). It is a low intertidal community associated with sandy or silty marshlands or beach flats. *Salicornia virginica* is a dominant herbaceous plant occurring in this community. This community mosaics with other intertidal communities. A small patch is found at Twanoh State Park and other patches are found at Belfair State Park.

***Salicornia virginica* – *Jaumea carnosa* – *Distichlis spicata* – *Triglochin maritimum*
(SAVI-JACA4-DISP-TRMA20 Community)**



This plant community was described by Kunze and Cornelius (1982). This tideland community is found in high salinity areas of the low marsh on silty sands. It experiences daily inundation by the tide. It is more diverse than the SAVI community and occurs at slightly higher elevation.

***Scirpus maritimus* (SCMA community)**



This plant community was described by Kunze and Cornelius (1982). Small patches of this community are found in the lower intertidal areas at Belfair State Park. There is usually a fairly homogenous cover of *Scirpus maritimus* in this community. This wetland plant can survive in polyhaline conditions enabling it to dominate brackish salt marshes.

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



This plant community was described by Chappell (2005). This association occurs in the mesic areas of Twanoh State Park. Many of the toe slopes and lower side slopes are covered with this plant community.

***Thuja plicata* - *Tsuga heterophylla* / *Ophloplanax horridus* / *Polystichum munitum* forest (THPL-TSHE/OPHO/POMU)**



This plant community was described by Chappell (2005). THPL-TSHE/OPHO/POMU occurs in the wet areas along the stream at Twanoh State Park. It typically occurs within a matrix of the *Tsuga heterophylla* - *Pseudotsuga menziesii* / *Polystichum munitum* - *Dryopteris expansa* association. It is commonly associated with wetter areas of the forest near wetland margins or in topographic depressions.

Rare Plant Surveys

Methods - Rare Plants

We visited Belfair and Twanoh State Parks multiple times during the 2006 field season to conduct rare plant surveys. 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 for each park (Figures 1 and 2).

Results - Rare Plants

No plants listed by the Washington DNR Natural Heritage program were found in either Belfair or Twanoh State Parks. This is not surprising considering the conditions at each of these parks. Belfair State Park is a small, heavily developed and disturbed park. It does not contain much suitable habitat for rare plants. Twanoh State Park is much less developed yet has had a history of heavy disturbance. It is nearly all covered with dense second-growth forest. The second-growth forests of the Puget Sound region do not contain suitable habitat for most rare plants and rare plants are generally absent from these forests.

Vascular Plant List for Belfair State Park

A total of 121 vascular plant species were identified during the 2006 surveys at Belfair State Park. Of these, 41 of the plant species are non-native, accounting for about 34% of the total.

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 3. Vascular Plant List for Belfair State Park.

#	Code	Scientific Name	Common Name/Accepted Synonym	Family	Alien
1	ACCI	<i>Acer circinatum</i> Pursh	vine maple	Aceraceae	
2	ACMA3	<i>Acer macrophyllum</i> Pursh	bigleaf maple	Aceraceae	
3	ACMI2	<i>Achillea millefolium</i> L.	yarrow	Asteraceae	
4	ADBI	<i>Adenocaulon bicolor</i> Hook.	pathfinder	Asteraceae	
5	AGEX	<i>Agrostis exarata</i> Trin.	spike bentgrass	Poaceae	
6	AGSC5	<i>Agrostis scabra</i> Willd.	rough bentgrass	Poaceae	
7	AICA	<i>Aira caryophyllea</i> L.	silver hairgrass	Poaceae	a
8	AIPR	<i>Aira praecox</i> L.	yellow hairgrass	Poaceae	a
9	ALRU2	<i>Alnus rubra</i> Bong.	red alder	Betulaceae	
10	AMCH4	<i>Ambrosia chamissonis</i> (Less.) Greene	silver burr ragweed	Asteraceae	
11	AMAL2	<i>Amelanchier alnifolia</i> (Nutt.) Nutt. ex M. Roemer	Saskatoon serviceberry	Rosaceae	
12	ANOD	<i>Anthoxanthum odoratum</i> L.	sweet vernalgrass	Poaceae	a
13	ARME	<i>Arbutus menziesii</i> Pursh	madrone	Ericaceae	
14	ASSU4	<i>Aster subspicatus</i> Nees	>> <i>Symphotrichum subspicatum</i> var. <i>subspicatum</i>	Asteraceae	
15	ATPA4	<i>Atriplex patula</i> L.	spear saltbush	Chenopodiaceae	
16	BAOR	<i>Barbarea orthoceras</i> Ledeb.	American yellowrocket	Brassicaceae	
17	BEPE2	<i>Bellis perennis</i> L.	lawn daisy	Asteraceae	a
18	BEAQ	<i>Berberis aquifolium</i> Pursh	>> <i>Mahonia aquifolium</i>	Berberidaceae	
19	BENE2	<i>Berberis nervosa</i> Pursh	>> <i>Mahonia nervosa</i>	Berberidaceae	
20	CANU	<i>Calamagrostis nutkaensis</i> (J. Presl) J. Presl ex Steud.	Pacific reedgrass	Poaceae	
21	CALY3	<i>Carex lyngbyei</i> Hornem.	Lyngbye's sedge	Cyperaceae	
22	CENU2	<i>Cerastium nutans</i> Raf.	nodding chickweed	Caryophyllaceae	
23	CEVU	<i>Cerastium vulgatum</i> L. 1762, non 1755	>> <i>Cerastium fontanum</i> ssp. <i>vulgare</i>	Caryophyllaceae	a
24	CHAL7	<i>Chenopodium album</i> L.	lambsquarters	Chenopodiaceae	
25	CHRUG	<i>Chenopodium rubrum</i> L. var. <i>glomeratum</i> Wallr.	>> <i>Chenopodium chenopodioides</i>	Chenopodiaceae	
26	CIAR4	<i>Cirsium arvense</i> (L.) Scop.	Canada thistle	Asteraceae	a
27	CIVU	<i>Cirsium vulgare</i> (Savi) Ten.	bull thistle	Asteraceae	a
28	COCO6	<i>Corylus cornuta</i> Marsh.	California hazelnut	Betulaceae	
29	CRMO3	<i>Crataegus monogyna</i> Jacq.	oneseed hawthorn	Rosaceae	a
30	CYSC4	<i>Cytisus scoparius</i> (L.) Link	scotchbroom	Fabaceae	a
31	DAGL	<i>Dactylis glomerata</i> L.	orchardgrass	Poaceae	a
32	DACA6	<i>Daucus carota</i> L.	Queen Anne's lace	Apiaceae	a
33	DIHOO	<i>Disporum hookeri</i> (Torr.) Nichols. var. <i>oreganum</i> (S. Wats.) Q. Jones	>> <i>Prosartes hookeri</i> var. <i>oregana</i>	Liliaceae	
34	DISP	<i>Distichlis spicata</i> (L.) Greene	inland saltgrass	Poaceae	
35	ELMO9	<i>Elymus mollis</i> Trin.	>> <i>Leymus mollis</i> ssp. <i>mollis</i>	Poaceae	
36	EPAN2	<i>Epilobium angustifolium</i> L.	>> <i>Chamerion angustifolium</i> ssp. <i>angustifolium</i>	Onagraceae	
37	EPCI	<i>Epilobium ciliatum</i> Raf.	fringed willowherb	Onagraceae	
38	EQTE	<i>Equisetum telmateia</i> Ehrh.	giant horsetail	Equisetaceae	
39	FEBR*	<i>Festuca bromoides</i> L.	>> <i>Vulpia bromoides</i>	Poaceae	a
40	FERU2	<i>Festuca rubra</i> L.	red fescue	Poaceae	
41	FRVI	<i>Fragaria virginiana</i> Duchesne	Virginia strawberry	Rosaceae	
42	FRLA2	<i>Fritillaria lanceolata</i> Pursh	>> <i>Fritillaria affinis</i> var. <i>affinis</i>	Liliaceae	

43	GASH	<i>Gaultheria shallon</i> Pursh	salal	Ericaceae	
44	GEMO	<i>Geranium molle</i> L.	dovefoot geranium	Geraniaceae	a
45	GERO	<i>Geranium robertianum</i> L.	Robert geranium	Geraniaceae	a
46	GEMA4	<i>Geum macrophyllum</i> Willd.	largeleaf avens	Rosaceae	
47	GLMA	<i>Glaux maritima</i> L.	sea milkwort	Primulaceae	
48	GRIN	<i>Grindelia integrifolia</i> DC.	Puget Sound gumweed	Asteraceae	
49	HEHE	<i>Hedera helix</i> L.	English ivy	Araliaceae	a
50	HEAN3	<i>Helianthus annuus</i> L.	common sunflower	Asteraceae	
51	HODI	<i>Holodiscus discolor</i> (Pursh) Maxim.	Indian plum	Rosaceae	
52	HOPE	<i>Honkenya peploides</i> (L.) Ehrh.	seaside sandplant	Caryophyllaceae	
53	HYRA3	<i>Hypochaeris radicata</i> L.	hairy cat's ear	Asteraceae	a
54	ILAQ80	<i>Ilex aquifolium</i> L.	English ivy	Aquifoliaceae	a
55	JACA4	<i>Jaumea carnosa</i> (Less.) Gray	marsh jaumea	Asteraceae	
56	JUBA	<i>Juncus balticus</i> Willd.	Baltic rush	Juncaceae	
57	JUTE	<i>Juncus tenuis</i> Willd.	poverty rush	Juncaceae	
58	LAMU	<i>Lactuca muralis</i> (L.) Fresen.	>>Mycelis muralis	Asteraceae	a
59	LAPU2	<i>Lamium purpureum</i> L.	purple deadnettle	Lamiaceae	a
60	LAPA4	<i>Lathyrus palustris</i> L.	marsh pea	Fabaceae	
61	LAPO3	<i>Lathyrus polyphyllus</i> Nutt.	leafy pea	Fabaceae	
62	LEVI3	<i>Lepidium virginicum</i> L.	Virginia pepperweed	Brassicaceae	
63	LOCI3	<i>Lonicera ciliosa</i> (Pursh) Poir. ex DC.	orange honeysuckle	Caprifoliaceae	
64	LUMI7	<i>Lupinus micranthus</i> Dougl., non Guss.	>>Lupinus polycarpus	Fabaceae	
65	MADI	<i>Maianthemum dilatatum</i> (Wood) A. Nels. & J.F. Macbr.	false lily of the valley	Liliaceae	
66	MOPA5	<i>Montia parviflora</i> (Dougl. ex Hook.) T.J. Howell	>>Claytonia parviflora ssp. parviflora	Portulacaceae	
67	MOSI2	<i>Montia sibirica</i> (L.) T.J. Howell	>>Claytonia sibirica var. sibirica	Portulacaceae	
68	MYLA	<i>Myosotis laxa</i> Lehm.	bay forget-me-not	Boraginaceae	
69	OECE	<i>Oemleria cerasiformis</i> (Torr. & Gray ex Hook. & Arn.) Landon	Indian plum	Rosaceae	
70	PEFR5	<i>Petasites frigidus</i> (L.) Fries	arctic sweet coltsfoot	Asteraceae	
71	PICOC	<i>Pinus contorta</i> Dougl. ex Loud. var. contorta	beach pine	Pinaceae	
72	PLLA	<i>Plantago lanceolata</i> L.	narrowleaf plantain	Plantaginaceae	a
73	PLMA2	<i>Plantago major</i> L.	common plantain	Plantaginaceae	a
74	PLMA3	<i>Plantago maritima</i> L.	goose tongue	Plantaginaceae	
75	POBU	<i>Poa bulbosa</i> L.	bulbous bluegrass	Poaceae	a
76	POPR	<i>Poa pratensis</i> L.	Kentucky bluegrass	Poaceae	a
77	POCU6	<i>Polygonum cuspidatum</i> Sieb. & Zucc.	Japanese knotweed	Polygonaceae	a
78	POGL8	<i>Polypodium glycyrrhiza</i> D.C. Eat.	licorice fern	Polypodiaceae	
79	POMU	<i>Polystichum munitum</i> (Kaulfuss) K. Presl	swordfern	Polypodiaceae	
80	POANP	<i>Potentilla anserina</i> L. ssp. pacifica (T.J. Howell) Rousi	>>Argentina egedii ssp. egedii	Rosaceae	
81	PRVU	<i>Prunella vulgaris</i> L.	common selfheal	Lamiaceae	
82	PRAV	<i>Prunus avium</i> (L.) L.	sweet cherry	Rosaceae	a
83	PRLA5	<i>Prunus laurocerasus</i> L.	cherry laurel	Rosaceae	a
84	PSME	<i>Pseudotsuga menziesii</i> (Mirbel) Franco	Douglas-fir	Pinaceae	
85	PTAQ	<i>Pteridium aquilinum</i> (L.) Kuhn	bracken fern	Dennstaedtiaceae	
86	PYFU	<i>Pyrus fusca</i> Raf.	>>Malus fusca	Rosaceae	
87	RARE3	<i>Ranunculus repens</i> L.	creeping buttercup	Ranunculaceae	a

88	RHMA3	Rhododendron macrophyllum D. Don ex G. Don	Pacific rhododendron	Ericaceae	
89	ROEG	Rosa eglanteria L.	sweetbriar rose	Rosaceae	a
90	RONU	Rosa nutkana K. Presl	Nootka rose	Asteraceae	
91	RUDI2	Rubus discolor Weihe & Nees	>>Rubus armeniacus	Rosaceae	a
92	RUPA	Rubus parviflorus Nutt.	thimbleberry	Rosaceae	
93	RUSP	Rubus spectabilis Pursh	salmonberry	Rosaceae	
94	RUUR	Rubus ursinus Cham. & Schlecht.	California blackberry	Rosaceae	
95	RUAC3	Rumex acetosella L.	common sheep sorrel	Polygonaceae	a
96	RUCR	Rumex crispus L.	curly dock	Polygonaceae	a
97	SAVI	Salicornia virginica L.	>>Salicornia depressa	Chenopodiaceae	
98	SASI2	Salix sitchensis Sanson ex Bong.	Sitka willow	Salicaceae	
99	SARA2	Sambucus racemosa L.	red elderberry	Caprifoliaceae	
100	SCAC	Scirpus acutus Muhl. ex Bigelow	>>Schoenoplectus acutus var. acutus	Cyperaceae	
101	SCCE6	Scirpus cernuus Vahl p.p.	>>Isoplepis cernua	Cyperaceae	
102	SCMA	Scirpus maritimus L.	>>Schoenoplectus maritimus	Cyperaceae	
103	SMRA*	Smilacina racemosa (L.) Desf.	>>Maianthemum racemosum ssp. amplexicaule	Liliaceae	
104	SODU	Solanum dulcamara L.	climbing nightshade	Solanaceae	a
105	SOOL	Sonchus oleraceus L.	common sowthistle	Asteraceae	a
106	SOAU	Sorbus aucuparia L.	European mountain ash	Rosaceae	a
107	SPCA3	Spergularia canadensis (Pers.) G. Don	Canadian sandspurry	Caryophyllaceae	
108	SYAL	Symphoricarpos albus (L.) Blake	common snowberry	Caprifoliaceae	
109	TAOF	Taraxacum officinale G.H. Weber ex Wiggers	dandelion	Asteraceae	a
110	TENU	Teesdalia nudicaulis (L.) Ait. f.	barestem teesdalia	Brassicaceae	a
111	THPL	Thuja plicata Donn ex D. Don	western red cedar	Cupressaceae	
112	TRLA6	Trientalis latifolia Hook.	>>Trientalis borealis ssp. latifolia	Primulaceae	
113	TRDU2	Trifolium dubium Sibthorp	suckling clover	Fabaceae	a
114	TRSU3	Trifolium subterraneum L.	subterranean clover	Fabaceae	a
115	TRMA20	Triglochin maritima L.	seaside arrowgrass	Juncaginaceae	
116	TSHE	Tsuga heterophylla (Raf.) Sarg.	western hemlock	Pinaceae	
117	VAOV2	Vaccinium ovatum Pursh	California huckleberry	Ericaceae	
118	VAPA	Vaccinium parvifolium Sm.	red huckleberry	Ericaceae	
119	VIHI	Vicia hirsuta (L.) S.F. Gray	tiny vetch	Fabaceae	a
120	VISAS2	Vicia sativa L. ssp. sativa	garden vetch	Fabaceae	a
121	VISAA2	Vicia sativa L. var. angustifolia (L.) Ser.	>>Vicia sativa ssp. nigra	Fabaceae	a

Vascular Plant List for Twanoh State Park

A total of 140 vascular plant species were identified during the 2006 surveys at Belfair State Park. Of these, 28 of the plant species are non-native, accounting for about 20% of the total.

Table 4. Vascular Plant List for Twanoh State Park

#	Code	Scientific Name	Common Name/Accepted Synonym	Family	Alien
1	ACCI	<i>Acer circinatum</i> Pursh	vine maple	Aceraceae	
2	ACMA3	<i>Acer macrophyllum</i> Pursh	bigleaf maple	Aceraceae	
3	ACTR	<i>Achlys triphylla</i> (Sm.) DC.	sweet after death	Berberidaceae	
4	ACRU2	<i>Actaea rubra</i> (Ait.) Willd.	red baneberry	Ranunculaceae	
5	ADBI	<i>Adenocaulon bicolor</i> Hook.	pathfinder	Asteraceae	
6	ADPE	<i>Adiantum pedatum</i> L.	>>Adinatum aleuticum	Pteridaceae	
7	AGSC5	<i>Agrostis scabra</i> Willd.	rough bentgrass	Poaceae	
8	AICA	<i>Aira caryophyllea</i> L.	silver hairgrass	Poaceae	a
9	ALRU2	<i>Alnus rubra</i> Bong.	red alder	Betulaceae	
10	AMCH4	<i>Ambrosia chamissonis</i> (Less.) Greene	silver burr ragweed	Asteraceae	
11	ANMA	<i>Anaphalis margaritacea</i> (L.) Benth.	western pearly everlasting	Asteraceae	
12	ANOD	<i>Anthoxanthum odoratum</i> L.	sweet vernalgrass	Poaceae	a
13	ARME	<i>Arbutus menziesii</i> Pursh	madrone	Ericaceae	
14	ARCO3	<i>Arctostaphylos columbiana</i> Piper	hairy manzanita	Ericaceae	
15	ARSYA	<i>Aruncus sylvester</i> Kostel. ex Maxim. ssp. <i>acuminatus</i> (Rydb.) Jepson	>>Aruncus dioicus var. <i>acuminatus</i>	Rosaceae	
16	ASCA2	<i>Asarum caudatum</i> Lindl.	British Columbia wildginger	Aristolochiaceae	
17	ATFI	<i>Athyrium filix-femina</i> (L.) Roth	common ladyfern	Dryopteridaceae	
18	ATPA4	<i>Atriplex patula</i> L.	spear saltbush	Chenopodiaceae	
19	BAOR	<i>Barbarea orthoceras</i> Ledeb.	American yellowrocket	Brassicaceae	a
20	BEPE2	<i>Bellis perennis</i> L.	lawn daisy	Asteraceae	a
21	BEAQ	<i>Berberis aquifolium</i> Pursh	>>Mahonia aquifolium	Berberidaceae	
22	BENE2	<i>Berberis nervosa</i> Pursh	>>Mahonia nervosa	Berberidaceae	
23	BLSP	<i>Blechnum spicant</i> (L.) Sm.	deer fern	Blechnaceae	
24	CAOLO	<i>Cardamine oligosperma</i> Nutt. var. <i>oligosperma</i>	little western bittercress	Brassicaceae	
25	CARO5	<i>Carex rossii</i> Boott	Ross' sedge	Cyperaceae	
26	CASI3	<i>Carex sitchensis</i> Prescott ex Bong.	>>Carex aquatilis var. <i>dives</i>	Cyperaceae	
27	CENU2	<i>Cerastium nutans</i> Raf.	nodding chickweed	Caryophyllaceae	
28	CHUMO2	<i>Chimaphila umbellata</i> (L.) W. Bart. ssp. <i>occidentalis</i> (Rydb.) Hultén	pipsissewa	Pyrolaceae	
29	CIAL	<i>Circaea alpina</i> L.	small enchanter's nightshade	Onagraceae	
30	CIAR4	<i>Cirsium arvense</i> (L.) Scop.	Canada thistle	Asteraceae	a
31	CIVU	<i>Cirsium vulgare</i> (Savi) Ten.	bull thistle	Asteraceae	a
32	COHE2	<i>Collomia heterophylla</i> Dougl. ex Hook.	variableleaf collomia	Polemoniaceae	
33	CORAL5	<i>Corallorhiza Gagnebin</i>	coralroot	Orchidaceae	
34	CONU4	<i>Cornus nuttallii</i> Audubon ex Torr. & Gray	Pacific dogwood	Cornaceae	
35	COCO6	<i>Corylus cornuta</i> Marsh.	California hazelnut	Betulaceae	
36	CYSC4	<i>Cytisus scoparius</i> (L.) Link	scotchbroom	Fabaceae	a
37	DAGL	<i>Dactylis glomerata</i> L.	orchardgrass	Poaceae	a
38	DAIN	<i>Danthonia intermedia</i> Vasey	timber oatgrass	Poaceae	a
39	DIFO	<i>Dicentra formosa</i> (Haw.) Walp.	Pacific bleeding heart	Fumariaceae	
40	DIPU	<i>Digitalis purpurea</i> L.	purple foxglove	Scrophulariaceae	a

41	DISP	<i>Distichlis spicata</i> (L.) Greene	inland saltgrass	Poaceae	
42	DREX2	<i>Dryopteris expansa</i> (K. Presl) Fraser-Jenkins & Jermy	spreading woodfern	Dryopteridaceae	
43	EPAM	<i>Epilobium americanum</i> Hausskn.	>> <i>Epilobium ciliatum</i> ssp. <i>ciliatum</i>	Onagraceae	
44	EPAN2	<i>Epilobium angustifolium</i> L.	>> <i>Chamerion angustifolium</i> ssp. <i>angustifolium</i>	Onagraceae	
45	EPCI	<i>Epilobium ciliatum</i> Raf.	fringed willowherb	Onagraceae	
46	EQTE	<i>Equisetum telmateia</i> Ehrh.	giant horsetail	Equisetaceae	
47	FEBR*	<i>Festuca bromoides</i> L.	>> <i>Vulpia bromoides</i>	Poaceae	a
48	FRVI	<i>Fragaria virginiana</i> Duchesne	Virginia strawberry	Rosaceae	
49	GAAP2	<i>Galium aparine</i> L.	stickywilly	Rubiaceae	a
50	GASH	<i>Gaultheria shallon</i> Pursh	salal	Ericaceae	
51	GERO	<i>Geranium robertianum</i> L.	Robert geranium	Geraniaceae	a
52	GEMA4	<i>Geum macrophyllum</i> Willd.	largeleaf avens	Rosaceae	
53	GLEL	<i>Glyceria elata</i> (Nash ex Rydb.) M.E. Jones	>> <i>Glyceria striata</i>	Poaceae	
54	GNMIT	<i>Gnaphalium microcephalum</i> Nutt. var. <i>thermale</i> (E. Nels.) Cronq.	>> <i>Pseudognaphalium canescens</i> ssp. <i>thermale</i>	Asteraceae	
55	GOOB2	<i>Goodyera oblongifolia</i> Raf.	western rattlesnake plantain	Orchidaceae	
56	GRIN	<i>Grindelia integrifolia</i> DC.	Puget Sound gumweed	Asteraceae	
57	HEHE	<i>Hedera helix</i> L.	English ivy	Araliaceae	a
58	HIERA	<i>Hieracium</i> L.	hawkweed	Asteraceae	
59	HODI	<i>Holodiscus discolor</i> (Pursh) Maxim.	Indian plum	Rosaceae	
60	HOPE	<i>Honkenya peploides</i> (L.) Ehrh.	seaside sandplant	Caryophyllaceae	
61	HYTE	<i>Hydrophyllum tenuipes</i> Heller	Pacific waterleaf	Hydrophyllaceae	
62	HYPE	<i>Hypericum perforatum</i> L.	common St. Johnswort	Clusiaceae	a
63	HYRA3	<i>Hypochaeris radicata</i> L.	hairy cat's ear	Asteraceae	a
64	ILAQ80	<i>Ilex aquifolium</i> L.	English ivy	Aquifoliaceae	a
65	JUBA	<i>Juncus balticus</i> Willd.	Baltic rush	Juncaceae	
66	LAMU	<i>Lactuca muralis</i> (L.) Fresen.	>> <i>Mycelis muralis</i>	Asteraceae	a
67	LAPO3	<i>Lathyrus polyphyllus</i> Nutt.	leafy pea	Fabaceae	
68	LIBO3	<i>Linnaea borealis</i> L.	twinline	Ericaceae	
69	LOCI3	<i>Lonicera ciliosa</i> (Pursh) Poir. ex DC.	orange honeysuckle	Caprifoliaceae	
70	LOPI2	<i>Lotus pinnatus</i> Hook.	meadow bird's-foot trefoil	Fabaceae	
71	LOPU3	<i>Lotus purshianus</i> F.E. & E.G. Clem.	>> <i>Lotus unifoliolatus</i> var. <i>unifoliolatus</i>	Fabaceae	
72	LUPO2	<i>Lupinus polyphyllus</i> Lindl.	bigleaf lupine	Fabaceae	
73	LUPA4	<i>Luzula parviflora</i> (Ehrh.) Desv.	smallflowered woodrush	Juncaceae	
74	LYAM3	<i>Lysichiton americanus</i> Hultén & St. John	American skunkcabbage	Araceae	
75	MADI	<i>Maianthemum dilatatum</i> (Wood) A. Nels. & J.F. Macbr.	false lily of the valley	Liliaceae	
76	MESM	<i>Melica smithii</i> (Porter ex Gray) Vasey	Smith's melicgrass	Poaceae	
77	MICA5	<i>Mitella caulescens</i> Nutt.	slightstemmed miterwort	Saxifragaceae	
78	MOUN3	<i>Monotropa uniflora</i> L.	Indianpipe	Monotropaceae	
79	MOSI2	<i>Montia sibirica</i> (L.) T.J. Howell	>> <i>Claytonia sibirica</i> var. <i>sibirica</i>	Portulacaceae	
80	MYLA	<i>Myosotis laxa</i> Lehm.	bay forget-me-not	Boraginaceae	
81	NEPA	<i>Nemophila parviflora</i> Dougl. ex Benth.	smallflower nemophila	Hydrophyllaceae	
82	OECE	<i>Oemleria cerasiformis</i> (Torr. & Gray ex Hook. & Arn.) Landon	Indian plum	Rosaceae	
83	OESA	<i>Oenanthe sarmentosa</i> K. Presl ex DC.	water parsely	Apiaceae	
84	OPHO	<i>Oplopanax horridus</i> Miq.	devilsclub	Araliaceae	
85	OSCH	<i>Osmorhiza chilensis</i> Hook. & Arn.	>> <i>Osmorhiza berteroi</i>	Apiaceae	
86	OSOC	<i>Osmorhiza occidentalis</i> (Nutt. ex Torr. & Gray) Torr.	western sweetroot	Apiaceae	

87	PEFRP	<i>Petasites frigidus</i> (L.) Fries var. <i>palmatus</i> (Ait.) Cronq.	arctic sweet coltsfoot	Asteraceae	
88	PHAR3	<i>Phalaris arundinacea</i> L.	reed canarygrass	Poaceae	a
89	PIMO3	<i>Pinus monticola</i> Dougl. ex D. Don	western white pine	Pinaceae	
90	PLLA	<i>Plantago lanceolata</i> L.	narrowleaf plantain	Plantaginaceae	a
91	PLMA2	<i>Plantago major</i> L.	common plantain	Plantaginaceae	
92	PLMA3	<i>Plantago maritima</i> L.	goose tongue	Plantaginaceae	
93	POBU	<i>Poa bulbosa</i> L.	bulbous bluegrass	Poaceae	a
94	POPR	<i>Poa pratensis</i> L.	Kentucky bluegrass	Poaceae	a
95	POFO2	<i>Polygonum fowleri</i> B.L. Robins.	Fowler's knotweed	Polygonaceae	
96	POGL8	<i>Polypodium glycyrrhiza</i> D.C. Eat.	licorice fern	Polypodiaceae	
97	POMU	<i>Polystichum munitum</i> (Kaulfuss) K. Presl	swordfern	Polypodiaceae	
98	POTR15	<i>Populus trichocarpa</i> Torr. & Gray ex Hook.	>> <i>Populus balsamifera</i> ssp. <i>trichocarpa</i>	Salicaceae	
99	PRVU	<i>Prunella vulgaris</i> L.	common selfheal	Lamiaceae	
100	PSME	<i>Pseudotsuga menziesii</i> (Mirbel) Franco	Douglas-fir	Pinaceae	
101	PTAQ	<i>Pteridium aquilinum</i> (L.) Kuhn	bracken fern	Dennstaedtiaceae	
102	PYAP	<i>Pyrola aphylla</i> Sm.	>> <i>Pyrola picta</i>	Pyrolaceae	
103	PYAS	<i>Pyrola asarifolia</i> Michx.	liverleaf wintergreen	Pyrolaceae	
104	PYFU	<i>Pyrus fusca</i> Raf.	>> <i>Malus fusca</i>	Rosaceae	
105	RARE3	<i>Ranunculus repens</i> L.	creeping buttercup	Ranunculaceae	a
106	RHPU	<i>Rhamnus purshiana</i> DC.	>> <i>Frangula purshiana</i>	Rhamnaceae	
107	RHMA3	<i>Rhododendron macrophyllum</i> D. Don ex G. Don	Pacific rhododendron	Ericaceae	
108	ROGY	<i>Rosa gymnocarpa</i> Nutt.	dwarf rose	Rosaceae	
109	RONU	<i>Rosa nutkana</i> K. Presl	Nootka rose	Asteraceae	
110	RUDI2	<i>Rubus discolor</i> Weihe & Nees	>> <i>Rubus armeniacus</i>	Rosaceae	a
111	RUPA	<i>Rubus parviflorus</i> Nutt.	thimbleberry	Rosaceae	
112	RUSP	<i>Rubus spectabilis</i> Pursh	salmonberry	Rosaceae	
113	RUUR	<i>Rubus ursinus</i> Cham. & Schlecht.	California blackberry	Rosaceae	
114	RUCR	<i>Rumex crispus</i> L.	curly dock	Polygonaceae	a
115	SAVI	<i>Salicornia virginica</i> L.	>> <i>Salicornia depressa</i>	Chenopodiaceae	
116	SASC	<i>Salix scouleriana</i> Barratt ex Hook.	Scouler's willow	Salicaceae	
117	SASI2	<i>Salix sitchensis</i> Sanson ex Bong.	Sitka willow	Salicaceae	
118	SACA52	<i>Sambucus caerulea</i> Raf.	>> <i>Sambucus nigra</i> ssp. <i>caerulea</i>	Caprifoliaceae	
119	SARA2	<i>Sambucus racemosa</i> L.	red elderberry	Caprifoliaceae	
120	SCMI2	<i>Scirpus microcarpus</i> J. & K. Presl	panicled bulrush	Cyperaceae	
121	SMRA*	<i>Smilacina racemosa</i> (L.) Desf.	>> <i>Maianthemum racemosum</i> ssp. <i>amplexicaule</i>	Liliaceae	
122	STME2	<i>Stellaria media</i> (L.) Vill.	common chickweed	Caryophyllaceae	a
123	STAMA	<i>Streptopus amplexifolius</i> (L.) DC. var. <i>americanus</i> J.A. & J.H. Schultes	>> <i>Streptopus amplexifolius</i> var. <i>amplexifolius</i>	Liliaceae	
124	SYAL	<i>Symphoricarpos albus</i> (L.) Blake	common snowberry	Caprifoliaceae	
125	TAOF	<i>Taraxacum officinale</i> G.H. Weber ex Wiggers	dandelion	Asteraceae	a
126	TABR2	<i>Taxus brevifolia</i> Nutt.	Pacific yew	Taxaceae	
127	TEGR2	<i>Tellima grandiflora</i> (Pursh) Dougl. ex Lindl.	bigflower tellima	Saxifragaceae	
128	THPL	<i>Thuja plicata</i> Donn ex D. Don	western red cedar	Cupressaceae	
129	TITR	<i>Tiarella trifoliata</i> L.	threeleaf foamflower	Saxifragaceae	
130	TOME	<i>Tolmiea menziesii</i> (Pursh) Torr. & Gray	youth on age	Saxifragaceae	
131	TRLA6	<i>Trientalis latifolia</i> Hook.	>> <i>Trientalis borealis</i> ssp. <i>latifolia</i>	Primulaceae	
132	TRMA20	<i>Triglochin maritima</i> L.	seaside arrowgrass	Juncaginaceae	
133	TROV2	<i>Trillium ovatum</i> Pursh	Pacific trillium	Liliaceae	

134	TRCE2	<i>Trisetum cernuum</i> Trin.	>> <i>Trisetum canescens</i>	Poaceae	
135	TSHE	<i>Tsuga heterophylla</i> (Raf.) Sarg.	western hemlock	Pinaceae	
136	URDI	<i>Urtica dioica</i> L.	nettle	Urticaceae	
137	VAOV2	<i>Vaccinium ovatum</i> Pursh	California huckleberry	Ericaceae	
138	VAPA	<i>Vaccinium parvifolium</i> Sm.	red huckleberry	Ericaceae	
139	VEOF2	<i>Veronica officinalis</i> L.	common gypsyweed	Scrophulariaceae	a
140	VIOR	<i>Viola orbiculata</i> Geyer ex Holz.	darkwoods violet	Violaceae	

Ecological Condition of Belfair State Park

Belfair State Park is a small, heavily developed park. Many years of human disturbance has substantially altered the ecological condition of the park. The most remarkable ecological feature of the park is the tidal area, which contains representative patches of several salt marsh plant associations. It does not contain much suitable habitat for rare plants.

Many non-native plants have made Belfair State Park their home. Thirty-four percent of the total flora of the park is comprised of non-native species – a relatively high number for the average state park. Most of these non-native plants have “naturalized” and will be very difficult to control or to eradicate from the park. At this point in time, it is probably best to let nature take its course rather than institute a major program to control non-native plants at the park. Reducing ongoing human disturbances and encouraging natural succession within the existing forest communities will eventually reduce the cover and diversity of non-native plants, as the native plants are better able to take advantage of late-successional forest conditions.

Ecological Condition of Twanoh State Park

Twanoh State Park is much less developed and disturbed. It is nearly all covered with dense second-growth forest. It also contains small patches of older forest, some approximating old-growth condition. During one of our field surveys, a northern spotted owl was heard calling from an area of older forest near the center of the park.

Twanoh State Park has considerably less cover and diversity of non-native plants than was found at Belfair. Only 20% of the flora at Twanoh is non-native. This is due to the general lack of recent disturbance and the prevalence of closed canopy coniferous forests. Most of the non-native plants are found in the developed portions of the park and along trails.

Twanoh State Park already has some older forest and most of its second growth forest is approaching maturity. With continued protection and careful management these forests will develop old-growth conditions in 50 to 100 years. At that time, Twanoh State Park will be a remarkable example of low-elevation Puget Sound old-growth forest in a sea of otherwise heavily developed and disturbed landscape. This should be a primary management goal for this park.



Unfortunately, clearcut logging at the border of the park is encroaching on the existing older forests of the park. During our 2006 field surveys, we discovered that clearcuts to the south of the park actually extend beyond the park boundary and impact the park. GPS measurements taken in the field and examination of ASTER satellite imagery from August 25, 2006 confirm that clearcut logging has extended into the park along the south boundary (Figure 7). In some places, the logging has extended over 100 feet into the park. It appears that over two acres of the

park have been recently logged along the south boundary. Blowdown from windstorms will likely take down additional older forest in the park along the edge of these clearcuts. Since Twanoh State Park is relatively small, incursions like these along the edges of the park will significantly affect the ecological value of the old and mature forests that are contained within the park.

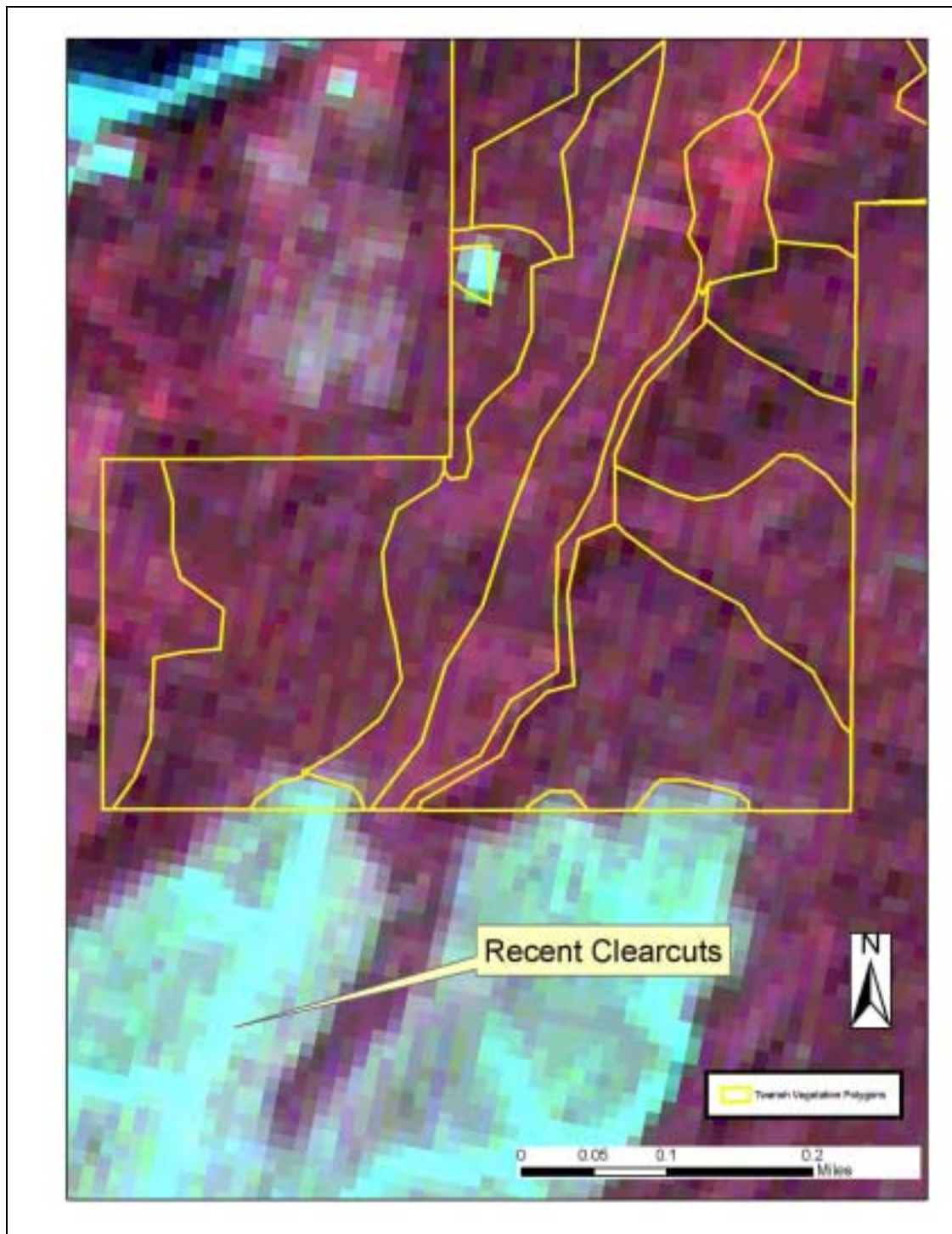


Figure 7. Recent clearcuts have encroached into Twanoh State Park along the southern border. Background is an ASTER satellite image from August 25, 2006.

GIS Products Produced

Associated with this report are polygon layers created by PBI depicting the vegetation community types mapped in Belfair and Twanoh State Parks. The datasets have 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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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

May 9-11, 2006

Field Staff: Peter Morrison and Scott Heller

August 8 and 28, 2006

Field Staff: Dana Visalli

Appendix B – Ecological Condition Ranking System

Ecological Condition Ranks

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

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

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

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

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

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

Appendix C – Description of Rare Element Status Codes

Global Rank (GRank)

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

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

State Rank (SRank)

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

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

State Status (StStat)

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

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

Federal Status

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

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

Appendix 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.

Notes = Comments about the polygon

Vegetation Polygon Data - Belfair State Park

Polygon Number	1
Survey Intensity	1
Observer	SH
Date	5/10/2006
Specific Location	NE portion of park. Stream is in polygon. (Mission creek).
Total Vegetation	5
Trees Total	5
Dominant Trees	ALRU2, PSME, ARME
emergent	1
maincanopy	5
subcanopy	2
Shrubs Total	5
Dominant Shrubs	RUSP, SYAL, GASH (Other side of stream), RONU, MAAQ2,
> 1.5' tall	5
< 1.5' tall	3
Graminoids Total	2
Dominant Graminoids	
Graminoids Perennial	2
Graminoids Annual	0
Forbs Total	2
Dominant Forbs	MADI, POMU, PTAQ
Forbs Perennial	2
Forbs Annual	0
Ferns Total	3
Ferns Evergreen	3
Ferns Deciduous	2
Exotics Total	4
Exotics Perennial	4
Exotics Annual	1
Water	
Rock Outcrop	0
Gravel	5
Bare Ground	1
Moss Lichen	1
Litter	93
Logging	3
Stand Age	3
Agriculture	0
Livestock	0
Development	3
Wildlife	0
Recreation Severity	3
Recreation Type	3
Hydrology	1

Exotic Species

Primary Exotic

HEHE

Secondary Exotic

CYSC4 (along polygon margin, rec

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-ARME/GASH (Chappell 2005)	75	Matrix	2
2. ALRU2/RUSP (Kunze 1994)	25	Small	2
3.	0		0

Notes:

Polygonum cuspidatum along creek (fair size patches).
Polygon plant associations are split between near stream and away.

Polygon Number 10
Survey Intensity 1
Observer SH
Date 5/10/2006
Specific Location south of far NW corner

Total Vegetation 6
Trees Total 5
Dominant Trees PSME, ACMA3
emergent 1
maincanopy 5
subcanopy 2
Shrubs Total 4
Dominant Shrubs OECE, SOAU, SYAL, RUSP, VAPA, GASH
> 1.5' tall 4
< 1.5' tall 2
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs GERO, PTAQ, POMU, SMRA
Forbs Perennial 2
Forbs Annual 2
Ferns Total 2

Exotic Species

Ferns Evergreen 2
Ferns Deciduous 2
Exotics Total 3
Exotics Perennial 3
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 0
Bare Ground 2
Moss Lichen 3
Litter 95
Logging 5
Stand Age 2
Agriculture 0
Livestock 0
Development 0
Wildlife 3
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic
 HEHE
Secondary Exotic
 ILAQ80, GERO, TAOF
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME/GASH/POMU (Chappell 2005)	100	Matrix	2
2.	0		0
3.	0		0

Notes: ABUNDANCE OF HEHE CLIMBING PSME---YOUNG EVEN-AGE STAND OF PSME.

Polygon Number 11
Survey Intensity 1
Observer SH
Date 5/10/2006
Specific Location Far NW corner

Total Vegetation 5
Trees Total 4
Dominant Trees PSME, ACMA3
emergent 1
maincanopy 4
subcanopy 2
Shrubs Total 3
Dominant Shrubs OECE, SOAU, SYAL, RUSP, VAPA, GASH
> 1.5' tall 3
< 1.5' tall 2
Graminoids Total 3
Dominant Graminoids POPR
Graminoids Perennial 3
Graminoids Annual 0
Forbs Total 2
Dominant Forbs GERO, PTAQ, POMU, SMRA
Forbs Perennial 2
Forbs Annual 2
Ferns Total 2

Exotic Species

Ferns Evergreen 2
Ferns Deciduous 2
Exotics Total 4
Exotics Perennial 4
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 0
Bare Ground 2
Moss Lichen 3
Litter 95
Logging 5
Stand Age 2
Agriculture 0
Livestock 0
Development 6, house, road at
Wildlife 3
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic
 HEHE, POPR
Secondary Exotic
 ILAQ80, GERO, TAOF
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. developed	50	Matrix	1
2. PSME/GASH/POMU (Chappell 2005)	50	Large	1
3.	0		0

Notes: ABUNDANCE OF HEHE CLIMBING PSME---YOUNG EVEN-AGE STAND OF PSME.

Polygon Number 2
Survey Intensity 1
Observer DV, SH
Date 5/10/2006 &
Specific Location NE portion of park, confluence of Mission Creek and Hood Canal.
Total Vegetation 5
Trees Total 3
Dominant Trees PSME
emergent 0
maincanopy 3
subcanopy 2
Shrubs Total 2
Dominant Shrubs GASH
> 1.5' tall 2
< 1.5' tall 0
Graminoids Total 4
Dominant Graminoids FERU2
Graminoids Perennial 4
Graminoids Annual 0
Forbs Total 3
Dominant Forbs ASSU4, RARE3
Forbs Perennial 3
Forbs Annual 0
Ferns Total 0

Exotic Species

Ferns Evergreen 0
Ferns Deciduous 0
Exotics Total 2
Exotics Perennial 1
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 0
Litter 100
Logging 0
Stand Age 0
Agriculture 0
Livestock 0
Development 6, houses, roads,
Wildlife 7
Recreation Severity 2
Recreation Type 3
Hydrology 2

Primary Exotic
 RARE3
Secondary Exotic
 CYSC4
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. developed	50	Matrix	1
2. PSME-ARME/GASH (Chappell 2005)	45	Large	1
3. CANU-AGAL3-JUBA-POPA23 (Kunze and	5	Small	1

Notes: Hydrology: Minor rip-rap. GRASSES & Carex sp. DOMINATE UPPER MARSH AREA. HOMEOWNER WAS LANDSCAPING THE STATE'S PROPERTY? ACCESS THE

Polygon Number 3
Survey Intensity 2
Observer PM
Date 5/11/06
Specific Location SALT WATER

Total Vegetation 0
Trees Total 0
Dominant Trees
 emergent 0
 maincanopy 0
 subcanopy 0
Shrubs Total 0
Dominant Shrubs
 > 1.5' tall 0
 < 1.5' tall 0
Graminoids Total 0
Dominant Graminoids
 Graminoids Perennial 0
 Graminoids Annual 0
Forbs Total 0
Dominant Forbs
 Forbs Perennial 0
 Forbs Annual 0
Ferns Total 0

Ferns Evergreen 0
Ferns Deciduous 0
Exotics Total 0
Exotics Perennial 0
Exotics Annual 0
Water
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. saltwater	100	Matrix	2
2.	0		0
3.	0		0

Notes:

Polygon Number 4
Survey Intensity 1
Observer SH
Date 5/10/2006
Specific Location Center, near and partially in campground.

Total Vegetation 5
Trees Total 5
Dominant Trees PSME, PICO, ARME
emergent 2
maincanopy 5
subcanopy 2
Shrubs Total 5
Dominant Shrubs GASH, RONU, AMAL2, MAAQ2, SYAL, LOCI3
> 1.5' tall 5
< 1.5' tall 2
Graminoids Total 3
Dominant Graminoids
Graminoids Perennial 3
Graminoids Annual 0
Forbs Total 2
Dominant Forbs MADI, LAPO3, PTAQ
Forbs Perennial 2
Forbs Annual 0
Ferns Total 2

Exotic Species

Ferns Evergreen 2
Ferns Deciduous 2
Exotics Total 4
Exotics Perennial 4
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 5
Moss Lichen 1
Litter 94
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 6
Wildlife 0
Recreation Severity 3
Recreation Type 4
Hydrology 1

Primary Exotic
 CYSC4
Secondary Exotic
 HEHE, GERO, TAOF
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-ARME/GASH (Chappell 2005)	100	Matrix	2
2.	0		0
3.	0		0

Notes: Polygon has patches of developed areas. PICO was planted in campground---not the best tree to plant. PSME or ARME would have been better for shade and more native to area.

Polygon Number 5A
Survey Intensity 1
Observer PM
Date 5/10/2006
Specific Location Low part of tidal marsh.

Total Vegetation 5
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 4
Dominant Graminoids DISP, CALY3, SCMA
Graminoids Perennial 4
Graminoids Annual 0
Forbs Total 4
Dominant Forbs SAVI, JACA4, TRMA20
Forbs Perennial 4
Forbs Annual 2
Ferns Total 0

Exotic Species

Ferns Evergreen 0
Ferns Deciduous 0
Exotics Total 0
Exotics Perennial 0
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 10
Bare Ground 15
Moss Lichen 0
Litter 75
Logging 0
Stand Age 0
Agriculture 0
Livestock 0
Development 0
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic
Secondary Exotic
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. SAVI-JACA4-DISP-TRMA20 (Kunze and	72	Matrix	3
2. SCMA community (Kunze and Cornelius	3	Small	3
3. DISP community (Kunze and Cornelius	25	Large	3

Notes: OTHER SMALL PATCH COMMUNITIES HERE AS WELL SUCH AS Carex lyngbyei COMMUNITY.

Polygon Number 5B
Survey Intensity 1
Observer PM
Date 5/10/2006
Specific Location High to mid-elevation salt marsh area.

Total Vegetation 6
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 5
Dominant Graminoids DISP, DECA18, CALY3
Graminoids Perennial 5
Graminoids Annual 0
Forbs Total 4
Dominant Forbs TRMA20, JACA4, POPA23, PLMA3
Forbs Perennial 4
Forbs Annual 1
Ferns Total 0

Exotic Species

Ferns Evergreen 0
Ferns Deciduous 0
Exotics Total 0
Exotics Perennial 0
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 1
Bare Ground 4
Moss Lichen 0
Litter 95
Logging 0
Stand Age 0
Agriculture 0
Livestock 0
Development 0
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. AGAL3-JUBA-POPA23 (Kunze and	75	Matrix	3
2. DECA18-CALY3-TRMA20 (Kunze and	15	Large	3
3. CALY3-TRMA20 (Kunze and Cornelius	10	Small	3

Notes:

Polygon Number 5C
Survey Intensity 1
Observer PM
Date 5/10/2006
Specific Location Salt marsh-forest margin.

Total Vegetation 6
Trees Total 2
Dominant Trees ARME, PSME
emergent 0
maincanopy 2
subcanopy 0
Shrubs Total 3
Dominant Shrubs MAAQ2, RONU, RUDI2
> 1.5' tall 2
< 1.5' tall 3
Graminoids Total 5
Dominant Graminoids Festuca
Graminoids Perennial 5
Graminoids Annual 3
Forbs Total 3
Dominant Forbs
Forbs Perennial 3
Forbs Annual 2
Ferns Total 0

Exotic Species

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

Primary Exotic
 RUDI
Secondary Exotic
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. CANU-AGAL3-JUBA-POPA23 (Kunze and	80	Matrix	2
2. MAAQ2-RONU (PBI)	20	linear	2
3.	0		0

Notes:

Polygon Number 5D
Survey Intensity 1
Observer PM
Date 5/10/2006
Specific Location Sandy beach at far SW part of park.

Total Vegetation 0
Trees Total 0
Dominant Trees
 emergent 0
 maincanopy 0
 subcanopy 0
Shrubs Total 0
Dominant Shrubs
 > 1.5' tall 0
 < 1.5' tall 0
Graminoids Total 0
Dominant Graminoids
 Graminoids Perennial 0
 Graminoids Annual 0
Forbs Total 0
Dominant Forbs
 Forbs Perennial 0
 Forbs Annual 0
Ferns Total 0

Ferns Evergreen 0
Ferns Deciduous 0
Exotics Total 0
Exotics Perennial 0
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 75
Bare Ground 20
Moss Lichen 0
Litter 5
Logging 0
Stand Age 0
Agriculture 0
Livestock 0
Development 3
Wildlife 0
Recreation Severity 1
Recreation Type 3
Hydrology 1

Exotic Species

Primary Exotic
Secondary Exotic
Noxious Exotic

Plant Associations

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

Notes:

Polygon Number 5E
Survey Intensity 1
Observer PM
Date 5/10/2006
Specific Location Sandy high area with logs and storm debris.

Total Vegetation 6
Trees Total 0
Dominant Trees
emergent 0
maincanopy 0
subcanopy 0
Shrubs Total 3
Dominant Shrubs RONU, MAAQ2
> 1.5' tall 3
< 1.5' tall 2
Graminoids Total 4
Dominant Graminoids
Graminoids Perennial 4
Graminoids Annual 2
Forbs Total 4
Dominant Forbs
Forbs Perennial 4
Forbs Annual 2
Ferns Total 1

Exotic Species

Ferns Evergreen 1
Ferns Deciduous 1
Exotics Total 3
Exotics Perennial 2
Exotics Annual 2
Water
Rock Outcrop 0
Gravel 2
Bare Ground 5
Moss Lichen 0
Litter 93
Logging 0
Stand Age 0
Agriculture 0
Livestock 0
Development 0
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic
 CYSC4
Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. CANU-AGAL3-JUBA-POPA23 (Kunze and	70	Matrix	2
2. MAAQ2-RONU (PBI)	30	Small	2
3.	0		0

Notes: THIS POLYGON REPRESENTS A COMPLEX MIXTURE, FROM QUITE DRY TO MESIC. It is inundated only during storms.

Polygon Number 6
Survey Intensity 1
Observer DV
Date 8/7/2006
Specific Location artificial salt water pool

Total Vegetation 4
Trees Total 0
Dominant Trees
emergent 0
maincanopy 0
subcanopy 0
Shrubs Total 0
Dominant Shrubs
> 1.5' tall 0
< 1.5' tall 0
Graminoids Total 3
Dominant Graminoids DIST3
Graminoids Perennial 0
Graminoids Annual 3
Forbs Total 3
Dominant Forbs JACA4, SAVI
Forbs Perennial 3
Forbs Annual 0
Ferns Total 0

Exotic Species

Ferns Evergreen 0
Ferns Deciduous 0
ExoticsTotal 0
Exotics Perennial 0
Exotics Annual 0
Water 70
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 0
Litter 30
Logging 0
Stand Age 0
Agriculture 0
Livestock 0
Development 3, dike, trail
Wildlife 7
Recreation Severity 2
Recreation Type 3
Hydrology 2

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. saltwater	70	Matrix	1
2. SAVI-JACA4-DISP-TRMA20 (Kunze and	30	Small	1
3.	0		0

Notes:

Polygon Number 7A
 Survey Intensity 1
 Observer DV
 Date 8/7/2006
 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 7B
 Survey Intensity 1
 Observer DV
 Date 8/7/2006
 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

Exotic Species

Ferns Evergreen 0
 Ferns Deciduous 0
 Exotics Total 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

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

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

Notes: disturbed RV parking

Polygon Number 7C
 Survey Intensity 1
 Observer DV
 Date 8/7/2006
 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: parking lot

Polygon Number 7D
 Survey Intensity 1
 Observer DV
 Date 8/7/2006
 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

Exotic Species

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

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

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

Notes: mowed picnic area

Polygon Number 8
Survey Intensity 1
Observer DV, SH
Date 5/10/2006 &
Specific Location Polygon is on the W side of the park.

Total Vegetation 6
Trees Total 5
Dominant Trees PSME, ACMA3, TSHE, THPL
emergent 2
maincanopy 5
subcanopy 3
Shrubs Total 4
Dominant Shrubs MANE2, RUPA, RUDI2, OECE, SYAL, RUSP, VAOV2
> 1.5' tall 4
< 1.5' tall 2
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs GERO, PTAQ, POMU, SMRA
Forbs Perennial 2
Forbs Annual 2
Ferns Total 2

Exotic Species

Ferns Evergreen 2
Ferns Deciduous 2
Exotics Total 3
Exotics Perennial 3
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 0
Bare Ground 2
Moss Lichen 3
Litter 95
Logging 5
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 3
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic
 RUDI2, HEHE
Secondary Exotic
 GERO
Noxious Exotic
 ILAQ80

Plant Associations

	Percent	Pattern	Rank
1. PSME/GASH/POMU (Chappell 2005)	50	Matrix	1
2. developed	50	Large	1
3.	0		0

Notes: CAMPGROUND CONSUMES much of POLYGON.

Polygon Number 9
Survey Intensity 1
Observer SH
Date 5/10/2006
Specific Location NW portion of park. Campground, stream on s/sw boundary.

Total Vegetation 0
Trees Total 0
Dominant Trees PSME, ACMA3
emergent 0
maincanopy 0
subcanopy 0
Shrubs Total 0
Dominant Shrubs RUDI2
> 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

Exotic Species

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

Primary Exotic
 RUDI2, GERO, TAOF, HEHE
Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME/GASH/POMU (Chappell 2005)	100	Matrix	1
2.	0		0
3.	0		0

Notes:

Vegetation Polygon Data - Twanoh State Park

Polygon Number 1
Survey Intensity 1
Observer DV
Date 8/28/06
Specific Location This polygon is a parking lot.

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

Exotic Species

Ferns Evergreen 0
 Ferns Deciduous 0
Exotics Total 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

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 10
Survey Intensity 1
Observer DV
Date 8/28/06
Specific Location Creek adjacent to lower campground.

Total Vegetation 6
Trees Total 4
Dominant Trees THPL, ACMA3, ALRU2
emergent 2
maincanopy 4
subcanopy 2
Shrubs Total 4
Dominant Shrubs OPHO, COCO6
> 1.5' tall 4
< 1.5' tall 0
Graminoids Total 2
Dominant Graminoids Carex
Graminoids Perennial 2
Graminoids Annual 0
Forbs Total 2
Dominant Forbs MADI, GERO
Forbs Perennial 2
Forbs Annual 2
Ferns Total 2

Exotic Species

Ferns Evergreen 2
Ferns Deciduous 2
Exotics Total 2
Exotics Perennial 0
Exotics Annual 2
Water
Rock Outcrop 0
Gravel 10
Bare Ground 10
Moss Lichen 10
Litter 70
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 3
Wildlife 7, BIRDS
Recreation Severity 2
Recreation Type 3
Hydrology 1

Primary Exotic
 DIPU
Secondary Exotic
 GERO
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. ACMA3-ALRU2/POMU-TEGR2 (Chappell	100	Matrix	2
2.	0		0
3.	0		0

Notes:

Polygon Number 11A
Survey Intensity 1
Observer PM
Date 5/11/2006
Specific Location Central portion of park - lower part of slope

Total Vegetation 6
Trees Total 6
Dominant Trees PSME, TSHE, THPL, ACMA3
emergent 2
maincanopy 5
subcanopy 3
Shrubs Total 4
Dominant Shrubs GASH, VAOV2, MANE2, LIBO3
> 1.5' tall 4
< 1.5' tall 3
Graminoids Total 1
Dominant Graminoids LUPA4
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs TOME, CIAL, ADBI, TRLA6, TITR, POMU, BLSP, DREX2
Forbs Perennial 2
Forbs Annual 0
Ferns Total 4

Exotic Species

Ferns Evergreen 3
Ferns Deciduous 2
Exotics Total 2
Exotics Perennial 1
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 0
Bare Ground 1
Moss Lichen 4
Litter 95
Logging 3
Stand Age 3
Agriculture 0
Livestock 0
Development 3
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic
 GERO
Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. TSHE-PSME/POMU-DREX2 (Chappell)	87	Matrix	2
2. THPL-TSHE/OPHO/POMU (Chappell)	3	Small	2
3. PSME-TSHE/VAOV2/POMU (Chappell)	10	Large	2

Notes:

Polygon Number 11B
Survey Intensity 1
Observer PM
Date 5/11/2006
Specific Location Central portion of park - upper part of slope

Total Vegetation 6
Trees Total 6
Dominant Trees PSME, TSHE, THPL, ACMA3
emergent 2
maincanopy 5
subcanopy 3
Shrubs Total 4
Dominant Shrubs GASH, VAOV2, MANE2, LIBO3
> 1.5' tall 4
< 1.5' tall 3
Graminoids Total 1
Dominant Graminoids LUPA4
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs TOME, CIAL, ADBI, TRLA6, TITR, POMU, BLSP, DREX2
Forbs Perennial 2
Forbs Annual 0
Ferns Total 4

Exotic Species

Ferns Evergreen 3
Ferns Deciduous 2
Exotics Total 2
Exotics Perennial 1
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 0
Bare Ground 1
Moss Lichen 4
Litter 95
Logging 3
Stand Age 3
Agriculture 0
Livestock 0
Development 3
Wildlife 7
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic

GERO

Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/VAOV2 (Chappell 2005)	60	Matrix	2
2. PSME-TSHE/VAOV2/POMU (Chappell)	30	Small	2
3. TSHE-PSME/POMU-DREX2 (Chappell)	10	Small	2

Notes:

Polygon Number 11C
Survey Intensity 2
Observer PM
Date 5/11/2006
Specific Location Clearcut at south end of polygon.

Total Vegetation 5
Trees Total 2
Dominant Trees ARME, ALRU2, CONU4, PSME
emergent 0
maincanopy 0
subcanopy 2
Shrubs Total 5
Dominant Shrubs VAOV2, VAPA, RUUR, GASH
> 1.5' tall 5
< 1.5' tall 3
Graminoids Total 0
Dominant Graminoids
Graminoids Perennial 0
Graminoids Annual 0
Forbs Total 1
Dominant Forbs GAAP2, PTAQ, EPAN2
Forbs Perennial 1
Forbs Annual 0
Ferns Total 3

Exotic Species

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

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. recent clearcut	80	Matrix	1
2. PSME-TSHE/VAOV2 (Chappell 2005)	20	Small	1
3.	0		0

Notes: RECENT CLEARCUT IN PARK-EXTENDS BEYOND PARK

Polygon Number 12
Survey Intensity 2
Observer DV
Date 8/28/06
Specific Location

Total Vegetation 6
Trees Total 5
Dominant Trees PSME, TSHE
emergent 2
maincanopy 5
subcanopy 2
Shrubs Total 5
Dominant Shrubs VAOV2
> 1.5' tall 5
< 1.5' tall 2
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 1
Dominant Forbs
Forbs Perennial 1
Forbs Annual 0
Ferns Total 1

Exotic Species

Ferns Evergreen 1
Ferns Deciduous 0
ExoticsTotal 0
Exotics Perennial 0
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 10
Litter 90
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 0
Wildlife 7
Recreation Severity 0
Recreation Type 0
Hydrology 1

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/VAOV2 (Chappell 2005)	100	Matrix	2
2.	0		0
3.	0		0

Notes: Ferns: POMU.

Polygon Number 13
Survey Intensity 1
Observer SH
Date 5/11/2006
Specific Location NE

Total Vegetation 6
Trees Total 6
Dominant Trees TSHE, THPL, PSME, ACMA3
emergent 2
maincanopy 6
subcanopy 2
Shrubs Total 4
Dominant Shrubs VAOV2, GASH, RUSP, OPHO
> 1.5' tall 4
< 1.5' tall 2
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs TROV2, POMU, PTAQ, ADPE
Forbs Perennial 2
Forbs Annual 0
Ferns Total 5

Exotic Species

Ferns Evergreen 5
Ferns Deciduous 3
Exotics Total 0
Exotics Perennial 0
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 2
Bare Ground 0
Moss Lichen 5
Litter 93
Logging 2
Stand Age 3
Agriculture 0
Livestock 0
Development 4
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 2

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. TSHE-PSME/POMU-DREX2 (Chappell)	40	Large	3
2. PSME-TSHE/VAOV2/POMU (Chappell)	40	Large	3
3. PSME-THPL/OXOR (Chappell 2005)	20	Small	3

Notes: Old dam possibly not used anymore.

Polygon Number 14
Survey Intensity 1
Observer PM
Date 5/11/2006
Specific Location Center of park, stream running through it, old logged area.

Total Vegetation 6
Trees Total 5
Dominant Trees ALRU2, ACMA3, PSME, TSHE, POTR15
emergent 3
maincanopy 4
subcanopy 3
Shrubs Total 5
Dominant Shrubs RUSP, OPHO, SARA2, VAPA, VAOC
> 1.5' tall 4
< 1.5' tall 4
Graminoids Total 1
Dominant Graminoids LUPA4
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 3
Dominant Forbs TRLA6, TOME, TROV2, CIAL, EPAN2, TRLA6
Forbs Perennial 2
Forbs Annual 1
Ferns Total 3

Exotic Species

Ferns Evergreen 3
Ferns Deciduous 3
Exotics Total 1
Exotics Perennial 0
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 1
Bare Ground 1
Moss Lichen 3
Litter 95
Logging 3
Stand Age 3
Agriculture 0
Livestock 0
Development 3
Wildlife 7 (NSO HEARD)
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic
 HYRA3
Secondary Exotic

Noxious Exotic

Plant Associations

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

Notes: HEAVIER LOGGING IN THIS AREA LOOKS LIKE IT OPENED A LARGE CANOPY HERE, PERHAPS ALSO MORE RECENT LOGGING.

Polygon Number 15
Survey Intensity 1
Observer SH
Date 5/11/2006
Specific Location E central

Total Vegetation 6
Trees Total 5
Dominant Trees PSME, TSHE, ARME, THPL
emergent 2
maincanopy 5
subcanopy 3
Shrubs Total 6
Dominant Shrubs VAOV2, GASH
> 1.5' tall 6
< 1.5' tall 2
Graminoids Total 0
Dominant Graminoids
Graminoids Perennial 0
Graminoids Annual 0
Forbs Total 1
Dominant Forbs POMU, PTAQ, ADPE
Forbs Perennial 1
Forbs Annual 0
Ferns Total 4

Exotic Species

Ferns Evergreen 4
Ferns Deciduous 2
Exotics Total 0
Exotics Perennial 0
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 2
Bare Ground 0
Moss Lichen 5
Litter 93
Logging 2
Stand Age 5
Agriculture 0
Livestock 0
Development 0
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic
Secondary Exotic
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/VAOV2 (Chappell 2005)	70	Matrix	3
2. PSME-TSHE/VAOV2/POMU (Chappell)	30	Small	3
3.	0		0

Notes: Selectively logged PSME. VAOV2 thick!! In majority of understory. Some GASH. Topographically complex polygon. Wfacing slope in W portion of polygon dominated by POMU.

Polygon Number 16
Survey Intensity 1
Observer DV
Date 8/28/06
Specific Location This polygon is the group campground

Total Vegetation 0
Trees Total 0
Dominant Trees
 emergent 0
 maincanopy 0
 subcanopy 0
Shrubs Total 0
Dominant Shrubs
 > 1.5' tall 0
 < 1.5' tall 0
Graminoids Total 0
Dominant Graminoids
 Graminoids Perennial 0
 Graminoids Annual 0
Forbs Total 0
Dominant Forbs
 Forbs Perennial 0
 Forbs Annual 0
Ferns Total 0

Ferns Evergreen 0
Ferns Deciduous 0
Exotics Total 0
Exotics Perennial 0
Exotics Annual 0
Water
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 17
Survey Intensity 1
Observer PM
Date 5/11/2006
Specific Location Stream polygon up center of watershed.

Total Vegetation 6
Trees Total 5
Dominant Trees THPL, TSHE, PSME, ALRU2, ACMA3, POTR15
emergent 3
maincanopy 3
subcanopy 3
Shrubs Total 5
Dominant Shrubs RUSP, SARA2, OPHO, MANE2, VAPA
> 1.5' tall 4
< 1.5' tall 3
Graminoids Total 1
Dominant Graminoids LUPA4
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 3
Dominant Forbs CIAL, TOME, DIFO, POMU, ATFI, DREX2, ADPE
Forbs Perennial 2
Forbs Annual 0
Ferns Total 3

Exotic Species

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

Primary Exotic
 HEHE
Secondary Exotic
 GERO
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. THPL-TSHE/OPHO/POMU (Chappell	60	Matrix	2
2. TSHE-PSME/POMU-DREX2 (Chappell	40	Large	2
3.	0		0

Notes: UPPER PART OF STREAM HAS LESS SHRUBS. SLOPE FAILURES AND LANDSLIDE SCARS IN UPPER PART OF CREEK.

Polygon Number 18
Survey Intensity 3
Observer PM
Date 5/11/2006
Specific Location east side of stream

Total Vegetation 6
Trees Total 5
Dominant Trees PSME, TSHE, ARME, THPL
emergent 2
maincanopy 5
subcanopy 3
Shrubs Total 5
Dominant Shrubs VAOV2, GASH, RUSP, MANE2
> 1.5' tall 5
< 1.5' tall 2
Graminoids Total 0
Dominant Graminoids
Graminoids Perennial 0
Graminoids Annual 0
Forbs Total 1
Dominant Forbs POMU, PTAQ, ADPE
Forbs Perennial 1
Forbs Annual 0
Ferns Total 4

Exotic Species

Ferns Evergreen 4
Ferns Deciduous 2
ExoticsTotal 0
Exotics Perennial 0
Exotics Annual 0
Water
Rock Outcrop 0
Gravel
Bare Ground 1
Moss Lichen 5
Litter 94
Logging 5
Stand Age 2
Agriculture 0
Livestock 0
Development 0
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/VAOV2 (Chappell 2005)	60	Matrix	3
2. PSME-TSHE/GASH/POMU (Chappell	20	Small	3
3. PSME-TSHE/VAOV2/POMU (Chappell	20	Small	3

Notes:

Polygon Number 19
Survey Intensity 2
Observer DV
Date 8/28/06
Specific Location

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

Exotic Species

Ferns Evergreen 4
Ferns Deciduous 0
ExoticsTotal 0
Exotics Perennial 0
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 5
Litter 95
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 0
Wildlife 7
Recreation Severity 0
Recreation Type 0
Hydrology 1

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

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

Notes:

Polygon Number 2
Survey Intensity 1
Observer PM, DV
Date 5/11/2006,
Specific Location Mouth of Twanoh Creek, tidal area

Total Vegetation 1
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 1
Dominant Graminoids
 Graminoids Perennial 0
 Graminoids Annual 0
Forbs Total 1
Dominant Forbs
 Forbs Perennial 1
 Forbs Annual 0
Ferns Total 0

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

Exotic Species

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. tidal mud and gravel	100	Matrix	1
2.	0		0
3.	0		0

Notes:

Polygon Number 20
Survey Intensity 2
Observer DV
Date 8/28/06
Specific Location

Total Vegetation 6
Trees Total 4
Dominant Trees PSME
emergent 1
maincanopy 4
subcanopy 2
Shrubs Total 5
Dominant Shrubs VAOV2
> 1.5' tall 5
< 1.5' tall 2
Graminoids Total 0
Dominant Graminoids
Graminoids Perennial 0
Graminoids Annual 0
Forbs Total 1
Dominant Forbs
Forbs Perennial 1
Forbs Annual 0
Ferns Total 1

Exotic Species

Ferns Evergreen 1
Ferns Deciduous 0
ExoticsTotal 0
Exotics Perennial 0
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 5
Litter 95
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 0
Wildlife 7, SOME BIRD
Recreation Severity 0
Recreation Type 0
Hydrology 1

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/VAOV2 (Chappell 2005)	100	Matrix	2
2.	0		0
3.	0		0

Notes: Ferns: POMU. VAOV2 very thick, no forb layer.

Polygon Number 21
Survey Intensity 2
Observer PM
Date 5/11/2006
Specific Location

Total Vegetation 6
Trees Total 6
Dominant Trees PSME, ARME, TSHE
emergent 3
maincanopy 5
subcanopy 3
Shrubs Total 5
Dominant Shrubs VAOV2, GASH, RHMA3
> 1.5' tall 5
< 1.5' tall 3
Graminoids Total 0
Dominant Graminoids
Graminoids Perennial 0
Graminoids Annual 0
Forbs Total 1
Dominant Forbs
Forbs Perennial 1
Forbs Annual 0
Ferns Total 0

Exotic Species

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 3
Litter 97
Logging 1
Stand Age 3
Agriculture 0
Livestock 0
Development 2
Wildlife 0
Recreation Severity 3
Recreation Type 3
Hydrology 1

Primary Exotic
Secondary Exotic
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/VAOV2 (Chappell 2005)	60	Matrix	2
2. PSME-ARME/VAOV2 (Chappell 2005)	25	Large	2
3. PSME-TSHE/RHMA3-VAOV2 (Chappell	15	Small	2

Notes:

Polygon Number 22
Survey Intensity 2
Observer DV
Date 8/28/06
Specific Location

Total Vegetation 6
Trees Total 5
Dominant Trees PSME
emergent 2
maincanopy 5
subcanopy 2
Shrubs Total 5
Dominant Shrubs VAOV2
> 1.5' tall 5
< 1.5' tall 2
Graminoids Total 0
Dominant Graminoids
Graminoids Perennial 0
Graminoids Annual 0
Forbs Total 0
Dominant Forbs
Forbs Perennial 0
Forbs Annual 0
Ferns Total 1

Exotic Species

Ferns Evergreen 1
Ferns Deciduous 0
ExoticsTotal 1
Exotics Perennial 0
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 5
Litter 95
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 0
Wildlife 7
Recreation Severity 0
Recreation Type 0
Hydrology 1

Primary Exotic
 LAMU
Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/VAOV2 (Chappell 2005)	100	Matrix	2
2.	0		0
3.	0		0
Notes:	VAOV2 very thick.		

Polygon Number 23
Survey Intensity 2
Observer PM
Date 5/11/2006
Specific Location water at NE portion of park

Total Vegetation 0
Trees Total 0
Dominant Trees
 emergent 0
 maincanopy 0
 subcanopy 0
Shrubs Total 0
Dominant Shrubs
 > 1.5' tall 0
 < 1.5' tall 0
Graminoids Total 0
Dominant Graminoids
 Graminoids Perennial 0
 Graminoids Annual 0
Forbs Total 0
Dominant Forbs
 Forbs Perennial 0
 Forbs Annual 0
Ferns Total 0

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

Exotic Species

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

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

Notes:

Polygon Number 26
Survey Intensity 2
Observer PM
Date 5/11/2006
Specific Location water at NE portion of park

Total Vegetation 0
Trees Total 0
Dominant Trees
 emergent 0
 maincanopy 0
 subcanopy 0
Shrubs Total 0
Dominant Shrubs
 > 1.5' tall 0
 < 1.5' tall 0
Graminoids Total 0
Dominant Graminoids
 Graminoids Perennial 0
 Graminoids Annual 0
Forbs Total 0
Dominant Forbs
 Forbs Perennial 0
 Forbs Annual 0
Ferns Total 0

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

Exotic Species

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

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

Notes:

Polygon Number 27
Survey Intensity 1
Observer DV
Date 8/28/06
Specific Location

Total Vegetation 4
Trees Total 4
Dominant Trees PSME, THPL
emergent 0
maincanopy 4
subcanopy 3
Shrubs Total 4
Dominant Shrubs COCO6, VAOV2, MANE2
> 1.5' tall 4
< 1.5' tall 2
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs ADBI, VIOR
Forbs Perennial 2
Forbs Annual 1
Ferns Total 1

Exotic Species

Ferns Evergreen 1
Ferns Deciduous 0
ExoticsTotal 1
Exotics Perennial 1
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 2
Bare Ground 38
Moss Lichen 5
Litter 55
Logging 2
Stand Age 2
Agriculture 0
Livestock 0
Development 6, buildings and
Wildlife 7, BIRDS
Recreation Severity 1
Recreation Type 3
Hydrology 1

Primary Exotic
 ILAQ80
Secondary Exotic
 LAMU
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/VAOV2/POMU (Chappell)	100	Matrix	1
2.	0		0
3.	0		0

Notes: Ferns: POMU. Highly disturbed picnic area and road right-of-way

Polygon Number 3
Survey Intensity 1
Observer DV
Date 8/28/06
Specific Location

Total Vegetation 4
Trees Total 4
Dominant Trees PSME, THPL
emergent 0
maincanopy 4
subcanopy 3
Shrubs Total 4
Dominant Shrubs COCO6, VAOV2, MANE2
> 1.5' tall 4
< 1.5' tall 2
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs ADBI, VIOR
Forbs Perennial 2
Forbs Annual 1
Ferns Total 1

Exotic Species

Ferns Evergreen 1
Ferns Deciduous 0
ExoticsTotal 1
Exotics Perennial 1
Exotics Annual 1
Water
Rock Outcrop 0
Gravel 2
Bare Ground 38
Moss Lichen 5
Litter 55
Logging 2
Stand Age 2
Agriculture 0
Livestock 0
Development 1, PICNIC
Wildlife 7, BIRDS
Recreation Severity 1
Recreation Type 3
Hydrology 1

Primary Exotic
 ILAQ80
Secondary Exotic
 LAMU
Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/VAOV2/POMU (Chappell)	100	Matrix	1
2.	0		0
3.	0		0

Notes: Ferns: POMU. Highly disturbed picnic area.

Polygon Number 4
Survey Intensity 1
Observer DV
Date 8/28/06
Specific Location This polygon is a mown picnic area.

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 5
Survey Intensity 1
Observer DV
Date 8/28/06
Specific Location Beach

Total Vegetation 2
Trees Total 1
Dominant Trees
emergent 0
maincanopy 1
subcanopy 0
Shrubs Total 0
Dominant Shrubs
> 1.5' tall 0
< 1.5' tall 0
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 1
Forbs Total 2
Dominant Forbs GRIN, SAVI
Forbs Perennial 2
Forbs Annual 0
Ferns Total 0

Exotic Species

Ferns Evergreen 0
Ferns Deciduous 0
ExoticsTotal 0
Exotics Perennial 0
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 50
Bare Ground 45
Moss Lichen 0
Litter 5
Logging 0
Stand Age 0
Agriculture 0
Livestock 0
Development 1
Wildlife 0
Recreation Severity 1
Recreation Type 1
Hydrology 1

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. beach	98	Matrix	1
2. SAVI community (Kunze and Cornelius)	2		1
3.	0		0

Notes: Sandy-gravelly beach area.

Polygon Number 6
Survey Intensity 1
Observer SH
Date 5/11/2006
Specific Location NE

Total Vegetation 6
Trees Total 6
Dominant Trees PSME, THPL, TSHE, ACMA3
emergent 1
maincanopy 6
subcanopy 2
Shrubs Total 6
Dominant Shrubs VAOV2 GASH, SARA2, SYAL, OPHO, MANE2
> 1.5' tall 6
< 1.5' tall 3
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 2
Dominant Forbs TROV2, ADBI, TRLA6, POMU, PTAQ
Forbs Perennial 2
Forbs Annual 0
Ferns Total 4

Exotic Species

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

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-TSHE/VAOV2/POMU (Chappell	95	Matrix	2
2. PSME-THPL/OXOR (Chappell 2005)	5	Small	2
3.	0		0

Notes:

Polygon Number 7
Survey Intensity 1
Observer DV
Date 8/28/06
Specific Location This polygon is a campground.

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 8
Survey Intensity 1
Observer DV
Date 8/28/06
Specific Location This polygon is a parking lot.

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 9A
Survey Intensity 2
Observer SH
Date 5/11/2006
Specific Location S portion of polygon 9

Total Vegetation 6
Trees Total 6
Dominant Trees PSME, ARME
emergent 1
maincanopy 6
subcanopy 1
Shrubs Total 6
Dominant Shrubs VAOV2, GASH, RHMA
> 1.5' tall 6
< 1.5' tall 2
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 1
Dominant Forbs
Forbs Perennial 1
Forbs Annual 0
Ferns Total 2

Exotic Species

Ferns Evergreen 2
Ferns Deciduous 2
Exotics Total 0
Exotics Perennial 0
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 5
Bare Ground 0
Moss Lichen 1
Litter 94
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 6
Wildlife 0
Recreation Severity 2
Recreation Type 4
Hydrology 1

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME-ARME/VAOV2 (Chappell 2005)	100	Matrix	1
2.	0		0
3.	0		0

Notes: Polygon near group camp. Crosscutting trails spreading away from camp. Vehicle access to site. Buildings and vault toilet.

Polygon Number 9B
Survey Intensity 2
Observer DV, SH
Date 8/28/06
Specific Location

Total Vegetation 6
Trees Total 5
Dominant Trees PSME, THPL, TSHE, ACMA3
emergent 2
maincanopy 5
subcanopy 2
Shrubs Total 4
Dominant Shrubs VAOV2, GASH
> 1.5' tall 4
< 1.5' tall 2
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 1
Dominant Forbs
Forbs Perennial 1
Forbs Annual 0
Ferns Total 4

Exotic Species

Ferns Evergreen 4
Ferns Deciduous 0
ExoticsTotal 0
Exotics Perennial 0
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 10
Litter 90
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 2
Wildlife 7
Recreation Severity 2
Recreation Type 1
Hydrology 1

Primary Exotic

Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME/GASH/POMU (Chappell 2005)	60	Large	2
2. PSME-TSHE/VAOV2 (Chappell 2005)	30	Large	2
3. PSME-ARME/VAOV2 (Chappell 2005)	10	Small	2

Notes:

Polygon Number 9C
Survey Intensity 3
Observer DV
Date 8/28/2006
Specific Location

Total Vegetation 6
Trees Total 5
Dominant Trees PSME, ALRU2
emergent 1
maincanopy 5
subcanopy 2
Shrubs Total 4
Dominant Shrubs GASH, VAOV2
> 1.5' tall 4
< 1.5' tall 2
Graminoids Total 1
Dominant Graminoids
Graminoids Perennial 1
Graminoids Annual 0
Forbs Total 1
Dominant Forbs
Forbs Perennial 1
Forbs Annual 0
Ferns Total 4

Exotic Species

Ferns Evergreen 4
Ferns Deciduous 0
Exotics Total 1
Exotics Perennial 1
Exotics Annual 0
Water
Rock Outcrop 0
Gravel 0
Bare Ground 0
Moss Lichen 0
Litter 100
Logging 3
Stand Age 2
Agriculture 0
Livestock 0
Development 2
Wildlife 3
Recreation Severity 2
Recreation Type 1
Hydrology 1

Primary Exotic
 ILAQ80
Secondary Exotic

Noxious Exotic

Plant Associations

	Percent	Pattern	Rank
1. PSME/GASH/POMU (Chappell 2005)	70	Matrix	2
2. ALRU2/POMU (Chappell 2005)	30	Large	2
3.	0		0

Notes: Ferns: POMU