**Spiranthes diluvialis** - Sheviak

Ute Ladies'-tresses

**Other Common Names:** Ute ladies'-tresses

**Synonym(s):** *Spiranthes romanzoffiana* var. *diluvialis* (Sheviak) Welsh

**Taxonomic Status:** Accepted

**Related ITIS Name(s):** *Spiranthes diluvialis* Sheviak (TSN 196426)

**French Common Names:** spiranthe des terrains inondés

**Unique Identifier:** ELEMENT_GLOBAL.2.129296

**Element Code:** PMORC2B100

**Informal Taxonomy:** Plants, Vascular - Flowering Plants - Orchid Family

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Phylum</th>
<th>Class</th>
<th>Order</th>
<th>Family</th>
<th>Genus</th>
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</thead>
<tbody>
<tr>
<td>Plantae</td>
<td>Anthophyta</td>
<td>Monocotyledoneae</td>
<td>Orchidales</td>
<td>Orchidaceae</td>
<td>Spiranthes</td>
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</table>

**Concept Reference**


**Concept Reference Code:** B94KAR01HQUS

**Name Used in Concept Reference:** *Spiranthes diluvialis*

**Taxonomic Comments:** Taxonomic studies have confirmed hybrid origin and taxonomic distinctiveness (Arft and Ranker 1998, Szalanski et al. 2001).

**Conservation Status**

**NatureServe Status**

**Global Status:** G2G3

**Global Status Last Reviewed:** 08Aug2014

**Global Status Last Changed:** 06May2008

**Ranking Methodology Used:** Ranked by calculator

**Rounded Global Status:** G2 - Imperiled

**Reasons:** Known from approximately 63 sporadic occurrences in lower-elevation wet, herbaceous-dominated habitats in interior western North America. The species was Federally listed (U.S.) in 1992 when it was only known from Colorado, Utah, and Nevada. Since that time, it has been found in Wyoming, Montana, Nebraska, Idaho, Washington, and British Columbia. Utah and Colorado have the most plants and occurrences. Most occurrences are small, with 81% having less than 1000 plants and 95% occupying less than 50 acres. Approximately 12 occurrences are considered protected and appropriately managed. Although trends are difficult to determine, habitat condition is known to be deteriorating at some sites. Several historic populations in Utah and Colorado are presumed extirpated. The riparian habitat on which this species depends has been drastically modified by urbanization and stream channelization for agriculture and development. Habitat loss or alteration from competition from non-native plants and vegetation succession appear to be the most widespread threats.

**Nation:** United States

**National Status:** N2N3

Nation: Canada
National Status: N1 (14Dec2009)

U.S. & Canada State/Province Status

<table>
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<tr>
<th>United States</th>
<th>Colorado (S2), Idaho (S1), Montana (S1), Nebraska (S1), Nevada (S1), Utah (S1), Washington (S1), Wyoming (S1S2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>British Columbia (S1)</td>
</tr>
</tbody>
</table>

Other Statuses

U.S. Fish & Wildlife Service Lead Region: R6 - Rocky Mountain
Committee on the Status of Endangered Wildlife in Canada (COSEWIC): Candidate (05Jan2015)
Comments on COSEWIC: scheduled to be included in the Fall 2015 Call for Bids

NatureServe Global Conservation Status Factors

Range Extent Comments: Adapted from Fertig et al. (2005): Known from northern and south-central Utah, central to north-central and northwestern Colorado, east-central and southeastern Wyoming, eastern Idaho, southwestern Montana, eastern Nevada, western Nebraska, and central to north-central Washington, as well as British Columbia, where recently discovered (J. Penny, pers. comm. 2008). Occurs in at least 33 counties in the United States as well as at one site in British Columbia. Utah has the largest number of extant EOs and the highest number of reported plants, followed by Colorado. Using a minimum convex polygon to estimate the range (i.e. without attempting to exclude "extreme discontinuities"), range extent is approximately 915, 850 sq km.

Area of Occupancy: 126-500 4-km2 grid cells
Area of Occupancy Comments: Using the 2 x 2 km grid method, however, AOO is estimated at 392 sq km. Physically occupied habitat is estimated at 674-784 acres (2.73 - 3.17 square km) (Fertig et al. 2005).

Number of Occurrences: 21 - 80
Number of Occurrences Comments: Based on standardized EO delineation criteria, 61 EOs were known in 2005, of which 52 were extant (Fertig et al. 2005). Since then, at least one new extant occurrence has been discovered in Colorado (J. Handwerk pers. comm. 2008) and one new extant occurrence has been discovered in British Columbia (J. Penny pers. comm. 2008).

Population Size Comments: Recognizing that most annual survey data underestimate the number of dormant, vegetative, and fruiting plants, the maximum number of flowering plants observed over a multi-year period of monitoring can be used to estimate total population size. Based on the maximum number of plants reported for each known occurrence since 1985, the total rangewide number is estimated as at least 83,316 plants (Fertig et al. 2005). However, most occurrences are relatively small, in terms of both number of plants and area occupied. Of all extant occurrences, 39% contain fewer than 100 plants and 81% have less than 1000 individuals; in addition, nearly 66% of all known occurrences are reported from areas of 0.1-10 acres, while only 5% occupy more than 50 acres (Fertig et al. 2005).

Number of Occurrences with Good Viability/Integrity: Few to some (4-40)
Viability/Integrity Comments: Approximately 24 occurrences have an A or B EO Rank rangewide (unstandardized EO delineation); when standardized EO delineation criteria are applied, this number will likely decrease. Approximately 10-11 occurrences (standardized EO delineation) have more than 1000 individuals (Fertig et al. 2005).

Overall Threat Impact: High
Overall Threat Impact Comments: Threats include (by descending number of individual plants affected) competition from invasive species, vegetation succession, hydrology change (including conversion of irrigation water to municipal use, flood control, water development/redevelopment, and stream/riparian restoration [where plants are dependent on current, altered conditions]), flooding, road and other construction, recreation-associated impacts, natural herbivory (e.g. by voles), urbanization, loss of pollinators (reduction in the quantity and suitability of available pollinators, particularly certain bees), grazing by livestock, drought, and haying/mowing (Fertig et al. 2005). Approximately 60% of occurrences are affected by one or more "current threats", while an additional 12% of occurrences are not affected by any "current threats" but have one or more "potential threats" listed, bringing the total to 72% of occurrences thought to be threatened in the present or near future. Competition from invasive species, the most widespread single threat, affects 62% of occurrences and 84% of individual plants (Fertig et al. 2005). Although this species is now thought to be more resilient to human-influenced environments than was originally supposed, many threats remain high.

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**Short-term Trend:** Decline of 10-30%

**Short-term Trend Comments:** Population monitoring studies in Colorado and Utah have projected long-term declines if not extirpations in both riparian corridor and wet meadow settings and under current land use practices without conservation intervention. In Idaho, long-term monitoring has detected local extirpation of subpopulations as habitat condition deteriorates through flooding or vegetative succession. Nevertheless, new monitoring and demographic research have documented that populations are more stable than originally suspected, because most past monitoring studies had focused on counts of flowering plants, which are more likely to fluctuate than counts that include more cryptic vegetative, fruiting, and dormant plants (Fertig et al. 2005). Most of the multi-year monitoring studies based on flowering plants exhibit an oscillating trend, alternating between periods of increase and decrease around a relatively stable mean (Fertig et al. 2005). This species also appears more tolerant of human-induced disturbances than originally supposed, based on the discovery of additional populations in significantly human-modified habitats (Fertig et al. 2005).

**Long-term Trend:** Decline of <50% to Relatively Stable

**Long-term Trend Comments:** Presumed extirpated at several collection sites in parts of range, but with limited historical data for gauging losses. Rocky Mountain Front habitat in Colorado may have been the most extensively converted.

**Intrinsic Vulnerability Comments:** The complex life history of this species, requiring mycorrhizal infection, frequently disturbed early seral habitat conditions, and specialized pollination biology all combine to make local populations more susceptible to stochastic events or human-induced threats than most native plant species (Fertig et al. 2005).

**Environmental Specificity:** Narrow to moderate.

**Environmental Specificity Comments:** Requires stable moisture throughout growing season as well as a seasonal reduction or season-long sparse vegetation cover within wet meadow habitat, i.e., dynamic or low-competition conditions for which too little disturbance can have as great a long-term impact as too much disturbance in an already fragile wetland setting.

**Other NatureServe Conservation Status Information**

**Distribution**

**Global Range:** Adapted from Fertig et al. (2005): Known from northern and south-central Utah, central to north-central and northwestern Colorado, east-central and southeastern Wyoming, eastern Idaho, southwestern Montana, eastern Nevada, western Nebraska, and central to north-central Washington, as well as British Columbia, where recently discovered (J. Penny, pers. comm. 2008). Occurs in at least 33 counties in the United States as well as at one site in British Columbia. Utah has the largest number of extant EOs and the highest number of reported plants, followed by Colorado. Using a minimum convex polygon to estimate the range (i.e. without attempting to exclude "extreme discontinuities"), range extent is approximately 915, 850 sq km.

**U.S. States and Canadian Provinces**
U.S. & Canada State/Province Distribution

United States
- CO, ID, MT, NE, NV, UT, WA, WY

Canada
- BC

Range Map
No map available.

U.S. Distribution by County

<table>
<thead>
<tr>
<th>State</th>
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<tr>
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<tr>
<td>ID</td>
<td>Bonneville (16019), Fremont (16043), Jefferson (16051), Madison (16065)</td>
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<tr>
<td>MT</td>
<td>Beaverhead (30001), Broadwater (30007), Gallatin (30031), Jefferson (30043), Madison (30057)</td>
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<tr>
<td>NE</td>
<td>Sioux (31165)</td>
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<tr>
<td>NV</td>
<td>Lincoln (32017)</td>
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<tr>
<td>UT</td>
<td>Cache (49005), Daggett (49009), Duchesne (49013), Garfield (49017), Salt Lake (49035)<em>, Tooele (49045), Uintah (49047), Utah (49049), Wasatch (49051), Wayne (49055)</em>, Weber (49057)*</td>
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<tr>
<td>WA</td>
<td>Chelan (53007), Okanogan (53047)</td>
</tr>
<tr>
<td>WY</td>
<td>Converse (56009), Goshen (56015), Laramie (56021), Niobrara (56027), Platte (56031)</td>
</tr>
</tbody>
</table>

* Extirpated/possibly extirpated

U.S. Distribution by Watershed

<table>
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<tr>
<th>Watershed Region</th>
<th>Watershed Name (Watershed Code)</th>
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<tbody>
<tr>
<td>10</td>
<td></td>
</tr>
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</table>

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Beaverhead (10020002)+, Ruby (10020003)+, Jefferson (10020005)+, Madison (10020007)+, Gallatin (10020008)+, Upper Missouri (10030101)+, Antelope (10120101)+, Niobrara Headwaters (10150002)+, Horse (10180012)+, Middle South Platte-Cherry Creek (10190003)+, Clear (10190004)+, St. Vrain (10190005)+, Cache La Poudre (10190007)+, Crow (10190009)+, Upper Lodgepole (10190015)+, Lower Lodgepole (10190016)+

11 Fountain (11020003)+

14 Roaring Fork (14010004)+, Upper Green-Flaming Gorge Reservoir (14040106)+, Vermilion (14040109)+, Lower Yampa (14050002)+, Lower Green-Diamond (14060001)+, Ashley-Brush (14060002)+, Duchesne (14060003)+, Strawberry (14060004)+, Fremont (14070003)+, Escalante (14070005)+, Pania (14070007)+

15 Meadow Valley Wash (15010013)+

16 Little Bear-Logan (16010203)+, Lower Weber (16020202)+, Utah Lake (16020201)+, Spanish Fork (16020202)+, Provo (16020203)+, Jordan (16020204)+, Southern Great Salt Lake Desert (16020306)+

17 Chief Joseph (17020005)+, Okanogan (17020006)+, Palisades (17040104)+, Idaho Falls (17040201)+, Lower Henrys (17040203)+

+ Natural heritage record(s) exist for this watershed
* Extirpated/possibly extirpated

Ecology & Life History

**Basic Description:** A perennial herb with a flowering stem, 2-5 dm tall, arising from a basal rosette of grass-like leaves. The flowers are ivory-colored, arranged in a spike at the top of the stem. Blooms mainly from late July through August.

**General Description:** Ute Ladies’ Tresses is a perennial orchid with usually 1 stem that is 20-50 cm tall and arising from tuberously thickened roots. Its narrow leaves are 1 cm wide, can reach 28 cm long, are longest at their base, and persist during flowering. The inflorescence consists of few to many white or ivory flowers clustered in a spike of 3-rank spirals at the top of the stem. The sepals and petals are ascending or perpendicular to the stem. The lateral sepals often spread abruptly from the base of the flower, and sepals are free or only slightly connate at the base. The lip petal is somewhat constricted at the median.

**Technical Description:** From CNHP Wetland Guide 2012: Growth Habit: perennial, terrestrial; roots few-several, horizontal to descending, slenderly tuberous, to 1 cm diameter. Stem: 2-6.2 dm tall. Leaves: persisting through anthesis, usually restricted to base of stem, ascending, linear-lanceolate, to 28 × 1.5 cm. Inflorescences: Spikes usually tightly spiraled, 3 flowers per cycle of spiral, rarely loosely spiraled with more than 4 flowers per cycle; rachis sparsely (rarely densely) pubescent, some trichomes capitate, glands obviously stalked (longest trichomes 0.2-0.4 mm). Flowers: white or ivory, ascending, strongly gaping from near base (lip prominently diverging at about a 90 degree angle or higher from rachis). Tepals distinct or united only at the base, not forming a hood above the lip, outer lateral tepals spreading (compared to the deeply constricted, fiddle-shaped lip petals of *S. romanzoffiana*), by its whitish, stout, ringent (gaping at the mouth) flowers, by its oval to lance-shaped, narrowed-at-the-middle lip petal with crispy-wavy margins, lack leaves at flowering time (leaves of *S. diluvialis* persist at flowering time), and occur in low-elevation (to 1900 m) wetlands of the Great Plains east of the known range of *S. diluvialis* (except in Nebraska). *S. portfolia* has pale yellow flowers with sepals fused for about half their length but not forming a hood (compared to the white flowers with sepals free or connate for a short distance of *S. diluvialis*), strap-shaped lip petals with peg-like hairs on the upper surface (compared to *S. diluvialis*’ oval to lance-shaped, narrowed-at-the-middle lip petal with crispy-wavy margins), and glabrous stems. It occurs primarily along the Pacific Coast inland to Idaho and western Nevada in wetlands from 100-2600 m. *S. infernalis* has yellowish-white flowers with a green lip that is widest near the middle before tapering to the base and is endemic to the Ash Meadows of southern Nevada.

From CNHP Wetland Guide 2012:

**Main Characteristics:**

- Tepals distinct or united only at the base, not forming a hood above the lip, outer lateral tepals spreading
- Flowers diverging at about a 90 degree angle or higher from rachis

Inflorescence looser, rachis usually visible

**Duration:** PERENNIAL

**Reproduction Comments:** Across its range *Spiranthes diluvialis* blooms from early July to late October. Asynchronous maturation of flowers promotes outcrossing, but flowers are self-compatible (Fertig et al. 2005).

**Riverine Habitat(s):** SPRING/SPRING BROOK

**Palustrine Habitat(s):** Bog/fen, FORESTED WETLAND, HERBACEOUS WETLAND, Riparian, SCRUB-SHRUB WETLAND

**Terrestrial Habitat(s):** Grassland/herbaceous

**Habitat Comments:** Adapted to early- to mid-seral, moist to wet conditions, where competition for light, space, water, and other resources is normally kept low by periodic or recent disturbance events. Major occupied habitat types include (1) alluvial banks, point bars, floodplains, or ox-bows associated with perennial streams, with a high water table and short, perennial graminoid- and forb-dominated vegetation maintained by grazing, periodic flooding, or mowing; (2) river floodplain habitats which experience regular spring flooding and/or frequent large scale floods but maintain relatively stable, moist to wet soil in summer, within moist meadow, riparian woodland, or riparian shrubland communities; (3) shores of lakes and reservoirs, in mesic meadow-type vegetation maintained by lake level fluctuations or seasonal flooding of gravel bars; (4) groundwater-fed springs, sometimes in desert settings, or subirrigated meadows where edaphic characteristics (e.g. high water table and calcic soil), fire, and/or grazing are sufficient to prevent invasion of later seral vegetation; and (5) human-influenced habitats, including perennial stream, river, lakeshore, and spring sites directly associated with human-developed dams, levees, reservoirs, irrigation ditches, reclaimed gravel quarries, roadside barrow pits, and irrigated meadows. More than half of documented populations occur in sites in which natural hydrology has been influenced by dams, reservoirs, or supplemental irrigation, and many populations occur within agricultural or urban settings. 550 - 2100 m. (adapted from Fertig et al. 2005)

**Economic Attributes**

Not yet assessed

**Management Summary**

**Stewardship Overview:** Continue to monitor known populations for status of threats, site condition, and abundance of plants. Survey potential habitat for new populations. Prioritize surveying EOs that haven’t been visited for 20+ years. Seek long term protection for exceptional sites.

Specific recommendations adapted from Arft (1995) and Fertig et al. (2005): Historically, patchy and episodic disturbance events created areas suitable for establishment of new colonies as existing sites became less hospitable over time. In current fragmented ecosystems, human manipulation may be necessary to create early- to mid-successional habitats, while maintaining adequate soil moisture levels. Studies have found that winter grazing and early season mowing or haying can reduce competing vegetation cover and increase plant survival and reproduction, while grazing or haying after flower production (i.e. in summer) can be detrimental. Prescribed burning does not appear to be as effective as winter grazing or early season mowing/haying. In addition, invasion of sites by non-native plants needs to be monitored and curtailed, as these species are frequently adapted to similar environments and act as highly effective competitors with *S. diluvialis*.

**Population/Occurrence Delineation**

**Minimum Criteria for an Occurrence:** Any location with one or more individuals.

**Separation Barriers:** Occurrences should be considered new if they are separated from existing occurrences markedly by distinct features on the landscape such as ridges, rivers, or roads.

**Separation Distance for Unsuitable Habitat:** 1.61 km

**Separation Distance for Suitable Habitat:** 8.05 km

**Separation Justification:** An occurrence within a meadow habitat may be considered new if separated by more than one mile of unsuitable habitat. Due to the dynamics of riparian habitat and population fluctuation of SPIRANTHES DILUVIALIS, an occurrence may stretch over many river miles and include breaks in the occurrence of up to five miles if the habitat continues.

**Date:** 28Sep2000

**Author:** Spackman, S., and D. Anderson

**Population/Occurrence Viability**

**Excellent Viability:** SIZE: >100 genets. CONDITION: Native plant community is intact with zero to low introduced plant species cover and/or minimal anthropogenic disturbance. LANDSCAPE CONTEXT: Surrounding landscape is unfragmented and ecological and hydrological processes are intact.

**Good Viability:** SIZE: 50-99 genets. CONDITION: Native plant community is intact with low to moderate introduced plant species cover and/or low to moderate anthropogenic disturbance. LANDSCAPE CONTEXT: Surrounding landscape may be partially fragmented, but ecological and hydrological processes are intact.

http://explorer.natureserve.org/servlet/NatureServe?sourceTemplate=tabular_report.wmt&loadTem...
**Fair Viability:** SIZE: 20-49 genets. CONDITION: Native plant community is partially intact with moderate to high introduced plant species cover and/or moderate to high anthropogenic disturbance. LANDSCAPE CONTEXT: Surrounding landscape may be moderately fragmented, but ecological and hydrological processes are intact.

**Poor Viability:** SIZE: <20 genets. CONDITION: Few components of the native plant community remain and introduced plant species cover and/or anthropogenic disturbance is high. LANDSCAPE CONTEXT: Surrounding landscape is fragmented with many ecological and hydrological processes no longer intact.

**Justification:** EO rank specifications were based on the Colorado Natural Heritage Program (2000) EO rank specifications for Ute ladies'-tresses and the "Element occurrence data standard" (NatureServe 2002). Rank factors were weighted based on the linear community pattern type so that: landscape context=45%; condition=33%; and size=22% (NatureServe 2002). Changes in the number of plants should not be used solely to justify a rank change unless condition and/or landscape context has concurrently changed; and/or if the known EO area has been expanded. The rank factors are calculated to verify the most appropriate rank, where A=4, B=3, C=2, and D=1. The output calculation is used to designate the following ranks: A=3.6-4.0; B=2.6-3.4; C=1.6-2.4; and D=0.0-1.4. A range rank (i.e. BC) is used when the output calculation is 1.5, 2.5, or 3.5. Range ranks can also be used if the EO or rank factors share qualities of multiple ranks. If there is incomplete information about size, condition, and/or landscape context factors, the "?" qualifier can be used with the most appropriate rank (i.e. B?). E-, F-, H-, and X-ranks should be used when appropriate.


**Date:** 25Oct2006

**Author:** Colket, B., S. Cooke, G. Crymes, and M. Mancuso

**Notes:** See: Colket, B., S. Cooke, G. Crymes, and M. Mancuso. 2006. Element occurrence review and update for five rare plant species. Idaho Conservation Data Center, Idaho Department of Fish and Game, Boise. 45 pp. plus appendices.

NOTE: At dx 2/08, Idaho CDC sent in a re-write of these EO Rank Specs (originally written by Colorado NHP), which was more succinct but contained less information. It was not clear which version was preferable. The Idaho version was accepted as the Biotics EO Rank Specs, but the Colorado version was preserved as the BCD Rank Specs. This decision can be re-evaluated as necessary (K. Gravuer).

**U.S. Invasive Species Impact Rank (I-Rank) Not yet assessed**

**Authors/Contributors**

**NatureServe Conservation Status Factors Edition Date:** 28Sep2000


**Management Information Edition Date:** 10Aug2014

**Management Information Edition Author:** Treher

**Element Ecology & Life History Edition Date:** 08Sep1996

**Element Ecology & Life History Author(s):** MZB

Botanical data developed by NatureServe and its network of natural heritage programs (see Local Programs), The North Carolina Botanical Garden, and other contributors and cooperators (see Sources).

**References**


http://explorer.natureserve.org/servlet/NatureServe?sourceTemplate=tabular_report.wmt&loadTem...


• Center for Plant Conservation. 2000. America's Vanishing Flora, stories of endangered plants from the fifty states and efforts to save them. Center for Plant Conservation, St. Louis, MO.


• Fertig, W., C. Refsdal, and J. Whipple. 1994. *Wyoming Rare Plant Field Guide*. Wyoming Rare Plant Technical Committee, Cheyenne, WY.


• Jordan, Lucy. 1992. Listing priority number assignment form, USFWS.


USDA, NRCS. 2012. The PLANTS Database (). National Plant Data Team, Greensboro, NC 27401-4901 USA.


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Note: All species and ecological community data presented in NatureServe Explorer at http://explorer.natureserve.org were updated to be current with NatureServe's central databases as of February 2015.

Note: This report was printed on August 6, 2015.

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