3.3 BOTANICAL RESOURCES

3.3.1 Affected Environment

This section presents information about botanical resources and plant communities existing along the proposed pipeline corridor. This section also discusses the following botanical resources that are considered important by the USFS and other state and federal agencies that manage natural resources because of their sensitive habitat features or uniqueness in the region:

- threatened, endangered, and sensitive plant species;
- Asurvey and manage@ plant species associated with old-growth forest; and
- unique high-quality native plant communities.

Noxious weeds are also discussed because of the importance of minimizing the spread of these species. Unless otherwise noted, information presented is based on field surveys, information presented in the ASC (OPL 1998), and technical reports prepared for this proposal (Dames & Moore 1997). The scientific names of plant species are provided in Table 3.3-1. Common names are used in text for ease of reading.

3.3.1.1 Plant Communities

The pipeline corridor would traverse a landscape that is affected by a broad range of factors such as climate, soil, elevation, and exposure, all of which influence vegetation patterns. Generalized vegetation maps of Washington identify major vegetation zones that recognize the different geographic and physiographic conditions throughout the state. Based on a vegetation analysis of the natural vegetation of the Pacific Northwest (Franklin and Dyrness 1988), the pipeline corridor crosses the following major plant communities:

- western hemlock and mixed conifer forest from the corridor's origin near Woodinville to the upper slopes of the west Cascade Mountains beyond the City of North Bend;

- subalpine forests that include Pacific silver fir and mountain hemlock at Snoqualmie Pass;

- Douglas fir and grand fir forests along the east side of the Cascade Mountains from below Snoqualmie Pass to the Ellensburg area; and

- shrub-steppe communities, which include shrubs such as big sagebrush and bitterbrush and a variety of grasses and forbs, from Ellensburg to the corridor's endpoint at Pasco.

Field studies and aerial photograph interpretation were conducted in 1995, 1996, and 1997 to map the dominant vegetation cover types. Vegetation was mapped within a 0.8 km (0.5-mile) study area centered along the pipeline corridor (and alternative Columbia River crossings). Field studies focused on a 61 m (200-foot) wide study corridor along the centerline of the pipeline corridor.

Table 3.3-1. Common and Scientific Names of Plant Species

Common Name	Scientific Name	Common Name	Scientific Name
big-leaf maple	*Acer macrophyllum*	needle-and-thread grass	*Stipa* spp.
big sagebrush	*Artemesia tridentata*	noble polypore	*Oxyporous nobilissimus*
bitterbrush	*Purshia tridentata*	Northern wormwood	*Artemisia campestris* ssp. *borealis* var. *wormskioldii*
black cottonwood	*Populus trichocarpa*	orange hawkweed	*Hieracium aurantiacum*
blackberry	*Rubus* spp.	orchard grass	*Dactylis glomerata*
bluebunch wheatgrass	*Agropyron spicatum*	Oregon (Wenatchee) checkermallow	*Sidalcea oregana* var. *calva*
boreal bedstraw	*Galium kamtschaticum*	Oregon white oak	*Quercus garryana*
bracken fern	*Pteridium aquilinum*	oxeye-daisy	*Chrysanthemum leucanthemum*
buckbrush	*Ceanothus velutinus*	Pacific silver fir	*Abies amabilis*
bulbous bluegrass	*Poa bulbosa*	Paiute suncup	*Camissonia scapoidea*
Buxbaum's sedge	*Carex buxbaumii*	pauper milk-vetch	*Astragalus misellus* var. *pauper*
cheatgrass	*Bromus tectorum*	ponderosa pine	*Pinus ponderosa*
clover	*Trifolium spp.*	quaking aspen	*Populus tremuloides*
colonial bentgrass	*Agrostis tenuis*	rabbitbrush	*Chrysothamnus* spp.
Columbia milk-vetch	*Astragalus columbianus*	red alder	*Alnus rubra*
common snowberry	*Symphoricarpos albus*	red top	*Agrostis alba*
Coyote tobacco	*Nicotiana attenuata*	Russian olive	*Elaeagnus angustifolia*
Desert evening primrose	*Oenothera cespitosa*	salal	*Gaultheria shallon*
Douglas-fir	*Pseudotsuga menziesii*	salmonberry	*Rubus spectabilis*
Dwarf evening primrose	*Oenthothera pygmaea*	Scot's broom	*Cytisus scoparius*
fiddleneck	*Amsinckia lycopsoides*	Snake Canyon desert-parsley	*Lomatium serpentinum*
filaree	*Erodium cicutarium*	Southern mudwort	*Limosella acaulis*
golden paintbrush	*Castilleja levisecta*	spiney hopsage	*Atriplex spinosa*
grand fir	*Abies procera*	stiff sagebrush	*Artemisia rigida*
Gray cryptantha	*Cryptantha leucophaea*	sword fern	*Polystichum munitum*
greasewood	*Sarcobatus vermiculatus*	tall Oregon grape	*Mahonia aquifolium*
hazelnut	*Corylus cornuta*	thistle	*Cirsium* spp.
Hoover's desert parsley	*Lomatium tuberosum*	three-leaved foam flower	*Tiarella trifoliata*
Hoover's tauschia	*Tauschia hooveri*	tumblemustard	*Sisymbrium altissimum*
huckleberry	*Vaccinium* spp.	western hemlock	*Tsuga heterophylla*
Idaho fescue	*Festuca idahoensis*	western red cedar	*Thuja plicata*
Indian ricegrass	*Oryzopsis* spp.	White eatonella	*Eatonella nivea*
knapweed	*Centaurea* spp.	wild rose	*Rosa* spp.
mock azalea	*Menziesia ferruginea*	willow	*Salix* spp.
mountain hemlock	*Tsuga mertensiana*	vine maple	*Acer circinatum*

The plant communities encountered within the study area and the major vegetation zone(s) in which they occur are shown in Table 3.3-2. Descriptions of these plant communities are summarized below from the vegetation technical report and vegetation maps (Dames & Moore 1997). The conditions of the plant communities along the corridor are representative of the land management activities that have occurred in Washington during the last 100 years. Timber harvests, utility corridor maintenance activities, agricultural practices, and development have affected the majority of the vegetation conditions in the communities. Acreages of plant communities within the construction corridor are described in the AEnvironmental Consequences@ subsection.

Table 3.3-2. Plant Communities Mapped in the One-Half-Mile Study Area and the Major Vegetation Zones in Which They Occur

	Major Vegetation Zones			
Cover Type	**Western Hemlock**	**Subalpine Fir (Pacific Silver Fir and Mountain Hemlock)**	**Douglas Fir and Grand Fir**	**Shrub-Steppe**
Western Hemlock	X	X		
Silver Fir	X	X		
Mountain Hemlock		X		
Douglas Fir	X	X	X	
Ponderosa Pine			X	
Deciduous Forest	X	X	X	X
Mixed Forest	X		X	X
Young Regenerating Coniferous Forest	X	X	X	
Old-Growth Forest	X	X		
Scrub-Shrub	X	X	X	X
Shrub-Steppe				X
Grass/Forb	X		X	X
Cropland			X	X
Hay/Pasture	X		X	X
Orchard			X	X
Developed (vegetated)	X	X	X	X
Wetland	X	X	X	X

Note: Cover types from Dames & Moore (1997).

The proposal is located in a mix of natural vegetation and converted vegetation types (e.g., cropland, orchards, hayfields, and pastures), or along utility corridors where disturbance has already

occurred. Native vegetation occurs within these vegetation communities, but forested areas are dominated by second- and third-growth forest. Many of the scrub-shrub communities identified in the study area are associated with the BPA ROW where vegetation management activities maintain the scrub-shrub vegetation. Native and non-native grass species are present in shrub-steppe communities as a result of grazing and other past land management.

Conifer Forests. Within the study corridor, the coniferous forests of the Puget Lowlands and the lower western slopes of the Cascade Mountains are dominated by second-growth Douglas fir and western hemlock. Western red cedar occurs occasionally and can be a co-dominant species in some forests. Big-leaf maple and red alder are intermittent within these forests but account for less than 25 percent of the total forest cover. Common understory plants include salmonberry, blackberries, salal, Oregon grape, vine maple, snowberry, and sword fern.

Pacific silver fir is found on the upper western slopes of the Cascade Mountains. Species mentioned above are also associated with conifer forest dominated by Pacific silver fir. The crest of the Cascades at Snoqualmie Pass is dominated by Pacific silver fir and mountain hemlock. Common understory species include huckleberry, mock azalea, and salmonberry. Although mountain hemlock dominated forest occurs at Snoqualmie Pass, the pipeline corridor crosses this area through an existing tunnel, avoiding this community type.

On the east slopes of the Cascade Mountains, much of the pipeline corridor is conifer forest dominated by Douglas fir, grand fir, or ponderosa pine. As the rainfall decreases toward the east, ponderosa pine tends to be a lone dominant species in the driest forests. Common understory shrubs on the east side of the Cascades include huckleberry, Oregon grape, snowberry, and buckbrush. The driest ponderosa pine forest may include bitterbrush and big sagebrush as understory species.

Young regenerating coniferous forests include tree farms and recently planted clearcuts dominated by Douglas fir and western hemlock. Other conifer species may be present depending upon species planted or naturally regenerating. Understory vegetation in these forests includes young red alder, blackberry, salmonberry, sword fern, and bracken fern.

Stands of old-growth forest occur in the 0.8 km (0.5-mile) study area, but none occur within the proposed 18.3 m (60-foot) construction corridor. Patches of old growth within the half-mile study area occur primarily on the western slopes of the Cascade Mountains (between approximately MP 13 and 59) and are dominated by western hemlock or silver fir.

Deciduous Forest. Deciduous forests occur on both sides of the Cascade Mountains, although within the 18.3 m (60-foot) construction corridor, most of this community type occurs west of Snoqualmie Pass. Deciduous forest is found primarily in patches along residential and commercial areas of Snohomish and King Counties and along riparian corridors. Big-leaf maple and red alder are the dominant species.

East of the Cascade Mountains, patches of quaking aspen are scattered in moist sites; small aspen groves and Oregon white oak occur in the study area at Swauk Creek in Kittitas County. Much of the deciduous vegetation in eastern Washington occurs in the wetlands and includes willow species and Russian olive (see Section 3.4, Wetlands).

Mixed Forest. Mixed forest communities are dominated by both coniferous and deciduous trees (i.e., cover of both coniferous and deciduous trees is greater than 25 percent). This community is found primarily west of the Cascades and is dominated by western hemlock, Douglas fir, big-leaf maple, and red alder.

Scrub-Shrub. Scrub-shrub vegetation primarily occurs in intensively managed areas (e.g., BPA transmission line ROW) in western Washington. Other scrub-shrub areas include riparian areas adjacent to streams. Commonly occurring shrubs in western Washington include vine maple, young black cottonwood, Scotch broom, salal, blackberries, salmonberry, hazelnut, wild roses, snowberry, and young alder and willows.

Shrub-Steppe Communities. The shrub-steppe vegetation zone is the predominant vegetation cover type along the study corridor in eastern Washington. Shrub-steppe vegetation is considered an important habitat by the Washington Department of Fish and Wildlife (WDFW), Washington Natural Heritage Program (WNHP), and U.S. Fish and Wildlife Service (USFWS). Shrub-steppe is considered important because of the limited occurrence of undisturbed, high-quality shrub-steppe habitat and the associated habitat features that support native plant and animal species in the eastern Washington Columbia Basin. Today, approximately 5 percent of the historic extent of shrub-steppe vegetation is considered to be in a relatively undisturbed condition based on estimates by the WNHP. The WDFW considers undisturbed shrub-steppe habitat to be a priority habitat type because of its limited occurrence and habitat features important to wildlife species (WDFW 1996).

Because of the importance of this vegetation type, detailed field studies were conducted to identify the type and condition of plant communities within the shrub-steppe zone. Vegetation mapping of these different communities was based on the dominant shrub and grass species present (i.e., percent cover). The condition of the shrub-steppe communities was based on the amount of disturbance to the cryptogam crust commonly associated with shrub-steppe communities (a layer of mosses and lichens growing on the ground surface between grasses and shrubs); evidence of grazing; road scars or off-road vehicle use; habitat fragmentation by roads or other development; herbicide overspray from nearby agricultural or roadside vegetation; and the presence of non-native grass species such as cheatgrass or bulbous bluegrass.

A total of 23 plant community types were identified in the shrub-steppe zone along the 61 m (200-foot) study corridor including the alternative YTC and Columbia River segments (Table 3.3-3). These communities can be grouped into three general types: (1) communities dominated by native shrubs and native grasses (at least 80 percent of the grass cover is native grasses); (2) native shrubs with a mix of native and non-native grasses; and (3) native shrubs with non-native grasses (at least 80 percent of the grass cover is non-native grasses). Several of the community types are dominated by a single grass species (at least 70 percent cover of the single grass species with shrub cover lacking), or just a shrub species without a significant grass cover.

Most of the shrub steppe community contains non-native grasses; 26 percent of the shrub-steppe area in the study corridor is predominantly native grass understory. Some cheatgrass and/or bulbous bluegrass is generally present in these native grass communities as discussed above

Table 3.3-3. Shrub-Steppe Plant Communities Mapped in the 200-Foot Study Corridor

- # Sagebrush/rabbitbrush/cheatgrass
- # Sagebrush/native grasses
- # Buckwheat/native and nonnative grasses
- # Bitterbrush/sagebrush/native and nonnative grasses
- # Sagebrush/rabbitbrush/cheatgrass/native grasses
- # Bitterbrush/native and nonnative grasses
- # Rabbitbrush/native grasses
- # Sagebrush/cheatgrass/native grasses
- # Rabbitbrush/buckwheat/native and nonnative grasses
- # Cheatgrass
- # Wildrye
- # Sagebrush/cheatgrass
- # Rabbitbrush/cheatgrass
- # Sagebrush/rabbitbrush/native grasses
- # Bitterbrush/rabbitbrush/native grasses
- # Native grasses
- # Spiney hopsage
- # Sagebrush/spiney hopsage/native and nonnative grasses
- # Sagebrush/buckwheats/native and nonnative grasses
- # Greasewood/cheatgrass
- # Greasewood/sagebrush/cheatgrass
- # Rabbitbrush/sagebrush/bitterbrush/cheatgrass/native and nonnative grasses
- # Rabbitbrush/sagebrush/bitterbrush/native and nonnative grasses

Source: OPL (1998) and other information provided by Dames & Moore.

In almost all of the shrub-steppe communities, however, disturbance of the habitat is evident from the absence or disruption of the cryptogam crust, livestock grazing, off-road use, or other disturbances mentioned above. Where the cryptogam crust is intact, it is limited primarily to under the shrubs where it is more protected from grazing and human disturbance. One area of shrub-steppe habitat that was relatively undisturbed is discussed later in this section under AUnique Plant Communities@.

The largest areas of shrub-steppe habitat along the study corridor are located between the town of Kittitas and the Columbia River. The primary land use in this area is grazing, which has disturbed the shrub-steppe plant communities (i.e., broken cryptogam crust and presence of non-native grass and forb species). East of the Columbia River, the shrub-steppe communities are more patchy and fragmented along the study corridor and have been disturbed to a greater extent by grazing, agricultural practices, development, and herbicide spraying. Small patches of shrub-steppe habitat with native grasses occur between irrigated crop circles and roads.

Herbaceous Communities. Herbaceous plant communities along the pipeline corridor are relatively rare and are composed of weedy, non-native grasses and forbs. West of the Cascade Crest, these herbaceous areas occur in previously disturbed areas such as roadsides, vacant lots that have been cleared, and abandoned pastures. Dominant plant species include orchard grass, redtop and colonial bentgrass, thistle, sword fern, ox-eye daisy, fescue, and clover. East of the Cascade Crest, herbaceous communities are dominated by cheatgrass, tumblemustard, filaree, fiddleneck, and knapweed.

Agricultural Communities. Agricultural plant communities occur throughout the study area, except for the mountainous portion of the corridor between approximately the Cities of North Bend and Easton. For a discussion of agricultural communities present see Section 3.13, Agriculture.

Kittitas Terminal and Pump Stations. The site of the Kittitas Terminal is approximately 10.9 ha (27 acres) and is currently cropland. The five pump station sites are each approximately 0.4 to 0.8 ha (1 to 2 acres) and have the following vegetation types:

- The Thrasher Station site at MP 0.0 is dominated by native and non-native grasses and forbs, Scotch broom, and a few scattered Douglas fir trees.
- The North Bend site (MP 37.3) is presently used as pasture.
- The Stampede Station (MP 67.2) is a small developed area with a gravel parking lot, a building, and scattered Douglas fir trees.
- The Beverly-Burke (MP 154.0) and Othello Station (MP 189.5) sites are cropland.

3.3.1.2 Threatened and Endangered Plant Species

Threatened, endangered, and candidate plant species have been identified by the USFWS as plants to be protected under the Endangered Species Act of 1973. The USFWS has published a list of threatened and endangered plant species (58 FR 51144, September 30, 1993) and a list of proposed threatened, endangered, and candidate species (61 FR 7596, February 28, 1996; 50 CFR 17.12).

A letter issued by the USFWS indicated that no listed plants, candidate plants, or plants proposed for designation as threatened or endangered under the Endangered Species Act are known to occur in the study area. Since the time when the USFWS was contacted for the ASC, however, the USFWS has listed golden paintbrush as a threatened plant species, and Wenatchee checkermallow as a proposed candidate species (Propp pers. comm.). Both species have the potential to occur along the pipeline corridor, based on information provided by the USFWS.

The USFWS also maintains a list of species of concern that are not considered threatened, endangered, or candidate species, but whose conservation standing is a concern to the USFWS. According to USFWS, additional information is still needed on distribution and population numbers to determine whether species of concern should be considered threatened, endangered, or candidate. Species of concern that could potentially occur in the project area are listed in Table 3.3-4.

Table 3.3-4. Sensitive Plant Species and USFWS Species of Concern that Occur, or Have the Potential to Occur, in the One-Half-Mile Study Area Based on Database Information

Common Name	Scientific Name	USFS, State (S), or USFWS Status
Plants Known to Occur Based on WNHP Database		
Buxbaum's sedge	*Carex buxbaumii*	Sensitive - USFS, S
Columbia milk-vetch	*Astragalus columbianus*	Threatened - S
Coyote tobacco	*Nicotiana attenuata*	Sensitive - USFS Threatened - S
Desert evening primrose	*Oenothera caespitosa*	Sensitive - S
Dwarf evening primrose	*Oenthothera pygmaea*	Threatened - S
Gray cryptantha	*Cryptantha leucophaea*	Sensitive - S
Hoover's desert parsley	*Lomatium tuberosum*	Threatened - S Species of Concern - USFWS
Hoover's tauschia	*Tauschia hooveri*	Threatened - S Species of Concern - USFWS
Paiute suncup	*Camissonia scapoidea*	Sensitive - S
Snake Canyon desert-parsley	*Lomatium serpentinum*	Sensitive - S
Southern mudwort	*Limosella acaulis*	Sensitive - USFS, S
White eatonella	*Eatonella nivea*	Threatened - S
Plants Which May Have the Potential to Occur Based on USFWS Information		
Golden Indian-paintbrush	*Castilleja levisecta*	Endangered - S Threatened - USFWS
Northern wormwood	*Artemisia campestris* ssp.*borealis* var. *wormskioldii*	Endangered - S Species of Concern - USFWS
Oregon (Wenatchee) checkermallow	*Sidalcea Oregana* var. *calva*	Endangered - S Proposed candidate - USFWS Sensitive - USFS

Source: Dames & Moore (1997) and other information provided by Dames & Moore.

3.3.1.3 Sensitive Plant Species

In addition to plants considered threatened, endangered, or candidate species by the USFWS, other state and federal agencies identify sensitive plant species for which population viability is a concern. Agencies contacted to identify sensitive species that may be present along the corridor include the following:

- The WNHP maintains a list of plant species whose population viability is considered threatened, endangered, or sensitive (WNHP 1994). The Bureau of Land Management refers to the WNHP list.

- The Mt. Baker-Snoqualmie National Forest (MBSNF) and Wenatchee National Forest (WNF) maintain lists (from the USFS Region 6 list) of those vascular plant species identified by a regional forester for which population viability is a concern (Potash 1991, Smith-Kuebel and Lillybridge 1993).

- The Department of the Army maintains a list of sensitive plants on the YTC.

Field surveys for threatened, endangered, and sensitive plant species as identified by the above agencies were conducted using the MBSNF standard operations for plant program field methods on federal lands and in shrub-steppe plant communities. In addition, a database search by the WNHP identified 12 species that are known to occur within the vicinity of the half-mile study area (Table 3.3-4). These recorded occurrences do not lie within the 18.3 m (60-foot) construction corridor.

During the field surveys, populations of two sensitive plant species were found along the 61 m (200-foot) study corridor: pauper milk-vetch and Piper's daisy. Populations of Columbia milk-vetch were found on Columbia River crossing alternative segments south of the pipeline corridor and west of the Columbia River, and desert evening primrose was found on the Beverly Railroad Bridge crossing alternative routes east of the Columbia River. Populations of Hoover=s tauschia were found along the alternative segment south of I-90 in the YTC. The general location and population size of these species are shown in Appendix E and Table 3.3-5.

Table 3.3-5. Size and Location of Sensitive Plant Species Populations Observed During Field Surveys in the 200-Foot-Wide Study Corridor

Common Name	Scientific Name	Population Size	Location	Federal Lands
Columbia milk-vetch	*Astragalus columbianus*	Two populations (size not determined)	Kittitas County T16N R22E S1 T17N R22E S36	--
Desert evening primrose	*Oenothera caespitosa*	Two populations (size not determined)	Kittitas County T16N R23E S33	--
Hoover's tauschia	*Tauschia hooveri*	Two populations of 100 individuals each	Kittitas County T17N R21E S27	DOD
Pauper milk-vetch	*Astragalus misellus* var. *pauper*	One population (size not determined)	Kittitas County T17N R20E S14	--
Piper's daisy	*Erigeron piperianus*	Two populations of 6 and 10 individuals	Grant County T16N R25E S11	BOR
		One population of 100 individuals	Adams County T15N R28E S23	BOR

DOD = U.S. Depatrment of Defense (Yakima Training Center) administered federal lands.
BOR = U.S. Bureau of Reclamation administered federal lands.

3.3.1.4 Survey and Manage Plant Species

ASurvey and manage@ plant species are those associated with late-successional forest within the range of the spotted owl, as referenced in the Record of Decision for the Northwest Forest Plan (USFS/BLM 1994). Because the construction corridor would not pass through any old-growth forest (see the AUnique Vegetation Communities@ section), no survey and manage plant species are expected to occur within this corridor. A database search for survey and manage plant species conducted by the MBSNF indicated that no known species are located within the construction corridor, although boreal bedstraw, a flowering plant species, is located within approximately 0.8 km (0.5 mile) of the pipeline corridor.

The Snoqualmie Pass Adaptive Management Area Plan FEIS identifies nine survey and manage plant species that are known to occur in the Snoqualmie Pass area based on herbarium collections inventoried at Central Washington University and the University of Washington (USFS/USFWS 1997). Table 3.3-6 lists the lichen and fungi species closely associated with late-successional and old-growth forests that have been collected or known to occur in the Snoqualmie Pass Adaptive Management Area.

Table 3.3-6. Survey and Manage Lichen and Fungi Species that have been Collected, or Known to Occur in the Snoqualmie Pass Area

Lichens
Hypogymnia duplicata
Lobaria linita
Fungi
Aleurodiscus farlowii
Cantharellus cibarius
Cantharellus subalbidus
Clavariadelphus truncatus
Cortinarius boulderensis
Mycena monticola
Rhodocybe speciosa
Thaxterogaster pingue

Source: USFS/USFWS 1997.

Based on USFS GIS information, the closest known occurrence of a survey and manage plant species to the construction corridor is a fungus located several miles west of Snoqualmie Pass. Noble polypore, a rare fungus, is located approximately 137 m (450 feet) north of the pipeline corridor. Noble polypore typically grows on large-diameter stumps, snags, and living trees. It occurs in late-successional forests, especially in old-growth and ancient stands, and can persist on ancient large stumps in second growth for a number of years. It has not been found growing on logs (USFS 1994). The Northwest Forest Plan states that this noble polypore population should be protected with a buffer of at least 1.6 km (1 square mile) with the fungus population centrally located. The pipeline would be located within this buffer area.

Within the noble polypore buffer area, the pipeline would be placed primarily in an existing road/railroad bed or on the John Wayne Trail with no mature trees being cut. The pipeline would need to cross a segment of forest requiring a 152 m (500-foot) long section of new corridor; in this area, the forest is dominated by young regenerating western hemlock and Douglas fir trees approximately 10 to 36 cm (4 to 14 inches) diameter at breast height. Old-growth conditions supporting noble polypore do not exist within the 152 m (500-foot) long pipeline segment that would pass near the existing fungus population.

Approved survey protocols for the noble polypore have not been issued from the Regional Ecosystem Office. In addition, the proposed pipeline route would not cross through any suitable habitats for this species (i.e., old-growth forest or other areas which have large old-growth tree stumps). For these reasons, surveys for the noble polypore were not conducted. (Surveys for vascular sensitive plant species that are also designated as survey and manage species were conducted as discussed in the ASensitive Plant Species@ subsection earlier. Survey protocol was developed in October 1997 for three lichen and three liverwort species that are closely associated with old-growth forest, but surveys for these species have not yet been conducted.)

3.3.1.5 Unique Plant Communities

None of the vegetation types identified along the pipeline corridor appear to qualify as high-quality natural communities except for a portion of the shrub-steppe habitat along the steep slopes east of the Columbia River. This section describes the basis for this conclusion.

Unique plant communities are high-quality native plant communities of particular concern to land resource management agencies because they are relatively uncommon across the landscape. The MBSNF and the WNF have completed watershed analyses for the South Fork Snoqualmie and Yakima Watersheds (MBSNF 1995, WNF 1997). Unique plant communities identified in these watershed analyses include non-forested areas such as wet and dry meadows, brushfields, wetlands, and subalpine parkland.

The only unique non-forested habitat areas identified by the WNF in the construction corridor are brushfields and several wetlands. The brushfields are associated with cleared forest along the BPA ROW. Wetlands are discussed under Section 3.4, Wetlands.

A WNHP database search identified six high-quality natural communities that could be considered unique vegetation communities in the vicinity of the 0.8 km (0.5-mile) wide study area. However, these communities, or other communities meeting the criteria for high-quality native communities, were not observed along the pipeline corridor or alternative alignments. Based on the locations identified in the WNHP database, the conditions where these communities could possibly occur within the 61 m (200-foot) study corridor are as follows:

- **Western hemlock/sword fern - three-leaved foam flower and red alder communities.** The WNHP identified locations of these high-quality native communities in the vicinity of MP 41. However, field surveys conducted in this area indicate that high-quality native plant communities of this type do not occur along the pipeline corridor. The forested areas in the study corridor are not considered high-quality native communities because the trees are not mature, old-growth conditions do not exist, and the area is disturbed and composed of weedy species along this segment of the corridor.

- **Big sagebrush/bluebunch wheatgrass and stiff sagebrush/Sandberg's bluegrass communities.** These communities could occur along one of the alternative alignments west of the Columbia River and north of I-90, based on WNHP information. Fieldwork identified these communities along portions of the alignment, but they are not considered high-quality because of the broken or missing cryptogam crust, presence of cheatgrass, and evidence of existing land use practices that reduce the habitat value of the area (cattle grazing and off-road vehicles).

- **Big sagebrush/needle-and-thread and tall gray rabbitbrush-bitterbrush/Indian rice grass communities.** These communities, identified by the WNHP, are beyond the one-half-mile study area assessed for this proposal.

Criteria used to determine whether unique or high-quality plant communities occur along the pipeline corridor were based on WNHP (1992, 1996) and WDFW (1996) information. Using these

criteria, none of the vegetation types identified along the pipeline corridor appear to qualify as high-quality natural communities except for a 457 m (1,500-foot) portion of the shrub-steppe habitat along the steep slopes east of the Columbia River. This area is dominated by native grasses and sagebrush with an intact cryptogam crust. The area has not been severely disturbed by grazing or off-road vehicle use and has not been fragmented by roads because of the steep slopes.

No other portion of the corridor is considered to have high-quality native communities because (1) the pipeline uses existing corridors (e.g., roads, BPA ROW, trails, etc.) where vegetation has already been removed or disturbed; and (2) vegetation conditions within new construction corridors have been disturbed to the extent that the area is not considered representative of a high-quality natural community. Examples of disturbance include timber harvest that has resulted in second- and third-growth forest; shrub-steppe communities disturbed by grazing, development, or off-road vehicle use; and the proximity of agricultural and other development activities.

Portions of the shrub-steppe community in the YTC (one alternative route for approaching the Columbia River) contain native grasses and shrubs. However, the area is not considered a high-quality natural community by WNHP standards because of the nearby disturbance of roads, occasional off-road vehicle use from military vehicles, the lack of other intact ecosystem elements such as a cryptogam crust on the soil surface, and the presence of non-native aggressive grasses such as cheatgrass and bulbous bluegrass.

Old-growth forest can be considered a unique plant community because of management decisions that have been made to protect elements of the old-growth forest associated with spotted owls (USFS/BLM 1994). Old-growth forest is also considered a priority habitat by the WDFW (1996). Old-growth forest, as defined by the Northwest Forest Plan, is a forest stand usually at least 180 to 220 years old with moderate to high canopy closure; a multilayered, multispecies canopy dominated by large overstory trees; high incidence of trees, some with broken tops and other indication of old and decaying wood; and numerous large snags and heavy accumulations of wood, including large logs on the ground.

Old-growth forest was identified within the one-half-mile-wide study area centered on the pipeline corridor based on aerial photograph interpretation and ground surveys. Old-growth forest, however, does not occur within the 18.3 m (60-foot) wide construction corridor. Field surveys conducted by Dames & Moore staff and some of which were confirmed by the EIS team have indicated that forest where new corridor would be constructed (i.e., outside of existing roads, trails, and ROWs) is second-growth or young regenerating coniferous forest.

The pipeline corridor would cross through a portion of the MBSNF and WNF designated as a Late-Successional Reserve (LSR) as defined in the Northwest Forest Plan (USFS/BLM 1994). This portion of the corridor is located along the John Wayne Trail, and no trees would be removed along the trail. Approximately 137 m (450 feet) of the route would cut a new 18.3 m (60 foot) wide corridor through second-growth forest within the LSR as described in "Survey and Manage Plant Species" earlier. This portion of the forest is dominated by young western hemlock and Douglas-fir trees 6.1 to 15.2 m (20 to 50 feet) tall with a salmonberry understory. The condition of the forest is representative of second-growth forest throughout western Washington and does not represent unique or rare vegetation.

3.3.1.6 Noxious Weeds

Noxious weeds are non-native weed species that easily invade farmland, decrease forest productivity, and alter ecosystems by out-competing native vegetation. Noxious weeds are commonly annual and perennial forbs. Under the Washington State Weed Law (RCW 17.10.080), noxious weeds are invasive weeds that are difficult to control by cultural or chemical practice. The Washington Noxious Weed Control Board and county noxious weed boards maintains lists of noxious weeds.

Noxious weed lists are also maintained by the MBSNF and WNF. The MBSNF identifies 11 forb species and the WNF identifies 21 forbs and 1 shrub (Scotch broom) as noxious weeds of these national forests (Potash 1991, Smith-Kuebel and Lillybridge 1993). The MBSNF has reported that knapweeds and orange hawkweed are prevalent in the Snoqualmie Pass area, and that the I-90 corridor is a serious noxious weed problem area (MBSNF 1995). The Yakima River watershed analysis identifies ox-eye daisy, Scotch broom, and orange hawkweed along the pipeline corridor (WNF 1997). Other noxious weeds common to eastern Washington include diffuse and spotted knapweed, yellow star-thistle, yellow toadflax, rush skeleton weed, and Canada thistle.

3.3.2 Environmental Consequences

3.3.2.1 Proposed Petroleum Product Pipeline

Construction Impacts. The following discussion of vegetation impacts is based on construction-related loss of vegetation, when ground breaking disturbance and vegetation removal would occur. Functions related to vegetation such as wildlife use, soil retention, water quality, recreation, and aesthetics are discussed in other sections of the EIS.

Types of Construction Impacts. Construction impacts can be characterized as temporary or permanent. Permanent impacts occur where vegetation would be removed for permanent structures (pump stations and terminal facility). Temporary impacts represent the time required for vegetation to reestablish where disturbance has occurred from placement of the pipeline and staging areas.

Direct construction impacts would occur from the placement of the pipeline in the ground and construction of the five remote pump stations and the Kittitas Terminal. Pipeline construction impacts on vegetation would occur within a designated 18.3 m (60-foot) construction corridor. Construction activities within the corridor would result in the removal of vegetation from digging and grading; trampling of shrub and herbaceous vegetation by vehicles, construction materials, and workcrews; and potential breaking or damaging branches of trees overhanging the corridor.

Construction impacts would also include the potential damaging effect of compacted soils from vehicle use. Compacted soils may damage root systems of shallowly rooted plants and restrict the infiltration of water into the soil.

Acreage of Plant Communities Affected. Total construction impacts on upland plant communities would be approximately 547 ha (1,353 acres), with the majority of impacts associated with clearing and grading 530 ha (1,310 acres) for the pipeline placement (Table 3.3-7). Approximately 15 ha (37 acres) of vegetation would be permanently removed by construction of the pump stations and Kittitas Terminal.

Table 3.3-7. Pipeline Construction Impact Area on Plant Communities Within the 60-Foot-Wide Construction Corridor

Cover Types	Impact Acreage
Western hemlock	38.6
Silver fir	1.0
Mountain hemlock	0.0
Douglas-fir	2.0
Ponderosa pine	2.2
Deciduous forest	4.9
Mixed forest	3.7
Young (regenerating) coniferous forest	51.9
Old-growth coniferous forest	0.0[a]
Scrub-shrub	207.6
Shrub-steppe	541.7
Grass/forb	10.6
Cropland	275.1[b]
Hay/pasture	150.1
Orchard	6.8[b]
Developed (vegetated)	13.8
Total	1,310.0

[a] The route avoids impacts to old-growth forest.
[b] Most impacts to agricultural land will occur prior to the growing season.

Source: OPL 1998.

Permanent impacts associated with the pump stations and the Kittitas Terminal include 2.8 ha (7 acres) of weedy grass and forb cover (with a small number of second- and third-growth conifer trees), and 12.1 ha (30 acres) of cropland. Directional drilling work areas at the Columbia River crossing would affect about 1.2 ha (2.9 acres) of shrub-steppe plant communities that have been degraded from previous development projects, including construction of the Wanapum Dam and installation of electrical transmission lines.

The pipeline construction impacts on plant communities within the 18.3 m (60-foot) construction corridor are shown in Table 3.3-7. Impacts on the different vegetation cover types along the 372 km (231-mile) corridor can be summarized as follows:

- Approximately 109 km (68 miles) of the pipeline corridor would impact communities in maintained BPA ROW or along abandoned railroad beds that are dominated primarily by scrub-shrub, young forest, or shrub-steppe vegetation.

- Approximately 217 km (135 miles) of the corridor would impact vegetation in areas where the construction corridor does not directly overlap with an existing road, trail, or maintained utility corridor. Within the 217 km (135 miles), impacts would occur on approximately 16 km (10 miles) of forest cover (including young regenerating forests in clearcut areas), 124 km (77 miles) of shrub-steppe, 64 km (40 miles) of agricultural land, and 13 km (8 miles) of the other miscellaneous plant communities.

- Vegetation impacts would not occur on approximately 45 km (28 miles) of the corridor where the pipeline follows existing trails or corridors and vegetation does not exist (Cedar Falls Trail, Homestead Valley Road, John Wayne Trail, Tinkham Road, and Snoqualmie Pass Tunnel).

The most substantial impacts would occur where new corridors are established in forested vegetation near streams, and on shrub-steppe vegetation. Cutting new corridors would result in the loss of forest in riparian areas at stream crossings such as the Tolt River, Griffin Creek, Tokul Creek, and Humpback Creek. Construction would result in the loss of the existing forest vegetation structure of overstory trees and understory vegetation in these areas. A permanent loss of forested conditions is considered a moderate impact near salmon-bearing streams and/or riparian areas. Revegetation would occur after construction, but a 9.1 m (30-foot) maintenance corridor would be maintained in scrub-shrub; trees would be planted outside this maintenance corridor.

Half of the 18.3 m (60-foot) construction corridor at all other forested areas along the construction corridor would be replanted with native forest vegetation after construction. However, there is still a minor impact because of the long time needed for the plantings to replace the existing forest condition. Revegetation efforts would be most successful in those areas with (1) sufficient topsoil, (2) soils with low percentage of cobbles and rocks, (3) not highly erosive conditions, and (4) absence of weeds in the surrounding area. Species that would be used for revegetation of eastern and western Washington forests are specified in the vegetation technical report (Dames & Moore 1997).

Approximately 218 ha (540 acres) of shrub-steppe would be disturbed. Although the majority of the shrub-steppe plant communities are somewhat degraded, approximately 26 percent of the shrub-steppe community impacted is dominated by native shrubs and grasses (Table 3.3-8). The disturbance of shrub-steppe communities dominated by native shrubs and grasses represents a moderate impact because restoring these communities is difficult and long term. Lost botanical resources would include the likely decrease in cover of native perennial grasses and the cryptogam crust. Exposure of soil on disturbed sites would create areas where cheatgrass and other non-native grasses could establish. Disturbance of the cryptogan crust could affect soil erosion. Impacts on soil and the related impacts of sedimentation on water quality are discussed in Sections 3.2 and 3.7.

Table 3.3-8. Pipeline Construction Impact Area on Shrub-Steppe Plant Communities Within the 60-Foot-Wide Construction Corridor

Plant Community	Impact Area (acres)	Percent of Total Impact Area
Communities Dominated by Native Shrubs and Grasses		
Sagebrush/native grasses	92.1	
Sagebrush/rabbitbrush/native grasses	27.3	
Native grasses	15.1	
Bitterbrush/rabbitbrush/native grasses	2.8	
Wildrye grass	3.9	
Subtotal	141.2	26%
Communities Dominated by Native Shrubs with Nonnative and Native Grasses		
Sagebrush/rabbitbrush/cheatgrass	47.5	
Buckwheat/native and nonnative grasses	10.8	
Bitterbrush/sagebrush/native and nonnative grasses	28.8	
Sagebrush/rabbitbrush/cheatgrass/native grasses	34.7	
Bitterbrush/native and nonnative grasses	42.3	
Sagebrush/cheatgrass/native grasses	81.3	
Rabbitbrush/buckwheat/native and nonnative grasses	5.0	
Cheatgrass	14.4	
Sagebrush/cheatgrass	70.0	
Rabbitbrush/cheatgrass	23.8	
Sagebrush/spiny hopsage/native and nonnative grasses	0.8	
Sagebrush/buckwheat/native and nonnativegrasses	25.5	
Greasewood/sagebrush/cheatgrass	7.1	
Greasewood/cheatgrass	0.7	
Subtotal	392.7	73%
Shrub-steppe unknown*	5.8	1%
Total	539.7	100%

Note: The total shrub-steppe impact in Table 3.3-7 is somewhat greater than the total area for detailed shrub-steppe community impacts shown above. This is due to the minimum mapping units between the two GIS coverages, which result in a cumulative difference of approximately 2 hectares (4.9 acres).

* Permission to access property denied.

Source: Plant communities and impact areas provided by OPL 1998.

Natural recovery times to reestablish a cryptogam crust on the shrub-steppe communities can be long term, 14 to 85 years, where crust has been heavily trampled or completely removed (Kaltenecker and Wicklow-Howard 1994).

To minimize the effects of the construction on shrub-steppe communities, OPL proposes to revegetate the construction corridor using a native seed mix that includes big sagebrush, stiff sagebrush, bluebunch wheatgrass, Sandberg's bluegrass, and Idaho fescue. The effectiveness of seeding native shrub-steppe vegetation would be limited by the aggressive growth of cheatgrass and other non-native species and dry soil conditions present in the shrub-steppe communities. The success of cheatgrass establishment on disturbed sites is apparently due to its winter root growth which gives it a spring and early summer advantage over native perennial grasses (Barbour 1980).

An Oregon white oak plant community is located near Swauk Creek east of Cle Elum in Kittitas County. Oregon white oak communities are considered a priority habitat by WDFW. The pipeline corridor would avoid cutting stands of this plant community, although a few individual trees could be removed during construction. The pipeline corridor would avoid most Oregon white oak stands and the removal of a few trees is considered a minor impact.

Impacts on aspen groves and talus slopes would be avoided because the pipeline corridor would not cross through these habitat types.

Impacts on the grass/forb, young regenerating forest, and developed (vegetated) plant communities are considered minor because:

- The impact area would be relatively small.
- Grass/forb and vegetated developed communities are composed primarily of non-native species along roads, vacant lots, and lawns.
- Disturbed areas would be revegetated with native or naturalized species that can be easily planted and maintained to preconstruction conditions (species used for revegetation are specified in the vegetation technical report, Dames & Moore 1997).
- The majority of the scrub-shrub plant community impacts would occur along the BPA ROW. Many of these scrub-shrub communities have been maintained in this condition by ROW maintenance activities and would be relatively easy to revegetate to these conditions. Scrub-shrub plant communities, however, are also associated with riparian areas in western and eastern Washington. Loss of riparian areas would be minimized along streams by replanting the corridor with native shrubs common to the affected site. A 3 m (10-foot) wide zone in riparian areas adjacent to streams would not be replanted to maintain a narrow corridor for visual inspection.

Impacts to vegetation would be avoided where the pipeline corridor utilizes an existing road or trail and no vegetation would be removed. Specialized construction equipment would be used so vegetation adjacent to the road or trail would not be cleared. Impacts would also be avoided by

using existing roads to access work areas. In addition, OPL would mark the edges of the 18.3 m (60-foot) construction zone with fencing to limit construction activities to the construction corridor.

For all upland communities to be restored, a 5-year monitoring program would be implemented. A monitoring plan would be developed that describes performance standards for plant cover and survivorship, percent cover allowable for invasive species, damage that may have occurred to existing vegetation along the construction corridor, erosion of topsoil, and other impacts. Contingency plans would also be included if revegetation efforts do not meet performance standards and measures are required to correct other impacts (e.g., damaged vegetation or erosion).

Threatened and Endangered Plant Species. No impacts on threatened, endangered, or candidate plant species are expected because no such species were identified during field surveys.

Sensitive Plant Species. Populations of sensitive plant species that would be lost during construction because they are located within the construction corridor include the following:

- one population of pauper milk-vetch (state sensitive species) in Kittitas County; and
- two populations of Piper's daisy (state sensitive) located in Grant County and one population in Adams County.

Although fewer than 100 plants would be lost, which represents a small percentage of the known number of these species in Washington, this impact is considered moderate because it contributes to the loss of state sensitive plant species. This impact could be eliminated or reduced by conducting additional field studies to reroute or narrow the construction corridor, and avoid the majority of Piper's daisy and pauper milk-vetch located along the corridor. (The two species are not USFS sensitive species.)

Survey and Manage Plant Species. Construction of the proposal is not expected to have any negative effect on survey and manage plant species because forest with old-growth characteristics, or habitat for plant species associated with old-growth forest or late-successional habitat, would not be affected. The no adverse effect conclusion for this proposed project is consistent with the USFS Northwest Forest Plan and the Snoqualmie Pass Adaptive Management Area Plan (USFS/USFWS 1997).

Approximately 0.2 ha (0.5 acre) of young second-growth conifer forest would be cut in an LSR land designation. The second-growth forest condition in the new corridor does not represent the specific old-growth habitat associations described for the lichen and fungi species in Table 3.3-6. However, until ecologists learn more about these species through additional field studies, it is presumed that survey and manage species could occur in areas other than old-growth forest. Field surveys were conducted for survey and manage plant species that are also listed as USFS sensitive plant species; these species were not found where the proposed route occurs in LSR designations.

The known occurrence of the fungus noble polypore would not be affected because the corridor primarily follows an existing road/railroad bed within the management area around the

fungus. The section of forest corridor to be cleared for the pipeline occurs in second-growth forest without the microsite habitat requirements where the fungus population could potentially expand.

The impact of constructing the pipeline through second-growth forest in the area of the noble polypore is not considered a significant impact because of (1) the small area of forest temporarily disturbed, and (2) the area to be impacted is dominated by plant species commonly found throughout the western Cascades. However, the impact of cutting vegetation in an LSR land-use designation is discussed in Section 3.12, Land Use.

Unique Communities. A high-quality, native shrub-steppe community dominated by sagebrush and native grasses with an intact cryptogam crust would be impacted by construction activities. Approximately 0.8 ha (2 acres) of this community type along the steep banks on the east side of the Columbia River would be affected. This is considered a moderate impact because of the rarity of this type of habitat in Washington.

Although the site would be revegetated with native shrub-steppe species after construction, restoration of disturbed shrub-steppe communities is difficult and long-term. Natural recovery times to reestablish the elements of a native shrub-steppe community (e.g., cryptogam crust and native shrubs and grasses) can be up to 85 years as previously mentioned. In addition, the disturbed site would create areas where invasive weeds could potentially grow and become a weed source.

Noxious Weeds. Plant species listed as noxious weeds could invade sites disturbed by construction activities. OPL would implement the following measures to reduce the impact of noxious weeds to a minor level:

- Check vehicle tires and undercarriages when entering or leaving a work site, knock and wash off mud and remove weeds, soil, seeds, and all vegetation material from vehicles; keep equipment clean and free of weeds and seed.

- Use weed-free certified straw bales instead of hay bales for erosion control to limit the number of weed seeds introduced to disturbed areas.

- Replant trees and shrubs in all appropriate disturbed areas outside the maintained corridor to shade out undesirable grasses and weeds.

- Use only noxious-weed-free seed and weed-free mulch for revegetation sites.

- Cooperate with the Washington Noxious Weed Control Board in designing and implementing other methods to control the spread or introduction of noxious weeds.

Operational Impacts. Operational impacts would be associated with the periodic removal of vegetation for maintenance of the line. In addition, there is a possibility of pipeline breaks and spills as discussed below.

Corridor Maintenance. Maintenance of the pipeline corridor would require the permanent removal of trees and some shrubs growing within a 9.1 m (30-foot) corridor. As

previously mentioned, a 3 m (10-foot) corridor would be maintained in riparian areas adjacent to streams. This would be done to allow visual inspection of the pipeline from the air and to prevent the roots of woody vegetation from damaging the pipe. Plant communities and area affected by the clearance are shown in Table 3.3-9.

Table 3.3-9. Operational Impact Area on Plant Communities Within the 30-Foot-Wide Maintenance Corridor

Cover Types	Impact Acreage
Western hemlock	21.1
Silver fir	1.0
Mountain hemlock	0.0
Douglas-fir	1.2
Ponderosa pine	1.1
Deciduous forest	3.3
Mixed forest	3.7
Young (regenerating) coniferous forest	27.9
Old-growth forest	0.0
Scrub-shrub	105.1
Shrub-steppe	0.0
Orchard	3.0
Developed (vegetated)	6.6
Total	174.0

Source: OPL 1998.

Vegetation clearing along the pipeline would be done by cutting vegetation with mechanical mowers and tree trimmers. EPA-approved herbicides may be used for weed control within the pump station areas owned and maintained by OPL. Because of the methods used for weed control, no impacts from herbicides would affect sensitive resource areas such as riparian zones, wetlands, sensitive plant and animal locations, recreation use areas, and urban areas.

Vegetation removed from the construction corridor during construction or maintenance would be disposed of per the request of the specific landowner in a manner consistent with state and federal requirements. Options for disposal could consist of burning, hauling to a dump site approved for vegetation material, or stacking onsite. Burning would require acquiring appropriate state and federal permits and would be subject to timing restrictions to reduce fire hazard and local air quality degradation.

Plant communities not affected by the maintenance clearing would be herbaceous plant communities, agricultural land, developed land, and shrub-steppe vegetation. These areas would be allowed to regrow naturally once the pipeline is installed.

Maintenance of 9.1 m (30-foot) wide visual corridor would result in (1) the permanent loss of approximately 66.5 ha (164 acres) of forested and scrub-shrub vegetation where native plant species occur, and (2) the permanent removal of riparian vegetation along streams (see Section 3.6, Water and Section 3.7, Fisheries). Although the vegetation removal represents a permanent loss, it would occur within the scrub-shrub plant community along the BPA corridor and in second-growth or young regenerating forest plantations. This represents a minor impact.

Spills. Potential impacts resulting from a spill are difficult to determine because the location and extent of a potential spill are unpredictable, except in terms of risk (see Appendix A, Spill Risk Information, and Section 3.18, Health and Safety). However, all plants are vulnerable to the effects of a product spill. Effects on vegetation would depend on whether a spray or high-volume point spill occurred.

Low-volume sprays or spills that contact foliage and move quickly over the soil surface (and do not penetrate the soil surface into the root zone) would likely have a toxic effect on herbaceous plants. Leaves and young shoots of trees and shrubs could also be killed by a spray.

High-volume spills that are distributed over the soil surface and penetrate the root zone would likely kill trees and shrubs that are shallowly rooted. Regrowth of woody species would depend on whether the entire root system was killed or if plants such as willow and alder could resprout from remaining root material. Recovery times from areas subject to a high-volume spill would depend on (1) the ability of desirable species to revegetate the site after the product in the soil has degraded to less than toxic concentrations, and (2) the type of plant community affected. Forested and shrub communities would require longer to reestablish the tree and shrub canopies compared to the reestablishment of an herbaceous community.

Over time, there is a substantial reduction in the concentrations of fuel spilled in soils after the spill occurs (Green et al. 1996, Piotrowski et al. 1992). The recovery time depends upon the concentrations in the soil. Study of a diesel fuel spill effects on herbaceous and shrub vegetation at an Alaskan air force station over two successive growing seasons after the pipeline ruptured showed significant reductions in concentration of spilled fuel were achieved and appreciable regrowth of the vegetation was observed in the affected areas (Piotrowski et al. 1992). However, research on the effects of crude oil spills indicates recovery of herbaceous and conifer vegetation can take several years and longer (Clark and Ward 1994, Collins et al. 1994). The proposed line would contain products that are heavier than the light aromatics present in crude, yet much lighter than the tar residuals remaining after a crude oil spill. Thus, short-term toxicity of a product spill might be similar to crude while longer term toxicity of product near the surface would be less, due to evaporation and degradation. Implementation of the spill recovery plan would reduce impacts on vegetation.

An oil spill from the line which leaves the corridor ROW could affect unique, sensitive, or threatened and endangered plant species. A location for such a spill cannot be predicted. The probability of such a spill is discussed in Section 3.18.

Threatened and Endangered Plant Species. No impacts are expected to occur from routine operation of the line because no federally listed threatened, endangered, or candidate plant species were found within the construction corridor.

Sensitive and Survey and Manage Plant Species. Operational impacts are not expected for sensitive plant species or survey and manage plant species. Survey and manage plant species are located approximately 0.04 to 0.8 km (0.01 to 0.5 mile) away from the operational ROW and would not be affected by operational activities.

Sensitive plants located in the shrub-steppe plant communities that were avoided during construction would also be avoided during any maintenance operations along the corridor. Additionally, shrub-steppe vegetation would not be removed to conduct inspections, and therefore no operational impacts would occur on sensitive plants in the shrub-steppe plant communities.

Unique Communities. The long-term impacts of reestablishing native shrub-steppe plant communities are discussed above under construction-related impacts. Although the operational activities would not occur along the portion of the high-quality native shrub-steppe community located east of the Columbia River, the disturbed nature of the site would encourage the invasion of noxious weeds and other undesirable non-native plant species.

Noxious Weeds. OPL would cooperate with the Washington State Noxious Weed Control Board, local county noxious weed representatives, and the USFS (if activities occur on federal lands) to identify specific means to control noxious weed infestations. Control methods would incorporate an integrated vegetation management approach where a combination of mechanical, biological, or chemical methods would be used to eradicate noxious weeds.

Columbia River Approach Options. The option south of I-90 through the YTC and west of the proposed route (as the route turns south to cross the Columbia River) would impact 3.8 ha (9.5 acres) of shrub-steppe vegetation more than the proposal (north of I-90 and south to cross the Columbia). Therefore, this option would have a slightly greater impact on this vegetation type. Shrub-steppe vegetation south of I-90 is used for military exercises in the YTC and livestock grazing. It is dominated by big sagebrush, bitterbrush, and a mix of native and non-native grasses.

This option south of I-90 would also impact an additional 1.6 ha (3.9 acres) of hay/pasture and 1.3 ha (3.3 acres) of grass/forb communities more than the proposed route (north of I-90). Placing the route inside the fence line of the YTC and closer to I-90 would result in similar impacts on shrub-steppe vegetation as this alternative.

Impacts on sensitive plant species would be greater for the alternative south of I-90 and through the YTC than for the proposed pipeline corridor. Two populations of Hoover's tauschia located during field surveys along an alternative route through the YTC would be impacted. Two populations of Hoover's tauschia identified by a WNHP rare plant inventory as being located on the YTC (Salstrom et al. 1995) would be avoided by a segment option that runs closer to the fence line.

No threatened and endangered plant species or plant communities meeting the criteria as unique communities would be affected by the segment options through the YTC.

Columbia River Crossing Options. A segment option that crosses the Columbia River using the Burlington Northern Beverly Railroad Bridge would impact 17 ha (42 acres) of shrub-steppe vegetation more than the proposed crossing below the Wanapum Dam. This assumes the railroad bridge alternative crossing would extend south from the proposed route along the Columbia River to the bridge. Shrub-steppe vegetation in this area is used for livestock grazing and is dominated by big sagebrush, bitterbrush, rabbitbrush, cheatgrass, and some native grasses.

Impacts on sensitive plant species by using the Burlington Northern Beverly Railroad Bridge crossing option could be greater than for the proposed route. Two populations of desert evening primrose, a state sensitive species, are located along the railroad bridge crossing alternative route. Columbia milk-vetch, a state threatened species, occurs along alternative segments for approaching a southern crossing of the Columbia River. The impacts could be avoided by narrowing the construction corridor between the desert evening primrose populations to leave the populations undisturbed by construction activities, and avoiding those alternative segments where the Columbia milk-vetch occurs.

No threatened and endangered plant species, or plant communities meeting the criteria as unique communities, would be affected by the segment options.

Vegetation impacts related to crossing of the Columbia River at the I-90 Bridge and a wet trench crossing north of the I-90 Bridge would be slightly greater than those described for the proposed route. The wet trench crossing would impact an additional 6.0 ha (14.9 acres) of shrub-steppe vegetation and 4.9 ha (11.6 acres) of cropland, hay/pasture, and grass-forb vegetation than the proposed route. The I-90 Bridge crossing would impact only an additional 1.1 ha (2.6 acres) of shrub-steppe vegetation and 1.8 ha (4.4 acres) of cropland and hay/pasture than the proposed action.

Cumulative Impacts. Construction of the project would not significantly contribute to the permanent loss of natural vegetation communities in Washington. The majority of impacts would be temporary because revegetation would occur on the proposed route. However, 15 ha (37 acres) of weedy cover and degraded shrub-steppe would be permanently lost from the construction of pump stations and terminal facilities. In addition, approximately 67 ha (164 acres) of forested and scrub-shrub vegetation cover would be permanently lost from maintaining a 9.1 m (30-foot-wide) maintenance corridor along the proposed route.

Construction of the pipeline would contribute to the decline of shrub-steppe habitat conditions. Approximately 57 ha (141 acres) of shrub-steppe communities dominated by native grasses and shrubs in eastern Washington would be disturbed by project construction. The amount of shrub-steppe communities with native species as dominants is approximately 5 percent of its historic extent in the state based on estimates by the Washington Natural Heritage Program. The difficulty in restoring shrub-steppe communities after pipeline construction could contribute to the overall loss of higher quality shrub-steppe vegetation.

Cumulative vegetation impacts could happen if other actions along the alignment were just completed or begin just before or after the OPL line is built. Revegetation activities in a state of recovery could be destroyed. Routine vegetation management and other ROW maintenance would occur along existing ROW in addition to OPL maintenance. Mechanical activities such as vehicle use,

human access, and vegetation cutting are minor impacts and routine. Herbicide application, however, could be cumulative if applied by each party along their own ROW. In general, OPL would minimize herbicide use in favor of mechanical clearing. If herbicides are to be used, OPL should develop a vegetation management plan which recognizes the activities of other ROW partners and does not contribute to additional chemical impacts.

3.3.2.2 No Action

Under the No Action Alternative, impacts from the proposal would not occur, although operational impacts from the existing system would continue. Vegetation along freeways and other roadways would be exposed to trucks that could spill product from the tanks onto roadside vegetation, and the risk would increase slightly each year as more trucks continue to use the roadways for delivery. No terrestrial impacts would occur from barge operation or barge spill.

3.3.3 Additional Proposed Mitigation Measures

3.3.3.1 Construction Mitigation and Subsequent Impacts

Additional mitigation measures that OPL should implement are as follows:

- Ensure the existing occurrence of noble polypore is not affected by the construction activities and no impacts occur to the species. A biologist familiar with the species should be present during construction to ensure construction activity does not occur beyond the designated construction limits, to reduce the possibility of inadvertently damaging the species or nearby potential habitat.

- Ensure noxious weed infestations remain a minor impact by conducting a post-construction weed inventory 1 year after construction to determine the extent to which noxious weeds may have invaded disturbed areas. Develop and implement a noxious weed control plan approved by the state and local county noxious weed control boards. The plan would address short-term (1-year post-construction) and ongoing long-term methods to control noxious weeds, monitoring methods, criteria to determine if noxious weeds are becoming a problem, and contingency plans to treat infestations of noxious weeds.

- Salvage and stockpile topsoil at all vegetation communities in separate stockpiles from subsoil. Replace the topsoil in its original position in the soil profile. This will help ensure impacts on vegetation communities remain at minor or moderate impact levels as previously discussed.

- Fence locations of sensitive plants that are to be avoided and use an onsite biological monitor at those locations during construction activities to ensure sensitive plants are not disturbed and no impacts on sensitive plants occur.

- Avoid Oregon white oak trees where possible. If trees are cut, replace trees removed during construction with trees propagated from acorns collected onsite at a 2:1 ratio of those trees cut along the pipeline corridor. Planting would occur outside of the 9.1 m (30-foot) maintenance corridor. Revegetation of oak trees would reduce the minor impact to a negligible impact.

- Include bitterbrush in the shrub-steppe seed mix where the species is part of the natural community which would be disturbed. Shrub-steppe impacts would remain a moderate impact because of the difficulty in restoring this plant community and time lag in restoring to pre-construction conditions. Include an onsite seed collection program and propagate container-grown plants to plant in those portions of the shrub-steppe communities that are high-quality, native plant communities.

- Before ground disturbance begins, prepare a revegetation plan that specifies plant material size, planting densities, planting methods, seed mixes, application rates, timing of planting, and seed application. Include willow wattling as a revegetation technique on those riparian areas where revegetation could help stabilize streambanks and reduce erosion. Monitor the revegetation plantings to ensure the revegetation plan is implemented as designed.

- Prepare a contingency plan before construction begins that addresses revegetation performance standards and measures to be taken if standards are not achieved.

- The revegetation and contingency plans would be reviewed and approved by the USFS, BLM, EFSEC, and other state and federal agency whose lands owned by those agencies would be affected by the pipeline.

3.3.3.2 Operational Mitigation and Subsequent Impacts

No additional operational mitigation measures are recommended.

LIST OF ACRONYMS

LIST OF CITATIONS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES