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**UTE LADIES TRESSES SPIRANTHES  
DILUVIALIS ALONG ROCKY REACH  
RESERVOIR MANAGEMENT PLAN**

**~~First Draft~~ Updated Version**

**ROCKY REACH HYDROELECTRIC PROJECT  
FERC Project No. 2145**

**~~June 11, 2004~~ October 28, 2009**



**Public Utility District No. 1 of Chelan County  
Wenatchee, Washington**

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## SECTION 1: INTRODUCTION

~~In August 2000, three~~ populations of Ute ladies' tresses (*Spiranthes diluvialis*) were discovered along the ~~upstream~~ Chelan County shoreline of Rocky Reach Reservoir ~~in August 2000~~. The plants were discovered during rare and sensitive plant surveys (Calypso 2000) conducted by botanists under contract to Public Utility District No. 1 of Chelan County (Chelan County PUD). Since their discovery, Chelan County PUD has monitored these populations annually to track the number of individual plants and identify changes in their distribution.

Since 2000, the population has expanded in the known location and with new discoveries both above (2005) and below (2009) historic locations. As a result, rather than 5 populations we likely have one population with several (maybe 3) metapopulations. In 2009 we recorded a minimum of 629 plants along Rocky Reach Reservoir between Howard Flats and Beebe Bridge. The maximum number of plants recorded in any one year was 959 in 2007. The minimum number of plants recorded was 71 in 2001.

One of the historic populations of Ute ladies' tresses along Rocky Reach Reservoir is located on Chelan County PUD property. A second population is located on Washington Department of Transportation property. The third population is located on private property. Recent discoveries on BLM land (2005) and Washington Department of Fish and Wildlife (WDFW) land (2009) have expanded the extent of the population greatly and contributed to increasing numbers of *S. diluvialis* plants observed.

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In 2009, the FERC granted a new operation license for the Rocky Reach hydro project. Article 404 of the new license requires the District to control noxious weeds, conduct annual monitoring, survey suitable habitats every 5 years, and acquire management rights for populations on private lands. In addition, the FERC requires the District to notify the U. S. Fish and Wildlife Service (USFWS), Bureau of Land Management (BLM), and WDFW of any new populations discovered along the project. Within 90 days of such discovery, the District must file a report with the FERC that identifies and describes the new population and any threats to the population. This report requires consultation with the USFWS, BLM, and WDFW. The purpose of this plan is to update the information on known *S. diluvialis* locations along Rocky Reach Reservoir through 2009 and to identify threats to the known populations. ~~identify measures that can be implemented to ensure the continued existence of the identified populations and if possible enhance the distribution of these populations.~~ Aspects of this plan include:

- ~~1) a noxious weed control program;~~
- ~~2) avoidance of these populations during land altering activities (e.g., construction, excavation);~~
- ~~3) examination of water fluctuation impacts on the existing populations;~~
- ~~4) possible acquisition of conservation easements on private lands; and~~
- ~~5) periodic population monitoring.~~



## SECTION 2: BIOLOGY AND ENHANCEMENT HISTORY

### 2.1 Biology and Status of the Plant

*S. diluvialis* is a member of the orchid family. It was first described in 1984. At that time, it was only known from Utah and Colorado. Since its listing in 1992, additional populations have been found in Utah, Colorado, Wyoming, Montana, Nevada, and Idaho. Most populations found in Idaho have been along the Snake River and its tributaries. In 1997, a population of less than 20 plants was found in north central Okanogan County in Washington. In 2000, the three populations along Rocky Reach Reservoir were found. Recent discoveries have expanded the extent of the *S. diluvialis* both north and south from historic locations. In 1996, ~~the~~ a petition to delist the *S. diluvialis* was submitted to the USFWS.

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*S. diluvialis* is endemic to mesic or wet meadows, river meanders, floodplains, and riparian/wetland habitats near springs, seeps, lakes, or perennial streams. The soils in which it grows may be inundated or saturated early in the growing season and become drier as the season progresses, but still retain sub-surface soil moisture. This plant seems to have an association with floodplain areas where the water table is close to the surface throughout the growing season. This plant grows where the over-story vegetation is relatively open and not dense or overgrown. Populations decline where trees and shrubs invade the habitat. They do not compete well with invasive species such as Reeds' canarygrass or purple loosestrife. They do colonize early successional riparian habitats such as point bars, sand bars, and low lying gravelly, sandy, or cobble edges.

*S. diluvialis* along Rocky Reach Reservoir blooms in late summer (late July - early August, varying with seasonal weather conditions). Individual plants can remain dormant for several growing seasons, or produce only vegetative shoots and no blossoms. The lack of bloom makes annual inventory or population assessment difficult. It is thought that this orchid may have a symbiotic association with mycorrhizal fungi for germination and also require pollinators to set seed. Ute ladies' tresses appear to have a relatively low reproductive rate.

### 2.2 Rocky Reach Reservoir Populations

#### 2.2 PUD PONDSITE

~~The downstream~~One *Spiranthes diluvialis* population is associated with a small artificial pond. The pond appears to be hydrologically linked to the reservoir by groundwater flow through the sandy/cobble substrate. Plants at this site grow at both ends of the pond and also along the Columbia River shoreline. This site is owned by Chelan County PUD. Purple loosestrife (*Lythrum salicaria*), diffuse knapweed (*Centaurea diffusa*), Dalmatian toadflax (*Linaria dalatica*), and yellow flag (*Iris pseudoacorus*) are noxious weeds that occur within or near the *Spiranthes* plants.

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### **BEEBE BRIDGE SITE**

In 2009, a Department of Natural Resources employee discovered approximately 50 plants on a WDFW parcel north of the Beebe Bridge and one plant on a District Parcel south of the bridge. These plants are closely associated with the PUD Pond site plants.

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### **GALLAHGER FLAT**

~~The middle~~One population of *S. diluvialis* occurs on a low-lying, grassy backwater wetland adjacent to the Columbia River. This site is owned by the Washington Department of Transportation. This population of *S. diluvialis* seemed to be mixed with a population of common ladies' tresses (*S. romanzoffiana*). Purple loosestrife (*Lythrum salicaria*), Himalayan blackberry (*Rosa discolor*), and other invasive weed species occur within the population.

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### **STOCKER PROPERTY**

~~The most upstream~~This population of *S. diluvialis* is located along a moist mud/gravel bar along the Columbia River. A backwater wetland exists at the northern end of this bar. This site is on private property. The site also includes some common ladies' tresses plants. Purple loosestrife is the primary noxious weed invader here. This area had been grazed by cattle, but since cattle have been removed from the area, encroachment by white sweet clover (*Melilotus alba*), willow (*Salix* spp.), alders (*Alnus* spp), and other shrubby vegetation has invaded the site.

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### **BLM SITE**

This is the most upstream population of *S. diluvialis* known to date. Plants at this site were discovered in 2005. In 2009, this site had on of the highest numbers of *S. diluvialis*

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### SECTION 3: CRITICAL UNCERTAINTIES

#### 3.1 Justification

Ute ladies' tresses is listed under the Endangered Species Act (ESA) as a federally Threatened orchid species. It was listed by the U.S. Fish and Wildlife Service in 1992 because of factors that include habitat loss or modification and hydrological modifications of existing and potential habitat areas. This plant's status in Washington is Threatened. In Washington, *S. diluvialis* occurs in 2 geographic locations one ~~There are four populations of this plant in Washington:~~ along Rocky Reach Reservoir in Chelan County and one in north-central Okanogan County. The Rocky Reach Reservoir populations are spread out over several miles and may consist of several metapopulations.

At least some portion of ~~all three four populations of Ute ladies' tresses~~ *S. diluvialis* that grow along Rocky Reach Reservoir are subject to occasional inundation by river levels. The effect of project operations on these three plant populations is unknown. ~~We do~~ It is known that individuals of these populations grow and bloom at locations that are sometimes under water. Aerial photos taken in 1930, before the creation of Rocky Reach Reservoir, indicate that the habitat that existed then on the sites where *S. diluvialis* exists now was not typical of sites that would be expected to support *S. diluvialis*. Furthermore, *S. diluvialis* now occurs at the PUD Pond site which was used as a gravel pit in (what year(s))

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#### 3.2 Restriction on Land Altering Activities

~~The three four~~ All *S. diluvialis* sites are located adjacent to the Columbia River and receive a measure of protection from many construction-type activities by shoreline protection and hydraulic permit application procedures. Activities that are expected to impact shorelines must undergo review procedures to acquire necessary state and or federal permits. These procedures allow for review of the proposed activity by environmental agencies and input from those agencies to mitigate project impacts.

A first step in allowing these agencies to protect the *S. diluvialis* sites is to ensure that the appropriate agencies know the locations of the sites. This has been accomplished through the Washington Natural Heritage Program database, the Rocky Reach Wildlife Forum, and through FERC required notices for newly discovered populations. To enhance the effectiveness of the review process, accurate information must be maintained in the database concerning the locations of the existing and new *Spiranthes* populations so that land managers have access to the most up-to-date accurate information.

#### 3.3 Monitor the Water Fluctuation Effects on Spiranthes Populations

The biology of *S. diluvialis* is not well understood. The plant does not emerge and bloom each year, which makes surveying population changes difficult on an annual basis. The potential link to ~~a~~ mycorrhizal fungi ~~which that~~ enables *S. diluvialis* to complete its life functions would be a difficult habitat association to incorporate into management models. Associations with water fluctuations and ground water levels are other habitat association that may be difficult to understand.

This plant does seem to "like having its feet wet." Receding water levels and retention of sub-surface ground waters allow *S. diluvialis* plants to grow in moist soil, while dry-land plants (e.g., bunchgrass, sage, and bitterbrush) may be growing nearby. How much water is enough and how much is too much are questions that likely vary between the sites along Rocky Reach Reservoir. Soil types and structure are likely influencing factors. ~~We do~~It is known that the individuals of these three populations grow, bloom, and maintain themselves within 1-20 feet of the current water levels (depending on slope) at the time during which they bloom. These populations have persisted, possibly even developed, during the water level regime associated with the Rocky Reach and Wells hydroelectric projects. The habitat conditions prior to these projects would likely have precluded occupation of the present sites by *S. diluvialis*.

Future changes in the present river level as a result of changes at hydroelectric projects should be evaluated to anticipate their effects on the known populations of *S. diluvialis* along the Columbia River. Potential river levels that would inundate existing populations during the bloom period may have negative effects on the population if those water levels persisted throughout the bloom period or for several years. *S. diluvialis* does seem adaptable with its bloom period depending on varying moisture conditions from year to year (i.e., sometimes it blooms early and sometimes it blooms later in the summer). Evaluation of the effects of present water fluctuation conditions on the existing populations could be accomplished with long term monitoring of the populations to track plant numbers, distribution changes, and bloom timing correlated with soil moisture and Columbia River elevations. However, other environmental factors (e.g., temperature, precipitation, vegetative associations, noxious weed invasion, and availability of pollinators) would complicate any analysis of water fluctuations and plant response).

## **SECTION 4: PROTECTION, MITIGATION AND ENHANCEMENT MEASURES**

### **4.1 Noxious Weed Control**

An integrated noxious weed control program ~~can have been~~ implemented in the vicinity of the *S. diluvialis* populations. Chelan County PUD ~~manages maintained a purple loosestrife control program~~ along Rocky Reach Reservoir ~~using biological controls in coordination with the Chelan County Weed Board and the WSU Extension program~~. In addition, the District ~~uses include~~ pesticide application by a licensed applicator ~~for Russian knapweed control in the vicinity of *S. diluvialis*~~. ~~When the three *Spiranthes* populations were found, Chelan PUD (at the request of botanists) stopped spraying purple loosestrife along the Chelan County shoreline upstream from Beebe Bridge to avoid harm to the *Spiranthes* populations.~~

~~An integrated noxious weed program in these areas can be implemented which will not likely harm *Spiranthes* plants. An integrated noxious weed control program uses several means of weed control such as different types of chemical application methods, use of biological control agents which are the natural enemies/pests of the weed species, mechanical control of the weeds, and vegetative control of desirable plants in the areas to provide competition with noxious weeds.~~

Biocontrol agents (insects) ~~can have been be~~ introduced ~~to control noxious weeds that coexist with *S. diluvialis* along Rocky Reach Reservoir~~. These biological controls ~~that~~ are USDA approved for relocation specifically to control target noxious weeds. For the *S. diluvialis* sites along Rocky Reach Reservoir, the recommended biocontrol agents for controlling the following noxious weeds would ~~include be~~:

- Purple loosestrife - *Galerucella californiensis* (defoliating beetle)  
*Nanophyes marmoratus* (flower weevil)
- Diffuse knapweed - *Larinus minutus* (seed eating beetle)  
*Sphenoptera jugoslavica* (root-mining beetle)  
*Cyphocleonus achates* (root mining beetle)  
*Agapeta zoegana* (root-mining butterfly larvae)
- Dalmatian toadflax- *Mecinus janthinus* (leaf-eating and stem boring weevil)  
*Brachyperolus pulicarius* (flower-feeding weevil)  
*Gymnetron antirrhini* (stem-boring weevil)

~~Many of these species have been released throughout Chelan County to control noxious weeds. In the vicinity of current *S. diluvialis* locations purple loosestrife biological controls have been released and there is evidence of diffuse knapweed and dalmatian toadflax ~~biological biological~~ controls.~~

Herbicides could harm the *S. diluvialis* plants if they were broadcast sprayed ~~onto or in the immediate vicinity of *S. diluvialis* locations as is typical of treating large infestations of noxious weeds~~. However, ~~for some noxious weeds like Russian knapweed, chemical or mechanical~~

control is the only means to reduce limit the threat of noxious weeds to *S. diluvialis* habitat. There are also other herbicide application methods would provide tight control over herbicide drift or exposure of non-target plants. Herbicides can be applied with wicks or daubers that apply product directly to individual weed plants. This method is expensive but could be justified as part of an integrated noxious weed plan associated with extremely environmentally sensitive sites. Another option could include using a contact herbicide (which does not leave a residual effect) to control noxious weeds during a time of year when the weeds would be present and susceptible to the herbicide but the *S. diluvialis* plants would not be in have not emerged at form. The *S. diluvialis* sites along Rocky Reach Reservoir are all in proximity to open waters, which restricts the use of many herbicides. "Rodeo," which is USDA licensed for use near water, would be a likely herbicide of preference. The District acquires a permit annually to use approved herbicides near perennial water sources from the Washington Department of Agriculture and is required to report all applications in riparian areas.

Mechanical means of controlling noxious weeds can be as simple as hand-pulling or digging out individual noxious weeds. Although this method often leaves too much root from the weed in the ground to achieve satisfactory weed control, it can have a place in an integrated noxious weed control plan. Pulling annual and biennial weeds before they set seeds can reduce the weed seed base in the treatment area and make other aspects of an integrated noxious weed control program (e.g., biological and chemical controls) more effective and cost efficient.

Noxious weeds invade disturbed areas where natural vegetation has been removed or diminished, usually because of some man-related activity. Encouragement of a native ground cover or vegetation is the desired end-result of most integrated noxious weed control programs. If a desired ground cover or vegetation occupies the soil surface, there is less space for noxious weeds to re-invade and re-establish a foothold. Often, native vegetation re-establishes itself on areas where noxious weeds have been reduced. This process could be encouraged at the *S. diluvialis* sites by the planting and seeding of desirable native species to fill the niches left behind by the effect of other weed control practices.

#### ***4.2 Possible Acquisition of Conservation Easement on Private Land with *Spiranthes****

~~Two~~ All but one of the known populations of *S. diluvialis* that occur along Rocky Reach Reservoir ~~occur~~ are located on public land (Chelan County PUD, ~~and~~ Washington Department of Transportation, and Washington Department of Fish and Wildlife). These agencies have the means and legal requirements to adequately protect these sites. ~~The upstream~~ One population of *S. diluvialis* occurs on private property. Article 404 of the new license requires the District to obtain a conservation easement ~~may be obtained~~ from the landowner to ensure protection for this population.

Such a conservation easement would compensate the landowner in return for an agreement that the landowner would ~~conduct or not~~ refrain from conducting various land management practices on the site where the *S. diluvialis* occurs. A land management practice that may be preferred could include grazing cattle during some months but not other months to reduce competition from encroaching vegetation but avoid the trampling of blooming *Spiranthes* plants. Noxious weed control methods may be a practice included in a conservation easement. Restrictions on construction or development of the *S. diluvialis* site would be a likely inclusion in any

conservation easement for this site. Other land use restrictions may be recommended by regulatory agencies or botanists.

#### ***4.3 Periodic Spiranthes Population Monitoring***

A key to tracking changes in the existing *S. diluvialis* populations would be a periodic population and distribution monitoring program. As required under Article 404 of the new license, existing populations ~~could~~ will be monitored annually to track numbers of blooming *S. diluvialis* plants and their distribution within the ~~three~~ known sites. Distribution ~~could~~ will be documented with the use of detailed site maps, GPS coordinates, photo documentation, and physical markers (e.g., landscape plastic flagging markers or stakes). ~~This would lay a baseline of existing population and distribution data to which future changes can be compared and tracked. Annual monitoring will allow for long-term trends to be evaluated.~~

Article 404 requires the licensee to conduct *S. diluvialis* surveys in suitable habitat every 5 years. ~~Periodic future rare and sensitive plant surveys could also be conducted at intervals (e.g., five or ten year intervals) to examine likely habitats where *Spiranthes diluvialis* plants might potentially occur or establish in the future. ~~The present~~ Three of the *S. diluvialis* populations along Rocky Reach Reservoir were found during rare and sensitive plant surveys conducted by Chelan PUD in 2000. ~~Another was discovered during rare plant surveys conducted by the DNR in 2009.~~ Similar surveys conducted by Chelan PUD in 1990 found no *S. diluvialis* plants. It is possible that this plant has pioneered into its present sites from some upstream seed source because habitat and hydraulic conditions were favorable. It is probable that future, periodic surveys could find new populations of this plant if habitat and water level conditions continue to be favorable for its establishment and existence.~~