UTE LADIES TRESSES (*SPIRANTHES DILUVIALIS)* IN IDAHO:

1998 STATUS REPORT

by

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SUMMARY

This 1998 status report for Ute ladies tresses is meant to compliment the 1997 report (Moseley 1998a) and only contains new or updated information about the species in Idaho. I follow the same format in this update as I did in the 1997 report, which should be consulted for information not covered here. The big news is that not much changed in 1998, so the Taxonomy, Legal Status, Description and Identification, Assessing Potential Habitat, Flood Plain Dynamics, and Assessment and Recommendations sections are little changed from last year=s report. I have updated the Distribution section with information about the new occurrence found along the Snake River. Substantive new data on the composition and structure of communities occupied by Ute ladies tresses appear in the Habitat section. The Population Biology section contains our 1998 observations on population levels, phenology, land use, and a new section reviewing sampling for genetic studies. Finally, I outline the Ute ladies tresses conservation work being planned for the Snake River populations in 1999, which will focus on population and habitat monitoring, continued habitat characterization, and the relationship of primary succession in ladies tresses habitat to fluvial processes.

ACKNOWLEDGMENTS

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TAXONOMY

No change from 1997 status report (Moseley 1998a).

LEGAL OR OTHER FORMAL STATUS

No change from 1997 status report.

DESCRIPTION AND IDENTIFICATION

No change from 1997 status report.

DISTRIBUTION

Rangewide distribution: No change from 1997 status survey report (Moseley 1998a).

Idaho distribution: The distribution of Ute ladies tresses in Idaho at the end of the 1998 field season is virtually the same as it was in 1997. Only one new occurrence was discovered this year and several new populations were found at previously delineated occurrences. In Idaho, it is still only known from the Snake River flood plain in the far eastern part of the state, in Jefferson, Madison, and Bonneville counties. 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. In Idaho, this stretch of river is known as the ASouth Fork,≅ while on USGS maps and in Wyoming the same waterway is known simply as the Snake River.

Precise occurrences in Idaho: I consider the populations along the Snake River to be one large metapopulation, although 21 occurrences have been delineated in the CDC data base based on management and geographic considerations. I distributed the precise occurrence records and maps for Idaho populations in October 1998 (Moseley 1998b), so only a summary is presented here (Table 1). Refer to the occurrence records for detailed location data on individual Idaho occurrences.

During the 1998 inventory season, one new occurrence was discovered. Rose Lehman, Targhee National Forest, found a small population (occurrence 021) along the Snake River, less than a mile upstream from a previously-known site. Our 1998 surveys added new populations to several previously-known occurrences. These results are discussed in the Population Biology section.

Table 1. 1998 Ute ladies tresses occurrences in Idaho, arranged by river mile along the Snake River from downstream to upstream.

Occurrence Name	Occurrence No.	River Mile[1]	Land Ownership
Annis Island	006	835	BLM
Lorenzo Levee	008	836.5	Private
Archer Powerline	015	844	Private
Twin Bridges Island	007	846	BLM, Madison County
Railroad Island	005	847	BLM
Kelly=s Island	001	853	BLM
Mud Creek Bar	009	862	BLM
Rattlesnake Point	002	863.5	BLM
TNC Island	010	863.5	BLM
Warm Springs Bottom	003	866*	BLM
Lufkin Bottom	011	867*	BLM
Gormer Canyon #5	012	867.8*	Targhee NF
Gormer Canyon #4	013	868.5*	Targhee NF
Gormer Canyon #3	021	869*	Targhee NF
Pine Creek #5	014	873.5*	BLM
Pine Creek #3 & #4	016	874.5*	BLM
Lower Conant Valley	017	876.3*	BLM
Upper Conant Valley	018	878*	BLM
Lower Swan Valley	019	881.8*	BLM
Falls Campground	004	882*	Targhee NF
Squaw Creek Islands	020	884*	BLM, Targhee NF,Private

[1]In some cases the river miles reported on the USGS quads are incorrect. I use the remeasured river mile index of the Hydrology and Hydraulics Committee (1976) as the reference for this table and subsequent discussions. Cases where the remeasurement disagrees with the quad are marked with an asterisk (*).

Extent of surveys in Idaho: Systematic surveys for Ute ladies tresses began in Idaho in a modest way during 1996 (CDC 1998; Moseley 1997a; 1997b). These surveys resulted in its discovery in Idaho. The 1997 Section 7 consultation area included 24 counties in eastern and east-central Idaho. Based on these guidelines, nearly 600 miles of rivers and creeks were surveyed by a small army of botanists during 1997. Refer to CDC (1998) and Moseley (1998a) for summaries of the 1997 survey work. When a Ute ladies tresses population was discovered in Washington in late 1997, the USFWS issued new Section 7 guidelines that expanded the consultation area to include the entire state (U.S. Fish and Wildlife Service 1998). Needless to say, during the 1998 field season the botanical army searching for *Spiranthes* expanded substantially. As I did last year, I will attempt to compile and map all the 1998 survey information for the state (see Request to Botanists and Surveyors! section, below).

HABITAT

In last year=s status report (Moseley 1998a) I discussed rangewide and Idaho-specific habitat characteristics for Ute ladies tresses at three scales: macro-, meso-, and micro-scales. I have nothing new to report for the macro- and micro-scales, at either rangewide or statewide levels. There is new information for meso-scale characteristics in Idaho. Remember that meso-scale characteristics included geologic and flood plain features, soils, landscape setting, plant communities, and broad hydrologic gradients. This year we collected quantitative data on the composition and structure of plant communities supporting Ute ladies tresses. In the 1997 report they were only discussed in general terms.

Review of Plant Communities

Last year I described Ute ladies tresses as occurring in four types of communities or cover types: *Eleocharis rostellata, Elaeagnus commutata, Salix exigua/Agrostis stolonifera*, and *Equisetum variegatum*. This pattern held true again in 1998, although I=m now adding *Agrostis stolonifera* to the name of the *Elaeagnus commutata* type (i.e., *E. commutata/A. stolonifera*). Below is a brief description of each community.

Eleocharis rostellata (wandering spike-rush): This is the odd ball for Idaho Ute ladies tresses occurrences. Only a portion of the Kelly=s Island occurrence (001) occurs in this community. Wandering spike-rush occurs in nearly monotypic stands and overall species diversity is low. At Kelly=s Island this community occurs in an old river channel at the center of the island that no longer floods regularly. Kelly=s Island is the only place this community is known to occur in the Snake River corridor from American Falls to the Wyoming border. There are, however, extensive stands at travertine springs along Fall Creek, ca. two miles upstream from the Snake River, south of Swan Valley.

Elaeagnus commutata/Agrostis stolonifera (silverberry/redtop): The silverberry/redtop community occurs as a narrow, often linear band in the transition zone between sedge-dominated areas or open water in the center of the channels and the higher bars dominated by narrowleaf cottonwood stands. Sedge-dominated areas have standing water and are too wet, while the higher bars are too dry. Ute ladies tresses habitat is characterized by a dense ground cover of redtop, a rhizomatous grass, with an overstory of widely scattered silverberry. This is the most common habitat for Ute ladies tresses along the Snake River.

Salix exigua (sandbar willow)*/Agrostis stolonifera*: This is essentially the same in composition, structure, and its position on the hydrologic gradient as the silverberry/redtop community described above, except silverberry is absent. Sandbar willow is the dominant shrub, albeit in relatively low cover, and redtop forms a dense sward in the understory. This is a common habitat for Ute ladies tresses along the Snake.

Equisetum variegatum (variegated scouring rush): This community occurs in small stands, usually adjacent to the silverberry or sandbar willow types. The low-growing, rhizomatous *Equisetum variegatum* dominates the ground cover. Redtop and other associates occur in only minor amounts. Shrubs are virtually absent. This is a relatively common habitat for Ute ladies tresses in the Snake River corridor, although it has low aerial coverage.

Methods for 1998 Data Collection

We collected composition and structure data in the silverberry/redtop, sandbar willow/redtop, and variegated scouring rush communities. We did not collect data in the wandering spike-rush community because of its single occurrence and its simple composition and structure; it is essentially a monotypic stand of wandering spike-rush. The sampling methods follow standards set up by the Natural Heritage/Conservation Data Center network in western North America (Bourgeron et al. 1992). The salient features of the methodology applied to sampling Ute ladies tresses habitat along the Snake River are as follows:

1. Plots were subjectively placed in Ute ladies tresses populations to assure the best habitat characterization in these small, isolated sites. Random placement of plots would have been impractical in this situation. Please note that in the data presented below, Ute ladies tresses does not appear in every plot; however, it was present in every stand sampled except for Plot 003C (explained below).

2. We used microplots to sample herbaceous species (graminoids and forbs) and a line-intercept procedure to sample woody species, as follows:

Herbaceous species: A 10 meter-long transect was used for the microplot layout. We used a transect instead of a rectangular arrangement, because of the linear nature of Ute ladies tresses habitat. Ten 20 x 50 cm (0.1 m^2) microplots were placed at 1 m intervals along the transect. Percent foliar cover was estimated for every graminoid and forb (including

pteridophyte) species in the microplot, using the following classes:

Code	Cover Class	Midpoint
1	<1%	0.5%
3	1% to 4.9%	3%
10	5% to 14.9%	10%
20	15% to 24.9%	20%
30	25% to 34.9%	30%
40	35% to 44.9%	40%
50	45% to 54.9%	50%
60	55% to 64.9%	60%
70	65% to 74.9%	70%
80	75% to 84.9%	80%
90	85% to 94.9%	90%
98	95% to 100%	97.5%

The class midpoint was used to calculate percent cover in all analyses that follow.

Woody species: For woody plants we measured the amount of canopy of each species intercepted by the 10 m-long transect tape. This value was converted to percent cover. Narrowleaf cottonwood was the only tree species in the plots. It is lumped with the shrubs in the life-form analyses because it only occurred as low, scrawny sprouts that were shrub-like.

3. Location of the plot was documented and the general site described. The following environmental features were noted for each transect: dominant life form, parent material, landform, plot position, slope shape, aspect, slope, elevation, erosion potential, erosion type, valley width, ground cover disturbance, animal use, and disturbance history. Ground cover was estimated, using the same cover classes defined above, for the following categories: bare soil (particles < 1/16 in. diam.); gravel (particles 1/16 to 3 in. diam.); rock (particles > 3 in. diam.); litter and duff; wood (downed fragments > 0.25 in. dia.); moss; and basal vegetation (area occupied by root crowns and stems, excluding moss).

4. I treat Plot 003C somewhat differently in the results that follow. This plot is from the upper end of the Warm Springs Bottom occurrence (003) from a stand where Ute ladies tresses was last observed in 1996. It was subsequently buried by deep sands in the June 1997 flood. In other

words, this plot is in habitat where Ute ladies tresses appears to have been extirpated. See Moseley (1998a) and the Flood Plain Dynamics in Relation to Ute Ladies Tresses Habitat section, below, for further discussion of this situation.

Results

Fourteen plots were sampled from throughout the 49-mile-long Ute ladies tresses metapopulation in the Snake River corridor. Summarized canopy cover and constancy data for species, life form, and ground cover appear in Table 2. Cover data for all plots appear in Appendix 1; original plot forms are archived in the files of the CDC. A total of 55 species (not counting unidentifiable forbs) occurred in all the plots, with 7 being woody species, 18 graminoids, and 30 forbs. Expect for Plot 003C, the average number of species/plot is about the same for each community, varying from 15.6 to 17.4.

Equisetum variegatum clearly dominates one community, while *Salix exigua* and *Elaeagnus commutata* are mutually exclusive in the two communities where they dominate the shrub layer. *Agrostis stolonifera* and *Poa pratensis* dominate the sandbar willow/redtop and silverberry/redtop communities. In the first two status reports for Ute ladies tresses in Idaho (Moseley 1997a; 1998a), I characterized these communities as having a dense sward of redtop dominating the ground cover. Detailed sampling using the microplots revealed a somewhat different picture. *Agrostis stolonifera* does indeed have high cover (average 60-70%), but surprisingly so does *P. pratensis* (average 30%). The reason it was overlooked previously was that, unlike in adjacent cottonwood stands, *P. pratensis* has a cryptic, vegetative habit when it occurs in Ute ladies tresses habitat. No flowering culms were observed in any plots. *Agrostis stolonifera*, on the other hand, has an overwhelming aspect dominance because of the tall culms and reddish and brown inflorescences. So, what I thought was solely a dense turf of reproductive *A. stolonifera*, actually has a high cover of vegetative *P. pratensis* hidden low in the canopy.

This discussion of *A. stolonifera* and *P. pratensis* brings up the issue of the dominance of introduced species in Ute ladies tresses habitat. Non-native species comprise 3% cover in Plot 003C, which was recently buried by flood alluvium, but increase to 33% in the variegated scouring rush community, and 109% and 100% in the sandbar willow/redtop and silverberry/redtop communities, respectively (Figure 1). These are cumulative totals, which, with canopy overlap, can be greater than 100%. The relative contribution of forbs and graminoids to these totals is shown in Figure 1. While there are more introduced forb species (nine versus five graminoids; Table 2), it is the rhizomatous graminoids that comprise most of the cover. *Agrostis stolonifera* is the most prominent, occurring in all three communities, followed by *P. pratensis* in the two shrub types.

The effect of these sod-forming exotics on Ute ladies tresses population viability and habitat characteristics is unknown. Recent work by Gremmen et al. (1998) on redtop invasion of a sub-Antarctic island may be analogous to Ute ladies tresses habitat in Idaho. They monitored redtop invasion on the island between 1966 and 1995 and compared the composition and structure of

Table 2. Summary of species cover and constancy (in parentheses) data for Ute ladies tresses habitat arranged by community type and Plot 003C. No constancy values are given for Plot 003C because n = 1. Canopy cover is given in classes defined in the Methods section. Ground cover categories are also explained in Methods. Heights are in meters. * = introduced species.

	Plot 003C (extirpated) n = 1	**Equisetum variegatum n = 5**	**Salix exigua/ Agrostis stolonifera n = 3**	**Elaeagnus commutata/ Agrostis stolonifera n = 5**
WOODY SPECIES				
Betula occidentalis		1 (20)		1 (40)
Elaeagnus commutata				10 (100)
Populus angustifolia	1	3 (40)	3 (100)	1 (40)
Rosa woodsii				1 (20)
Salix bebbiana			3 (33)	
Salix exigua		3 (40)	10 (100)	
Salix lutea	1		3 (33)	
GRAMINOIDS				
**Agrostis stolonifera*	3	20 (100)	70 (100)	60 (100)
Calamagrostis neglecta			1 (33)	3 (20)
Carex lanuginosa		10 (100)	3 (100)	3 (40)
Carex nebraskensis		1 (40)		1 (40)
Carex sp.			1 (33)	
Eleocharis palustris		3 (40)	1 (33)	
**Festuca arundinacea*				3 (40)
Juncus balticus		1 (40)	1 (33)	3 (60)
Juncus ensifolius		3 (100)		1 (20)
Juncus longistylis		1 (40)		
Juncus tenuis		1 (40)	1 (33)	1 (20)
Muhlenbergia asperifolia		1 (20)		10 (40)

	Plot 003C	Eqva	Saex/Agst	Elco/Agst
Muhlenbergia richardsonis		10 (20)	3 (66)	3 (60)
Phalaris arundinacea			3 (33)	
**Phleum pratense*			1 (33)	1 (20)
**Poa palustris*			1 (33)	
**Poa pratensis*		1 (20)	30 (100)	30 (100)
Scirpus pungens				1 (20)
FORBS & PTERIDOPHYTES				
Aster ascendens		1 (40)	3 (100)	3 (40)
Aster hesperius		3 (40)		3 (40)
Cicuta douglasii		1 (20)		
**Cirsium vulgare*			1 (33)	1 (20)
Clematis ligusticifolia				1 (20)
Conyza canadensis		1 (20)		
Epilobium ciliatum		1 (20)		
Equisetum arvense		1 (20)		1 (20)
Equisetum laevigatum		1 (40)	3 (100)	10 (100)
Equisetum variegatum	60	60 (100)	3 (33)	3 (60)
Euthamia occidentalis		3 (20)	3 (33)	
Fragaria virginiana				1 (20)
Glycyrrhiza lepidota		3 (40)		3 (60)
Habenaria hyperborea				1 (20)
**Medicago lupulina*				1 (20)
Mentha arvense		3 (80)	1 (66)	1 (20)
**Myosotis scorpioides*		3 (40)	3 (66)	1 (20)
**Plantago major*		3 (60)	3 (33)	1 (40)
Potentilla anserina			1 (33)	
Prunella vulgaris		3 (40)	3 (66)	1 (20)

	Plot 003C	Eqva	Saex/Agst	Elco/Agst
Ranunculus cymbalaria		3 (80)	1 (33)	
**Rumex crispus*			1 (33)	
Smilacina stellata				1 (33)
Solidago missouriensis	1	1 (20)	3 (66)	1 (20)
**Sonchus arvense*		3 (40)		
Spiranthes diluvialis		1 (60)		1 (20)
**Taraxacum officinale*		3 (80)	1 (33)	1 (60)
**Trifolium fragiferum*		3 (60)		1 (20)
**Trifolium repens*		1 (40)	1 (66)	1 (40)
Viola sp.		3 (80)	1 (33)	3 (60)
unknown forbs		3 (40)		1 (40)
TOTAL SPECIES (avg)	5.0	17.4	17.3	15.6
LIFE FORM DATA				
Woody Cover / Mean Ht.	1 / 0.5	3 / 0.5	10 / 1.6	10 / 1.4
Graminoid Cover / Mean Ht.	3 / 0.4	40 / 0.5	98 / 0.5	90 / 0.7
Forb Cover / Mean Ht.	60 / 0.1	80 / 0.2	10 / 0.1	20 / 0.1
GROUND COVER				
Soil	70	10	10	10
Gravel				
Rock		1		1
Litter	1	10	50	60
Wood	1	1		1
Moss	0	30	10	3
Basal Vegetation	30	50	30	30

Figure 1. Canopy cover of non-native species in plots from Ute ladies tresses habitat along the Snake River, Idaho. The X axis represents community types and Plot 003C (see text). EQVA = Equisetum variegatum community; SAEX/AGST = Salix exigua/Agrostis stolonifera community; ELCO/AGST = Elaeagnus commutata/Agrostis stolonifera community. The Y axis represents cumulative percent cover.

stands with and without redtop. It invaded communities whose position along the hydrologic gradient, as well as some other environmental and physical attributes, appear similar to ladies tresses habitat along the Snake. Redtop averaged 83% cover in invaded stands and reduced the cover and constancy of all native species of vascular plants, bryophytes, and a lichen. It also reduced native species richness in all stands. What had been a relatively diverse community dominated by a large forb and having high moss ground cover, became a dense redtop turf. Could a similar scenario have played out along the Snake a century ago? It=s possible, but we=ll never know for sure.

There is one major difference between Gremmen=s study area and the Snake River. His communities do not experience the dynamic fluvial processes that are known to radically affect the flood plain habitat of Ute ladies tresses in Idaho. This brings us back to the composition and structure data collected this year in both extant and extirpated habitats. Plot 003C is treated separately in Table 2 because it represents habitat where Ute ladies tresses was observed in 1996, but was subsequently buried by sand in June 1997 and apparently extirpated (see detailed discussion in Flood Plain Dynamics section in Moseley 1998a). Given the dominance of *Equisetum variegatum* at this site it probably belongs in the *E. variegatum* community. Although no composition and structure data were collected in 1996, this was a silverberry/redtop community prior to the flood. The silverberry was killed and *E. variegatum* invaded the open sands during 1997 and 1998. These data and other observations give some insights into possible scenarios for primary succession in Ute ladies tresses habitat along the Snake River. Admittedly, this hypothesis is a relatively simplistic, Clementsian view of an orderly natural succession and does not account for the creation of and dispersal into new habitats. It should be treated as a working hypothesis that probably will be refined by further research in 1999 (see Conservation Work for 1999 section). Here are the key points of this hypothesis:

< It appears that Plot 003C represents the pioneering stage of the variegated scouring rush community, formed in deposition from a (pre-dam) 10-year flood event (Martin 1998; Moseley 1998a).

< The variegated scouring rush community may be an early sere of the silverberry/redtop community. Shrubs, redtop, and *Poa pratensis* increase in density over time.

< Shrub density eventually increases to the point where Ute laddies tresses is excluded from the stands if another flood does not deposit alluvium and start the cycle again.

ASSESSING POTENTIAL HABITAT

No change from 1997 status report.

FLOOD PLAIN DYNAMICS IN RELATION TO UTE LADIES TRESSES HABITAT

1997 flood observations: In last year=s report (Moseley 1998a) I made several observations on the June 1997 flood in relation to the four Ute ladies tresses occurrences known at the time. My 1998 observations of flood effects on two of the four occurrences are worth mentioning here.

< Falls Campground (004) - Although its exact location was not known, the single plant seen in 1996 was not seen this year and none were observed in the vicinity. The site remains under deep sand deposited during the 1997 flood.

< Warm Springs Bottom (003) - I saw no plants at the site of the alluvial deposition (Plot 003C mentioned above). The composition and structure of the habitat remains radically different from the pre-flood community, which was silverberry/redtop. The widely scattered silverberry shrubs that occupied the site prior to the flood never resprouted and are dead, and redtop occurs in very low cover.

Merigliano floodplain and vegetation dynamics research: In this section last year (Moseley 19988a) I used Merigliano=s (1996) research to estimate the substrate age of selected Ute ladies tresses occurrences above Heise, which ranged from about 40 to 100 years old. What I didn=t mention last year was that portions of two occurrences occur on man-made substrates that can also be dated

Annis Island (006) - Many of the populations that comprise this occurrence are on excavated or fill material resulting from construction of the nearby levees. Construction of the Snake River levee system began in the early 1950s, with the authorization of Palisades Dam by Congress, and continued through the early 1960s (K. Rice, personal communication, 1998). The exact time of levee construction on Annis Island is unknown.

Warm Springs Bottom (003) - In 1970, a small dam was constructed by Idaho Fish and Game along the spring-creeks on Warm Springs Bottom. We were going to use the resulting pond to raise fingerling trout, but the dam was built in an active channel and was blown out by floods in 1971. It was rebuilt the next year and lasted until either 1975 or 1976 when high water again washed it out. It was then never rebuilt (P. Jeppson, personal communication, 1998). The densest portion of the Warm Springs Bottom occurrence is on excavated or filled surfaces resulting from dam construction, making it the youngest-known surface supporting Ute ladies tresses along the Snake River.

POPULATION BIOLOGY

Refer to Heidel (1998) for a review of the population biology of Ute ladies tresses, in general, and Moseley (1998a) for observations and data pertaining to the Idaho populations. Below is updated information based on 1998 observations.

Phenology: Based on 1996 and 1997 observations, we thought Ute ladies tresses began flowering in mid-August. This year it started significantly earlier, probably around August 1. For example, the Upper Conant Valley (018) population was in full flower on August 13 this year, compared to the same phenological stage on September 17, 1997. Throughout the Idaho metapopulation, however, we observed many plants in full flower through the end of September 1998. In an update to last year=s information, Karen Rice (personal communication, 1998) reported that some individuals were in flower through late October 1997. Similar to last year, flowering time can vary significantly among individuals within a population, with up to a four-week off-set.

There was one very surprising phenological finding this year. Like many orchids, Ute ladies tresses plants are known to have a prolonged dormancy, but I always assumed that at least some individuals in a population would be observable above ground every year. This appears not to be the case. No plants were seen at Gormer Canyon #5 (012), Lower Conant Valley (017), and that portion of the Squaw Creek (020) occurrence discovered in 1997. The Squaw Creek and Lower Conant Valley occurrences had relatively dense populations last year. No disturbances occurred at any of these sites during the intervening year. The implication of this is that you can never be sure that Ute ladies tresses is not present based on a single visit to potential habitat. It should be noted, however, that nearby populations were in full flower and that this was not a widespread phenomenon over a large segment of river.

Population size and condition: A total of 2,604 Ute ladies tresses plants were observed at the 21 occurrences in Idaho during 1998 (Table 3), an increase of 1,533 plants over 1997. The observed number of plants at most occurrences in 1998, was similar to 1997. A notable decrease took place at what were three large populations in 1997, Warm Springs Bottom (003), Lower Conant Valley (017), and Squaw Creek Islands (020). The latter two were discussed in the previous section and no major disturbances were observed at Warm Springs Bottom. So, these fluctuations in numbers of above-ground individuals appear to be natural variability. Most of the increase was a result of a thorough survey of Annis Island (006), which contains 78% of observed plants along the Snake River in 1998. Only a superficial inventory was conducted on Annis Island last year, largely because of heavy cattle grazing. This year the cows were taken off by late June. Five surveyors worked on the island over the course of two days in late August. A total of 2,036 individual plants were observed in 18 populations at the site.

Population genetics: Leaf tip samples were collected from Ute ladies tresses at various Idaho occurrences over the last three years. A summary of these activities is outlined below:

< 1996 - Upon discovery of Ute ladies tresses in Idaho, Moseley collected samples from the Rattlesnake Point (002) and Warm Springs Bottom [(003); voucher Moseley 3016 (S.P.)] occurrences. They were sent to Anna Arft, University of Colorado, who confirmed the species identification genetically, and compared the genetic structure of Idaho plants to previously-analyzed populations elsewhere.

Table 3. Number of plants observed at *Spiranthes diluvialis* occurrences in Idaho, 1996-1998. Occurrences are arranged from downstream to upstream. Dashed line means that occurrence wasn=t counted that year.

Occurrence Name	Occurrence No.	1996	1997	1998
Annis Island	006	----	35	2,036
Lorenzo Levee	008	----	1	----
Archer Powerline	015	----	145	----
Twin Bridges Island	007	----	160	108
Railroad Island	005	----	9	14
Kelly=s Island	001	12	22	30
Mud Creek Bar	009	----	9	32
Rattlesnake Point	002	15	4	23
TNC Island	010	----	9	9
Warm Springs Bottom	003	173	301	80
Lufkin Bottom	011	----	61	96
Gormer Canyon #5	012	----	10	0
Gormer Canyon #4	013	----	10	11
Gormer Canyon #3	021	----	----	8
Pine Creek #5	014	----	6	14
Pine Creek #3 & #4	016	----	18	113
Lower Conant Valley	017	----	127	0
Upper Conant Valley	018	----	61	15
Lower Swan Valley	019	----	1	8
Falls Campground	004	1	14	5
Squaw Creek Islands	020	----	168	2

< 1997 - USFWS personnel sent samples from Archer Powerline (015) to the University of Colorado for confirmation through genetic analysis.

< 1998 - A systematic, range-wide analysis of the genetic structure of Ute ladies tresses is being coordinated by Gerry Steinauer, Nebraska Natural Heritage Program. Laboratory analysis will continue to be conducted by Anna Arft at the University of Colorado. Gerry identified a collector in every state who would collect sample leaf tips from ten plants at four populations in each state. I was the Idaho collector and attempted to spread the four sample sites over the range of occupied river corridor. Unfortunately, the highest collection site was at Pine Creek #3 & #4 (016), ca. 9.5 river miles below the uppermost populations. All populations along the upper stretch were either too small (<10 plants) or did not appear above ground this year. The other three samples were from the lowest occurrence at Annis Island (006), as well as two more in the center of its distribution, Kelly=s Island (001) and Lufkin Bottom (011).

Reproductive biology: No change from 1997 status report.

Competition: Two exotic, sod-forming grasses, *Agrostis stolonifera* and *Poa pratensis*, dominate a majority of Ute ladies tresses habitat in Idaho. The implications of this for possible compositional and structural changes in Ute ladies tresses habitat are discussed in the Habitat section. Its affect on ladies tresses population density, demography, or viability is unknown. If, however, the scenario worked out by Gremmen et al. (1998) is analogous to the Snake River, the impact could have been large. Unfortunately, we=ll never know for sure because no pre-invasion data exist.

Herbivory: Livestock grazing was a significant management issue in 1997 (see Moseley 1998a for a description of the problem). The effect of cattle grazing on inventory results is well-illustrated at Annis Island (006). Although the season-of-use for this allotment us usually in the early season (May-June), in 1997 the BLM allowed late-season grazing because of early-season access problems associated with the flood. During our inventory in August 1997, we found only 35 plants in the heavily grazed redtop turf. In 1998, grazing was back to its normal early season of use. During our inventories in early September 1998, we found vigorous regrowth of all species in the redtop habitats, including the discovery of over 2,000 Ute ladies tresses individuals.

The biological effects of grazing on Ute ladies tresses viability and plant succession in its habitat is not well understood. Annis Island has been grazed for many years and it still supports the largest population known in Idaho by far. The other interesting aspect of the Annis Island situation is that most of the populations are outside the levee system and no longer experience the normal erosion and deposition that occurs with the larger floods. These processes are probably responsible, at least in part, for maintaining open shrub habitat elsewhere along the Snake River. Grazing may actually be a surrogate for natural flooding by reducing shrub density on Annis Island. Another important aspect of cattle herbivory that is not well understood is its interaction with the cover and vigor of exotic turf-forming grasses (redtop and Kentucky

bluegrass) that dominate much of Ute ladies tresses in Idaho.

Land ownership and management responsibility: See Table 1 for land ownership and management responsibilities for the Idaho occurrences. Fifteen of the 21 occurrences are entirely or partially on public land managed by the BLM. Four occurrences, including the new one discovered in 1998, occur entirely on the Targhee National Forest. Two occurrences occur entirely on private land below Heise and the upstream-most occurrence at Squaw Creek Islands (020) is partially on private land. Madison County and the BLM each manage populations within the Twin Bridges Island (007) occurrence.

Land use and possible threats: As documented in last year=s report (Moseley 1998a), alteration of the flow regime resulting from the operation of Palisades Dam is the single biggest long-term threat facing the species in Idaho. Regarding short-term, localized land use impacts and possible threats, nearly every occurrence has human activity taking place in or around them, either direct use or through cattle grazing (Table 4). It is not known, however, the degree to which these pose a threat to persistence and viability of Ute ladies tresses populations.

Livestock grazing was the biggest management issue during 1997. Over the last year, grazing management has changed significantly on nearly all grazed occurrences, as follows:

< Small exclosures were used to prevent cattle from taking Ute ladies tresses plants at several occurrences in late 1997, mostly as an interim measure until a longer-term solution could be found. The small exclosure at Falls Campground (004), however, appears to have turned into a permanent solution, even though only a small area occupied by plants in 1997 was caged. Habitat known to be occupied in 1996 and much potential habitat remains unprotected.

< Cattle grazing was eliminated from the Rattlesnake Point (002) occurrence by the Forest Service through construction of fences and a cattleguard.

< Trespass grazing at Kelly=s Island (001) was eliminated.

< There was an attempt by the Forest Service to implement early season grazing on Warm Springs Bottom (003), but cattle remained on the site into August 1998. Herbivory was observed on Ute ladies tresses plants.

< Livestock grazing administered by the BLM occurs in three allotments, affecting four Ute ladies tresses occurrences:

  5-Ways Allotment [Pine Creek #5 (014) and Pine Creek #3 &#4 (016)] - has been early-season grazing since about 1987, which followed two years of nonuse. It was also in nonuse from about 1991 to 1996. During 1997, the allotment was grazed, but the June flood prevented livestock from grazing the floodplain of the Snake River (and Ute ladies tresses habitat).

Table 4. Known activities and impacts observed in 1998 at *Spiranthes diluvialis* occurrences in Idaho. Occurrences are arranged from downstream to upstream.

Occurrence Name	Occ. No.	Human Activities
Annis Island	006	Cottonwood Grazing Allotment (BLM). Season of use changed to spring (out by end of June).
Lorenzo Levee	008	Not visited this year.
Archer Powerline	015	Not visited this year.
Twin Bridges Island	007	County campground and boat ramp being reconstructed. County and FEMA will protect one population that occurs in project area.
Railroad Island	005	Tressel Grazing Allotment (BLM). No change from 1997.
Kelly=s Island	001	Heavily trampled habitat by humans in 1997 & 1998. Problem with trespass cattle grazing solved. No impacts seen associated with being adjacent to BLM fee campground.
Mud Creek Bar	009	Trespass cattle grazing has been controlled. Intermittent outfitter camp, lots of bank fishing, some dispersed camping, but none appears to be impacting populations.
Rattlesnake Point	002	No cows anymore, due to new fences and a cattleguard.
TNC Island	010	Dispersed camping at upstream end; some trampling of habitat. Outfitter camp (located mid-island) was permitted in 1998.
Warm Springs Bottom	003	Targhee NF grazing allotment, grazed through late August. ATV use appears to have been eliminated by construction of bigger barriers. Popular fishing area but no impacts observed.
Lufkin Bottom	011	Same as 1997. Designated river camping area with some trampling in vicinity of plants.
Gormer Canyon #5	012	Spotted knapweed common immediately above upper edge of habitat. No human use seen.
Gormer Canyon #4	013	No change. River camp site nearby, but population isolated from impacts.
Gormer Canyon #3	021	Near lightly use designated river camp. Habitat undisturbed.
Pine Creek #5	014	Designated river camping area. 5-Ways Grazing Allotment (BLM); cattle off by mid-June. No impacts from either activity observed.

Pine Creek #3 & #4	016	Designated river camping area. 5-Ways Grazing Allotment (BLM); cattle off by mid-June. No impacts from either activity observed.
Lower Conant Valley	017	Undisturbed.
Upper Conant Valley	018	Undisturbed.
Lower Swan Valley	019	Undisturbed.
Falls Campground	004	Targhee NF grazing allotment with cage around known cluster of plants. Recreational impacts from campground appear minimal.
Squaw Creek Islands	020	No change to the undisturbed state of the populations discovered in 1997. The 1998 population is near dispersed camp site and habitat appears to receive some recreational trailing.

Trestle Allotment [Railroad Island (005)] - has been early-season and late fall grazing since 1991. In 1997, the adjacent Lowder Slough Allotment was added to the Trestle Allotment to allow cattle an alternate pasture use in the fall.

Cottonwood Allotment [Annis Island (006)] - has been early-season cattle grazing since 1991. In 1997, the BLM allowed the lessees to graze in the late summer because livestock could not access the floodplain during the June flood. Ten horses graze the allotment until mid-August.

With funding from the Federal Emergency Management Agency (FEMA), Madison County is reconstructing and relocating the boat ramp and campground on Twin Bridges Island. Only one small population of occurrence 007 is in the project area. It occurs in a roadside ditch between the old boat ramp and the picnic ground. Madison County and FEMA have agreed to erect a barrier between the population and the road to protect it from disturbance (Moseley 1998c).

ASSESSMENT AND RECOMMENDATIONS

General assessment of vigor, trends, and status: My assessment of the Idaho populations is unchanged from last year, that is, all Idaho populations have existing and potential threats and are vulnerable. Flow regime alteration by Palisades Dam represents the most significant long-term threat to species viability in the Snake River metapopulation, while cattle grazing represents the most significant short-term threat. Management actions implemented by the BLM and Forest Service in 1997 and 1998, however, have greatly reduced the threat of cattle grazing.

Recommendation to the U.S. Fish and Wildlife Service: While the Idaho status information summarized in this report is a necessary component, it does not provide sufficient scope or information for making rangewide status decisions. As with last year=s report (Moseley 1998a), this status survey report should be considered an interim summary.

Recommendations to the other federal agencies: The USFWS will work with the BLM and Forest Service on management guidelines for Ute ladies tresses populations on federal land. The Forest Service should implement an early season of use on the cattle allotment that encompasses Warm Springs Bottom, closing the allotment to grazing after the end of June (see section on land use and possible threats).

Recommendation to the Heritage Network: No change from last year. The current conservation rank for Ute ladies tresses, Aglobally imperiled≅ or G2, is outdated and should be changed to the more appropriate designation of Arare or uncommon, but not imperiled≅ or G3, which typically is given to species with 21 to 100 occurrences (Master 1991). The Utah Natural Heritage Program has lead responsibility for the global conservation rank and has initiated a review with this in mind (B. Franklin, personal communication, 1998).

Recommendations regarding present or anticipated activities: The Snake River Basin Office of the USFWS has prepared Section 7 consultation guidelines for Idaho, the most recent being dated February 4, 1998 (U.S. Fish and Wildlife Service 1998). They will be updated annually or as needed. These guidelines characterize potential habitat and outline survey and conservation protocols.

REQUEST TO BOTANISTS AND SURVEYORS!

As I mentioned in a previous section, the CDC compiled all known Ute ladies tresses survey routes for 1996 and 1997. The routes are mapped on 1:100,000-scale maps, identified by surveyor and year. Copies are available upon request from the CDC office in Boise. We plan to do the same thing in 1998. If you conducted any surveys, please send me the information and share it with the world. The minimum information needed is: (1) area surveyed (mapped on ca. 1:100,000-scale maps); (2) surveyor; and (3) date. This information will be compiled throughout the winter and distributed in early spring.

CONSERVATION WORK FOR 1999

The three actions recommended last year (Moseley 1998a) were all accomplished during 1998: 1) a resurvey of suitable-appearing, but unoccupied habitat to determine if plants were missed in 1997 due to prolonged dormancy and/or phenological timing; 2) monitor population levels of known populations and compare with 1996 and 1997 data to determine variability of observable plant numbers; and 3) finish the intensive survey of the remaining segment of the Snake River corridor from the Henry=s Fork confluence to Market Lake.

In addition to the nearly 600 miles surveyed in 1997 (CDC 1998; Moseley 1998a), many hundreds more miles were surveyed in Idaho during 1998 (to be documented in a later report). The South Fork of the Snake River remains the only known location for Ute ladies tresses in the state. Aside from project clearances, it appears that additional systematic surveys for Ute ladies tresses in eastern and east-central Idaho are not warranted. I recommend, therefore, that conservation activity be focused on the 49-mile segment of the Snake River known to be occupied habitat. Funding has been secured by the CDC from the BLM and Forest Service to carry out the following proposed work:

1. Continue to monitor population levels and habitat conditions of all known populations and compare with 1996 - 1998 data. Compile 1999 population and habitat data into the centralized data bases at the CDC. This will provide land managers with an understanding of annual variability of observable population levels. Annual monitoring of habitat conditions is important to quickly determine if management regimes or other human disturbances are adversely affecting habitat quality and, potentially, population viability.

2. The Fall Creek Travertine Springs areas is ecologically unique and contains potential habitat for Ute ladies tresses. It is also only a few miles from the Snake River corridor. We will conduct a survey for Ute ladies tresses, sample plant communities in the area, characterize the physical and ecological processes maintaining those communities, as well as record observations on succession and management implications. These data will be entered into the CDC=s conservation site and community data bases and compared to ecologically similar sites elsewhere in Idaho.

3. As mentioned previously, there are both long- and short-term threats affecting nearly all Ute ladies tresses in Idaho. River flow alteration by Palisades Dam represents the most significant long-term threat, while direct human use (recreation) and cattle grazing are having short-term impacts to its habitat. In collaboration with researchers from the University of Montana, we plan to gain a greater understanding of primary successional pathways in ladies tresses habitat that will help land and river managers maintain viable populations of Ute ladies tresses. This work will build on past (Merigliano 1996) and ongoing studies of the relationship between fluvial geomorphology, riparian community ecology, and river management. It will also build upon the preliminary ecological data collected this year and the successional hypothesis developed from them (discussed in the Habitat section).

Primary succession is the sequential development of plant communities on newly created habitat. Along the Snake River, this begins with new substrate deposition by a flood. This has implications for river management because it appears that there is no natural Ute ladies tresses habitat younger than Palisades Dam (Moseley 199a). Another possible effect of damming on primary succession is the persistence of some physical site factor on new islands that limits Ute ladies tresses. An understanding of primary succession in Ute ladies tresses habitat will also allow us to better predict the consequences of human disturbance. Secondary succession is the development of communities following interruption by disturbance to the primary successional sequence. In Ute ladies tresses habitat along the Snake, this results largely from cattle grazing

and, to a minor extent, recreational trampling. This is important information for the BLM and Forest Service, who manage most of the recreation and cattle grazing in ladies tresses habitat along the river (see Herbivory section).

The ultimate goal is to relate flood plain dynamics and primary succession to long-term conservation of Ute ladies tresses on the Snake River. Below are the general objectives for three related areas: substrate age, primary succession, and flow regime. We will develop a detailed study plan for this work in early 1999.

A. Determine the age of the alluvial substrate supporting occupied Ute ladies tresses habitat. This will be inferred from the flood plain mapping conducted by Merigliano (1996) above Heise, supplemented with additional air photo interpretation below Heise and measurements directly from ladies tresses habitat using decay rates for an isotope of lead. We are currently testing the applicability of using Pb^{210} to age substrates in herbaceous communities. Samples collected during Fall 1998 were sent to a laboratory in Ontario, Canada for analysis.

B. Model development of plant communities along the primary successional gradient. It appears that we can use a combination of two different techniques to model this chronological sequence: (1) use time-series analysis of a site, that is, observed changes over time in Ute ladies tresses habitat, and (2) infer the chrono-sequence from plots of different successional ages. The model will include estimates of the rate of development along the primary successional pathways and the compositional and structural characteristics of these changes, including possibly the invasion of exotic turf-forming grasses.

C. Determine the elevation Ute ladies tresses habitat on the flood plain and relate river flows. Related to this, we will characterize flow regime and depositional events responsible for creating new habitat and destroying old habitat. Ultimately, we will also try and answer the question of whether the flow regime predicted to restore cottonwood forests (Merigliano 1996) will suffice to maintain Ute ladies tresses habitat.

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APPENDIX 1

Spiranthes diluvialis habitat plot data.

Values in the matrix are cover class codes, which are defined in the Habitat section.

	Equisetum variegatum						***Salix exigua/ Agrostis stolonifera***			***Elaeagnus commutata/ Agrostis stolonifera***				
	003C	003B	011A	006A	005A	007A	002B	003A	020A	010A	002A	017A	016A	006B
WOODY SPECIES														
Betula occidentalis				1								1	1	
Elaeagnus commutata										1	1	10	10	3
Populus angustifolia	1		3			3	1	3	1			1		1
Rosa woodsii											1			
Salix bebbiana								3						
Salix exigua		1				10	3	10	10					
Salix lutea	1							3						
GRAMINOIDS														
**Agrostis stolonifera*	3	3	20	3	40	50	90	50	70	60	98	50	40	40
Calamagrostis neglecta									1	10				
Carex lanuginosa		1	10	3	10	3	3	1	1			3		20
Carex nebraskensis				3	1								1	
Carex sp.								1						
Eleocharis palustris			1		20			1						
**Festuca arundinacea*										10			3	
Juncus balticus			1	3				1				1	3	1
Juncus ensifolius		1	1	3	3	1								1
Juncus longistylis			1	1										
Juncus tenuis		1		1				1						1

	003C	003B	011A	006A	005A	007A	002B	003A	020A	010A	002A	017A	016A	006B
Muhlenbergia asperifolia						1				20				10
Muhlenbergia richardsonis				30			1		3			1	1	3
Phalaris arundinacea								3						
**Phleum pratense*									1			1		
**Poa palustris*								1						
**Poa pratensis*		1					3	60	40	40	20	60	40	10
Scirpus pungens													1	
FORBS & PTERIDOPHYTES														
Aster ascendens					3	1	3	1	3	10				3
Aster hesperius		3	10								3		3	
Cicuta douglasii			1											
**Cirsium vulgare*								1			1			
Clematis ligusticifolia														3
Conyza canadensis						1								
Epilobium ciliatum						1								
Equisetum arvense				1							1			
Equisetum laevigatum			1			1	1	1	3	3	1	1	10	10
Equisetum variegatum	60	80	50	40	30	80	3			3	1			1
Euthamia occidentalis					10			3						
Fragaria virginiana												3		
Glycyrrhiza lepidota			3	10							10	10		1

	003C	003B	011A	006A	005A	007A	002B	003A	020A	010A	002A	017A	016A	006B
Habenaria hyperborea												1		
**Medicago lupulina*													3	
Mentha arvense		3	3		10	1	1	1					1	
**Myosotis scorpioides*		10	1				1	3				1		
**Plantago major*			1	10	1		3						1	3
Potentilla anserina							1							
Prunella vulgaris		3		3			1		3	1				
Ranunculus cymbalaria		1	1	1		3			1					
**Rumex crispus*								1						
Smilacina stellata										1				
Solidago missouriensis	1	1						3	1			3		
**Sonchus arvense*		10	1											
Spiranthes diluvialis		1		1		1							1	
**Taraxacum officinale*		1		3	10	1	1				1		1	1
**Trifolium fragiferum*				3	10	3				1				
**Trifolium repens*			1	3			1		1		1		1	
Viola sp.		1	1	3		1			1	1		3	1	
unknown forbs			10	1									1	1
TOTAL SPECIES	5	17	20	21	12	17	16	21	15	13	12	16	19	18

	003C	003B	011A	006A	005A	007A	002B	003A	020A	010A	002A	017A	016A	006B
LIFE FORM DATA														
Woody Cover / Mean Ht.	1/0.5	1/1.0	3/0.2	1/0.1	0/0	10/1.0	3/2.0	10/1.2	10/1.5	1/1.0	1/1.2	10/1.0	10/1.5	3/2.5
Graminoid Cover / Mean Ht.	3/0.4	3/0.3	30/0.3	40/0.1	70/0.7	50/0.9	98/0.9	98/0.4	98/1.0	98/0.8	98/1.5	98/0.2	80/0.5	80/0.3
Forb Cover / Mean Ht.	60/0.1	98/0.1	70/0.2	80/0.1	70/0.2	90/0.2	10/0.2	10/0.1	10/0.1	10/0.2	10/0.1	20/0.1	20/0.1	20/0.1
GROUND COVER														
Soil	70	10	3	1	50	1	20	0	0	10	30	0	3	1
Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rock	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Litter	1	3	40	0	10	1	10	80	60	80	20	80	50	60
Wood	1	0	1	0	3	1	0	0	0	0	0	1	1	0
Moss	0	10	50	10	0	60	0	1	40	1	0	3	3	0
Basal Vegetation	30	70	10	90	40	40	70	20	10	10	50	10	40	40