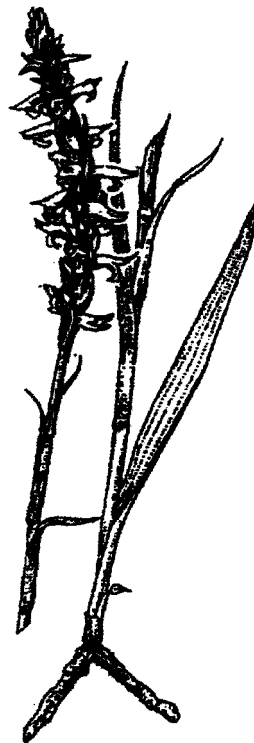


# Ute Ladies'-Tresses (*Spiranthes diluvialis*) in Idaho: 2001 Status Report

by

Chris Murphy  
Assistant Botanist  
Conservation Data Center



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Conservation Data Center**

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**Idaho Department of Fish and Game  
Natural Resource Policy Bureau  
600 South Walnut, P.O. Box 25  
Boise, Idaho 83707  
Rod Sando, Director**



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## SUMMARY

The 2001 status report for Ute ladies'-tresses (*Spiranthes diluvialis*) compliments the previous 1997-2000 status reports and contains new or updated information about the species and its habitat in Idaho. The 1997 status report is the best source for basic distribution and habitat information, as well as for the description and identification of *Spiranthes diluvialis*. The 1998 status report is the best source for more detailed habitat information of populations on the South Fork Snake River in Idaho. The 1999 status report explains the on-going research on floodplain dynamics in relation to Ute ladies'-tresses habitat. The 2000 status report and this report are primarily focused on current habitat conditions, threats to populations, and the conservation of *Spiranthes diluvialis*. The same format is used in this update as in previous reports, which should be consulted for information not covered here. Reports can be downloaded from the Conservation Data Center homepage at: [www2.state.id.us/fishgame/info/cdc/plant\\_pubs.htm](http://www2.state.id.us/fishgame/info/cdc/plant_pubs.htm)

Major findings reported here include:

- Significant expansions of prior known occurrences were discovered at Kelly's Island (001) and at Black Canyon (022).
- The Conservation Data Center completed a model for predicting the distribution of potential *Spiranthes diluvialis* habitat on the National Forests of Idaho.
- Vegetation was again monitored at Warm Springs Bottom (003) and Black Canyon (022) to study the influence of floodplain dynamics on succession in *Spiranthes diluvialis* habitat. No significant vegetation changes could be detected compared with prior years.
- The habitat ecology study, initiated in 1999, relating floodplain dynamics and primary habitat succession to conservation of Ute ladies'-tresses, is on-going and will be completed in 2002.
- 4,133 Ute ladies'-tresses plants were observed in 2001. While the total number of plants observed was a record high, only seven occurrences had higher numbers over last year and seven occurrences have decreased for three or more years in a row. Five occurrences had decreased numbers of plants from last year and three remained the same as in 2000.
- A significant increase in flowering individuals was observed at Annis Island (006), despite a human-ignited wildfire burning a portion of the occurrence during late spring.
- Most occurrences are still threatened by human activities (e.g., cattle grazing, recreation) and/or noxious weed invasion. Habitat at Lufkin Bottom (011) experienced trampling by recreationists. At Mud Creek Bar (009), a trail leading from a boat landing to an unauthorized outfitter camp went directly through occupied habitat. Late-season trespass cattle grazing occurred at Warm Springs Bottom (003). At Falls Campground (004), eight cattle grazed the occurrence prior to the authorized use period (after Labor Day).
- At least 14 occurrences had noxious weeds present within occupied *Spiranthes diluvialis* habitat. The BLM and USFS released biological control agents to curtail weed invasions.
- A systematic, easily repeatable method for objectively measuring changes and threats to Ute ladies'-tresses habitat was developed, tested, and implemented. Twenty-three permanent monitoring transects were established. The data provides a reference point for measuring future environmental change at multiple scales. An index of habitat change was used involving the measurement of important *Spiranthes* habitat attributes.

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## TAXONOMY

No major changes from 1997-2000 status reports. However, Szalanski et al. (2001) recently published results of their research on the extent and distribution of genetic variation within and among populations of *Spiranthes diluvialis* sampled from across its geographic range. Their genetic analysis confirmed the hypothesis that *Spiranthes magnicamporum* and *S. romanzoffiana* are the parental species of *Spiranthes diluvialis*, with the latter species being the more closely related maternal parent. Importantly, across its geographic range, no genetic differentiation among or within populations was found. Based on this lack of genetic uniqueness, they concluded no individual population is a higher conservation priority than any other.

## LEGAL OR OTHER FORMAL STATUS

No changes from 1997-2000 status reports.

## DESCRIPTION AND IDENTIFICATION

No changes from 1997-2000 status reports. *Spiranthes romanzoffiana* occurs within *Spiranthes diluvialis* populations on the South Fork of the Snake River upstream from Warm Springs Bottom (003) (Moseley 2000). This observation was confirmed again this year, but *S. romanzoffiana* were not tallied at most sites since they were in seed (or gone) during periods of survey in late August.

## DISTRIBUTION

**Rangewide Distribution:** No change from 1997-2000 status reports.

**Idaho Distribution:** No changes from 1997-2000 status reports. There were no changes in the known distribution of *Spiranthes diluvialis* discovered in 2001. It is still only known from the South Fork of the Snake River floodplain in Jefferson, Madison, and Bonneville counties of eastern Idaho. Populations are scattered along 49 river miles from near the confluence of the Henry's Fork, upstream to Swan Valley, nine river miles below Palisades Dam.

**Precise Occurrences in Idaho:** No major changes from 1997-2000 status reports. In 2001, there were two significant expansions of prior known occurrences. At Kelly's Island (001), a new sub-population, with 15 *Spiranthes diluvialis* individuals, was discovered on the island to the southwest of the campground. This sub-population occurs in habitat more typical for the species on the South Fork Snake River than the previously known occupied habitat at Kelly's Island. Another expansion was found at the Black Canyon occurrence (022), where 390 *Spiranthes diluvialis* were documented in typical habitat on the mainland (west bank of the river).

For the third consecutive year there were no Ute ladies'-tresses observed at Squaw Creek Islands (020). As noted in previous status reports (Moseley 1998b, 2000; Murphy 2000), all *Spiranthes* observed at Squaw Creek Islands since 1998 have been *Spiranthes romanzoffiana*. Due to unpredictable Ute ladies'-tresses phenology, the potential for mis-timed surveying, and livestock grazing (on the mainland portion), one more year of careful searching for *S. diluvialis* should occur before this occurrence is confirmed as a misidentification. As in the case three of last four years, there were no

Ute ladies'-tresses observed at Gormer Canyon #5 (012). The Gormer Canyon #5 (012) occurrence may be on its way to extirpation because of competition with spotted knapweed (*Centaurea maculosa*); the area is marginal habitat. Nevertheless, future surveys should occur since this site once supported Ute ladies'-tresses individuals. At Twin Bridges Island (007), the Madison County park portion of the occurrence is nearly extirpated, with only one *Spiranthes diluvialis* plant found (none were found in 1999 or 2000).

The Ute ladies'-tresses along the Snake River are generally considered one large meta-population, although 22 occurrences have been delineated in the Conservation Data Center (CDC) database based on management and geographic considerations (Moseley 2000). The precise occurrence records, with detailed location data, were updated in late November 2001 (Conservation Data Center 2001).

**Extent of Surveys in Idaho:** No change from 1997-2000 status reports.

## HABITAT

**Plant Communities:** No changes from 1997-2000 status reports.

**Vegetation Monitoring:** Currently, vegetation succession is annually monitored at two Ute ladies'-tresses populations. They were chosen because these sites reveal a lot about the influence of floodplain dynamics on vegetation succession in *Spiranthes diluvialis* habitat. The June 1997 flood heavily impacted the upstream portion of the Warm Springs Bottom (003) occurrence, while the island portion of the Black Canyon (022) occurrence is on a frequently flooded, young fluvial landform.

**Warm Springs Bottom (003)** - For the past three years vegetation monitoring has occurred on a portion of the Warm Springs Bottom (003) occurrence that was apparently extirpated by June 1997 flood deposits (Moseley 1998b, 2000; Murphy 2000). The flood deposited 18 cm of sand on the site, apparently beyond the threshold depth that Ute ladies'-tresses can withstand (Moseley 1998b). In 1999, a permanently marked belt transect was established and sampled to provide baseline data for monitoring vegetation succession related to floodplain dynamics (using methods of Moseley 1998b). Photo-points were also established. During 2000 and 2001, vegetation composition and structure was measured on the extirpated patch and photographs re-taken. The 2001 results are described below.

**Vegetation Data:** On August 28, 2001 vegetation data was again collected at transect 98SD003C. Table 1 is a comparison of composition and cover estimates from 1998-2001. *Equisetum variegatum* was the first species to invade sand deposited by the June 1997 flood and it continued to increase in cover until it dominated the site in 1999 (Moseley 2000). Since 1999, however, *Equisetum variegatum* has dramatically decreased in cover (Murphy 2000). By 1999, *Agrostis stolonifera*, the dominant herb on the site before the flood, increased in cover, but has remained stable ever since. The *Elaeagnus commutata* shrubs on the site prior to the flood never re-sprouted (Moseley 2000). Species richness increased from 1998 to 1999 but has not noticeably changed since then.

Several factors may have influenced the vegetation data collected this year. First, trespass cattle had recently grazed the transect, possibly causing a decrease in total cover of graminoids. However, grazing utilization and trampling was not high, and much less than in 2000. Second, the site was very dry due to abnormally high summer heat and drought. These combined factors have probably kept total graminoid cover and height from increasing since 1999 and litter levels low (Table 1). For



example, the cover of *Agrostis stolonifera* and *Poa pratensis* did not change from 2000. In general, the height of woody species increased slightly from 2000, but ungulate browsing has helped keep the total cover of shrubs and trees the same as in 2000. Total forb cover also did not change from 2000. *Equisetum variegatum* is decreasing in importance, probably in response to site desiccation. However, *Solidago missouriensis* cover noticeably increased and contributed to the increase in average forb height. The cover of *Medicago lupulina*, a nitrogen-fixing, early-seral exotic species of both moist and dry sites, increased in 2000 but remained the same in 2001.

In 2001, no *Spiranthes diluvialis* plants were observed along the transect, which now appears as very dry, marginal habitat. The *Spiranthes diluvialis* observed in 2000, blooming eight meters immediately down slope of the end of transect 98SD003C, was not observed this year. Because no significant vegetation changes have occurred for the last two years, the transect will not be sampled in 2002. Vegetation measurements and photos will be redone in 2003.

**Table 1. Vegetation of the permanent monitoring transect 98SD003C at Warm Springs Bottom (003) for 1998-2001.**

Vegetation Data for 98SD003C	1998 % cover	1999 % cover	2000 % cover	2001 % cover
<b>WOODY SPECIES</b>				
<i>Betula occidentalis</i>		seedling		
<i>Elaeagnus commutata</i>	dead stems	dead stems		
<i>Populus angustifolia</i>	1	1	1	1
<i>Salix boothii</i>				1
<i>Salix exigua</i>		3	1	1
<i>Salix lasiandra</i>			3	1
<i>Salix lutea</i>	1		1	1
<b>GRAMINOIDS</b>				
* <i>Agrostis stolonifera</i>	3	10	10	10
<i>Juncus ensifolius</i>		1		
<i>Juncus tenuis</i>			1	
* <i>Phalaris arundinacea</i>		1		1
* <i>Poa pratensis</i>		1	3	3
Unknown grass		1		
<b>FORBS &amp; PTERIDOPHYTES</b>				
<i>Aster ascendens</i>		1	1	1
* <i>Cirsium vulgare</i>			1	1

Vegetation Data for 98SD003C	1998 % cover	1999 % cover	2000 % cover	2001 % cover
<i>Epilobium ciliatum</i>		1		
<i>Equisetum variegatum</i>	60	80	10	3
<i>Frageria virginiana</i>				1
<i>Geum macrophyllum</i>			1	1
* <i>Medicago lupulina</i>		3	10	10
<i>Solidago missouriensis</i>	1	3	3	10
* <i>Taraxacum officinale</i>		1		
* <i>Tragopogon dubius</i>				1
* <i>Trifolium repens</i>		3	1	1
<i>Viola</i> sp.			1	
Unknown forb		1		
<b>TOTAL SPECIES</b>	5	16	15	17
<b>LIFE FORM DATA</b>				
Woody Cover / Mean Ht. (m)	1 / 0.5	1 / 0.8	1 / 1.1	1 / 1.2
Graminoid Cover / Mean Ht. (m)	3 / 0.4	10 / 0.4	10 / 0.3	10 / 0.1
Forb Cover / Mean Ht. (m)	60 / 0.1	90 / 0.1	20 / 0.2	20 / 0.5
<b>GROUND COVER</b>				
Soil (sand)	70	60	30	60
Gravel	0	0	0	0
Rock	0	0	0	0
Litter	1	1	60	20
Wood	1	1	1	3
Moss	0	30	10	10
Basal Vegetation	30	10	10	10

\* = exotic species

**Repeat Photography:** Photos were re-taken on August 28, 2001 at a series of photo-points established during 1996, 1997, and 1998 at 98SD003C (Moseley 2000). Below is the list of repeat photo sets archived at the CDC (Table 2). The dramatic change in vegetation and habitat is illustrated by comparing the 96-1 photo (taken September 13, 1996, before the June 1997 flood deposits) with the same 96-1 photo from 2001 (Figure 1). Note the significant decrease in mesic graminoid cover, increase in exposed sandy soil, and complete loss of *Elaeagnus commutata* shrubs.

**Table 2. Record of photo-points and their archived photo sets at Warm Springs Bottom (003) permanent monitoring transect 98SD003C.**

Photo #	First Taken	Repeated			
		1999	2000	2001	
96-1	1996	-	1999	2000	2001
97-1	1997	1998	1999	2000	2001
97-2	1997	1998	1999	2000	2001
97-3	1997	1998	1999	2000	2001
98-1	1998	-	1999	2000	2001
98-2	1998	-	1999	2000	2001

**Figure 1. Repeat photos, 1996 and 2001, of photo-point 96-1 at Warm Springs Bottom (003) permanent monitoring transect 98SD003C. The arrows point to matching landmarks.**



**Photo-point 96-1 taken on September 13, 1996. Note the thick and tall grass and *Elaeagnus commutata* shrubs.**



**Photo-point 96-1 taken on August 28, 2001. Note the lack of mesic graminoid cover, barren sandy soil, and lack of *Elaeagnus commutata* shrubs.**

**Black Canyon (022)** - In 1999, the vegetation at the recently discovered island portion of the Black Canyon (022) occurrence was sampled with methods described in the 1998 status report (Moseley 1998b). The same Ute ladies'-tresses habitat was sampled in 2000, but due to time constraints, a different and quicker method (with a greater area sampled) was used (Murphy 2000). On August 16, 2001, a permanently marked belt transect was established and sampled to provide baseline data for monitoring vegetation succession (using methods of Moseley 1998b). Photo-points were also established. This transect (01SD022A) corresponds with the start of the habitat change monitoring transect (Murphy 2001). Unfortunately, the exact location of Moseley's 1999 vegetation transect is not known.

Vegetation data: Though exact comparisons between 1999, 2000, and 2001 data are impossible, some general vegetation patterns (especially comparing 1999 and 2001), can be made. Table 3, on the following page, displays the vegetation of the Black Canyon transect from 1999 to 2001. First, the diversity and cover of woody species was not noticeably different between 1999 and 2001. The high cover of *Populus angustifolia* documented in 2000 is probably an artifact of transect location or observer over-estimation. Second, the cover of *Agrostis stolonifera* was slightly higher in 2001 than in 1999, but total graminoid cover was similar to 1999. Possibly due to differing transect locations, the diversity of mesic graminoid species recorded in 2001 was lower than prior years. The cover of *Equisetum variegatum* was similar to that recorded in 1999, but the cover of *Equisetum hyemale* was much lower. The reason for this was not clear. Higher cover of *Aster hesperius* was recorded in 2001, but the cover of weedy exotic species, such as *Cirsium vulgare*, *Medicago lupulina*, *Plantago major*, *Sonchus arvensis*, and *Trifolium* spp., was not noticeably different. Total forb cover and height, as well as moss cover, was lower than in prior years, but litter cover was higher.

Interestingly, this site was originally classified as an *Equisetum variegatum* community type. However, this community type may be short-lived due to rapid succession on this frequently flooded island point-bar. The data from 1999 to 2001 may indicate a successional trend toward a *Salix exigua*/mesic graminoid community (which is adjacent at this Ute ladies'-tresses population). This hypothesis should be tested, however, by continued monitoring of this permanent vegetation transect with repeated photography (Moseley 1998b; Murphy 2000).

**Table 3. Vegetation of the island portion of the Black Canyon (022) occurrence (01SD022A) for 1999-2001.**

<b>Vegetation Data for Black Canyon (022) Occurrence</b>	<b>1999: % cover, sampled with ten 50x20 cm microplots on 10 m transect</b>	<b>2000: % cover, sampled with one 5 x 5 m plot</b>	<b>2001: % cover, sampled with ten 50x20 cm microplots on 10 m transect</b>
<b>WOODY SPECIES</b>			
<i>Betula occidentalis</i>	1	1	seedlings
<i>Cornus stolonifera</i>		1	
<i>Populus angustifolia</i>	1	10	1
<i>Salix bebbiana</i>			seedlings
<i>Salix exigua</i>	1	1	1
<i>Salix lutea</i>		1	1
<b>GRAMINOIDS</b>			
* <i>Agrostis stolonifera</i>	1	10	3
<i>Carex lanuginose</i>	1	1	
<i>Carex nebraskensis</i>	1	1	
<i>Juncus ensifolius</i>	1	1	
<i>Juncus tenuis</i>		1	
<i>Muhlenbergia richardsonis</i>		1	1
* <i>Phalaris arundinacea</i>	1	3	1
* <i>Poa pratensis</i>	1	1	1
<b>FORBS &amp; PTERIDOPHYTES</b>			
<i>Aster hesperius</i>	1	1	10
* <i>Cirsium arvense</i>		1	
* <i>Cirsium vulgare</i>		1	1
<i>Conyza canadensis</i>	1	1	
<i>Epilobium ciliatum</i>	1	1	
<i>Equisetum arvense</i>	3	1	1
<i>Equisetum hyemale</i>	50	30	1
<i>Equisetum laevigatum</i>			1
<i>Equisetum variegatum</i>	20	1	20
<i>Habenaria hyperborea</i>		1	1
<i>Geum macrophyllum</i>		1	
* <i>Medicago lupulina</i>		3	3
* <i>Melilotus alba</i>		1	
<i>Mentha arvensis</i>	1	1	1
* <i>Myosotis scorpioides</i>		3	
* <i>Plantago major</i>		1	1
<i>Potentilla rivularis</i>	1		
<i>Ranunculus cymbalaria</i>			1
<i>Ranunculus sp.</i>		1	1
<i>Senecio hydrophilus</i>		1	
<i>Solidago missouriensis</i>		1	1
* <i>Sonchus arvensis</i>		1	3

Vegetation Data for Black Canyon (022) Occurrence	1999: % cover, sampled with ten 50x20 cm microplots on 10 m transect	2000: % cover, sampled with one 5 x 5 m plot	2001: % cover, sampled with ten 50x20 cm microplots on 10 m transect
<i>Spiranthes diluvialis</i>	1	1	1
* <i>Tragopogon dubius</i>			1
* <i>Trifolium pratense</i>			1
* <i>Trifolium repens</i>	3	10	1
<i>Veronica anagallis-aquaticus</i>	1		
<b>TOTAL SPECIES</b>	20	34	27
<b>LIFE FORM DATA</b>			
Woody Cover (avg. ht)	1	10 (1.30 m)	1 (0.60 m)
Graminoid Cover (avg. ht.)	3	20 (0.40 m)	3 (0.20 m)
Forb Cover (avg. ht.)	70	60 (0.30 m)	40 (0.15 m)
<b>GROUND COVER</b>			
Soil	0	3	10
Gravel	0	1	1
Rock	3	30	10
Litter	0	20	50
Wood	1	1	3
Moss/Lichen	90	40	20
Basal Vegetation	3	10	10

\* = exotic species

*Repeat Photography:* Photos were taken on August 16, 2001. The photos are the same as those taken for the habitat change monitoring transect (Murphy 2001). Photos were taken both at the start and end of the transect, looking up and down the line. Figure 2 is a photo of the habitat looking from the start to end of transect 01SD022A. Unfortunately, photos of the habitat were not taken in 1999 or 2000.

**Figure 2. Photo-point at start of the Black Canyon (022) permanent monitoring transect (01SD022A), looking toward the end (taken on August 16, 2001).**



## ASSESSING POTENTIAL HABITAT

In July 2001, CDC completed a model for predicting the distribution of potential habitat for *Spiranthes diluvialis* on the National Forests of Idaho (Jankovsky-Jones and Graham 2001). First, rangewide habitat indicators at the meso- and macro-scales were used to develop a habitat profile for *Spiranthes diluvialis*. The known distribution of riparian plant associations on National Forest land in Idaho was then mapped. Finally, a Geographic Information System model was populated with habitat indicator values based on the habitat profile and locations of riparian plant associations. Fifth field watersheds were the unit area considered. The model identified 51 watersheds with high to very high potential for supporting *Spiranthes diluvialis* potential habitat (Jankovsky-Jones and Graham 2001). A substantial number of these watersheds are found within the Southern Rocky Mountains Ecoregion of eastern Idaho. The lack of plant association data for central Idaho may be a limitation to the model's predictive power in some areas. The CDC may develop a similar predictive model for other public lands in Idaho.

On the South Fork of the Snake River, evidence from historic aerial photos indicates that the island portion of the Black Canyon (022) occurrence is the only population on a fluvial landform post-dating the construction of Palisades Dam in 1956 (Murphy 2000). Portions of two occurrences, Annis Island (006) and Warm Springs Bottom (003), also occur on substrates formed since Palisades Dam. These substrates, however, were created mostly (or in-part) by human disturbance (Moseley 1998b). The island portion of Black Canyon (022), in contrast, is on a relatively young island (about 40 years old) with *Spiranthes diluvialis* growing on a cobble point-bar that has only been vegetated since about 1974. The site is frequently flooded, but flood scouring is probably reduced by upstream willow stands (Mike Merigliano pers. comm.). Considering this, surveyors on the South Fork of the Snake River should broaden their view of potential Ute ladies'-tresses habitat. Younger fluvial landforms, similar to the bar at Black Canyon, exist along the river and should be surveyed for Ute ladies'-tresses.

## FLOODPLAIN DYNAMICS IN RELATION TO UTE LADIES'-TRESSES HABITAT

**Floodplain and Vegetation Dynamics Research—An Update:** During 1999, a habitat ecology study was initiated, with the goal of relating floodplain dynamics and primary habitat succession to long-term conservation of Ute ladies'-tresses on the South Fork of the Snake River (Moseley 2000). A complete description of floodplain and vegetation dynamics research methods and preliminary results appears in the 1999 and 2000 status reports (Moseley 2000; Murphy 2000). This work, to be completed in 2002, builds on past and on-going studies of the relationship between fluvial geomorphology, riparian community ecology, and river management along the South Fork (Merigliano 1996; Mike Merigliano pers. comm.). In summary, research looks “at the distribution of Ute ladies'-tresses habitat in three dimensions: temporal distribution on the floodplain, horizontal distribution on the floodplain, and vertical distribution related to river stage” (Moseley 2000). The basis for the research is best described in the following excerpt from Ute ladies' tresses (*Spiranthes diluvialis*) in Idaho: 1999 status report (Moseley 2000):

I consider the Snake River populations of Ute ladies' tresses to be a single meta-population. Although it is a working hypothesis at this point, the underlying assumption is that the Snake River meta-population consists of a set of local populations linked by dispersal. Although each patch supports its own breeding population, no single population is

adequately large enough to ensure the long-term viability of the meta-population. Therefore, multiple local patches of habitat must be maintained in order to conserve the meta-population.

Along the Snake River, the greatest factor affecting the distribution and viability of habitat patches is the dynamics of the floodplain. Under pre-Palisades Dam flow regimes, suitable habitat patches were being destroyed and created by periodic flood events. This is significant because, if Ute ladies' tresses is similar to cottonwood, habitat patches are only viable for a finite period of time. Eventually the habitat may become too dry because of channel degradation or encroached upon by dense shrubs through plant succession. Periodic high flows create new habitat and possibly also limit shrub encroachment. Merigliano (1996) found that, under post-Palisades river operations, cottonwood forests are not viable in the long term. Current river operations are also considered a long-term viability threat to Ute ladies' tresses (Moseley 1998b).

Unlike cottonwood trees, however, *Spiranthes diluvialis* is usually not an early colonizer of recently deposited alluvium. Instead, plants apparently persist on fine, moist, and stable soils for a long time, unless site conditions significantly change (i.e., become too dry or too wet due to natural or human-caused change, or succession causes excessive vegetation competition) (Mike Merigliano pers. comm.). *Spiranthes diluvialis* possibly establishes on floodplain sites after they have aggraded with at least a thin layer of finer sediments and been inoculated with necessary mycorrhizal fungi. Though *Spiranthes diluvialis* occurs on a relatively young landform at Black Canyon (022), this site has accumulated enough fine sediments to support the orchid; it is also protected from flood scouring by upstream willows (Mike Merigliano pers. comm.). In addition, it is possible that *Spiranthes diluvialis* individuals are long-lived, though their mortality and regeneration rates need to be tested with demographic monitoring. Thus, periodic floods are important for creating new landforms that later in the site-development/successional sequence (i.e., with additional flood deposition of fine sediments) become potential *Spiranthes diluvialis* habitat (Mike Merigliano pers. comm.). The questions to be answered for predicting *Spiranthes* maintenance are: what is the regeneration rate of plants on existing sites; how often is suitable habitat created; and how long do these sites last? (Mike Merigliano pers. comm.). To help answer these questions, data were collected related to three categories: substrate age and characterization, flow regime, and primary succession.

**Substrate Age and Characterization** - The ages of the alluvial substrates supporting occupied Ute ladies'-tresses habitat were inferred from the following: 1) floodplain mapping conducted by Merigliano (1996) above Heise; 2) air photo interpretation both above and below Heise; and 3) measurements directly from Ute ladies'-tresses habitat using decay rates for a naturally occurring isotope of lead ( $Pb^{210}$ ). Only preliminary work was done in 1999 (Moseley 2000). During 2000, Mike Merigliano collected soil samples from nearly all Ute ladies'-tresses occurrences on public land for isotope dating. In order to determine substrate age from isotope decay rates, a background horizon depleted of atmospheric sources of  $Pb^{210}$  must be obtained. As of November 2001, this proved to be a challenge and the results of isotope dating were not yet available (Mike Merigliano pers. comm.).

During 1999, 25 soil pits were dug at 18 Ute ladies'-tresses occurrences to better characterize the alluvial substrate (Moseley 2000). In 2000, additional soil pits were dug at Annis Island (006) and Warm Springs Bottom (003) on substrates of human origin that post-dated the construction of



Palisades Dam. Results are described in the 2000 status report (Murphy 2000).

***Flow regime and Floodplain Cross Sections*** - In 1999, the elevation of habitat on the flood plain was measured from low water, through Ute ladies'-tresses habitat, to higher narrow-leaf cottonwood stands (Moseley 2000). Cross sections of the floodplain were constructed and various river stages were tied to different elevations, including elevations of Ute ladies' tresses habitat (see Moseley 2000 for complete results). From this information, the flow regime and depositional events responsible for creating new habitat and destroying old habitat may be inferred. In addition, the question of whether the flow regime predicted to restore cottonwood forests (Merigliano 1996) would suffice to maintain Ute ladies'-tresses habitat may be answered (Moseley 2000).

***Primary Succession*** - In 2001-2002, plant community development will be modeled along the primary successional gradient by Mike Merigliano. There are two different techniques to model this chronological sequence: 1) the use of time-series analysis sites (e.g., changes over time in Ute ladies'-tresses habitat observed by monitoring the permanent transects); and 2) inferring the chrono-sequence from plots of different successional ages (Moseley 2000). The model will include estimates of the rate of development along the primary successional pathways as well as the compositional and structural characteristics of these changes (Moseley 2000).

## POPULATION BIOLOGY

**Phenology:** No change from 1997-2000 status reports. Timing our population surveys with the unpredictable and annually variable peak-flowering period of Ute ladies'-tresses remains an obstacle to obtaining accurate long-term monitoring data (Murphy 2000).

**Population Size and Condition:** Tables 4 and 5 summarize the numbers of flowering plants and conditions observed in 2001. A total of 4,133 Ute ladies'-tresses plants were observed at the 20 occurrences surveyed in Idaho during 2001 (Table 4). This was the highest number ever documented, and unexpected for a drought year. The total was over 700 plants more than the previous record high (3,410 plants in 1999). However, the bulk of the increase was due to a large increase at Annis Island (006) (over 500 more plants than previously counted at this occurrence). The significant additions discovered this year at the Black Canyon (022) and Kelly's Island (001) occurrences added over 400 plants not previously counted. Of the other 17 occurrences surveyed, only four had more plants compared to 2000, while Railroad Island (005), Twin Bridges (007), and Gormer Canyon #4 (013) had new record low population totals. Comprehensive surveys were done from August 8 to August 28, one to two weeks earlier than normal. As in 2000, surveys were done at this time because reconnaissance visits indicated an apparent trend toward an early peak-flowering period (due possibly to hot temperatures and drought conditions). Follow-up surveys to sites surveyed on August 8 were done to see if there was a late flush of flowering individuals. Few new flowering plants were observed during re-visits. Nevertheless, due to these late blooming individuals, the total count of above-ground plants is likely an underestimate. As with prior years, the two occurrences located on private land were not surveyed. Refer to Conservation Data Center (2001) for detailed data at each occurrence.

The overall increase in observed flowering individuals this year was mainly due to a significant increase at Annis Island (006) and the additional sub-population at Black Canyon (Table 4). A human-ignited wildfire burnt a portion of the southwest edge of the Annis Island occurrence during late spring

(Table 5). A mosaic pattern of intensity, from lightly burning the duff layer to full removal of the duff layer, was observed within the habitat burned (Figure 3). *Spiranthes diluvialis* was documented blooming within areas lightly burnt, though it is difficult to draw any conclusions regarding the benefit or harm of the fire to the orchid. Three other sites had notably record high numbers of plants counted this year—Lower Swan Valley (019), Gormer Canyon #3 (021), and Black Canyon (022) (Table 4). None of these sites had any human related disturbances, but noxious weeds (*Cirsium arvense* and *Sonchus arvensis*) are common at the latter two and wild ungulate browsing and trailing were noticeable at the first two (Table 5).

No *Spiranthes diluvialis* was observed at the Railroad Island (005) occurrence in 2001 (Table 4). This site had no obvious human or other disturbances, though the habitat appeared very dry this year (Table 5). Two occurrences, Gormer Canyon #5 (012) and Squaw Creek Islands (020), each had their fourth consecutive year of nearly zero individuals (Table 4). Gormer Canyon #5 is heavily infested with spotted knapweed (*Centaurea maculosa*) and Canada thistle (*Cirsium arvense*). Squaw Creek Islands also has degraded habitat conditions, but may only support *Spiranthes romanzoffiana* (Table 5).

A decrease in flowering individuals compared to the last three years was observed at Mud Creek Bar (009) (Table 4). Plant numbers were slightly higher than in 1997. An unauthorized outfitter camp, with heavy human trampling and an illegal off-highway vehicle route, was established less than 15 m away from occupied habitat (Table 5; Figure 4). A trail from their boat landing to the camp went directly through occupied habitat. Though no trampled plants were confirmed, the possibility of trampling was high. The potential long-term impacts to the habitat, such as soil compaction, will be monitored. Other habitat at the occurrence was apparently not trampled, but plants were not observed this year. The majority of potential *Spiranthes diluvialis* habitat at Mud Creek Bar (009) has been lost to non-human related bank erosion.

Compared to 2000, the numbers of *Spiranthes diluvialis* plants observed at Warm Springs Bottom (003) and Lufkin Bottom (011) decreased by large amounts in 2001 (Table 4). The plant numbers were roughly similar to those observed in 1999. The Warm Springs Bottom (003) has experienced August trespass grazing the last two years, though the impacts to *Spiranthes diluvialis* habitat (e.g., trampling, direct grazing of occupied habitat) ranges from negligible to locally noticeable (Table 5). Lufkin Bottom (011) annually experiences trampling of *Spiranthes diluvialis* habitat by campers, boaters, and anglers (Figure 5). No trampled plants were observed this year. At all occurrences, reasons for declines in numbers of observed plants may be due to poor growing conditions (e.g., too hot and dry), habitat problems (e.g., noxious weed invasion), poor survey timing, or poorly understood demographics (e.g., prolonged dormancy) (Murphy 2000). Because of these factors, it is important to remember that the numbers of above ground plants observed at any occurrence does not necessarily reflect the actual population.

**Population Genetics:** No major changes from 1997-2000 status reports. See “Taxonomy” section (page 1) for a summary of Szalanski et al.’s (2001) recently published research on the rangewide extent and distribution of genetic variation within and among populations of *Spiranthes diluvialis*. No genetic variation was discovered within the Idaho population.

**Table 4. Ute ladies'-tresses population counts at each occurrence for 1996-2001. Occurrences arranged by location from downstream to upstream.**

<b>Occurrence Name</b>	<b>Occ. #</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>
Annis Island	006	----	35	2,036	1,917	726	2,557
Lorenzo Levee	008	----	1	----	----	----	----
Archer Powerline	015	----	145	----	----	----	----
Twin Bridges Island	007	----	160	108	99	43	36
Railroad Island	005	----	9	14	42	17	0
Kelly's Island	001	12	22	30	30	15	19
Mud Creek Bar	009	----	9	32	71	63	16
Rattlesnake Point	002	15	4	23	26	0	19
TNC Island	010	----	9	9	118	21	17
Warm Springs Bottom	003	173	301	80	476	942	522
Black Canyon	022	----	----	----	50	42	507
Lufkin Bottom	011	----	61	96	224	494	184
Gormer Canyon #5	012	----	10	0	1	0	0
Gormer Canyon #4	013	----	10	11	12	7	7
Gormer Canyon #3	021	----	----	8	59	30	76
Pine Creek #5	014	----	6	14	30	47	24
Pine Creek #3 & #4	016	----	18	113	200	103	118
Lower Conant Valley	017	----	127	0	40	23	12
Upper Conant Valley	018	----	61	15	5	5	1
Lower Swan Valley	019	----	1	8	4	9	13
Falls Campground	004	1	14	5	6	13	5
Squaw Creek Islands	020	----	168	2	0	0	0
<b>Total</b>	----	201	1,171	2,604	3,410	2,600	4,133
<b>(Mean)</b>	----	(50)	(59)	(137)	(171)	(130)	(207)

**Table 5. Habitat conditions, threats, and conservation actions accomplished in 2001, and conservation actions planned for 2002 at each Ute ladies'-tresses occurrence (in order of downstream to upstream location).**

Occurrence # (land ownership)	Habitat Conditions, Threats, and Human Activities	Conservation Actions Accomplished in 2001 and Conservation Actions Planned in 2002
Annis Island #006 (BLM)	2+ acre human-ignited fire burned portion of SW edge of occurrence. <i>Carduus nutans</i> and <i>Cirsium arvense</i> are present in occupied habitat.	2001: BLM performed allotment compliance and trespass fire inspections and is pursuing trespass fire case and fire suppression costs. Biological control agents released for leafy spurge ( <i>Aphthona lacertosa</i> ). CDC established two habitat change monitoring transects. 2002: Continue allotment compliance and fire recovery monitoring. Continue biological control for leafy spurge and knapweed.
Lorenzo Levee #008 (private)	Not visited in 2001.	
Archer Powerline #015 (private)	Not visited in 2001.	
Twin Bridges Island #007 (BLM and Madison County)	<i>Cirsium arvense</i> is present in occupied habitat. Appears that the sub-population on the Madison County portion is almost extirpated (only one plant found behind the picnic pavilion). The remaining sub-population is on the BLM portion of the occurrence.	CDC established a habitat change monitoring transect on the BLM portion of the occurrence.
Railroad Island #005 (BLM)	Conditions were very dry. <i>Cirsium arvense</i> and <i>Sonchus arvensis</i> are present at the occurrence. No human impacts noted.	CDC established a habitat change monitoring transect.
Kelly's Island #001 (BLM)	No human impacts noted. <i>Sonchus arvensis</i> has thoroughly invaded the campground portion of the occurrence. <i>Cirsium arvense</i> is also present. A new sub-population (with 15 individuals) was found on the island southwest of the campground.	2001: BLM implemented motorized vehicle closure on 6/6/01. CDC established a habitat change monitoring transect (on campground portion of the occurrence).
Mud Creek Bar #009 (BLM)	Human trails and OHV impacts from unauthorized commercial outfitter camp. No trampled plants documented. Bank erosion. <i>Carduus nutans</i> , <i>Centaurea maculosa</i> , and <i>Cirsium arvense</i> are present in occupied habitat.	2001: BLM implemented motorized vehicle closure 6/6/01. Knapweed biological control agents ( <i>Larinus minutus</i> and <i>Chpho cleonus achates</i> ) released on 6/27/01. BLM contacted and met with outfitter. Directed human trails away from occurrence on 8/16/01. The camp was moved 9/3/01. CDC established a habitat change monitoring transect. 2002: Outfitter camp will be located in the designated outfitter area and OHV barriers will be reconstructed. Knapweed biological control will be continued if available.

Occurrence # (land ownership)	Habitat Conditions, Threats, and Human Activities	Conservation Actions Accomplished in 2001 and Conservation Actions Planned in 2002
Rattlesnake Point #002 (BLM)	No human impacts noted.	2001: Cattle off by first week in July; Rangeland Specialist visited area on 7/18/01 and found no cattle present. Area was found not to meet grazing standards for stubble height. CDC established a habitat change monitoring transect. 2002: Pasture will be rested.
TNC Island #010 (BLM)	Human trails through occurrence at the upstream tip of island, but no trampled plants documented.	CDC established a habitat change monitoring transect.
Warm Springs Bottom #003 (BLM)	<i>Cirsium arvense</i> and <i>Sonchus arvensis</i> are common throughout the occurrence.	2001: Implemented motorized vehicle closure on 6/6/01. Palisades District Rangeland Specialist was notified of trespass cattle and cattle were removed. CDC established one habitat change monitoring transect above old dam site and another transect in the central portion of the occurrence. 2002: Reconstruct vehicle barriers.
Black Canyon #022 (BLM)	<i>Cirsium arvense</i> and <i>Sonchus arvensis</i> are common throughout the island portion of occurrence. An additional sub-population was discovered on the mainland, left bank of the river. No human impacts noted.	CDC established a habitat change monitoring transect on the island portion of occurrence. Measured vegetation along first 10 m of this transect.
Lufkin Bottom #011 (BLM)	Human trails through portions of the outer bank habitat. No trampled plants were documented. <i>Cirsium arvense</i> and <i>Sonchus arvensis</i> are present in the occupied habitat.	CDC established two habitat change monitoring transects.
Gormer Canyon #5 #012 (USFS)	<i>Centaurea maculosa</i> and <i>Cirsium arvense</i> have thoroughly invaded the occurrence. No <i>Spiranthes diluvialis</i> observed.	2001: BLM released knapweed biological control agents ( <i>Larinus minutes</i> and <i>Cypho cleonus achates</i> ) and Canada thistle biological control agents ( <i>Larinus planus</i> ). No habitat change monitoring transect established. 2002: Continue knapweed and Canada thistle biological control if available.
Gormer Canyon #4 #013 (USFS)	No human impacts observed. <i>Cirsium arvense</i> is present in the occupied habitat.	CDC established a habitat change monitoring transect.
Gormer Canyon #3 #021 (USFS)	<i>Cirsium arvense</i> and <i>Sonchus arvensis</i> are common in the occupied habitat. Wildlife trail through occurrence.	2001: BLM released Canada thistle biological control agents ( <i>Larinus planus</i> ). CDC established a habitat change monitoring transect. 2002: Continue Canada thistle biological control if available.
Pine Creek #5 #014 (BLM)	No human impacts noted. <i>Cirsium arvense</i> is present in the occupied habitat.	2001: BLM denied requests for livestock grazing extensions in the fall of 2000 and the spring of 2001. Five-ways Allotment compliance and monitoring inspection performed. CDC established a habitat change monitoring transect. 2002: Continue allotment compliance and monitoring inspections. Continue to adhere to permitted livestock season of use.

Occurrence # (land ownership)	Habitat Conditions, Threats, and Human Activities	Conservation Actions Accomplished in 2001 and Conservation Actions Planned in 2002
Pine Creek #3 & #4 #016 (BLM)	<i>Cirsium arvense</i> invasion noted.	2001: BLM denied requests for livestock grazing extensions in the fall of 2000 and the spring of 2001. Five-ways Allotment compliance and monitoring inspection performed. Released Canada thistle biological control agents ( <i>Larinus planus</i> ) at Pine Creek #4. CDC established habitat change monitoring transects at both Pine Creek #3 and #4. 2002: Continue allotment compliance and monitoring inspections. Continue to adhere to permitted livestock season of use. Continue biological control of Canada thistle if available.
Lower Conant Valley #017 (BLM)	Dry conditions. Plants found in only one swale rather than three. No human impacts noted.	CDC established a habitat change monitoring transect.
Upper Conant Valley #018 (BLM)	No human impacts noted. <i>Cirsium arvense</i> is present in occupied habitat.	CDC established a habitat change monitoring transect.
Lower Swan Valley #019 (BLM)	Heavy big game browsing noted. No human impacts noted. <i>Cirsium arvense</i> is present in the occupied habitat.	CDC established a habitat change monitoring transect.
Falls Campground #004 (USFS)	Trespass cattle (8 total) in area during surveys, but no direct impacts to <i>Spiranthes diluvialis</i> were observed. Six <i>Spiranthes romanzoffiana</i> observed in exclosure. <i>Cirsium arvense</i> and <i>Sonchus arvensis</i> are common at the island sub-population.	2001: Entire pasture surveyed; all <i>Spiranthes diluvialis</i> plants found to be within exclosures. 2002: Continue to survey pasture prior to cattle "on date." CDC established habitat change monitoring transects at both the mainland and island exclosures.
Squaw Creek Islands #020 (BLM)	No <i>Spiranthes diluvialis</i> observed. No human impacts documented on island portion, but site was very dry. Mainland portion is heavily grazed and human trails were also present.	No habitat change monitoring transect established.

**Figure 3. Annis Island (006) on June 6, 2001. Showing recent fire effects in *Spiranthes diluvialis* habitat. Note tracks from firefighting vehicle.**



**Figure 4. Mud Creek Bar (009) on August 28, 2001. Showing unauthorized outfitter camp adjacent to *Spiranthes diluvialis* habitat (15 m in background). Note trampled grass in foreground.**



**Figure 5 (right).  
Lufkin Bottom (011) on August 14, 2001.  
Showing recreation trail through  
*Spiranthes diluvialis* habitat.**



**Reproductive Biology and Pollination Ecology:** No major changes from 1997-2000 status reports. However, some observations regarding possible pollinators were made. On August 14, a Red Admiral butterfly (*Vanessa atalanta*) was observed (and photographed) visiting *Spiranthes diluvialis* flowers at the Lufkin Bottom (011) occurrence. On August 16, an unknown species of bee, tentatively identified as either an Anthophoridae (Anthophorinae) or a Apidae (Bombinae), was photographed visiting *Spiranthes diluvialis* flowers at the Black Canyon (022) occurrence.

**Competition:** No major changes from 1997-2000 status reports. As in 2000, several exotic species continue their expansion at several Ute ladies'-tresses occurrences and have the potential to become significant competitors. For example, Russian olive (*Elaeagnus angustifolia*) may be expanding at Kelly's Island (001) and common tansy (*Tanacetum vulgare*) may potentially invade *Spiranthes diluvialis* habitat at Warm Springs Bottom (003). Other competitive exotic species, are widespread and locally abundant in *Spiranthes diluvialis* habitat along the South Fork, including bull thistle (*Cirsium vulgare*), black medic (*Medicago lupulina*), reed canarygrass (*Phalaris arundinacea*), and clover (*Trifolium* species). Of these, *Trifolium* species (e.g., red and white clover (*T. pratense*, *T. repens*)) are the most potentially competitive components in the red-top (*Agrostis stolonifera*) turf supporting *Spiranthes diluvialis*. There is some debate on whether *Phalaris arundinacea* is native or exotic on the upper Snake River. Nevertheless, it is quite competitive along the wetter margins of potential *Spiranthes diluvialis* habitat. Weedy native species, such as licorice-root (*Glycyrrhiza lepidota*), are widespread and locally abundant (especially in 2001), but their populations seem to fluctuate based on disturbance or climatic influences. Generally, noxious weeds present along the South Fork, such as musk thistle (*Carduus nutans*), diffuse knapweed (*Centaurea diffusa*), spotted knapweed (*Centaurea maculosa*), Canada thistle (*Cirsium arvense*), leafy spurge (*Euphorbia esula*), and perennial sowthistle (*Sonchus arvensis*), are excellent competitors for light and nutrients with native plants. Their current expansion and competition with Ute ladies'-tresses at numerous occurrences is a concern (see "Land Use and Possible Threats" section below).

**Herbivory:** No change from 1997-2000 status reports.

**Land Ownership and Management Responsibility:** No change from 1997-2000 status reports.

**Land Use and Possible Threats:** Detailed information for each occurrence is found in Murphy and Cooke (2001) and in prior status reports. See also "Population Size and Condition" above. In addition, an objective method of monitoring habitat change was implemented in 2001 (Murphy 2001). Every occurrence visited, except Lower Conant Valley (017), is still threatened by either localized human activities (e.g., cattle grazing, recreation) and/or noxious weed invasion. Table 5 summarizes habitat threats, human activities, and conservation actions observed in 2001, and future conservation actions needed or planned to ameliorate the problems, supplemented with information from habitat change monitoring (Murphy 2001).

**Cattle Grazing** - Late-season trespass cattle grazing occurred at Warm Springs Bottom (003) in 2001. At Falls Campground (004), eight cattle were observed grazing at the occurrence prior to the authorized period of use (that begins on Labor Day) (Table 5). This problem presents a short-term threat to Ute ladies'-tresses, due to the increased chance of direct grazing and trampling of plants and a long-term threat from potentially decreased reproduction. The BLM and the USFS increased grazing allotment compliance inspections in 2001 due to drought conditions, especially for riparian/wetland



areas, to ensure compliance with the permitted season of use (Table 5). This prevented any trespass grazing problems at the Annis Island (006), the Pine Creek occurrences, Mud Creek Bar (009), and Rattlesnake Point (002). However, inspections found that the Rattlesnake Point (002) area failed to meet grazing standards for stubble height in 2001. The pasture will be rested in 2002. The BLM will continue allotment compliance inspections in 2002. In addition, the BLM denied requests for livestock grazing extensions in the fall of 2000 and spring of 2001 at the Pine Creek occurrences (the Five-ways Allotment). Also, a draft Environmental Assessment (EA) was completed by the U.S. Forest Service (USFS) for the Moody, South Fork, and Burns Allotments. The preferred alternative in the EA includes continuing grazing the Warm Springs Bottom pasture in the spring (with the cattle off by July 1) and fencing off the Rattlesnake Point area from cattle grazing.

**Off-highway Vehicle Use** - No off-highway vehicle (OHV) use was documented within occupied *Spiranthes diluvialis* habitat this year. The BLM implemented motorized vehicle closures at Kelly's Island (001), Warm Springs Bottom (003), and Mud Creek Bar (009) in June (Table 5). However, at Mud Creek Bar (009) an OHV route was established, in violation of the closure, to access an unauthorized outfitter camp. Fortunately, the OHV route was about 15 to 20 m away from *Spiranthes diluvialis* plants and did not traverse any occupied habitat. The OHV barriers at Warm Springs Bottom (003) and Mud Creek Bar (009) will be re-constructed in 2002. In addition to the motorized vehicle closures mentioned above, the BLM also implemented closures at four other areas along the South Fork in 2001.

**Noxious Weeds** - The extent of noxious weed invasion in *Spiranthes diluvialis* habitat along the South Fork Snake River is alarming (Table 5; Murphy 2001). At least 14 of the occurrences visited had noxious weeds present within occupied *Spiranthes diluvialis* habitat (i.e., within about 5 m of plants). The following 7 occurrences had noxious weeds within occupied habitat at relatively high levels: Kelly's Island (001), Warm Springs Bottom (003), Falls Campground (004), Gormer Canyon #5 (012), Pine Creek #3 and #4 (016), Gormer Canyon #3 (021), and Black Canyon (022) (Table 5). Canada thistle (*Cirsium arvense*) was ubiquitous, being observed at all 14 occurrences with noxious weeds within occupied habitat. Perennial sowthistle (*Sonchus arvensis*) was nearly as common, documented within occupied habitat at six occurrences (especially on moister ground). Spotted knapweed (*Centaurea maculosa*), followed by musk thistle (*Carduus nutans*), were the next most common noxious weeds (both observed at two occurrences each). Diffuse knapweed (*Centaurea diffusa*) and leafy spurge (*Euphorbia esula*) (previously documented as threats at several sites (Moseley 1998a, 1998b, 2000; Murphy 2000)) have not yet invaded within 5 m of occupied *Spiranthes diluvialis* habitat at any occurrence; they are usually nearby on slightly drier soil.

To slow or reverse the spread of noxious weeds on the South Fork Snake River, the BLM released biological control agents for Canada thistle (*Larinus planus*), knapweed (e.g., *Chpso cleonus achates*, *Larinus minutus*), and leafy spurge (e.g., *Aphthona lacertosa*) at Annis Island (006), Mud Creek Bar (009), Gormer Canyon #5 (012), Pine Creek #3 and #4 (016), and Gormer Canyon #3 (021) in 2001 (Table 5). In addition, the BLM released 21 other colonies of insects along the South Fork of the Snake River to control knapweed, leafy spurge, and Canada thistle invasions from Swan Valley to the confluence with the Henrys Fork. The USFS also released biological controls between Table Rock and Mud Springs for musk thistle and Canada thistle. The USFS also used mechanical control (pulling) on potentially aggressive burdock and houndstongue. Biological control agents for perennial sowthistle are still being tested at this time. The BLM will continue to release biological control agents along the

South Fork in 2002, pending their availability. It is too early to assess the success or failure of biological control efforts. No herbicide spraying in *Spiranthes diluvialis* habitat was observed in 2001. Invasion by noxious weeds and other potentially competitive exotic species (especially tall forbs such as *Tanacetum vulgare*) are, of course, symptomatic of other soil disturbing activities and ecological factors. Thus, holistic management is required to prevent the spread of noxious weeds and competitive exotic species in Ute ladies'-tresses populations.

**Recreation** - An unauthorized outfitter camp, with heavy human trampling, was established less than 15 m away from occupied habitat at Mud Creek Bar (009) (Figure 4). A trail from the boat landing to the camp went directly through occupied habitat. Though no trampled plants were confirmed, the possibility of trampling was high. Portions of the TNC Island (010) and Lufkin Bottom (011) occurrences annually experience trampling of *Spiranthes diluvialis* habitat by campers, boaters, and anglers (Figure 5; Table 5; Murphy 2000). Though no trampled plants were observed this year, human trails were noticeable and the risk of trampling was high. The long-term impacts to *Spiranthes diluvialis* habitat will be monitored with permanent transects.

During 2001, the BLM and USFS initiated weekly to bi-weekly river patrols (20 total) on the upper South Fork of the Snake River to maintain dispersed camp areas, to ensure compliance with over night camping and sanitation regulations, and to increase public education and information contacts with river users. The BLM also conducted a visitor use survey at upper South Fork boat accesses to, in part, explore visitors' attitudes toward sensitive species, crowding, safety, low impact camping, and river use issues.

**Other Potential Threats** - A human-ignited wildfire burnt a portion of the southwest edge of the Annis Island (006) occurrence during late spring (Table 5). A mosaic pattern of intensity, from lightly burning the duff layer to full removal of the duff layer, was observed within the habitat burned (Figure 3). *Spiranthes diluvialis* was documented blooming within areas lightly burnt, but it is difficult to draw any conclusions regarding the benefit or harm of the fire to the orchid at this time. The BLM has monitored post-fire vegetation recovery and is pursuing the "trespass" fire case and suppression costs.

Landscape level threats, mainly floodplain alteration related to levee construction and maintenance, water diversions, road and bridge development, bank stabilization rip-rapping, and housing development, continue to increase along the South Fork Snake River. For example, additional housing and road development on the floodplain is currently proposed within potential habitat in Swan Valley. The effect on *Spiranthes diluvialis* habitat is likely negative. In 2001, the BLM Upper Snake/South Fork Snake River Land and Water Conservation Fund project acquired two conservation easements, totaling 493 acres, on private lands along the South Fork to prevent further subdivision and resort development. The BLM Upper Snake/South Fork Snake River Land and Water Conservation Fund project is currently negotiating three more separate conservation easements, totaling about 1,525 acres, on private lands along the South Fork of the Snake River. The results of these negotiations are dependent on FY2002 appropriations, as well as landowner willingness.

## ASSESSMENT AND RECOMMENDATIONS

**General Assessment of Vigor, Trends, and Status:** Assessment of the Idaho Ute ladies'-tresses meta-population is similar to previous status reports. While the total number of plants observed in the

meta-population was a record high in 2001, only seven of the 20 occurrences surveyed had increases over last year (Table 4). Of those seven occurrences, only one (Lower Swan Valley (019)) has had a population increase three years in a row. Seven occurrences have decreased in total numbers for three or more consecutive years. New sub-populations were discovered at Kelly Island (001) and Black Canyon (022), and numbers of observed plants increased dramatically at Annis Island (006) in 2001. However, two occurrences (Gormer Canyon #5 (012) and Squaw Creek Islands (020)) probably do not support any *Spiranthes diluvialis*.

A re-evaluation of “Element Occurrence Ranks” was conducted for each occurrence in the CDC database (Conservation Data Center 2001). Element occurrence ranks are used by the network of Natural Heritage Programs and Conservation Data Centers to help prioritize occurrences for conservation planning (The Nature Conservancy 1999). The ranks represent the estimated viability, or probability of persistence, of occurrences based on current habitat condition, population size, and landscape context. An ‘A’ rank equals excellent estimated viability, a ‘B’ rank equals good, a ‘C’ rank equals fair, and a ‘D’ rank equals poor. Currently, six occurrences are ranked as ‘A’ or ‘A/B’ and eight occurrences are ranked as ‘B’ or ‘B/C.’ Four occurrences are ranked as ‘C’ and one as ‘D.’ Three occurrences were unranked due to insufficient information.

In general, all Idaho occurrences are vulnerable to extirpation due to existing and potential threats. Flow regime alteration by Palisades Dam, combined with floodplain development, represents the most significant long-term threat to species viability in the Snake River meta-population. On a local scale, noxious weed invasion is probably the most imminent and serious threat to *Spiranthes diluvialis* persistence on the South Fork (Table 5). Impacts from cattle grazing, though much reduced, still occur. Recreation use continues to increase on the South Fork and currently causes local impacts to *Spiranthes diluvialis* habitat.

**Recommendation to the U.S. Fish and Wildlife Service:** No change from 1997-2000 status reports.

**Recommendations to Upper Snake River District, Bureau of Land Management and the Caribou-Targhee National Forest:** No change from 1997-2000 status reports. The proposed conservation actions by the BLM and USFS for 2002, outlined below in the “Monitoring Work—2001-2002” section, are sufficient and should be executed.

**Recommendations to the Heritage Network:** No change from 1997-2000 status reports.

**Recommendations Regarding Present or Anticipated Activities:** Recent monitoring, research (e.g., Szalanski et al. 2001), and modeling (e.g., Jankovsky-Jones and Graham 2001) has provided new and useful information regarding *Spiranthes diluvialis* status, habitat characteristics, and viability. Based on this information, the Snake River Basin Office of the U.S. Fish and Wildlife Service should consider revising the Section 7 consultation guidelines for Idaho.

## MONITORING WORK—2001 AND 2002

Monitoring *Spiranthes diluvialis* is a challenging, but important task necessary for conservation planning. Due to the natural annual variability of Ute ladies’-tresses populations, and thus, the potential for mis-timed surveys, plant counts alone are inadequate for determining long-term

population trends. Moreover, plant counts tell us nothing about the condition or viability of *Spiranthes* habitat. Additionally, there is significant subjectivity in simply describing habitat conditions; the annual notations by different observers do not provide a good reference point from which to measure habitat changes. For these reasons a systematic and objective method of habitat monitoring is needed.

In 2001 a systematic, easily repeatable method for objectively measuring changes and threats to the habitat of Ute ladies'-tresses was developed, tested, and implemented. The complete methods, results, and discussion for the first year are found in "Monitoring Ute ladies'-tresses (*Spiranthes diluvialis*) habitat on the South Fork Snake River, Idaho—First year results" (Murphy 2001). Twenty-three permanent monitoring transects were established at 18 occurrences on public land during the last half of August 2001. The data collected provide a reference point for annually measuring future environmental change at both the population and landscape levels. An "index of habitat change" method was used that involves the measurement of specific habitat attributes important to *Spiranthes diluvialis*. The index integrates what we have learned about Ute ladies'-tresses habitat from prior vegetation sampling and monitoring, as well as current floodplain dynamics and vegetation succession modeling. The measurements of habitat attributes use a relative scale, yielding cumulative values that represent current habitat conditions at each transect. If those conditions change, the cumulative values change. In addition, repeatable photo-points were established. Much of the information collected this year was incorporated in the "Land Use and Possible Threats" section of this status report.

Habitat and population monitoring oriented toward Ute ladies'-tresses conservation will continue along the South Fork of the Snake River in 2002, funded by the BLM and Caribou-Targhee National Forest. In combination with re-visiting all 23 permanent habitat change monitoring transects (and possibly establishing a few more in under-represented habitats), measurement of Ute ladies' tresses population levels will continue (to comply with the Biological Assessment requirements). As in prior years, the habitat conditions of all known populations will be described and compared with 1996-2001 data. The 2002 population and habitat data will be entered into the centralized databases at the CDC and annual status and monitoring reports will be produced and distributed after the field season. In addition, the permanent vegetation monitoring transect will be re-read at the Black Canyon (022) occurrence.

In related conservation work planned for 2002, the BLM will develop an educational kiosk at the Conant Boat Access, which will address Ute ladies'-tresses and advise recreationists to avoid occurrences. The BLM and USFS will continue regular river patrols during the high public use season of July through August on the South Fork of the Snake River, in part, to prevent habitat degradation by users.

## REFERENCES

- Conservation Data Center, Idaho Department of Fish and Game. November, 2001. *Spiranthes diluvialis* occurrences in Idaho. Boise, ID.
- Jankovsky-Jones, M., and D. Graham. 2001. Predicting the distribution of potential habitat for *Spiranthes diluvialis* on National Forests in Idaho by fifth field watersheds: Phase 3 – Develop a Predictive Model. Prepared for Conservation Data Center, Idaho Department of Fish and Game, Boise, ID. 5 pp. plus appendices.
- Merigliano, M.F. 1996. Ecology and management of the South Fork Snake River cottonwood forest. Technical Bulletin 96-9. Idaho State Office, Bureau of Land Management, Boise, ID. 79 pp., plus plates.
- Moseley, R.K. 1998a. Ute ladies'-tresses (*Spiranthes diluvialis*) in Idaho: 1997 status report. Prepared for Idaho Department of Parks and Recreation. Conservation Data Center, Idaho Department of Fish and Game, Boise, ID. 35 pp. plus appendices.
- \_\_\_\_\_. 1998b. Ute ladies'-tresses (*Spiranthes diluvialis*) in Idaho: 1998 status report. Prepared for Idaho Department of Parks and Recreation. Conservation Data Center, Idaho Department of Fish and Game, Boise, ID. 23 pp., plus appendix.
- \_\_\_\_\_. 2000. Ute ladies'-tresses (*Spiranthes diluvialis*) in Idaho: 1999 status report. Prepared for Upper Snake River District BLM and Targhee National Forest. Conservation Data Center, Idaho Department of Fish and Game, Boise. 16 pp., plus appendices.
- Murphy, C.J. 2000. Ute ladies'-tresses (*Spiranthes diluvialis*) in Idaho: 2000 status report. Prepared for Upper Snake River District BLM and Targhee National Forest. Conservation Data Center, Idaho Department of Fish and Game, Boise. 20 pp. plus appendix.
- \_\_\_\_\_. 2001. Monitoring Ute ladies'-tresses (*Spiranthes diluvialis*) habitat on the South Fork Snake River, Idaho—First year results (in progress). Prepared for Upper Snake River District BLM and Caribou-Targhee National Forest. Conservation Data Center, Idaho Department of Fish and Game, ID.
- The Nature Conservancy. 1999. Draft Element Occurrence Data Standard: September 20, 1999. The Nature Conservancy and Association for Biodiversity Information in cooperation with the Network of Natural Heritage Programs and Conservation Data Centers. Available online at: <http://whiteoak.natureserve.org/eodraft/index.htm>
- Szalanski, A.L., G. Steinauer, R. Bischof, and J. Petersen. 2001. Origin and conservation genetics of the threatened Ute ladies'-tresses, *Spiranthes diluvialis* (Orchicaceae). American Journal of Botany 88(1): 177-180.