

CHAPTER 4: VEGETATION

HISTORIC CONDITIONS

Plant Associations (potential vegetation)

The watershed boundary straddles two plant series: the Sitka Spruce Zone and the Western Hemlock Zone. These zones are descriptors of the environment, productivity levels, and forest types. The Sitka Spruce Zone, which generally coincides with the Coastal Fog Zone, extends far up the valleys in this watershed due to proximity to the coast and the gentle topography which allows the coastal fog to creep far inland. Spruce are found as far east as the headwaters of Leitel Creek. The Western Hemlock Zone occurs on the higher elevations near the top of the watershed in the headwaters of Maple, Five Mile, and Fiddle Creeks. Siuslaw National Forest plant association classification is based on theoretical climax stands (i.e. western hemlock or Sitka spruce dominated) although these stands have not yet developed (Hemstrom and Logan 1986) due to an extensive, catastrophic fire that swept most of the analysis area in 1850 (Map 15).

The Sitka Spruce Zone is considered the most productive forest zone on the Siuslaw National Forest. The moist air allows the trees to grow continuously during the day rather than shutting down to maintain their moisture. The moderate temperatures allow trees to grow most of the year.

The wet environments (salmonberry plant association groups) occur adjacent to stream channels and in the headwall areas, the moist environments (swordfern PAGs) occur on the mid slopes, and the dry environments (salal PAGs) occur in narrow strips along the tops of ridges. Within the Sitka spruce plant series the frequent summer fog moderates the effect of climate and the vegetation patterns associated with PAGs are less distinctive as indicators of the environment than in the hemlock plant series. The pattern may also be obscured, at least in part, by the constant influence of wind which blows down trees, overturns the soil, and accumulates large masses of downed logs which affects soil moisture and species composition (Map 15).

Table 4.1. Climate and Vegetation Influences in the Coastal Fog Zone and the Southern Interior Coast Range. This table emphasizes the relative differences between the two zones, but actually the difference within the watershed is a gradation.

	Coastal Fog Zone	Southern Interior Coast Range
Plant series (Dyrness and Franklin, 1976)	Sitka Spruce Series	Western Hemlock Series
Climate	Uniformly wet and mild. Fog and low clouds during relatively drier summer months ensure minimal moisture stresses.	Wet and mild, under considerable maritime influences but, experiences moisture stress in summer months
Fire regime	Infrequent (500+ yr.), stand replacing fires	Low to moderate frequency, moderate to high severity fires
Wind disturbance	Chronic wind disturbance. Mortality 2.8%/year of live biomass (Green, et al. 1992).	Little wind disturbance. Mortality rate 1/2 of one percent per year
Productivity	Higher than western hemlock zone (Franklin and Dyrness, 1973).	Moderate to high productivity, lower than Sitka spruce zone.
Succession	<u>Pioneer species:</u> Sitka spruce. Salt tolerant spruce and salal. <u>Climax tree species:</u> Western hemlock with a mix of spruce and cedar on wet sites. Spruce considered a "sub-climax".	<u>Pioneer species:</u> Douglas-fir. <u>Climax species:</u> Western hemlock. Shrubs not as dense as in Sitka spruce series (Franklin and Dyrness, 1973)
Stand Structure	<u>Tree species diversity:</u> higher than hemlock zone <u>Canopy layers:</u> More layering than hemlock zone <u>Coarse woody debris:</u> Higher accumulations than hemlock zone	<u>Tree species diversity:</u> fewer species present than spruce zone <u>Canopy layers:</u> Fewer layers than spruce zone <u>Coarse woody debris:</u> Lower accumulations than spruce zone

Dunes Plant Communities

Although sand dunes are not hospitable to many life forms, habitat is provided by a wide variety of plant communities within the Oregon Dunes NRA. The variety of communities is due partly to blending ocean and coastal forest ecosystems and the introduction of exotic species. Classification systems developed for plant and wildlife communities on the Oregon Dunes NRA reflect a combination of landforms and habitats (Map 16).

A landform is a specific land structure such as a foredune, deflation plain, hummock or oblique dune. These landforms may be completely unvegetated or may support one or more plant communities with associated wildlife species. The major landforms associated with plant communities include; beach, sand dunes, deflation plain, upland forests, aquatic and riparian, meadows and plantations. To simplify this analysis, several plant communities were combined on the Dunes Vegetation Map. However, this discussion will describe these plant communities in the broader context of landforms in order to tie the two together.

Beach: The beach includes the area between the ocean edge and the foredune. The land below mean high tide is managed by Oregon State Parks, while the Oregon Dunes NRA manages the land between mean high tide and the vegetation line.

Sand Dunes: A variety of sand-based landforms can be found on the Oregon Dunes NRA. Several are colonized by native and non-native plant communities. Others are constantly shifting and essentially devoid of vegetation. The foredune supports European beachgrass and American dunegrass communities. Hummocks are partially stabilized small dunes. European beachgrass is the dominate species with other herbaceous and shrub species present depending on soil wetness.

Wetlands: The Oregon Dunes NRA contains a variety of wetland types. These include mainly deflation plain wetlands and a minor amount of salt water and fresh water marshes, swamps and bogs. For purposes of this analysis, National Wetlands Inventory data was used to roughly define wetlands within the watershed. Deflation plain wetlands are included in both palustrine, emergent and palustrine, forest/shrub types (Map ??).

Much of the deflation plain is inundated with water in the winter; the degree to which an area is inundated influences the type of deflation plain community the area supports. Various plant communities with associated wildlife species can be found within the deflation plain depending on the water regime and successional stage. These communities are found in a mosaic across the deflation plain. Early seral stage habitats include grasses, rushes and sedge communities. The second successional stage includes low and tall shrub habitats. The shore pine forest is the final successional stage.

Aquatic/Riparian: Aquatic habitat support unique and diverse plant communities depending on characteristics of the water body and soils. Riparian zones are transitional areas between aquatic and upland habitats along the edges of creeks, rivers, lakes and ponds.

Estuaries: Estuaries are the most fertile naturally occurring areas in the world (USDA 1972). The fertility is a result of nutrients and organic matter from decaying vegetation both washed in by tides or downstream. These nutrients provide a for high amounts of plankton and invertebrates which are basis of the food chain in the estuary. Salt marshes and tidal flats are important components of many estuaries.

Shore Pine Forest: Shore pine forests can be found on stabilized dune surfaces, precipitation ridges and flood plains. Regardless of landform, this community is always dominated by shore pine although other trees may be scattered throughout. A very dense shrub layer, but no herbaceous layer, is present. Matsutake mushrooms, an important commercial species, are associated with shore pine.

Transition Forest: Similar to the shore pine forest, the transition community can be found on a variety of landforms from stabilized dunes to mountain fronts. Species composition is similar across these landforms, but trees growing in richer soils of floodplains and mountain fronts will have more closely spaced larger trees. A dense shrub layer and trees of various age classes provides for a diverse forest structure.

Plantations: Plantations of European beachgrass, Scot's broom and shore pine were planted on a variety of landforms between the 1880's and the mid 1900's. These plantations generally have a fairly dense cover of shore pine with an understory of Scot's broom, although the later begins to die in older plantations. the herbaceous layer is relatively sparse, particularly in older stands.

Fire

In the Coastal Lakes watershed a series of fires in the mid 1800's burned the landscape with varying levels of intensity, leaving a sea of snags and down wood, patches of unburned and partly burned sites, and isolated surviving trees. "Lands around Siltcoos and Woahink burned during the big fire in the 1830 - 1840 era" (U.S. Fish Commission, 1897). The land the settlers came upon consisted of "an endless expanse of dead, charred, big trees remaining from terrible forest fires that raged in the mid 1800's" (Siuslaw Pioneers, 1947 & 1951). Although fires increased in frequency in adjoining forests, dune vegetation was hardly affected. Human caused fires has not been an agent of change on the dunes landscape in the past 130 years (Weidemann 1984) (Map 17).

Old growth Sitka spruce and Douglas-fir escaped the fires on the south end of Siltcoos and the north end of Tahkenitch. "Lands around Tahkenitch did not burn in the big fires of 1830's and 1840's. There were large fir all around the lake" (U.S. Fish Commission, 1897). A land classification of National Forest lands and describes Section 13 & 24 as being covered with "a stand of old growth fir and spruce" with high timber volumes (Pagter, 1917) (Appendix B). Long time residents recall this area as having old growth up to 6 and 8 feet in diameter. Aerial photos from about the mid 1940s reveal a early cutting pattern that seems to correspond to where the old growth was. Estimated extent of this area is Township 20 S. Range 12 W. sections 1,3,4,9,10,11,12,13,14,15, 16,20,21,22, 23,24,25,26, part of 29 and 32, Township 20 S. Range 11 W. parts of sections 15, 16, 17, and 18. Another spot of unburned large trees noted in the Land Classification was the Henderson Creek area, Township 19 S. Range 11 W. parts of sections 1,2 10 and 11. Pagter states "a good body of second growth fir is found. . .which runs as high as 50 to 60 M feet B.M. per acre and which is between 100 & 200 years in age" (Pagter, 1917). It is unknown whether the Leitel creek area was part of the unburned tract or not.

In the burned over areas, the land regenerated. With scattered remnant trees for seed and a diverse seed bed ranging from mineral soil to head-high loads of wood, the results were a patchwork of age classes and densities. In 1917 areas along the coast were described as being composed of "scrubby fir, logepole pine and spruce, between 20 - 80 years old" and large areas of sand "wasteland". Areas more to the east were described as "virtually a fir type . . . with restocking to Douglas-fir with an occasional cedar, hemlock and spruce. The reproduction was well established and trees were between 20 and 80 years old. Dead, standing and down cedar comprised about 40 percent of the total estimated volume. Timbered areas were covered with almost impenetrable brush" (Pagter, 1917).

Insects, Disease, and Windthrow

Several diseases are endemic to the analysis area. None are of a concern since they all currently exist at minimal levels. These include laminated root rot (*Phellinus weirii*), Swiss Needle Cast (*Phaeocryptopus gaumanni*), *Fomes annosus*, *Armillaria ostyoe*, and Hemlock dwarf mistletoe (*Arceuthobium tsugense*). Insects endemic to the area include Douglas-fir beetle (*Dendroctonus pseudotsugae*), spruce beetle (*Dendroctonus rufipennis*) the Sitka spruce tip weevil (*Pissodes strobi*), and the hemlock looper. Swiss Needle Cast is increasing in coastal forests, possibly as a result of several years with above-average precipitation. It is suspected that Douglas-fir within a few miles from the ocean (possibly within the Sitka spruce zone) are more at risk for defoliation and growth loss. (Hansen 1997). Swiss Needle Cast has had considerable impact in the northern part of the Forest (Hebo District) and is a growing concern across the Forest. Remotely sensed vegetation data indicate that Swiss Needle Cast is spreading southward, and its presence may become apparent in the analysis area in the next few years. It has primarily affected Douglas-fir plantations in the coastal fog/Sitka spruce zone, and has resulted in substantial economic losses on private industrial forest land. It is also found in mature forests and is a concern for the LSR. Little

is known about it, but if the levels reach high proportions in the Coastal Lakes area, it is expected to have similar effects in this area.

On the Dunes, earlier surveys found trees most susceptible to disease and insect damage are primarily confined to stabilized floodplain and dune areas (USDA, 1972). Problems were noted in the Siltcoos and Tahkenitch areas. Noted disease and insects included; Western gall rust, pine needle cast, red band needle blight, spruce needle rust, pitch nodule moth, pine engraver, pine root collar and feeding weevils and mosquitoes. Introduced tree species to this harsh environment may be more susceptible to insect and disease damage.

Winds of hurricane force (over 74 mph) strike the Oregon Coast several times each winter (Badura et al. 1974). Blowdown resulting from these storms can be substantial. Wind is the dominant disturbance factor in the Coastal Fog Zone. The effect is to cause small, 1-10 acre patches of trees to blow down, creating discrete openings in the forest and providing CWD inputs to the forest floor and stream channels. Less frequently surface winds occur that result in diffuse blowdown over large areas and widespread property damage. The most destructive winds are those which blow from the south, parallel to the mountain ranges. Within the analysis area, the area along Henderson Ridge and the Sunset Road have been hardest hit by winds, including the 1953 storm and the Columbus Day storm. According to sources on the Mapleton District, logging has followed windthrow up the drainage or it could be said windthrow has followed clearcutting up the drainage. Wind prone areas include Henderson, Jordon Creek, 5 mile and Tahkenitch Campground. The Columbus Day storm of 1962 blew down large spruce. The openings created by wind provide growing sites primarily for shade tolerant species, such as western hemlock and western redcedar, to become established, thus increasing species diversity stands and accelerating succession toward multistory and late-successional conditions.

Wind plays a major roll in shaping the dune landscape seasonally and through time. In the beginning, winds blew sand inland from the exposed ocean floor. Sand continually moved inward from the beach until foredune establishment. Later, the deflation plain was created from winds scouring behind the foredune. Seasonally, wind patterns change from northern and southern directions. Changing directions and velocities affect patterns of transverse dunes and to a lesser extent the movement of larger oblique and parabola dunes.

CURRENT CONDITION

Seral Stages and Landscape Pattern

Aerial photos of the watershed indicate that by the mid- to late-1940s the forest vegetation had already been significantly altered by post-European settlers. Fires and logging had fragmented the forest around Siltcoos and Woahink lakes. Both the large patches of old-growth had been acquired by private timber companies and clear-cut. The first patch was between the dunes and Siltcoos Lake, and the second was on the ridge separating Tahkenitch Lake and Smith River (Map 17).

The watershed is currently dominated by large mixed conifer-deciduous stands (11,142 acres), semi-open (9,946 acres), plantations, (9,646 acres) deciduous (8,975 acres), and open (8,401 acres). The seral classes with by far the fewest acres are very large conifer (131 acres). *Bring in Dunes numbers*

Figure 4.2. Seral class distribution by landowner. Total acres in the watershed by type of landowners (Appendix ?).

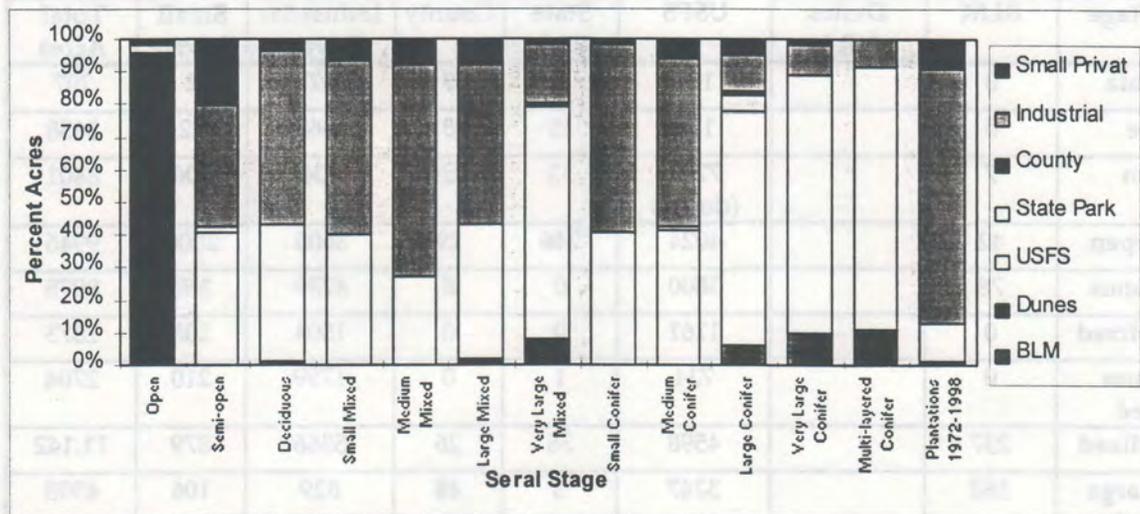
Seral Stage	BLM	Dunes NRA	USFS	State Park	County	Industrial Private	Small Private	Total Acres
No Data	0		144	4	0	57	2	207
Lake	0		178	15	0	5363	82	5638
Open	7		7792 (dunes)	33	159	204	206	8401
Semi-open	42		4024	246	29	3605	2000	9946
Deciduous	78		3800	0	8	4739	350	8975
Small Mixed	0		1161	0	0	1504	208	2873
Medium Mixed	0		734	1	0	1759	210	2704
Large Mixed	237		4598	36	26	5366	879	11,142
Very Large Mixed	360		3247	3	48	829	106	4593
Small Conifer	0		1396	0	0	1930	71	3397
Medium Conifer	0		2562	33	6	3157	368	6126
Large Conifer	203		2265	147	22	329	167	3133
Very Large Conifer	13		103	0	0	12	3	131
Multi-layered large conifer	117		896	0	0	98	2	1113
Plantations	1193		34037	518	312	54223	5475	9646
Total Acres								

Areas where old growth spruce remain include Ada County Park and Camp Baker. Remnant Douglas-fir are numerous in Henderson, Bell and North Prong Creeks. The Siltcoos Trail and Tahkenitch Dunes NRA land acquisition are developing into mature stands. In the future they will provide the best, and probably the only, late-successional forest and wildlife habitat around the lakes since the middle one-third of the watershed is owned primarily by industrial timber companies (Maps 2 and 18).

Timber harvest by the Forest Service began in the analysis area during the 1950's in the Henderson Creek area. According to the Land Classification (Appendix B) these areas had 200 year old trees.

The vegetation data is from remotely sensed satellite imagery taken in 1988 and updated in 1998 (CLAMs, 1998). The imagery provides consistent data across a large landscape and covers all the land ownerships in the analysis area. Accurately is best in areas that have conifer species and large trees. The information is not adequate for riparian areas and the dunes. Consequently, aerial photo and field mapping were used for riparian and dunes vegetation other than this broad watershed summary (Maps 16 and 18).

Figure 4.1. Vegetation seral classes, species composition, and tree size.



Managed Stands

The proportion of hardwoods in the watershed has probably been influenced by timber management and road building. These activities increase soil compaction and disturbance, due to road building and yarding, which favors alder over conifer. Alder tends to be more competitive than conifer on moist, disturbed sites. On the other hand, planting dense conifer plantations after logging has reduced the amount of time and presence of red alder in some areas relative to species composition and succession following natural disturbance, such as fire.

Table 4.3. Acres of US Forest Service plantations and other seral classes by age class (years).

Age Class of Plantations	Acres
0 - 14	297
15 - 24	2,700
25 - 29	1,395
30 - 39	1,555
40 +	337
SUBTOTAL	6,284
Unknown Age	267
Natural Stands	11,479
Administrative Sites	124
Brush	8
Meadow	69
Rock	7
TOTAL	18,238

Site Productivity is variable over the analysis area. Stand exams show site indices of 140 to 200 (Douglas-fir 100 year). Site quality is lower on the ridgetops and higher on mid to low slope positions. *Relate this to Management Recommendation Map (Map X--Final Draft)*

We expect dense/high priority typing on lower slopes...Does the map support that? Does Stu's map verify that pattern of understocked and clumpy plantations in the southern part of the watershed relative to the northern part??

Several exotic conifer species were planted to stabilize and occupy the drifting sands. These include Monterey Pine (*Pinus radiata*) a fast growing pine from California, Maritime pine (*Pinus pinaster*) from the Mediterranean basin and Austrian Black pine (*Pinus nigra*) (personal communication, Dan Segotta). Native shorepine (*Pinus contorta*) was widely planted alone and to some extent interplanted with Scots broom with the intention that the pine would shade out the Scots broom, but that did not happen. Port Orford cedar has been found infrequently during cruises of the Tahkenitch land acquisition. Some noble fir

and southern pines have been planted on industrial forest ownerships (personal communication, Dave Beck).

The differences between managed and natural stands are that planted trees grow quickly and have large diameters early. They begin to slow down in growth by age 30. Decreased light results in shorter crowns, and self thinning begins to kill small suppressed trees and later, intermediate sized trees. Due to uniform spacing, plantation trees are in a sense stuck--they grow up evenly together with low mortality rates, and differentiation into different crown classes takes a longer time, resulting in tall, thin trees. Logging "reset" the successional clock, in a sense, by mimicking stand replacement events and accelerating the early seral stages through planting and tending of Douglas-fir. Under current management direction there is a desire for more species diversity. Lack of diversity in spacing and size of plantations is one of the largest discrepancies between the development of natural and planted stands.

Siltcoos Trail and Tahkenitch Land Acquisitions: The highest potential to develop late-successional habitat in the lakes stratification area is two forest patches that were logged in the 1930s by Tahkenitch Tree Farms, and recently acquired by the Dunes NRA.

The west side of the XX acre Siltcoos Trail area is primarily a Sitka spruce forest which is locally a favorite spot for picking chanterelles. The east side is western hemlock with a few Douglas-fir and western redcedar. A 1931 photo mosaic shows a sea of stumps, burnt snags, brush, and seedlings. The trees are now about 60 years old. Site productivity is high and there are many old cedar remnants and large stumps. The land is hummocky indicating a history of blowdown or deep seated failures. Blowdown is adding diversity and accelerating forest succession, especially along the boundary with private land.

The 1,500 acre Tahkenitch land acquisition was purchased and became part of the Dunes NRA in 1996. Most of the area had been planted in 1942 with Douglas-fir and reportedly was thinned by the previous owner, Murphy Company. Species include Sitka spruce, with western hemlock and a few Douglas-fir which have survived since planting. Trees on the main peninsula to the east of Tahkenitch Landing are slightly older and larger on average. There is some Port Orford cedar, and blocks of Monterey Pine (detectable on aerial photos) with thick understory brush due to the sparse foliage of these trees.

The Tahkenitch and Siltcoos Trail parcels are both developing natural stand structure. Although they were planted, the bulk of the live trees have grown from natural seedlings. The spacing is irregular and differentiation is occurring naturally. Stem exclusion has occurred in most places with suppression mortality producing some snags. The Tahkenitch Land acquisition was not included in the 1994 Oregon Dunes Management Plan (personal communication, Dave Braley). Timber cruises completed in August, 1991 indicated that volume was about 30 - 35 mbf/acre.

Eight to 12 year old plantations just south of the Siltcoos trail area were also acquired by the Dunes NRA. Tree densities and species composition are probably similar to Forest Service young stands, but they have not been surveyed.

Globally Significant Plant Communities

Plant communities of the Oregon Dunes NRA were surveyed in 1993 by the Oregon Natural Heritage Program. Data gathered during the surveys were used to describe and assess plant communities of the Oregon Dunes. A 5-point ranking system used by Natural Heritage Programs worldwide to assess rarity and imperilment of individual species and natural communities were used to assess the global, or "conservation priority" of each plant community. Global ranks are based on number, quality and condition of occurrences, narrowness of range and habitat, trends in populations and habitat, threats and fragility of the community or element being assessed. The global ranks are:

- G1 - critically imperiled globally (typically 5 or fewer occurrences)
- G2 - imperiled globally (typically 6 to 20 occurrences)
- G3 - rare or uncommon but not imperiled (typically 21 to 100 occurrences)
- G4 - not rare and apparently secure, but with cause for long term concern (usually more than 100 occurrences)
- G5 - demonstrably widespread, abundant, secure

Two G1 ranked plant communities, red fescue and American dunegrass, and two G2 ranked communities, shore pine/hairy manzanita/kinnikinnik and bog blueberry/tufted hairgrass, are known to occur within the Lakes Watershed area. Descriptions of the plant communities and location of high quality occurrences within the watershed are as follows:

Red fescue (G1) - A long lived early seral plant community composed of coastal red fescue (*Festuca rubra* var. *littoralis*) with seashore lupine (*Lupinus littoralis*) scattered throughout. Once common on semi-stable dunes inland from the deflation plain, most stands have been overrun by European beachgrass. High quality sites are at least 5 acres in size and have no European Beachgrass. Within the watershed area, high quality red fescue areas are located on the Umpqua spit in the vicinity of the Clambed Road. Approximately 20 acres is located on private lands (recently patented sand mining claim) with approximately 6 acres occurring on NFS lands.

American dunegrass (G1) - Once the dominant species in native foredune communities from northern California to British Columbia, this community has largely been replaced by European beachgrass. In addition to American dunegrass (*Elymus mollis*), component species of the plant community often include; yellow sand verbena (*Abronia latifolia*); seashore bluegrass (*Poa macrantha*); American sea rocket (*Cakile edentula*), American glehnia (*Glehnia leiocarpa*); maritime pea (*Lathyrus japonicus*) and seashore lupine. Ongoing habitat restoration projects (European

beachgrass control) in foredune areas near the outlets of Tahkenitch Creek (36 acres) and the Siltcoos river (44 acres) have improved the quality and quantity of American dunegrass plant community from small (< 1/10 acre) isolated fragments to larger contiguous patches (some > 1 acre).

Shore pine/hairy manzanita/kinnikinnik (G2) - This long live pioneer community occurs on dry semi-stable sand ridges and slopes. Tree and shrub layers are dominated by shore pine (*Pinus contorta* var. *contorta*) and hairy manzanita (*Arctostaphylos columbiana*). Some evergreen huckleberry (*Vaccinium ovatum*), salal (*Gaultheria shallon*) or Pacific rhododendron (*Rhododendron macrophyllum*) may be present. The ground layer is a mat of mosses, lichens and kinnikinnik (*Arctostaphylos uva-ursi*). The lichen flora is diverse and includes several rare species. High quality stands are greater than 20 acres, contain varied age classes of trees and shrubs and have no Scot's broom or recreational (OHV) damage. The community is declining throughout its range due to succession, Scot's broom invasion, residential development and OHV damage. High quality stands are located on the Umpqua spit in the vicinity of the Clambed Road. Approximately 40 acres are located on private lands (recently patented sand mining claim) and 15 acres on NFS lands.

Bog blueberry/tufted hairgrass (G2) - This wetland community occurs infrequently in seasonally flooded depressions of old deflation plains, marine terraces and margins of shallow dune lakes. Tufted hairgrass (*Deschampsia cespitosa* var. *longiflora*) dominates the open areas with bog blueberry (*Vaccinium uliginosum*) forming low thickets around the margins or scattered though the interior. Sphagnum moss (*Sphagnum papillosum* and/or *S. imbricatum*) are almost always present. This community is declining throughout its range due to recreational and residential development and, possibly, dewatering of coastal aquifers by groundwater pumping. High quality sites are 2-5 acres in size with less than 2% cover by introduced species. A relatively large, 4 acre, high quality stand is located in the shallow "narrows" between the north and south open water areas of Three Mile Lakes.

Special Status Plant Species

The following four plant species listed as sensitive in Region 6 are known to occur within the watershed.

Pink Sandverbena, *Abronia umbellata* ssp. *brevifolia* - occurring in high beach and foredune habitats this species was once thought to be extirpated from the Central Oregon Coast due to habitat loss resulting from the introduction and spread of European beachgrass. Using genetic material from healthy populations to the south (Port Orford), two reintroduction sites have been established within the watershed. Reintroduction sites are located in

foredune areas adjacent to the Siltcoos and Tahkenitch Estuaries where a European beachgrass control program has been implemented to restore plover nesting habitat and native plant communities. Reintroduction efforts have shown some promise with overwintering individuals and reproduction observed, however, neither population is yet self-sustaining and both require supplemental out planting of greenhouse stock and/or broadcast seeding.

Adder's Tongue, *Ophioglossum pusillum* - of the nine populations of this species that have been documented within the State of Oregon, two occur within deflation plain areas of this watershed. All other known populations are from Cascade Forests. Both populations within the watershed occur in dense slough sedge/hookers willow deflation plain on the Oregon Dunes NRA. One small population located north of the Siltcoos River has not been relocated since 1988. The second population, located north of the goosepasture area has been visited biannually since it's discovery in 1992. Both sites are protected under an approved conservation strategy for the species (February 1996). Although OHV use is allowed in adjacent open sand areas and "designated routes" through the deflation plain, no OHV intrusion has occurred in either site due to the density of surrounding vegetation. No additional protection measures appear to be warranted at this time. Long term monitoring of the Goosepasture site was initiated in 1996 following protocols established in the Conservation Strategy.

Whorled Marsh Pennywort, *Hydrocotyle verticillata* - one population of this rare wetland plant was documented within the watershed in 1990. The site is located off the Tahkenitch trail in an old cutoff creek channel dominated by hookers willow and slough sedge. The population was relocated in 1998 and appears to be stable.

Bog Clubmoss, *Lycopodium inundatum* - several populations of this sensitive plant species have been documented within the watershed. This species has been documented in deflation plain areas of the Umpqua Spit, Tahkenitch Creek, Goosepasture and Siuslaw Spit areas. It is generally associated with early seral deflation plain habitats and appears to be stable to increasing in most areas.

Humped Bladder-Wort, *Urticularia gibba* - a population of this sensitive aquatic species was documented in Cleawox Lake, Honeyman State Park, in 1992. Small clumps of bladder-wort were reported to be growing tangled within or on top of native aquatic plants in numerous locations along the lake edge. Most notable in the report was the absence of aggressive non-native aquatic weeds such as South American waterweed and Brazilian water-mil foil, which dominate the aquatic vegetation in the watershed's larger lakes. Introduction of non-native aquatic weeds, by recreational boaters, poses the greatest risk to this population. Inventory of remote lakes where weed introduction has not occurred (such as Threemile Lake), would likely yield more populations.

A number of sensitive plant species not documented within the watershed have a high probability of occurrence because suitable habitat is present within the watershed.

Table 4.4. Sensitive Species and specific habitat present within the watershed.

Species	Habitat
Frye's moss, <i>Limbella fryei</i>	Hookers willow bog w/ deep humus
Pohlia moss, <i>Pohlia sphagnicola</i>	Hummocks in sphagnum bogs
Indian rice lily, <i>Fritillaria canschatcensis</i>	Sphagnum bogs
Lessor bladder-wort, <i>Utricularia minor</i>	Shallow lake edges, aquatic
North Pacific plantain, <i>Plantago macrocarpa</i>	Bogs and lake edges
Bog anemone, <i>Anemone oregana var, felix</i>	Sphagnum bogs and marshes

Survey and Manage Plant Species

Vascular Plants - No survey and manage plant species have been documented on federal lands within the watershed. However, potential habitat is present for several species within the watershed. (????) Survey and manage species will be protected through implementation of the Survey and Manage guidelines (USDA and USDI, 1994).

One known site of *Albatrellus caeruleoporus*, a rare ecto-polypore, exists within Honeyman State Park on the east side of highway 101.

Non-Vascular Plants

As part of the Siuslaw National Forests Air Quality Monitoring surveys 1993-1997 12 sites within the watershed were surveyed for epiphytic macrolichens. 105 species were documented. (List Appendix XX)

Noxious Weeds and Non-Native Plant Species

The introduction of European beachgrass is probably the most extensive and far-reaching human impact in it's effect on the dune landscape. It' effect has been both geomorphological (effect on dune forms) and biological (creation of new habitats and competition with other species)(Wiedemann 1984). The extent of effects from this introduced species on the dunes is not well studied and may yet to be seen.

Many other plant species found on the coastal dunes were also introduced after European settlement. These plants also influenced the landscape and altered native plant communities. Almost all of the plants now present in the foredune area have been introduced (Weidemann 1984). Scot's and Portuguese broom are now present across the dunes. Fortunately, gorse, another exotic shrub, has only been found in isolated locations

on the Oregon Dunes NRA. Extensive plantations of shore pine and Scot's broom were established in the 1940's. In addition, 600 hectare of deflation plain were planted with annual and perennial grasses and legumes to provide wildlife forage.

The following noxious weeds are documented or suspected to occur within the watershed. List 1 includes species which, once established, have the capacity for long term site occupancy (20+ years) and disruption of natural plant successional development. List 2 includes species that aggressively colonize disturbed sites but require frequent disturbance (such as mowing or roadside brushing) for long term occupancy. Species on both lists are generally recognized as "problem species" of ecological or economic importance. Highlighted species are those currently on the Oregon Department of Agriculture's Noxious Weed List.

Table 4.5. Noxious weeds known or suspected in the watershed.

List 1: Species with potential for long-term occupancy

Scot's broom (d), <i>Cytisus scoparius</i>	Terrestrial
Portuguese broom (d), <i>Cytisus striatus</i>	Terrestrial
Gorse (d), <i>Ulex europaeus</i>	Terrestrial
Giant knotweed (d), <i>Polygonum sachalinense</i>	Riparian
Japanese knotweed (d), <i>Polygonum cuspidatum</i>	Riparian
Himalayan knotweed (s), <i>Polygonum polystachyum</i>	Riparian
Purple loosestrife (d), <i>Lythrium salcaria</i>	Aquatic, riparian
South American waterweed (d), <i>Elodea densa</i>	Aquatic
Brazilian water-mil foil (d), <i>Myriophyllum brasiliense</i>	Aquatic
European beachgrass (d), <i>Ammophila arenaria</i>	Terrestrial
English ivy (d), <i>Hedera helix</i>	Terrestrial
English holly (d), <i>Ilex aquifolium</i>	Terrestrial
Himalaya berry (d), <i>Rubus discolor</i>	Terrestrial
Evergreen blackberry (d), <i>Rubus laciniatus</i>	Terrestrial
Reed canary grass (d), <i>Phalaris arundinacea</i>	Riparian
Yellow flag iris (d), <i>Iris pseudacorus</i>	Aquatic/riparian

List 2: Species of short-term site occupancy

Canada thistle (d), <i>Cirsium arvense</i>	Terrestrial
Bull thistle (d), <i>Cirsium vulgare</i>	Terrestrial
Tansy Ragwort (d), <i>Senecio jacobaea</i>	Terrestrial
St. Johnswort (d), <i>Hypericum perforatum</i>	Terrestrial
Poison Hemlock (d), <i>Conium maculatum</i>	Terrestrial
Australian fireweed (d), <i>Erechtites minima</i>	Terrestrial
Oxeye-daisy (d), <i>Chrysanthemum leucanthemum</i>	Terrestrial
Tree Lupine (d), <i>Lupinus aboreus</i>	Terrestrial