CANDIDATE ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: Artemisia campestris ssp. borealis var. wormskioldii

COMMON NAME: Northern wormwood

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: February 2003

STATUS/ACTION (Check all that apply):
___ New candidate
_X_ Continuing candidate
_X_ Non-petitioned
___ Petitioned - Date petition received: ___
___ 90-day positive - FR date: ___
__ 12-month warranted but precluded - FR date: ___
__ Is the petition requesting a reclassification of a listed species?
___ Listing priority change
Former LP: ___
New LP: ___
___ Candidate removal: Former LP: ___ (Check only one reason)
___ A - Taxon more abundant or widespread than previously believed or not subject to a degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
___ F - Range is no longer a U.S. territory.
___ M - Taxon mistakenly included in past notice of review.
___ N - Taxon may not meet the Act=s definition of Aspecies.@
___ X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Plant; Asteraceae (aster family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Oregon, Washington

CURRENT STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Washington

LEAD REGION CONTACT (Name, phone number): Scott McCarthy (503) 231-6131

LEAD FIELD OFFICE CONTACT (Office, name, phone number): Western Washington Fish and Wildlife Office, Ted Thomas, (360) 753-4327 or Dr. L. Karolee Owens, (360) 753-4369

BIOLOGICAL INFORMATION (Describe habitat, historic vs. current range, historic vs. current population estimates (# populations, #individuals/population), etc.):

Artemisia campestris ssp. borealis var. wormskioldii (northern wormwood) was first collected along the Columbia River by David Douglas and described in 1833 by W. S. J. G. von Besser as Artemisia borealis var. wormskioldii. After several taxonomic changes Artemisia campestris ssp. borealis var. wormskioldii is the currently accepted taxonomic name for northern wormwood. Artemisia campestris ssp. borealis var. wormskioldii is restricted to exposed basalt, cobbly-sandy terraces, and sand habitat along the banks of the Columbia River at elevations ranging from 50 to 150 meters (160 to 500 feet).

Historically, at least eight populations of Artemisia campestris ssp. borealis var. wormskioldii occurred within the species= range. This plant was previously collected from sites along the banks of the Columbia River near the mouth of the John Day River in Wasco County, Oregon, to the vicinity of Hood River in Hood River County, Oregon, a distance of 80 kilometers (km) (50 miles) (Washington Natural Heritage Program and Bureau of Land Management 1999). All of the historical locations have been surveyed recently, and no populations were found. It is likely that disturbances due to the construction of several dams and subsequent flooding of habitat resulted in the extirpation of the historical occurrences (Carlson 1997; Rush 1999).

Currently, this species is known from only two sites, separated by approximately 322 km (200 mi) of the Columbia River, in Klickitat and Grant Counties in Washington. These two populations were discovered in 1983 (Carlson 1997). Three large hydroelectric dam/reservoir complexes (Priest Rapids Dam, McNary Dam, and John Day Dam) are located between the two sites (Carlson 1997; Rush 1999). Both populations are found just downstream of dams where current habitat most resembles historic habitat. There may be little or no suitable habitat between the two known populations because much of the original river bank has been inundated by the construction of the three dams and the use of riprap along the river banks; however, remnant populations may remain (Carlson 1997).

Although potential habitat is found on the Hanford Reach of the Columbia River, surveys of apparently suitable habitat have not detected any Artemisia campestris ssp. borealis var. wormskioldii plants. In 2002, intensive surveys of the islands in the Hanford Reach by staff from the Washington Natural Heritage Program and the Hanford Reach National Monument found no additional populations of Artemisia campestris ssp. borealis var. wormskioldii (Florence Caplow, Washington Department of Natural Resources, pers. comm., 2002). The Miller Island population in Klickitat County, Washington, occurs on the Columbia River Gorge National Scenic Area, which is managed by the U.S. Forest Service (Forest Service). This population is found near water level in the crevices of basalt outcrops, compacted cobbly terrace, and sand. Seventy-five plants occupied less than 0.4 hectare (ha) (1 acre (ac)) at this site in 1989 (Kaye 1995). During monitoring in 1995, 335 plants were recorded, and 109 of these plants were flowering (Kaye 1995). The majority of the plants, 319 individuals, were found on a sandy substrate. Many of these were small seedling-sized individuals, either seedlings or second year individuals less than 5 centimeters (cm) (2 inches (in)) tall (average height was 7.8 cm (3.0 in). Few of the 16 remaining plants, which were found on bedrock, were small (average height was 9.0 cm (3.5 in). The more numerous smaller individuals found on the sandy substrate suggests that seedling recruitment on bedrock is limited when compared with sandy substrate. The 1989 survey, however, may have missed a portion of the population, particularly small plants.

Nonflowering plants were not counted because of the difficulty in distinguishing Artemisia campestris ssp. borealis var. wormskioldii from var. scouleriana, which also occurs at this site (Rush 1999). In 2002, only 170 plants were found on both sand and bedrock; 104 were flowering and there were no seedlings. The large fluctuations in population sizes between 1989 and 2002 indicate the likelihood of a large yearly variation in seedling recruitment with few or no seedlings produced in 1989 and 2002 but a large number of seedlings produced in 1995. A total of 142 flowering plants were counted in a June 1999 census (Rush 1999). Both A. c. ssp. borealis var. scouleriana and Artemisia ludoviciana occur at the Miller Island site, and there is some evidence of hybridization of both taxa with A. c. ssp. borealis var. wormskioldii.

The Beverly population in Grant County, Washington, occurs on land owned and managed by the Bureau of Reclamation (BOR) along the shore of the Columbia River and on several Aislands@composed mostly of compacted cobbly terrace (Rush 1999). This population appears to be restricted to an area of compacted cobbles with varying amounts of sand and little, if any, soil development (Carlson 1997). In 1989, several hundred to possibly one thousand individuals occupied approximately 4 ha (10 ac) at the Beverly site (Carlson 1997; Rush 1999). In April 1999, 65 plants were mapped in a monitoring plot established in the densest part of the population, and an additional 30 plants were counted in surrounding areas (Rush 1999). In November 2000, additional subpopulations on a nearby Aisland@were found. A total of about 1,400 plants in the five subpopulations were counted. Generally, the numbers of plants are stable or decreasing (Tom Dresser, pers. comm., 2000).

At the Beverly site, a monitoring project was established in 2001 in the largest subpopulation of 1,260 plants. Within the 31 monitoring plots, 179 Artemisia campestris ssp. borealis var. wormskioldii individuals were mapped in 2001, and 150 of these were observed in 2002. In the same plots, 157 individuals of A. c. ssp. borealis var. scouleriana were mapped in 2001, and 128 of these were observed in 2002. Fourteen newly observed individuals of A. c. ssp. borealis var. wormskioldii were observed in 2002. However, because only six seedlings were observed in 2001, it is unclear to what degree this represents actual recruitment. In 2002, a total of 563 A. c. ssp. borealis var. wormskioldii seedlings were observed (Devin Malkin, Framatome ANP DE&S, pers. comm., 2002).

THREATS (Describe threats in terms of the five factors in section 4 of the ESA providing specific, substantive information. If this is a removal of a species from candidate status or a change in listing priority, explain reasons for change):

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

The construction of dams along the Columbia River, and possibly railroad and highway construction, resulted in the direct loss of suitable habitat as well as individuals and populations of Artemisia campestris ssp. borealis var. wormskioldii (Carlson 1997). Losses of habitat and individuals probably occurred not only because of disturbances from dam construction but, also, from the resulting inundation. Much of the existing river bank is riprap, which is not suitable habitat (Carlson 1997; Rush 1999). Grant County PUD has an informal interest in raising reservoir levels within the Priest Rapids reservoir, which could further compromise the Beverly population (F. Caplow, pers. comm., 2002).

Recreational use at both the Miller Island and Beverly sites leads to trampling of plants.

However, all of the Beverly site has now been fenced to exclude vehicles. The site is still accessible to boats (F. Caplow, pers. comm., 2002). At Miller Island, the Artemisia campestris ssp. borealis var. wormskioldii population is immediately adjacent to an area that is suitable for landing a boat and that is used as a beach (Carlson 1997; Rush 1999). The small size of the population and its proximity to the boat landing site make it particularly vulnerable to trampling pressure. The Beverly site has been affected by recreational use, including picnicking, camping, hunting, and vehicular traffic.

Two years of above annual rainfall in 1996 and 1997, high runoff, and likely higher than normal releases of water from the upstream Grand Coulee and Wanapum Dams produced excessively high water levels on the Columbia River at the Beverly population (Rush 1999). The high water levels may have washed away Artemisia campestris ssp. borealis var. wormskioldii from the site. Signs of deposited silt, sand, and debris are found on the site, providing a suitable substrate for growth of Bromus tectorum (T. Thomas, in litt., 1998).

B. Overutilization for commercial, recreational, scientific, or educational purposes.

There is no evidence that Artemisia campestris ssp. borealis var. wormskioldii has been used for commercial or recreational purposes. Several cuttings, however, have reportedly been taken from the Miller Island populations (Carlson 1997). The species may have some potential as a rock garden plant; other species of Artemisia are commonly sold in nurseries for this purpose (T. Thomas, in litt., 1998). Overutilization for scientific or educational purposes is not known. The populations, however, are small enough that even low levels of collecting could pose a threat.

C. Disease or predation.

There is no evidence that disease or predation is a concern for Artemisia campestris ssp. borealis var. wormskioldii, although herbivory (cattle grazing) could be a threat. The Miller Island population, until recently, was within an area grazed by cattle (Carlson 1997). While the palatability of this species is not known, some individual plants growing in a very loose substrate (sand) are easily uprooted by cattle. Disturbance of the habitat by cattle grazing also may have contributed to the increase of nonnative plant species (Carlson 1997).

D. The inadequacy of existing regulatory mechanisms.

Artemisia campestris ssp. borealis var. wormskioldii is designated as endangered by the Washington Department of Natural Resources (Washington Natural Heritage Program 1997). There is, however, no State Endangered Species Act for plants and no existing regulatory mechanisms provide protection for this species in Washington. Artemisia campestris ssp. borealis var. wormskioldii is listed as endangered by Oregon Department of Agriculture (OAR 603B073B0070), as provided by the Oregon Endangered Species Act. Listed species in Oregon receive protection only on State-owned and State-managed lands, which includes any non-Federal public lands. Artemisia campestris ssp. borealis var. wormskioldii is managed as a sensitive species by the Forest Service, which provides management direction for the population on Miller Island (Kaye 1995).

E. Other natural or manmade factors affecting its continued existence.

In addition to direct loss of habitat as a result of dam construction, the manipulation of waterflows by hydroelectric dams is a major threat to this species. The severity of spring floods has been reduced or eliminated in most years, and populations may be inundated for much of their growing season. Manipulated water regimes do not mimic historic waterflows and have affected the ability of these plants to grow, flower, reproduce, and colonize (Rush 1999).

Altered water regimes, as well as recreational uses and grazing, have also allowed nonnative plants to invade both sites (Rush 1999). Centaurea diffusa, a Washington State class-B noxious weed (RCW 17.10, Chap 16B750) is also present and spreading at the Beverly site and was found scattered throughout the Miller Island site in 1999 (T. Thomas, in litt., 1998). This species poses a serious threat to the region and has the ability to outcompete native plants for resources (water and nutrients) and displace native vegetation.

The extreme loss of habitat that has resulted in two small, widely separated populations may affect the viability of Artemisia campestris ssp. borealis var. wormskioldii. Small isolated populations are more vulnerable to a variety of ecological and genetic factors, as well as naturally occurring random events (Gilpin and Soule 1986; Given 1994; Schemske et al. 1994). Disease, insect damage, unfavorable weather, including flooding or drought, could cause extinction of this species. The Beverly population apparently was greatly reduced by inundation of the site during the 1996B1997 winter and spring.

Threats that are increasingly significant in smaller populations are related to the loss of genetic variability due to random changes in gene frequencies (genetic drift). Loss of genetic variability can affect disease resistance, response to climatic change, and reproductively compatible gene combinations (genotypes). Small populations are more susceptible to increased inbreeding, which can lead to reduced fitness of offspring.

FOR RECYCLED PETITIONS:

a. Is listing still warranted?_____
b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? _____
c. Is a proposal to list the species as threatened or endangered in preparation? _____
d. If the answer to c. above is no, provide an explanation of why the action is still precluded.

LAND OWNERSHIP (Estimate proportion Federal/state/local government/private, identify non-private owners): One hundred percent of the known populations are on Federal land.

The Miller Island population in Klickitat County, Washington, occurs on Forest Service land, which is managed by the Columbia River Gorge National Scenic Area of the Gifford Pinchot National Forest. The Beverly population in Grant County, Washington, occurs on land owned and managed by the BOR along the shore of the Columbia River and on several Aislands.@

PRELISTING (Describe status of conservation agreements or other conservation activities):

The Washington Natural Heritage Program, using funding provided under section 6 of the Act, prepared a conservation strategy and monitoring plan for Artemisia campestris ssp. borealis var. wormskioldii (Rush 1999). Management objectives include identifying and scheduling

management actions that will remove or limit threats to this species. The primary conservation goals of this plan are to protect existing populations and habitat and to maintain occupied and potential habitats in a condition that will sustain A. c. ssp. borealis var. wormskioldii.

At the Beverly site, Grant County PUD is involved in relicensing of Priest Rapids and Wanapum Dams (T. Dresser, pers. comm., 2000). Grant County PUD has developed a study plan to establish demographic modeling and a study of the effects of water levels, including groundwater. They are also working with the Bureau of Reclamation to limit public access to the area because of recreational impacts to this site, a fence has been constructed around the largest population of the species. They have implemented weed control (hand pulling) to remove knapweed and cheatgrass.

REFERENCES (Identify primary sources of information (e.g., status reports, petitions, journal publications, unpublished data from species experts) using formal citation format):

Carlson, M. 1997. Status report for Artemisia campestris ssp. borealis var. wormskioldii (Bess.) Crone. Unpublished Report. Washington Natural Heritage Program, Department of Natural Resources, Olympia. 30 pp.

Franklin, J.F. and C.T. Dyrness. 1988. Natural Vegetation of Oregon and Washington. Oregon State University Press. 452 pp.

Hitchcock, C.L., A. Cronquist, M. Ownbey, J.W. Thompson. 1955. Vascular plants of the Pacific Northwest, part 5: Compositae. U. of Washington Press, Seattle.

Kaye, T. N. 1995. Monitoring plan for northern wormwood at Miller Island, Columbia River Gorge National Scenic Area. Unpublished Report. Oregon Department of Agriculture, Plant Conservation Biology Program. 28 pp.

Rush, T. 1999. Conservation strategy and monitoring plan for Artemisia campestris var. wormskioldii (northern wormwood). Unpublished Report. Washington Natural Heritage Program, Department of Natural Resources, Olympia. 19 pp.

U.S. Fish and Wildlife Service. 1999. Endangered and threatened wildlife and plants; review of plant and animal taxa that are candidates or proposed for listing as endangered or threatened; annual notice of findings on recycled petitions; and annual description of progress on listing actions. Federal Register 64:57534B57547.

Washington Natural Heritage Program. 1997. Endangered, threatened and sensitive vascular plants of Washington with working lists of rare and non-vascular species. Washington Department of Natural Resources, Olympia. 62 pp.

Washington Natural Heritage Program and Bureau of Land Management, Spokane District. 1999. Field guide to selected rare vascular plants of Washington.

LISTING PRIORITY (place * after number)

THREAT

Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	**3***
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude: Only two populations exist for this species. The habitat where it is found is dynamic, with frequently changing water levels that can scour the habitat and remove plants. Threats that would be moderate to low in a widespread species represent higher threat to these small disjunct populations.

Imminence: Because of the relatively small size of the populations and their small spatial distribution, a single disturbance could eliminate one or both populations.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all additions of species to the candidate list, removal of candidates, and listing priority changes.

Approve: Rowan Gould March 6, 2003
Acting Regional Director, Fish and Wildlife Service Date

Concur: _____ _____
Director, Fish and Wildlife Service Date

Do not concur: _____ _____
Director, Fish and Wildlife Service Date

Director's Remarks:

_____

_____

Date of annual review: February 2003

Conducted by: T. Thomas and L.K.Owens

Comments:

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