Appendix B

Botanical Resources Technical Report for the Conservation and Renewable Energy System

Columbia Wind Farm #1 EIS

Submitted to:

Bonneville Power Administration Portland, OR

Submitted by:

Jones & Stokes Associates, Inc. Bellevue, WA

February 3, 1995

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Submitted to:

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Table of Contents

 1.0 EXECUTIVE SUMMARY 2.0 PROJECT DESCRIPTION 3.0 STUDY METHODS 3.1 Consultation and Preliminary Data Review 3.2 Field Methodology 	1 3 5 5 6
2.2 Fieldwork Implementation	0
	7 10
4.0 AFFECTED ENVIRONMENT	10
4.1 FIORSIC Setting	10
4.2 Special-Status Plant Species	10
4.3 Vegetation Communities	10
4.3.1 Douglas' Buckwheat/Sandberg's Bluegrass Vegetation Community	
	11
4.3.2 Idaho Fescue/Bluebunch Wheatgrass Vegetation Community	12
4.3.3 Oregon White Oak/Ponderosa Pine Vegetation Community	13
4.3.4 Rangeland Pasture	13
4.4 Culturally Important Plant Species	14
5.0 ENVIRONMENTAL CONSEQUENCES AND MITIGATION	
MEASURES	15
5.1 Environmental Consequences	15
5.1.2 Analysis	15
5.1.3 Cumulative Impacts	19
5.2 Mitigation Measures	20
6.0 REFERENCES	21
6.1 Citations	21
6.2 Personal Communications	22
7.0 GLOSSARY AND ACRONYMS	23
7.1 Glossary	23
7.2 Acronyms	24
	<u> </u>

Appendix A. List of Culturally Important Plant Species

Appendix B. Species List - CARES Site

i

Table	Page
1	Special-Status Plant Species Identified during Presurvey Investigations
2	Summary of Impact Area on Vegetation Communities
Figure	Page
1	Vicinity Map 4
2	Location of Transects in the Study Area follows 6
3	Vegetation Communities in Study Area, CARES Project Site

1.0 EXECUTIVE SUMMARY

Jones & Stokes Associates conducted botanical investigations of the Conservation and Renewable Energy Systems (CARES) project site from April through July 1994. Presurvey investigations were conducted to gain information regarding potential special-status plant species and vegetation communities that might exist on the project area. Field surveys were conducted to determine the presence of special-status plant species, map and describe potential vegetation communities, and document the presence of other species onsite, including culturally important species. Field surveys also were used to identify possible mitigation measures as a means to reduce potential project impacts to botanical resources.

Floristically, the project area is located in the Columbia Basin Province dominated by shrub-steppe grassland vegetation (Franklin and Dyrness 1988). Completion of the presurvey and field investigations documented that the project area is dominated by native bunchgrass communities. Vegetation communities which were observed on the project area included the following:

- Eriogonum douglasii/Poa secunda (Douglas' buckwheat/Sandberg's bluegrass);
- Festuca idahoensis/Agropyron spicatum (Idaho fescue/bluebunch wheatgrass);
- Quercus garryana/Pinus ponderosa (Oregon white oak/ponderosa pine); and
- rangeland pasture.

Field surveys also determined that no special-status plant species were found on the study area.

Native grass and forb species are the dominant species present. Native bunchgrass such as Idaho fescue and Sandberg's bluegrass are the dominant species with other grasses such as bluebunch wheatgrass, needlegrass, and brushy squirrel tail present. Forbs and low shrubs such as Astragalus, lupine, yarrow, buckwheat species, daggerpod, desert parsley, showy phlox, longleaf phlox, pussytoes, Lithophrgma, and stiff sagebrush are present. Other woody species distributed across the project area include rabbit brush, western juniper, western service berry, Oregon white oak, and ponderosa pine.

The Douglas' buckwheat/Sandberg's bluegrass, Idaho fescue/bluebunch wheatgrass, and Oregon white oak/ponderosa pine communities mapped on the project area would likely qualify as a native, natural community as defined by Washington Natural Heritage Program (WNHP). These communities are not regulated by state or federal laws, but they are considered priority habitats by the Washington Department of Fish and Wildlife and WNHP.

The project area has been relatively undisturbed with development and heavy grazing pressure. The predominance of native plants, presence of a relatively undisturbed cryptogam crust on the soil surface, and the size of the communities meet the WNHP's criteria for a native, natural community. Because of the predominance of the ungrazed native bunchgrasses and the reduced extent of these communities in the Columbia Basin

Province, the native bunchgrass communities represent a relatively large area of important vegetation communities, as defined by WNHP criteria.

Implementation of the project would result in moderately significant impacts to the vegetation resource. Impacts include the following direct impacts: removal or disturbance of approximately 38 hectares (95 acres) of vegetation, including 32 hectares (80 acres) of native, natural communities, from project construction and the initiation of development into relatively undisturbed native vegetation communities. Indirect impacts to vegetation are associated with impacts that could occur in the future. Ongoing activities that are required to maintain the site's function of producing wind power could result in vegetation trampling and removal of vegetation. This disturbance could create areas where invasive weeds could establish and provide a continual source of weed seed in the project area.

Potential mitigation measures that could be implemented to reduce the impact include the following:

- Minimize the amount of construction traffic over the area by preparing a site access plan showing traffic routes and utilizing existing roads.
- Prepare a revegetation plan for areas temporarily disturbed by construction of underground lines and other activities. The revegetation plan would specify means to reseed the area with native grasses and forbs and to salvage topsoil and bunchgrass plant material. The plan would be implemented immediately after the temporary impacts had occurred.
- Preserve the remaining vegetation resources in the project area by maintaining the low level of livestock use after the project facilities are operating.
- Locate construction staging areas in locations that minimize impacts to native bunchgrass communities.
- Limit to the extent possible, vehicle access during wet periods and the early growing season (generally November through May) to minimize soil disturbance and damage to plants.
- Compensate for the loss of the native, natural bunchgrass habitat by restoring rangeland areas within the project site in coordination with agencies and restoration ecologists familiar with the bunchgrass vegetation communities.

2.0 PROJECT DESCRIPTION

The Columbia Wind Farm #1 project, proposed by CARES and FloWind, Inc., would be composed of 91 AWT-26 wind turbines generating 25 megawatts (MW) of electricity at any one time (an annual average of 7 MW). The CARES project site is 395 hectares (975 acres) located in the Columbia Hills, situated north of the Columbia River about 10.5 kilometers (6.5 miles) south of Goldendale in Klickitat County, Washington (Figure 1). The site is currently rangeland, with a radio facility located at the apex of Juniper Point. CARES is a consortium of eight Washington state public utility districts and FloWind is a wind energy developer. CARES would be the project owner and utility sponsor. As a contractor to CARES, FloWind would assist in project development and initial project operations. The Bonneville Power Administration (BPA) would purchase the 25 MW of electricity generated by the project and would provide the financial guarantee for bond financing.

The CARES project AWT-26 wind turbines are each rated at 275 kilowatts and generally operate in winds between 21 and 89 kilometers per hour (kph, or 13 and 55 miles per hour [mph]). The turbines would be arranged in 11 rows (i.e., turbine strings) in a southwest to northeast configuration. The turbines have two-bladed rotors that are 26.2 meters (86 feet) in diameter, or 13.1 meters (43 feet) in radius. The rotors are attached to a horizontal-axis generator, mounted at the top of a tubular tower, and operate downwind of the towers. The tubular towers measure approximately 43 meters (140 feet) tall and 0.9 meter (3 feet) in diameter, resulting in the blade rotating sweep reaching from about 30 to 56 meters (98 to 184 feet) above the ground.

The project would also include associated power collection and transmission lines, transformers, electrical substation, operations building, and access roads. As much as 10% of the site would be disturbed during construction and about 5% would be occupied during facility operation. The power collection and transmission system would consist of approximately 3,962 meters (13,000 feet) of underground trench, 5.6 kilometers (3.5 miles) of overhead 24 kilovolt (kV) line, and 4.0 kilometers (2.5 miles) of overhead 115 kV line. Approximately 2.4 kilometers (1.5 miles) of the 115 kV line would extend offsite to connect with an existing Klickitat County Public Utility District (PUD) #1 transmission line, which then connects to BPA's Goldendale substation. All overhead transmission lines would be built to meet or exceed appropriate raptor protection standards. Each turbine string would be served by an access road and the existing jeep trail would be made into an engineered main access road. A sediment and erosion control plan would be developed and implemented.



BPA/WA#1 CARES EIS 02/03/95p

3.0 STUDY METHODS

Jones & Stokes Associates conducted botanical investigations of the CARES project site from April through July 1994. Presurvey investigations were conducted to gain information regarding potential special-status plant species and vegetation communities that might occur on the project area. Field surveys were conducted to determine the presence of special-status plant species, map and describe potential vegetation communities, and document the presence of other species onsite, including culturally important species. Field surveys also were used to identify possible mitigation measures as a means to reduce project impacts to botanical resources.

3.1 Consultation and Preliminary Data Review

Before conducting field surveys, Jones & Stokes Associates biologists compiled a list of potential special-status plant species and natural plant communities that might occur in the project area. Species and communities were included if they were known or suspected to occur in the project area. Information used to compile the list was based on a review of botanical information relevant to the project area and consultation with the WNHP (Norwood and Gamon pers. comms.). The Yakima Nation was also contacted to obtain a list of culturally important plants (Robson pers. comm.)

Information which was reviewed during the presurvey investigations included the following:

- WNHP fact sheets on potentially occurring special-status plant species describing morphological characteristics and habitat associations (WNHP 1981).
- A special-status plant species list and vegetation communities list developed by R.W. Beck and Associates for a wind farm project that is located adjacent to the CARES project area (R.W. Beck and Associates 1994). The lists were developed based on database searches from the Washington and Oregon Natural Heritage Programs and consultation with state, federal, and Yakima Nation representatives.
- Washington Department of Natural Resources (WDNR) publication of Endangered, Threatened, and Sensitive Vascular Plants of Washington (WNHP 1994).
- Black and white aerial photographs taken August 29, 1993 (2.54 centimeters = 610 meters [1 inch = 2,000 feet]) of the project area.

Other botanical literature which was reviewed included (see reference section) Hitchcock and Cronquist (1973), Washington State University Cooperative Extension (1988), Franklin and Dyrness (1988), and Onsager (1987).

Presurvey investigations also included visiting the University of Washington's herbarium to observe specimens of the potential special-status plant species that could occur on the project site. All field botanists visited the herbarium to better familiarize themselves with morphological characteristics of the potential special-status plant species and review locations where herbarium specimens were collected.

The presurvey list of the special-status plant species that were found to potentially occur in the project area is shown in Table 1. High quality native plant communities that may occur in the project area include:

- Bluebunch wheatgrass Sandberg's bluegrass lithosol association;
- Idaho fescue/hounds-tongue hawkweed association;
- Northern buckwheat/Sandberg's bluegrass association; and
- Douglas' buckwheat/Sandberg's bluegrass association.

3.2 Field Methodology

Jones & Stokes Associates used field survey methods recommended by Nelson (1987) to locate and identify vascular plant species in the project area. Based on the review of aerial photographs and topographic maps, a series of transects were located across the study area to serve as a guide for examining the project area. To ensure all vegetation communities would be surveyed, transects in the eastern portion of the study area were laid out in a north-south direction and transects in the western portion of the project area were laid out in an east-west direction (Figure 2).

Transects were spaced systematically approximately 152 meters (500 feet) across the project area to divide the project site into units and reduce the likelihood of repeated coverage, or lack of coverage, of a certain area. Rather than walking a straight line along a transect, biologists used the transect as a guide to walk a meandering path along the unit being searched. Deviations from the transects were also made to investigate any habitats that were unusual or that appeared suitable for the targeted special-status plants. Transect placement excluded the steep slopes on the southern edge of the project area where wind turbine strings would not be located.

During the field surveys, plant species observed along the transect routes were identified and boundaries of vegetation types were mapped on 2.54 centimeters = 610 meters (1 inch = 2,000 feet) aerial photographs. The location and boundaries of vegetation communities on the aerial photographs and topographic maps are approximate because of (1) the small scale of the photographs, and (2) transfer mapping of boundaries from the photography to the maps produces some error.

6



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	Status ^a			
Plant Species	USFWS/WNHP/TNC	Washington Distribution	Habitat Association	
Astragalus arrectus Palouse milk-vetch	-/S/G2G3S1S2	Regionally endemic in Columbia Basin	Exposed rocky ridges, grassy hillsides, and open pine forests	
Astragalus misellus var. pauper Barnaby-pauper milkvetch	-/S/G4T3S3	Regionally endemic in central and southern Washington	Exposed ridges and sagebrush zones	
Collinsia sparsiflora var. bruceae Few-flowered collinsia	-/S/G4T4S1S2	Peripheral in its range in Klickitat County	Open grassy slopes and swales	
Cryptantha rostellata Beaked cryptantha	-/S/G4S1	Peripheral in its range in southeastern and southwestern Washington	Dry open places	
Draba douglasii var. douglasii Douglas' draba	-/S/G4T4S1	Peripheral in its range in Klickitat County	Exposed rocky and shallow soils of dates	
Meconella oregana White meconella	C2/T/G2S1	Scattered in south-central and western Washington	Open oak groves with bunchgrasses such as Idaho fescue	
Navarretia tagetina Marigold navarretia	-/T/G5S1S2	Klickitat County	Dry streambeds and gravelly washes near Columbia Gorge	
Penstemon deustus var. variabilis Hot-rock penstemon	-/S/G5T2S1S2	Regionally endemic in Klickitat County	Dry foothills of lowlands and open grassy slopes	
Ranunculus reconditus Obscure buttercup	C1/T/G2S1	Locally endemic in Klickitat County	Open meadows associated with phlox desert parsley, and buckwheat	

Table 1. Special-Status Plant Species Identified during Presurvey Investigations

7

^a Status Definitions:

- USFWS = U.S. Fish and Wildlife Service
- C1 = Category 1 candidate for federal listing. Category 1 includes species for which the USFWS has on file enough substantial information on biological vulnerability and threats to support proposals to list them.
- C2 = Category 2 candidate for federal listing. Category 2 includes species for which the USFWS has some biological information indicating that listing may be appropriate but for which further biological research and field study are usually needed to clarify the most appropriate status. Category 2 species are not necessarily less rare, threatened, or endangered than Category 1 species or listed species; the distinction relates to the amount of data available and is therefore administrative, not biological.
- S = Sensitive. A vascular plant taxon is labelled sensitive when it is vulnerable or declining and could become endangered or threatened in the state without active management or removal of threats.

TNC Rank. The ranking system developed by The Nature Conservancy facilitates a quick assessment of a taxon's global and state rarity. Each taxon is assigned both a global (G) and state (S) rank of 1 to 5. The rank is based on the number of known occurrences, quality of habitat, number of individuals, population and habitat trends, threats, etc. All state (S) ranks have been assigned by the Washington Natural Heritage Program. Global (G) ranks have been assigned by various state Natural Heritage Programs. The ranks are summarized as follows:

- G = Indicator of global, i.e., rangewide, status
- T = Indicator of status of infraspecific taxa, always used in conjunction with a global rank
- S = Indicator of state status
- 1 = Critically imperiled because of extreme rarity or because it is particularly vulnerable to extinction or extirpation; typically 5 or fewer occurrences
- 2 = Imperiled because of rarity or because it is vulnerable to extinction or extirpation; typically 6 to 20 occurrences
- 3 = Either very rare and local throughout its range or found locally (even abundantly) in a restricted range; typically 21 to 100 occurrences
- 4 = Apparently secure; typically more than 100 occurrences
- 5 = Demonstrably widespread, abundant and secure

3.3 Fieldwork Implementation

Field surveys for special-status plants and vegetation types were conducted on April 27 - 28, May 16 - 17, and July 1, 1994. The survey dates were selected to ensure that the surveys would be the most suitable time of the year (i.e., during flowering and fruiting periods) to search for the special-status plant that might occur in the project area.

Surveys were completed along all transects on April 27-28. Heavy rainstorms on May 17 precluded walking along all of the transects. Transect numbers 14, 15, and 16 were not completed because of the rainstorm. During the last field survey on July 1, all transects plus an additional set of transects spaced in between transects 1 - 10 were walked. This was done to increase the level of survey intensity for two special-status species, hot-rock penstemon (*Penstemon deustus* var. *variabilis*) and Palouse milk-vetch (*Astragalus arrectus*), whose habitats, grassy slopes and dry foothills, are common to the project area.

4.0 AFFECTED ENVIRONMENT

4.1 Floristic Setting

The project area supports vegetation communities that are representative of the physiographic region described by Franklin and Dyrness as the Columbia Basin Province (1988). The topography of this province varies from gently to moderately undulating hills that are dominated by grassland or shrub-grassland vegetation, with small areas of ponderosa pine present in the western and northeastern portion of the province (Franklin and Dyrness 1988). The project area is located in a zone of transition between the shrub-steppe grassland and sagebrush vegetation zone and the lower elevation limits of the ponderosa pine vegetation zone (Franklin and Dyrness 1988).

Floristically, the project area primarily supports native grass and forb species from the shrub-steppe grassland. A much smaller portion of the area supports an Oregon white oak and ponderosa pine forest. The project area's relatively undeveloped landscape and limited grazing activities account for the prevalence in cover of native bunchgrasses and forbs. Much of the area could be characterized as a native, natural plant community as defined by WNHP because of the dominance of native plant species. Criteria for WNHP's native, natural plant community are described in Section 4.3.

4.2 Special-Status Plant Species

None of the special-status plant species identified during the presurvey investigations were observed during the field surveys. No other species identified by WNHP as endangered, threatened, or sensitive species were observed.

4.3 Vegetation Communities

A vegetation community as used in this report identifies an assemblage of plants that form a distinctive system with its own composition, structure, and functions. In general, vegetation communities are the product of local site conditions such as topography, soils, hydrology, and degree of disturbance (natural or artificial). Names given to vegetation communities in this report are similar to plant associations described by Franklin and Dyrness (1988) and Daubenmire (Washington State University Cooperative Extension 1988). A vegetation community may meet WNHP's criteria and be considered a native, natural plant community. WNHP's minimum criteria for an occurrence of a native, natural plant community are as follows:

- native plants dominate the site;
- little or insignificant disturbance to vegetation was caused by human activities; and
- a large enough area exists for within-community processes.

The degree to which these criteria are applied to a site depends on the characteristics of the particular vegetation community present. For example, large but moderately disturbed communities, which are representative of community types that have been lost throughout their range because of various land developments, may need to only meet the first and last criteria (WNPH 1992).

The vegetation communities mapped at the CARES project site are shown in Figure 3 and are described below.

4.3.1 Douglas' Buckwheat/Sandberg's Bluegrass Vegetation Community

This community is found predominately along the top of the ridge by Juniper Point. Smaller areas of this vegetation community are found on the north-facing slopes north of Juniper Point. Of the 274 hectares (678 acres) surveyed, the *Eriogonum douglasii/Poa secunda* (Douglas' buckwheat/Sandberg's bluegrass) vegetation community covers 69.6 hectares (172 acres) in the survey area.

The community is characterized by a mix of low, shrubby vegetation, bunchgrass, and forbs. This community is found on windy, exposed sites with shallow, rocky soils. In areas where vegetation cover is absent, a gravelly and rocky surface or a cryptogam crust is present. Cryptogam crusts are composed of mosses and lichens and indicate a relatively undisturbed vegetation community that has not been degraded from heavy livestock grazing.

Along with Douglas' buckwheat and Sandberg's bluegrass, other plant species found in this community include hood's phlox, threepart sagebrush, daggerpod, pussy-toes, nineleaf desert parsley, pestle parsnip, bitterroot, big-head clover, Astragalus, spring-gold, northern buckwheat, and brushy squirrel tail.

Intermixed in portions of the Douglas' buckwheat/Sandberg's bluegrass community are circular mounds approximately 3 to 6 meters (10 to 20 feet) in diameter with deeper soils than the surrounding community. These soils support a vegetation community similar to the Idaho fescue/bluebunch wheatgrass community described below.



FIGURE 3: Vegetation Communities In Study Area, CARES Project Site

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The Douglas' buckwheat/Sandberg's bluegrass community mapped on the project site would likely qualify as a native, natural community. Because of the predominance of native plants and the reduced extent of this community in the Columbia Basin Province, it represents a relatively large area of an important community as defined by WNHP criteria. The current extent of shrub-steppe vegetation, of which the Douglas' buckwheat/Sandberg's bluegrass community is a part, is estimated to be only 5% of its historic range in the Columbia River Basin (Norwood and Soper pers. comms.)

4.3.2 Idaho Fescue/Bluebunch Wheatgrass Vegetation Community

The Festuca idahoensis/Agropyron spicatum (Idaho fescue/bluebunch wheatgrass) community is the dominant vegetation community in the survey area. This native perennial bunchgrass community is located on the north-facing grassy slopes below the Douglas' buckwheat and Sandberg's bluegrass community. Other areas of this vegetation community are found along the ridge line where deeper soils support the associated plant species. The Festuca idahoensis/Agropyron spicatum vegetation community covers 133.6 hectares (330 acres) of the study area.

The community is characterized by the predominance of a robust stand of bunchgrasses. Vegetation cover in this community is high, with the amount of exposed bare ground less than in the Douglas' buckwheat/Sandberg's bluegrass community. In places where vegetation cover is sparse or absent, a discontinuous cryptogam crust is present.

Idaho fescue is the predominant species, comprising at least half of the vegetation cover within the community. Bluebunch wheatgrass and northern buckwheat are other species common to the community. Northern buckwheat is scattered throughout this community with bluebunch wheatgrass more common in the northern portions of the community. Other species found in this community include grasses such as brushy squirrel tail, and *Stipa* spp. Annual and perennial forbs including western yarrow, pussytoes, balsamroot, clusterlilly, Astragalus, upland larkspur, collinsia, velvet lupine, nineleaf desert parsley, pestle parsnip, showy phlox, longleaf phlox, saxifrage, big-seed desert parsley, lungwort, and Lithophragma were observed.

Woody species occur in this community, although they provide limited cover. Woody species observed include western juniper trees found in some of the drainage ways and on the higher elevations of the grassy north slope. Several small stands of western chokecherry as well as isolated plants of western service berry occur in this vegetation community. Rabbit brush is distributed across most of the community but with low cover.

As described above, this community type is also included as small, circular inclusions in the Douglas' buckwheat/Sandberg's bluegrass community. Although the plant species are similar in the inclusions and the larger community, the cover of rabbit brush is greater in the inclusions. Idaho fescue, yarrow, Astragalus, brushy squirrel tail, and Eriophyllum also comprise the community found in the inclusions. The Idaho fescue/bluebunch wheatgrass community mapped on the project site would likely qualify as a native, natural community. Cheatgrass, a non-native, invasive annual grass species, is found in this community. However, it is an uncommon species and is indicative of the reduced livestock use for this area. Because of the predominance of the ungrazed native bunchgrasses and the reduced extent of this community in the Columbia Basin Province, it represents a relatively large area of an important community as defined by WNHP criteria. The current extent of shrub-steppe vegetation, of which Idaho fescue/bluebunch wheatgrass is a part, is estimated to be only 5% of its historic range in the Columbia River Basin (Norwood and Soper pers. comms.).

4.3.3 Oregon White Oak/Ponderosa Pine Vegetation Community

A small portion of the *Quercus garryana/Pinus ponderosa* (Oregon white oak/ ponderosa pine) community is found on the western side of the project site near the ridge line. The majority of the vegetation community is on the north-facing slopes north of the project boundary. This community covers only 2.4 hectares (6 acres) of the 274 hectares (678 acres) surveyed.

The community is characterized by a dense cover of Oregon white oak growing on well drained gravelly soils. Within the project area, western juniper and ponderosa pine are found growing with the Oregon white oak. Ponderosa pine becomes more common in this community north of the project site.

The understory consists of a shrub layer and herbaceous layer. Wax currant, common snowberry, western service berry, and rose are common shrub species. The cover of the shrubs can become dense and form small thickets. The herbaceous layer consists of nonnative grasses such as bulbous bluegrass, Kentucky bluegrass, and Canada bluegrass. Native forbs such as Lithophragma, waterleaf, and miner's lettuce are common in the herbaceous layer.

The small portion of this Oregon white oak community is part of a large 101-hectare (250-acre) white oak community. On the project site, the understory consists of native shrubs and a mix of native and non-native herbaceous species. Because of the predominance of the native trees and shrubs, and the reduced extent of this community in the Columbia Basin Province, it represents a relatively large area of an important vegetation community as defined by WNHP criteria.

4.3.4 Rangeland Pasture

Rangeland pasture includes grassland areas dominated by annual grass, non-native grasses and weedy forbs, or woody species which are all tolerant to livestock use. This vegetation community also includes rangeland that has been seeded with introduced range grass such as intermediate wheatgrass (*Agropyron intermedium*). Rangeland pasture occurs primarily in two places: (1) in a band located between the Oregon white oak and Douglas'

buckwheat/Sandberg's bluegrass community on the southern portion of the project site, and (2) on lower elevations of the north-facing slopes in the northern portion of the project site. This community covers 68.8 hectares (170 acres) of the project site.

This community is found on the deeper soils similar to the soils in the Idaho fescue/bluebunch wheatgrass community. Annual grasses such as cheatgrass and annual fescue are more dominant here, however, than in the native bunchgrass communities. Rangeland pasture also includes areas where rabbit brush is common or dominant with a substantial increase in its cover compared to the native bunchgrass communities. Compared to historic conditions, rabbit brush is a more common and widespread species in the Columbia Basin Province than the native bunchgrasses. Rangeland pasture that has been seeded with intermediate wheatgrass include bulbous bluegrass (*Poa bulbosa*), a non-native grass, and other native herbaceous species such as yarrow, Astragalus, lupine, and northern buckwheat.

Although this vegetation community is dominated by herbaceous and woody species tolerant to livestock use, a low cover of native bunchgrasses and forbs is present. Native species such as Idaho fescue, Sandberg's bluegrass, squirreltail, yarrow, Astragalus, lupine, and *Eriogonum* species indicate that this may be an Idaho bunchgrass community that has been subjected to more grazing pressure than other areas. Because of the predominance of annual grasses and rabbit brush, the rangeland pasture vegetation community would not meet WNHP's criteria for a native, natural community.

4.4 Culturally Important Plant Species

Many of the plant species observed are those identified in the list of species submitted by the Yakima Nation as culturally important species (Robson pers. comm.). The native plant species observed onsite were distributed throughout the project site. Appendix A lists those species considered culturally important by the Yakima Nation. The species observed on the project site are listed in Appendix B.

The Yakima Nation has reported to use the Juniper Point site as a collection area for native plants used for ceremonial purposes (Meninick pers. comm.). Plants can be collected year-round depending on the species and purpose. Ethnobotanical information for this area is included in a separate cultural resources document (HRA 1995).

5.0 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

5.1 Environmental Consequences

This section describes the potential effects of the project on vegetation communities identified in Section 4. Conclusions regarding the significance of impacts are based on National Environmental Policy Act regulations. The methodology for determining potential impacts is based onsite surveys and interpretation of aerial photographs. Impact acres are quantified by planimetering facility footprints on 2.54 centimeters = 259 meters (1 inch = 850 feet) maps of the project site.

5.1.2 Analysis

This analysis includes impacts associated with the following project features: turbine strings and their appurtenant facilities, a 5.6 km (3.5 mile) 24-kV transmission line, a 3.2 km (2.0 mile) 115-kV transmission line, substation, operation and maintenance building, construction staging area, and access roads.

To determine the acreage of vegetation that will be affected, this analysis assumes that construction corridors are required to install the project features. Construction corridors for project features are as follows:

- 30 meter (100 feet) corridor for wind turbine string development (this corridor includes construction area for access roads and the turbines);
- 14 meter (45 feet) corridor for upgraded access road;
- 6 meter (20 feet) corridor for overhead transmission lines;
- 0.4 hectare (1 acre) substation;
- 2 hectare (5 acre) temporary staging area; and
- 0.4 hectare (1 acre) operation and maintenance building.

Direct impacts associated with vegetation removal can be characterized as temporary or permanent. Permanent impacts are associated with areas where vegetation will be removed for permanent structures such as roads and ditches, buildings, and turbine pads. Temporary impacts are disturbance areas associated with activities required to build the project, but would not result in a permanent structure. These activities include staging areas, trenches that are dug to install underground lines, and construction areas around permanent structures. Revegetation of these areas with native species would be done to reduce the area of soil disturbance. These temporary impacts may, however, be long-term impacts because of the difficulty in restoring the native bunchgrass systems to a natural condition.

Potential impacts within the construction corridors include the following direct impacts: vegetation disturbance or removal from project construction and the initiation of development into relatively undisturbed native vegetation communities. Initiation of development would also divide the existing habitat into smaller units of the existing vegetation community.

Direct impacts from construction of the project would result in the temporary disturbance of 38.3 hectares (94.7 acres) of vegetation and the permanent loss of 16.0 hectares (39.4 acres) of vegetation. Native bunchgrass communities dominated by Sandberg's bluegrass and Idaho fescue would be the primary vegetation communities affected (Table 2).

Offsite impacts would include disturbance of native bunchgrass communities west of the CARES project area associated with the installation of approximately 1.7 km (1.1 miles) of 115kV transmission line. Temporary disturbance to vegetation, such as trampling, would occur from truck traffic during placement of poles and transmission lines. This disturbance would be minimized be using low pressure, rubber tires on vehicles driving across the vegetation. Existing roads would also be used where possible to limit traffic on native vegetation. Placement of power poles would result in the permanent loss of less than 0.01 hectare (0.03 acre) of bunchgrass vegetation.

Plant species that would be affected by the project would include those listed in the Affected Environment Section. Native grasses and shrubs would be removed or disturbed with development of the project. In addition to the loss of native plants that grow in these communities, the cryptogam crust on the soil surface would also be disturbed. Loss of the cryptogam crust could result in an increase in soil erosion and decreased soil nutrient and water retention.

In addition to direct impacts, indirect impacts to vegetation are likely to occur. Indirect impacts are associated with activities that would occur in the future. Ongoing activities that are required to maintain the site's function of producing wind power would likely result in trampling and degradation of native vegetation during maintenance of the site and facilities. This disturbance would create areas where invasive weeds could potentially grow and provide a continual source of weed seed in the project area.

	Area Temporarily Disturbed		Area Perr Occup	nanently vied*
Vegetation Community Type	hectares	acres	hectares	acres
Douglas' buckwheat/ Sandberg's bluegrass	17.3	42.8	8.2	20.3
Idaho fescue/bluebunch wheatgrass	14.8	36.6	5.8	14.3
Rangeland pasture	6.0	14.9	1.8	4.4
Oregon white oak/Ponderosa pine	_0.2	<u>0.4</u>	<u>0.2</u>	<u>0.4</u>
Total	38.3	94.7	16.0	39.4

Table 2. Summary of Impact Area on Vegetation Communities

* Permanently occupied area within the transmission line corridors include power poles and cleared areas within oak/pine forest for transmission line maintenance activities.

Removal or disturbance of 32.3 hectares (79.8 acres) of the Douglas' buckwheat -Sandberg's bluegrass, Idaho fescue - bluebunch wheatgrass, and Oregon white oak ponderosa pine vegetation communities would be considered a moderately significant impact because of the following:

- These communities meet WNHP's criteria for native, natural communities and represent some of the higher quality native communities in the area. Other native bunchgrass communities that have been documented by WNHP include sites approximately 19.3 kilometers (12 miles) east-northeast of the CARES project site. The existing relatively undisturbed condition of the native communities would be negatively modified.
- The extent of the existing native bunchgrass communities meeting WNHP's criteria for native, natural communities would be reduced in the area.
- The ability and time needed to restore grazed rangeland, which once supported native bunchgrass communities, and recover lost botanical resources on existing disturbed land would be considered a difficult and timely process. Cheatgrass dominates much of the grazed rangeland in the Columbia Basin Province and often increases with heavy grazing of native shrub-steppe communities, relinquishing ground very slowly after grazing has been reduced (Franklin and Dyrness 1988).
- Natural recovery time to reestablish the cryptogram crust component of the bunchgrass communities is long-term.

Restoration of a grazed site that once supported a bunchgrass community, and now is dominated by non-native grasses such as cheatgrass, would initially require eliminating the non-natives and reintroducing plant species found in an undisturbed site. Establishing desirable plant species would be done either by seeding or plugging of young seedlings. Establishment of other components of the system, such as the cryptogam crust and wildlife supported by the community, may naturally occur over time as the plants become established.

Establishment of bunchgrasses and other native vegetation, however, would be difficult because of the following factors:

- Cheatgrass is well adapted to grow in this region. Eliminating annual grasses like cheatgrass is difficult because of existing seed sources including onsite soils and adjacent grasslands, which would provide a continual source of weed seed for plants to invade the restoration site (Roche pers. comm.).
- Eliminating cheatgrass from the restoration site is important because of the competitive advantage cheatgrass has over bunchgrass seedlings. Reintroducing bunchgrass species into an area dominated by cheatgrass is also difficult because of these competitive advantages. Cheatgrass obtains soil

moisture for its growth during fall and spring and continues root growth during winter, which gives it a spring and summer advantage over wheatgrass seedlings (Barbour et al. 1980). This imposes water stress on bunchgrass, decreasing its ability to survive.

- Continual, long-term intensive maintenance of a site planted with native bunchgrasses would be required to inhibit the colonization of the restored area with annual grasses (Roche pers. comm.).
- Restoring the bunchgrass vegetation is only one component of restoring bunchgrass communities. The unique cryptogam crust and animal communities are other components. Reestablishing a system that would support the animals using the bunchgrass community would be a long-term process as the vegetation becomes established over time.

Successful restoration of bunchgrass communities has focused efforts on sites where some component of the system (such as native plant species and a cryptogam crust) still remains (Soper pers. comm.). Restoration techniques such as management of neighboring land uses, control of non-natives through weed-pulling, burning from wildfires, and management of land use activities on the restoration site (i.e., only low-impact passive recreational use) have been used to improve botanical resources.

Loss of rangeland pasture would not be considered a significant impact because of the common occurrence of these vegetation communities in the regional area.

5.1.3 Cumulative Impacts

Native vegetation communities are being lost in the Columbia Basin Province because of past and current land use. The historic extent of the shrub-steppe vegetation type that occurred in Washington is approximately 4,249,000 hectares (10.5 million acres) (Soper pers. comm.). Today, an estimated 5% of the historic extent of the shrub-steppe vegetation type, approximately 202,350 to 242,820 hectares (500,000 to 600,000 acres), is considered to be in a relatively undisturbed condition (Norwood and Soper pers. comms.). Conversion of the native vegetation for agricultural purposes and loss of habitat from livestock have contributed to the loss of the original conditions of the habitat.

The actions under this project would aid in the continuation of loss of native vegetation communities. Together with other developments and land management practices, there would be a small but negative effect on a regional scale.

5.2 Mitigation Measures

To reduce the impact of the loss of native bunchgrass vegetation communities, the following mitigation measures would be implemented:

- Avoid impacts to the Oregon white oak/ponderosa pine community by decreasing the size of the wind turbine strings affecting this community or by realigning the strings.
- Minimize the amount of construction traffic over the area by preparing a site access plan showing traffic routes and utilizing existing roads.
- Locate construction staging areas in locations that minimize disturbance to native bunchgrass communities.
- Limit to the extent possible, vehicle access during wet periods and the early growing season (generally from November through May) to minimize soil disturbance and damage to plants.
- Prepare a revegetation plan for areas temporarily disturbed by construction of underground lines and other activities. The revegetation plan would specify means to salvage topsoil and bunchgrass plant material and replace the soil and plants. The plan would be implemented immediately after the temporary impacts have occurred.
- Preserve the remaining vegetation resources on the project site by maintaining the low level of livestock use after the project facilities are operating.
- Compensate for the loss of the native, natural bunchgrass habitat by restoring rangeland areas within the project site in coordination with agencies and restoration ecologists familiar with the bunchgrass vegetation communities.

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7.0 GLOSSARY AND ACRONYMS

7.1 Glossary

Bunchgrass: A densely tufted perennial grass with a compact cluster of stems, shoots, and leaves.

Cryptogam crust: a surface crust on the ground that is composed of lichens and mosses and is a characteristic feature of bunchgrass and sagebrush communities in the Columbia Basin and other Great Basin deserts.

Forb: any plant that does not have a woody stem and branches and that is not a grass or grasslike.

Herbaceous: A plant without woody stem and branches such as grasses, grasslike plants, and forbs.

Inclusion: A vegetation community within a mapped unit that is not identified by the map unite name, e.g., the small Idaho fescue/bluebunch wheatgrass community occurring within the mapped Douglas' buckwheat/Sandberg's bluegrass community is an inclusion.

Special-status plant species: For the purposes of this survey, the term "special-status plant species" is defined to include species from the following categories:

- plants listed or proposed for listing as threatened or endangered under the federal Endangered Species Act (50 CFR 17.12 [listed plants] and various notices in the Federal Register [proposed species]);
- plants that are Category 1 or 2 candidates for possible future listing as threatened or endangered under the federal Endangered Species Act (55 Federal Register 6184, February 21, 1990);
- plants listed as endangered, threatened, or sensitive WNHP.

Vascular plant: Those plants with vascular systems to conduct water and food throughout the plant; does not include fungi and mosses.

Vegetation community: An assemblage of plants that form a distinctive system with its own composition, structure, and functions.

7.2 Acronyms

CARES:	Conservation	and	Renewable	Energy	Systems

- **WDNR:** Washington Department of Natural Resources
- WNHP: Washington Natural Heritage Program

Appendix A

List of Culturally Important Plant Species

1



CONFEDERATED TRIBES AND BANDS OF TRE YAKIMA INDIAN NATION P.O. Box 151, Toppenish, WA 98948 ESTABLISHED BY THE TREATY OF JUNE 9, 1855

ENVLRONMENTAL RESTORATION /WASTE MANAGEMENT

WAPATO, WA OFFICE 622 West 1st Street Wapato, WA 98951 FAX: (509) 877-4101 RICHLAND, WA OFFICE 1933 Jadwin Ave., Ste 110 -Richland, WA 99352 FAX: (509) 943-8555

TRANSMISSION COVER SHEET ONOS & STOKES DATE: 18 APR. 94 NO. OF PAGES FAX NUMBER: son. Botavisi

REMARKS: This list of culturally important plants OF Hanfard is, of course, missing a Few Hungs in Klickitat Co. (E. E.g. OR. Wht. OBK-QUERCUS GARYAND) but many SPP. Will be Hur Some. I would hope that if you came upone a wice stand of big sagebrush with a wative plant understory, you would Recommend it be spared, anyway! Hope this helps for a start!

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Some Plant Species of Concern for the Hanford Cultural Resources Management Plan

The following is a partial list of plant species that are of cultural significance to the Native Americans of the Hanford area. Protection and proper management of these plants should be considered in all clean-up and restoration activities. These species should be given priority in re-vegetation projects. The local plant populations should be used for seed source and propagation material.

Plants of shorelines, springs, canyons and moist areas.

Trees & shrubs

Amelanchier alnifolia Alnus incana var. occidentalis Clematis ligusticifolia Cornus stolonifera Crataegus columbiana Crataegus douglasii Eriogonum compositum (also drier rocky sites) Philadelphus lewisii Physocarpus malvaceus Populus tremuloides Populus trichocarpa Prunus emarginata Prunus virginiana var. melanocarpa Rhus glabra Ribes aureum Rosa woodsii var. ultramontana Salix amygdaloides Salix bebbiana Salix exigua ssp. exigua Salix lasiandra Salix lasiolepis Salix scouleriana Sambucus cerulea Symphoricarpos albus

Western serviceberry Mountain alder

Western virgins-bower Red-osier dogwood Columbia hawthorn Black hawthorn Northern buckwheat

Mockorange Mallow ninebark Quaking aspen Black cottonwood Bitter cherry Chokecherry

Smooth sumac Golden currant Wood's rose

Peach-leaf willow Bebb's willow Sandbar willow Whiplash willow Arroyo willow Scouler's willow Blue elderberry Common snowberry

Perennial, biennial & annual forbs

Allium cernuum Allium schoenoprasum Apocynum cannabinum Apocynum sibiricum Nodding onion Chives Common dogbane Indian hemp

Aquilegia formosa Artemisia campestris ssp. borealis var. scouleriana Artemisia dracunculus Artemisia ludoviciana Asclepias speciosa Cardimine pensylvanica Epilobium angustifolium Equisetum arvense Equisetum hyemale Equisetum laevigatum Gaillardia aristata Galium aparine var. echinospermum Geum macrophyllum Geum triflorum Glycyrrhiza lepidota Helenium autumnale Iris missouriensis Lomatium grayi Lotus purshianus Mentha arvensis Mimulus guttatus Potentilla arguta Potentilla gracilis Prunella vulgaris Pteridium aquilinum Rumex salicifolius ssp. triangulivalvis Sagittaria cuneata Silene menziesii Solidago canadensis Urtica dioica ssp. gracilis var. holosericea Verbena hastata Veronica americana

Red columbine Pacific sagebrush eriana Tarragon Prairie sagebrush Showy milkweed Pennsylvania bittercress Fireweed Field horsetail Common scouring-rush Smooth scouring-rush Blanketflower Bedstraw

Large-leaved avens Prairie smoke Licorice root Sneezeweed Western blue flag Gray's desert-parsley Spanish clover Field mint Yellow monkeyflower Tall cinquefoil Slender cinquefoil Selfheal Bracken fern Willow dock

Wapato Menzies' catchfly meadow goldenrod Stinging nettle ericea Blue verbena American brooklime

Grasses, sedges, rushes & cattails

Eleocharis palustris Phalaris arundinacea Phragmites communis Scirpus acutus Scirpus validus Typha latifolia Common spikerush Reed canarygrass Common reed Hardstem bulrush Softstem bulrush Common cattail

10 **.** 10

Plants of sagebrush steppe, grassy slopes & sandy areas

Trees & shrubs

Artemisia tridentata Chrysothamnus nauseosus Eriogonum elatum Eriogonum heracleoides Eriogonum microthecum Eriogonum niveum Eriogonum sphaerocephalum Eriogonum strictum ssp. proliferum (3 vars.) Eriogonum viminium Juniperus occidentalis Juniperus scopulorum Purshia tridentata Salvia dorrii

Big sagebrush Gray rabbitbrush Tall buckwheat Parsnip-flowered buckwheat Slender buckwheat Snow buckwheat Rock buckwheat Strict buckwheat

Broom buckwheat Western juniper Rocky Mountain juniper Antelope bitterbrush Gray ball sage

Perennial, biennial & annual forbs

Achillea millefolium Allium robinsonii Allium scilloides Balsamorhiza careyana Brodiaea douglasii Calochortus macrocarpus Castilleja thompsonii Chaenactis douglasii Cleome lutea Collomia grandiflora Comandra umbellata Crepis atrabarba Cymopterus terebinthinus Delphinium nuttallianum Epilobium paniculatum Erigeron filifolius Erigeron linearis Erigeron pumilus Erysimum asperum Fritillaria pudica Helianthus annuus Helianthus cusickii Lesquerella douglasii Linum perenne var. lewisii Lithospermum ruderale Lomatium triternatum Lupinus laxiflorus var. calcaratus Lupinus lepidus var. aridus Lupinus leucophyllus Lupinus pusillus Lupinus sericeus

Yarrow Robinson's onion Squill onion Carey's balsamroot Douglas' clusterlily Sagebrush mariposa lily Thompson's paintbrush Hoary false-yarrow Yellow bee plant Large-flowered collomia Bastard toadflax Slender hawksbeard Turpentine cymopterus Upland larkspur Tall willowherb Threadleaf fleabane Desert yellow-daisy Shaggy fleabane Rough wallflower Yellow bells Common sunflower Cusick's sunflower Bladderpod Wild blue flax

Western gromwell nineleaf desert-parsley Spurred lupine

Prairie lupine

Velvet lupine Low lupine Silky lupine

var. fikeranus Lupinus sulphureus var. subsaccatus Lupinus wyethii Machaeranthera canescens Mentzelia laevicaulis Nicotiana attenuata (rare) Oenothera pallida Opuntia polyacantha Orobanche corymbosa Orobanche fasciculata Perideridia gairdneri Phlox longifolia Plantago patagonica Ranunculus glaberrimus Rumex venosus Vicia americana Zigadenus paniculatus Zigadenus venenosus

Sulfur lupine

Wyeth's lupine Hoary aster Blazing-star Coyote tobacco Pale desert primrose Prickly pear cactus Flat-topped broomrape Clustered broomrape Gairdner's yampah Longleaf phlox Indian wheat Sagebrush buttercup Winged dock American vetch Foothill deathcamas Meadow deathcamas

Grasses, sedges, rushes & cattails

Agropyron spicatum Elymus ciner**s**us Oryzopsis hymenoides Sporobolus cryptandrus Bluebunch wheatgrass Giant wildrye Indian ricegrass Sand dropseed

Rocky hills, ridgetops & basalt outcrops

Trees & shrubs

Artemisia tripartita Eriogonum thymoides Haplopappus resinosus Phlox hoodii Ribes cereum

Three-tip sage Thyme buckwheat Columbia goldenweed Hood's phlox Squaw currant

Perennial, biennial & annual forbs

Agastache occidentalis	Western horse-mint
Allium douglasii	Douglas' onion
Allium macrum	Rock onion
Arabis sparsiflora	Elegant rockcress
Balsamorhiza hookeri	Hooker's balsamroot
Balsamorhiza rosea	Rosy balsamroot
Geranium viscosissimum	Sticky purple geranium
var. nervosum	

Heuchera cylindrica Lewisia rediviva Lomatium canbyi Lomatium dissectum Lomatium farinosum Lomatium geyeri Lomatium gormanii Lomatium macrocarpum Lomatium tuberosum (rare) Microseris troximoides Monardella odoratissima Penstemon richardsonii Lava alumroot Bitterroot Canby's desert-parsley fernleaf desert-parsley Coeur d'Alene desert-parsley Geyer's desert-parsley Bigseed desert-parsley Hoover's desert-parsley False mountain dandelion Coyote mint Basalt beardtongue

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Appendix B

Species List - CARES Site



Appendix B. Species List - CARES Site

Achillea millefolium Agoseris spp. Agropyron intermedium Agropyron spicatum Allium spp. Amelanchier alnifolia Amsinckia retrorsa Antennaria dimorpha Antennaria geyeri Antennaria stenophylla Apocynum androsaemifolium Arenaria franklinii Artemesia rigida Astragalus purshii Astragalus spp. Balsamorhiza careyana Brodiaea howellii Bromus tectorum Castilleja hispida Chaenactis douglasii Chrysothamnus nauseosus Clarkia pulchella Collinsia parviflora Collomia grandiflora Crocidium multicaule Cryptantha spp. Delphinium nutallianum Draba verna Dodecathion pulchellum Erigeron spp. Eriogonum compositum Eriogonum caespitosum Eriogonum douglasii Eriogonum heracleoides Eriophyllum lanatum Erodium cicutarium Erysimum spp. Frasera albicaulis var. columbiana Festuca bromioides Fritillaria pudica

Galium aparine Grindellia spp. Hydrophyllum capitatum var. thompsonii Juncus effusus Juniperus occidentalis Lithophragma parviflora Lithophragma tenella var. thompsonii Lithospermum ruderale Lomatium macrocarpum Lomatium nudicaule Lomatium triternatum Lewesia rediviva Lotus spp. Lupinus leucophyllus Lupinus sericeus Mertensia oblongifolia Montia perfoliata Myosurus minimus Navarretia intertexta var. propinqua Nemophila breviflora Penstemon gairdneri Phacelia humilis Phleum pratense Phoenicaulis cheiranthoides Phlox hoodii Phlox longifolia Phlox speciosa Pinus ponderosa Plagiobothrys tenellus Poa bulbuosa Poa compressa Poa sandbergii Prunus virginiana Quercus garryana Ribes cereum Rosa spp. Sedum stenopetalum Saxifraga integrifolia claytoniaefolia Sisyrinchium douglasii Sitanion hystrix

BPA/WA#1CARES 02/03/95u Stipa thurberiana Symphoricarpos mollis Thysanocarpus curvipes Trifolium macrocephalum Viola nuttallii Vulpia spp.