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Monitoring Ute ladies'-tresses (*Spiranthes diluvialis*) on the South Fork Snake River, Idaho: Conservation Status and Third Year Results of Habitat Monitoring

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Cooperators:

SUMMARY

Ute ladies'-tresses (*Spiranthes diluvialis*) is an orchid listed as Threatened under the Endangered Species Act. It was found on the South Fork Snake River in 1996 and is now known from 24 occurrences in eastern Idaho. From 1997 to 2003, the population and habitat of Ute ladies'-tresses occurrences on public land was monitored along the South Fork Snake River. The results of monitoring in 2003 are discussed in this report. The report format focuses on two areas: general conservation status of Ute ladies'-tresses based on visits of all occurrences on public land along the South Fork Snake River, and results of habitat monitoring based on re-sampling permanent transects. This report compliments previous 1997 through 2002 status reports, as well as reports on habitat monitoring results for 2001 and 2002. Reports can be downloaded from the Idaho Conservation Data Center homepage at: www2.state.id.us/fishgame/info/cdc/cdc.htm

Major findings and highlights from 2003 include:

- On the South Fork Snake River, 3,856 Ute ladies'-tresses plants were observed at 20 occurrences. The total was the second highest since inception of monitoring, and over 2,100 more than 2002.
- Six occurrences had more plants observed when compared to 2002, six occurrences had fewer plants, and eight remained approximately the same.
- Threats to Ute ladies'-tresses habitat were similar to prior years. No new threats were observed in 2003. Conservation actions taken by the BLM and Caribou-Targhee National Forest have minimized, decreased, and/or eliminated threats where possible.
- Invasion by noxious weeds and exotic species remains an imminent threat to Ute ladies'-tresses on the South Fork Snake River.
- Suspected unauthorized cattle grazing occurred at three occurrences. Administration of livestock grazing met with allotment standards at all other grazed occurrences.
- Data were collected at 15 of the 23 permanent habitat monitoring transects. No major habitat changes from 2002 were documented at the landscape scale, and only a few major habitat changes were documented at the population scale.
- Five transects had cumulative means that increased, suggesting an overall decline in habitat conditions. Three transects had cumulative means that decreased, suggesting an overall improvement in habitat conditions. Seven remained the same or nearly the same.
- The amount of recreation trailing decreased at four transects. The amount of recreation trailing increased at two transects. Only one transect had associated campsite impacts at the population scale. Recreation is the second most important threat to habitat.
- During inventories for the Idaho Department of Transportation at proposed highway construction sites, a new Ute ladies'-tresses occurrence was discovered on private land near Thornton.

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INTRODUCTION

Ute ladies'-tresses (*Spiranthes diluvialis*) is an orchid listed as Threatened under the Endangered Species Act. It is currently known from widely dispersed populations in Washington, Montana, Idaho, Utah, Wyoming, Nebraska, and Colorado. In 1996, three occurrences were discovered in riparian and wetland habitats on the floodplain of the South Fork Snake River in eastern Idaho. Subsequent searches from 1997 through 2003 yielded 24 occurrences in eastern Idaho (22 on the South Fork Snake River and two in the lower Henrys Fork basin) (Moseley 1998a, 1998b, 2000; Murphy 2000, 2001b, 2003b). From 1997 to 2003, the Idaho Conservation Data Center (IDCDC), Upper Snake River District of the Bureau of Land Management (BLM), and Caribou-Targhee National Forest (C-TNF) cooperatively monitored the population and habitat of Ute ladies'-tresses occurrences on public land along the South Fork Snake River.

After habitat and population monitoring in 2000, it was determined that an objective method of monitoring Ute ladies'-tresses was needed (Murphy 2000). Annual monitoring prior to 2001 relied only on counting the observable population (i.e., flowering and fruiting individuals) and making notations regarding threats and habitat conditions at each occurrence (Moseley 1998a, 1998b, 2000; Murphy 2000). However, the flowering population is naturally variable year-to-year and annual climate fluctuations may alter the phenology of Ute ladies'-tresses, creating the potential for mistimed surveys. In addition, within tall grassy habitats observers can easily miss small plants, vegetative plants, and plants in fruit. Counting plants may be insufficient for determining long-term population (and meta-population) health because they tell us little about the condition of Ute ladies'-tresses habitat. In addition, subjective notations on habitat quality may reflect observer bias and do not provide a good reference point from which to measure changes and threats to habitat over time.

In 2001, systematic, repeatable, and objective monitoring methods for measuring changes and threats to the habitat of Ute ladies'-tresses were developed, tested, and implemented. These monitoring methods use an index of habitat change, incorporating what we have learned from past research and monitoring about Ute ladies'-tresses habitat characteristics and the effects of disturbance (Murphy 2001a). The index assumes that Ute ladies'-tresses requires riparian and wetland habitat with specific environmental characteristics and disturbance levels for population establishment and persistence (summarized in Moseley 1998b, 1999, 2000). The index is applied by measuring indicators of habitat threats or disturbance factors affecting Ute ladies'-tresses habitat at a series of permanent transects. Importantly, such an index is holistic and realizes that populations can respond to the cumulative impacts of habitat disturbance and change.

During 2001 and 2002, 24 permanent habitat-monitoring transects were established and sampled at 18 Ute ladies'-tresses occurrences on the South Fork Snake River. During late August and early September 2003, 15 of these transects, at 11 occurrences, were re-sampled. The data collected during the last three years provide a reference point for measuring future environmental change at both the population and landscape scale. As in prior years, the observable population of Ute ladies'-tresses individuals was counted and threats and habitat conditions were recorded at all 20 occurrences on public land along the South Fork Snake River. In both 2001 and 2002, two monitoring reports were written. One was a report on results from habitat monitoring transects (Murphy 2001a, 2003a), while the other was an updated conservation status report (Murphy 2001b, 2003b) based on occurrence visits. Because there was duplication between reports, and land managers were encumbered with having to refer to two reports instead of one, we decided to combine both reports for 2003. Information for this report is presented under two major sub-headings: 1) General conservation status, including population size and condition, disturbances and

threats, current and proposed management, and conservation actions taken and actions planned; and 2) Habitat monitoring results based on re-sampling transects using the index of habitat change protocol.

METHODS

I. Occurrence Visits

Since 1997, annual monitoring of Ute ladies'-tresses on the South Fork Snake River has involved counting the observable population and making notations regarding threats and habitat conditions at each occurrence (Moseley 1998a, 1998b, 2000; Murphy 2000, 2001b, 2003b). Occurrence visits were repeated in 2003 for all 20 occurrences located on public land. Each year after the field season, all Idaho occurrence records for Ute ladies'-tresses are updated (Idaho Conservation Data Center 2004). From this information, a general assessment of the conservation status of Ute ladies'-tresses is made at both the meta-population and occurrence levels. Land managers then proactively develop conservation actions to prevent population declines and maintain or improve habitat conditions. An "element occurrence" is the standard database record used throughout the Natural Heritage Program/Conservation Data Center network to track rare species, or "elements," of conservation concern (NatureServe 2002). Each occurrence is assigned a three-digit reference number. The name and number for each occurrence is listed in Table 1.

II. Index of Habitat Change

The index of habitat change uses a relative scale with numeric values reflecting changes and threats to habitat quality. A checklist of habitat changes and threats, both human-caused and natural, was developed for the index of habitat change. For reference, the "Ute ladies'-tresses Habitat Monitoring Checklist" is included in Appendix 1. The checklist includes important habitat attributes (i.e., habitat characteristics, changes, threats) that are assumed to affect Ute ladies'-tresses populations. These habitat attributes were divided into direct and indirect threat/change categories. Measurable indicators, or surrogates, for the habitat attributes were assigned numeric values reflecting different condition classes. For all attributes, the numeric values were zero, one, or two (except the population tally, which included four classes). The zero class represents "the most suitable" habitat conditions—the higher the number, the less suitable the current habitat conditions. These attributes were evaluated at both the population scale and the landscape scale at a series of permanent transects. Landscape scale habitat measurements are more useful for assessing the risk of future impacts to Ute ladies'-tresses habitat rather than the magnitude of current or imminent threats. The higher the cumulative value of all attributes, the greater the number of threats at the landscape scale and higher the risk of habitat change.

A thorough description of the methods for the index of habitat change is found in the 2001 monitoring report (Murphy 2001a). That report also includes a complete description of the habitat attributes, the indicators measured, and the rationale for their inclusion. Detailed steps for transect establishment, photo-point monitoring, and habitat monitoring are also included. The equipment required for these procedures is also listed. Field-useable copies of the "Ute ladies'-tresses Transect Establishment and Environmental Description Data Form," "Ute ladies'-tresses Habitat Monitoring Checklist," and "Ute ladies'-tresses Habitat Monitoring Tally Sheet" are available in the 2002 monitoring report (Murphy 2003a). Completed copies of forms for all transects are on file at the IDCDC. No significant changes to the methodology were made in 2003. Only some minor edits were made for clarification.

RESULTS AND DISCUSSION

DISTRIBUTION OF OCCURRENCES IN IDAHO—AN UPDATE - In 2003, no new sub-populations or expansions of prior known occurrences were found during monitoring. On the South Fork Snake River, Ute ladies'-tresses is known from 49 river miles. These begin near the confluence of the Henry's Fork and extend upstream to Swan Valley, nine river miles below Palisades Dam. No additional or new information regarding environmental characteristics, plant communities, or associated species at these occurrences was documented in 2003. However, because of the discovery of the Chester Wetlands occurrence in 2002, the need for surveying additional potential habitat in the lower Henrys Fork basin was identified. In late August and early September 2003, the IDCDC conducted inventories of BLM property along the lower Henrys Fork. No new occurrences were found (Mancuso 2004).

On September 2, 2003, the IDCDC conducted inventories for the Idaho Department of Transportation at several proposed highway-related construction sites along U.S. Highway 21 south of Rexburg. During this inventory, one new occurrence was discovered on private land near Thornton. This is the second population found in the Henrys Fork basin. This site is near Texas slough, a drainage-way in the historic floodplain of the South Fork Snake River that flows toward the Henrys Fork. Texas Slough is now used as an irrigation canal for water diverted from the South Fork Snake River to the Henrys Fork. This new occurrence is approximately three miles east of the Annis Island occurrence. Two other occurrences (Lorenzo Levee and Archer Powerline) are within a similar distance to the south and southeast, repectively. This new occurrence is probably part of the South Fork Snake River meta-population. With the addition of the Thornton-Texas Slough occurrence, the total number of Idaho occurrences now stands at 24.

I. OCCURRENCE VISITS

Visits to all occurrences on public land along the South Fork Snake River took place between August 11 and September 3, 2003. As with prior years, the two occurrences located on private land were not surveyed. Visits were conducted one week earlier than in 2002 (Murphy 2003b). Reconnaissance during early August indicated an apparent trend toward an early peak-flowering period for 2003. Due to the possibility of later blooming individuals missed by early surveys, the total count of observed flowering plants is likely lower than the actual number of flowering plants. Our monitoring does not include the time consuming process of counting vegetative individuals. The ratio of flowering to non-flowering individuals in any year is not known. Detailed population, habitat, and other conservation information for each Idaho occurrence is in the Element Occurrence Records for Ute ladies'-tresses (Idaho Conservation Data Center 2004). Information from 2003 are summarized in Tables 1 and 2, and discussed below by meta-population and occurrence.

META-POPULATION SIZE AND STATUS - A total of 3,856 Ute ladies'-tresses plants were observed at 20 occurrences monitored on the South Fork Snake River during 2003 (Table 1). This was the second highest total since inception of monitoring. Only 2001 had a higher total, with 4,133 plants observed. The 2003 total was 2,103 plants more than in 2002. About 80% of the increase was attributable to an increase at Annis Island. Both Lufkin Bottom and Pine Creek #3 & #4 had increases of about 200 plants, accounting for the remaining 20% of this year's increase. The largest, core occurrences are Annis Island, Black Canyon, Lufkin Bottom, Pine Creek #3 & #4, and Warm Springs Bottom. These five occurrences typically account for between 86% and 94% of the total number of Ute ladies'-tresses observed on the South Fork Snake River in any given year. While all occurrences are valuable for overall meta-population dynamics and colonization of new habitat, these five occurrences should be

the top priorities for monitoring and conservation. Chester Wetlands is also very important and valuable for the long-term recovery of the species in Idaho. It is also one of the largest occurrences in Idaho.

Table 1. Ute ladies'-tresses population counts at South Fork Snake River occurrences for 1996-2003.

Occurrence Name	Occ. #	1996	1997	1998	1999	2000	2001	2002	2003
Kelly's Island	001	12	22	30	30	15	19	15	10
Rattlesnake Point	002	15	4	23	26	0	19	68	1
Warm Springs	003	173	301	80	476	942	522	538	502
Falls Campground	004	1	14	5	6	13	5	3	0
Railroad Island	005	----	9	14	42	17	0	0	0
Annis Island	006	----	35	2,036	1,917	726	2,557	306	2,006
Twin Bridges Island	007	----	160	108	99	43	36	14	15
Lorenzo Levee	008	----	1	----	----	----	----	----	----
Mud Creek Bar	009	----	9	32	71	63	16	20	25
TNC Island	010	----	9	9	118	21	17	13	7
Lufkin Bottom	011	----	61	96	224	494	184	309	514
Gormer Canyon #5	012	----	10	0	1	0	0	0	0
Gormer Canyon #4	013	----	10	11	12	7	7	----	9
Pine Creek #5	014	----	6	14	30	47	24	24	74
Archer Powerline	015	----	145	----	----	----	----	----	----
Pine Creek #3 & #4	016	----	18	113	200	103	118	121	353
Lower Conant Valley	017	----	127	0	40	23	12	12	0
Upper Conant Valley	018	----	61	15	5	5	1	0	3
Lower Swan Valley	019	----	1	8	4	9	13	27	25
Squaw Creek Islands	020	----	168	2	0	0	0	0	0
Gormer Canyon #3	021	----	----	8	59	30	76	47	50
Black Canyon	022	----	----	----	50	42	507	236	262
Total	**----**	**201**	**1,171**	**2,604**	**3,410**	**2,600**	**4,133**	**1,753**	**3,856**

Of the 20 occurrences monitored on the South Fork Snake River in 2003, six had more Ute ladies'-tresses plants observed than in 2002, six occurrences had fewer plants, and eight remained the same or nearly the same. This is a very similar ratio as 2002. The total number of plants observed has decreased over the last four years at both Lower Conant Valley and TNC Island, and decreased each of the last three years at Falls Campground. Prior to 2003 (when the number was about the same as 2002), the number observed at Twin Bridges had decreased each of the last five years. In comparison, only one occurrence, Pine Creek #3 & #4, has had a long-term increase. The number of plants observed has increased each of the

last three years at this occurrence. Five occurrences, Falls Campground, Railroad Island, Gormer Canyon #5, Lower Conant Valley, and Squaw Creek Islands, had zero Ute ladies'-tresses observed. For the fifth consecutive year there were no plants observed at Squaw Creek Islands. As noted in previous status reports (Moseley 1998b, 2000; Murphy 2000, 2001b), only hooded ladies'-tresses (*Spiranthes romanzoffiana*) has been observed at Squaw Creek Islands since 1998. In addition, no Ute ladies'-tresses were observed at Gormer Canyon #5 five of the last six years, including the last four years in a row. No Ute ladies'-tresses were observed at Railroad Island each of the last three years. Due to annual variability in the number of flowering stems, prolonged dormancy, climatic variations, the potential for mistimed surveys, and late-season livestock grazing (at Squaw Creek Islands), it is premature to consider any of these occurrences to be extirpated.

META-POPULATION THREATS AND CONSERVATION ACTIONS TAKEN - As with prior years, all occurrences on the South Fork Snake River, except Lower Conant Valley and Upper Conant Valley, and possibly Lower Swan Valley, are threatened by either localized human activities (e.g., recreation, inappropriately-timed cattle grazing) and/or noxious weed invasion. Conservation actions taken by the BLM and C-TNF have generally been effective in minimizing, decreasing, and/or eliminating threats where possible through land management actions and compliance inspections. The types of threats to the Ute ladies'-tresses meta-population have not changed much over time, and no new threats were observed in 2003. However, the magnitude of the threats varies across occurrences and from year to year, even with conservation actions taken to minimize these threats. This underscores the difficulty land managers sometimes face under growing demands (e.g., recreation use), conflicting or complex management policies often beyond their control (e.g., policies on threatened or endangered species, livestock grazing, water management, etc.), and insufficient time or funding for carrying out necessary work. Table 2 summarizes threat and condition information for all the South Fork Snake River occurrences, as well as conservation actions taken in 2003. A brief discussion on threats to the meta-population and conservation actions taken to address these threats follows.

Hydrologic and Floodplain Alteration: Operation of Palisades Dam has dramatically altered the hydrologic regime on the South Fork Snake River. Combined with floodplain development, hydrologic alteration represents a long-term threat to the viability of the meta-population (Moseley 2000). Over time, channel migration may decrease soil moisture at existing Ute ladies'-tresses occurrences while also allowing encroachment of dense woody vegetation, both leading to decreases or elimination of habitat. Periodic floods may be needed to set back woody vegetation succession and create new landforms with fine sediments that are suitable for colonization by Ute ladies'-tresses. If the operation of Palisades Dam prevents or reduces these necessary high flows and decreases sediment inputs, then a decrease in the number and size of occurrences might be expected over time. However, some occurrences may benefit from hydrologic regime alteration. For example, dam operations often keep fall and winter flows at higher levels than the pre-dam hydrologic regime (U.S. Geological Survey 2004). Summer streamflows on the South Fork Snake River are predominantly dictated by downstream irrigation demands. This might maintain groundwater at a higher level in late summer at some occurrences to the benefit of Ute ladies'-tresses. Proposals by federal agencies to change water management on the South Fork Snake River to create a more natural (pre-dam) hydrograph would probably benefit the meta-population in the long-term, but this hypothesis would have to be tested with detailed monitoring.

In 2003, streamflows on the South Fork Snake River were sufficient for short-term maintenance of the Ute ladies'-tresses meta-population. Streamflows were below the long-term average in May and June (but higher than in 2002), reflecting lower than normal snowpack in the prior winter (U.S. Geological Survey 2004). However, streamflows were

Table 2. Summary of habitat conditions, threats, and conservation actions accomplished in 2003, and conservation actions planned for 2004, for Ute ladies'-tresses occurrences on the South Fork Snake River.

Occurrence # (land ownership)	Habitat Conditions, Threats, and Human Activities	Conservation Actions Accomplished in 2003 and Planned for 2004
Kelly's Island #001 (BLM)	No human disturbances in either the mainland nor island portions of occurrence. Noxious weed cover about the same as 2002. Dredging of channel nearby island portion, with deposit of spoils on bank, but no dredging occurred in channel supporting island portion. Beaver and moose trails adjacent to island portion, and moose browsing present. Water birch (*Betula occidentalis*) appears to be invading occupied habitat on island portion of occurrence.	2003: Habitat monitoring transect not re-sampled.
Rattlesnake Point #002 (BLM)	One recent campsite and fire ring within 20 m of occupied habitat. Recent suspected unauthorized grazing evident on 8/20/03. Cattle use varied. Forage cropped to less than 10 cm stubble height in some areas.	2003: IDCDC re-sampled the habitat monitoring transect. C-TNF performed allotment compliance inspections. 2004: Pasture that includes the occurrence is scheduled to be rested. C-TNF will continue allotment compliance inspections. 2005: Construction of a fence excluding this area of the floodplain from cattle is planned.
Warm Springs Bottom #003 (BLM)	Beaver dam has flooded a portion of the occurrence, reducing the area of Ute ladies'-tresses habitat. Vegetation becoming dominated by sedges (*Carex* spp.) instead of willows (*Salix* spp.). Unauthorized late-season grazing by three cow-calf pairs was observed during surveys on 8/15/03. Cattle use varied. Forage cropped to less than 10 cm stubble height in the central part of occurrence, but was minimal in most areas. Grazing probably did not reduce the number of observable Ute ladies'-tresses.	2003: IDCDC re-sampled the habitat monitoring transects. C-TNF performed allotment compliance inspections. Permittee informed of the presence of cattle on 8/15/03 and cattle were removed. 2004: C-TNF will continue allotment compliance inspections. Areas found to be "moderately to heavily utilized" by cattle will be reviewed by the Palisades District Rangeland Specialist and C-TNF Botanist.
Falls Campground #004 (USFS)	Cattle grazing out of the permitted season of use was observed on the island portion of the occurrence in 2003. No other human disturbances observed at occurrence.	2003: IDCDC re-sampled the habitat monitoring transect on the island portion of occurrence. Habitat monitoring transect on mainland portion not re-sampled. C-TNF performed allotment compliance inspections. 2004: C-TNF will continue to survey pasture prior to cattle "on date" and will continue allotment compliance inspections.

Table 2. continued.

Occurrence # (land ownership)	Habitat Conditions, Threats, and Human Activities	Conservation Actions Accomplished in 2003 and Planned for 2004
Railroad Island #005 (BLM)	Conditions were dry, but vegetation greener than last two years. No human impacts or other threats observed. Heavy moose browsing observed. No obvious changes in exotic species cover.	2003: Habitat monitoring transect not re-sampled.
Annis Island #006 (BLM)	No human disturbances observed. Only trace evidence of 2001 fire remaining in the herbaceous layer of occupied habitat. Cover of noxious weeds similar to, or slightly less than, prior two years.	2003: BLM performed allotment compliance and monitoring inspections. IDCDC re-sampled two habitat monitoring transects on mainland, but habitat monitoring transect not re-sampled on the island portion of occurrence. 2004: BLM will continue allotment compliance inspections and continue release of noxious weed biological control agents based on availability.
Twin Bridges Island #007 (BLM; Madison Cty)	No human disturbances observed.	2003: Habitat monitoring transect not re-sampled.
Lorenzo Levee #008 (private)	Not visited in 2003.	No habitat monitoring transect established.
Mud Creek Bar #009 (BLM)	Natural bank erosion continues to be a threat. No human disturbances observed.	2003: Habitat monitoring transect not re-sampled. 2004: BLM will continue release of knapweed biological-control agents based on availability.
TNC Island #010 (BLM)	Recreation trails through occupied habitat at the upstream end of island/bar. Heavily used campsites occur nearby. Trampling of vegetation along recreation trails was higher than in 2002. Moles or gophers are active in occupied habitat. Leafy spurge (*Euphorbia esula*) present.	2003: IDCDC re-sampled the habitat monitoring transect.
Lufkin Bottom #011 (BLM)	Recreation trails through portions of the outer bank habitat resulting in trampled vegetation and soil. Debris from fire ring also scattered in occupied habitat. Trampling along trails was similar to, or slightly less than in 2002; no Ute ladies'-tresses were trampled. Beaver active in habitat.	2003: IDCDC re-sampled the habitat monitoring transects.
Gormer Canyon #5 #012 (USFS)	Spotted knapweed (*Centaurea maculosa*) and Canada thistle (*Cirsium arvense*) have thoroughly invaded the occurrence. No Ute ladies'-tresses observed.	2003: BLM released knapweed biological control agents (*Cyphocleonus achates*). No habitat monitoring transect established. 2004: BLM will continue release of noxious weed biological control agents based on availability.
Gormer Canyon #4 #013 (USFS)	Trampling of vegetation along recreation trails in occupied habitat was higher than in 2001.	IDCDC re-sampled the habitat monitoring transect.

Table 2. continued.

Occurrence # (land ownership)	Habitat Conditions, Threats, and Human Activities	Conservation Actions Accomplished in 2003 and Planned for 2004
Pine Creek #5 #014 (BLM)	No human impacts or other threats observed. The lessee did not graze the allotment in 2003.	2003: IDCDC re-sampled the habitat monitoring transect. 2004: BLM will continue allotment compliance and monitoring inspections.
Archer Powerline #015 (private)	Not visited in 2003.	No habitat monitoring transect established.
Pine Creek #3 & #4 #016 (BLM)	The lessee did not graze the allotment in 2003. Dense sweetclover (*Melilotus* spp.), up to 1 m tall, in portions of habitat, but overall forb and exotic species cover slightly lower than 2002. Moles or gophers active in occupied habitat and moose browsing was evident.	2003: IDCDC re-sampled the habitat monitoring transects. 2004: BLM will continue allotment compliance and monitoring inspections. BLM will continue release of noxious weed biological control agents based on availability.
Lower Conant Valley #017 (BLM)	Habitat conditions were dry. No human impacts or other threats observed.	2003: Habitat monitoring transect not re-sampled.
Upper Conant Valley #018 (BLM)	No human impacts or other threats observed.	2003: Habitat monitoring transect not re-sampled.
Lower Swan Valley #019 (BLM)	No human impacts or other threats observed.	2003: Habitat monitoring transect not re-sampled.
Squaw Creek Islands #020 (BLM)	No Ute ladies'-tresses observed during cursory survey of mainland and nearest island portions of occurrence. Island in main river channel was not surveyed. Mainland portion was heavily grazed during late summer.	No habitat monitoring transect established.
Gormer Canyon #3 #021 (USFS)	Cover of Canada thistle and perennial sowthistle (*Sonchus arvensis*) similar to 2002. Major wildlife trail goes through occurrence. No human disturbances observed.	2003: IDCDC re-sampled the habitat monitoring transect. 2004: BLM will continue release of noxious weed biological control agents based on availability.
Black Canyon #022 (BLM and private)	Use of campsite, fire ring, and boat landing trail about 10 m from occupied habitat on the mainland portion of occurrence higher than in 2002. Cover of Canada thistle and perennial sowthistle similar to 2002 on the island portion of occurrence. Ungulate browsing is maintaining woody vegetation at similar height and cover as prior two years. No human disturbances observed on island portion.	2003: IDCDC re-sampled the habitat monitoring transect on the island portion of occurrence. IDCDC re-photographed photo-monitoring point on the mainland portion.

higher than average from July through September (July and August were the highest flows since 1998). Moseley (2000) found that late August to early September streamflows on the South Fork Snake River of about 8,400 cfs at the Heise Gauge were sufficiently high to create about an 80 cm or less deep water table at nearly all occurrences. The average monthly streamflow statistics for May through August were examined for the period of 1997 through 2003 (U.S. Geological Survey 2004). Only during the extreme drought year of 2001 were August streamflows sufficiently low (6,879 cfs) to cause moisture stress at some occurrences. From mid-May through September 3, 2003, streamflows remained above 8,000 cfs. Between 1997 and 2003, mean monthly streamflows for June through August (the prime growing season for Ute ladies'-tresses) never dropped below 9,582 cfs on the South Fork Snake River. Early and late season flows were lower than average from 2001 through 2003, but not far below the long-term average. Late August and September surface soil moisture may be partly maintained by summer thunderstorm showers (although even these were diminished during drought years, including 2003; Idaho State Climate Service 2004). Thus, in mild drought years, such as 1999, 2000, 2002, and 2003, insufficient soil moisture is probably not a limiting factor at any occurrences. Only during years with abnormally low summer streamflows combined with drought (e.g., 2001), might soil moisture stress influence occurrences (e.g., possibly Rattlesnake Point, Falls Campground, Mud Creek Bar, Lufkin Bottom, Pine Creek #5, and Lower Conant Valley). Of the occurrences with water table depth data, Lower Conant Valley appears most vulnerable to moisture stress (Moseley 2000).

Other landscape level threats exist along the South Fork Snake River, including floodplain alteration related to levee construction and maintenance, water diversions, road and bridge development, bank stabilization riprapping, channel dredging, and housing development. No new floodplain alteration projects or other threats directly affecting Ute ladies'-tresses were observed in 2003. However, a channel immediately upstream from the island portion of the Kelly Island occurrence was dredged, and spoils were deposited on the bank. No dredging occurred in the channel where the island portion of this occurrence is found. With the goal of preventing subdivision and resort development (and associated impacts), the BLM Upper Snake/South Fork Snake River Land and Water Conservation Fund project is currently negotiating three separate conservation easements totaling 966 acres on private lands along the South Fork of the Snake River. Additionally, two acquisitions of property in fee-title were acquired using Bonneville Power Administration Funds, totaling 200 acres.

Livestock Grazing: Five occurrences were grazed by cattle in 2003. The lessee did not graze the allotment encompassing Pine Creek #3 & #4 and Pine Creek #5 in 2003. Suspected unauthorized cattle grazing occurred at three occurrences (Falls Campground, Rattlesnake Point, and Warm Springs). Grazing levels were highest at Rattlesnake Point. Graminoids and some forbs were cropped to less than 10 cm stubble height in some areas, while other areas had less grazing. Only one Ute ladies'-tresses plant was observed at Rattlesnake Point, probably due to grazing of flowering stems by cattle. Cattle grazing complied with allotment season-of-use requirements at all other grazed occurrences in 2003. As a result, grazing disturbance during the Ute ladies'-tresses growing season was less than in 2002 at Annis Island. Late-season grazing presents a short-term threat to Ute ladies'-tresses due to the increased chance of direct grazing and trampling of flowering plants and a long-term threat from potentially decreased reproduction (Heidel 2001). However, occurrences are usually resilient to late-season grazing the prior year. This was observed at Annis Island where the number of plants was similar to the year prior to late-season grazing (i.e., 2002). A similar increase after late-season cattle grazing the year before was documented in Montana by Heidel (2001).

The BLM and the USFS performed grazing allotment compliance and monitoring inspections in 2003. Current BLM livestock grazing seasons are spring/early summer. This grazing

regime is probably not harmful, and may be beneficial to Ute ladies'-tresses on the South Fork Snake River. Spring and early summer cattle grazing can sometimes benefit Ute ladies'-tresses flowering by decreasing the cover and density of competing forbs and grasses (Allison 2001, Heidel 2001, Riedel 2002). However, soil compaction and invasion by noxious weeds and competitive unpalatable forbs, sometimes associated with cattle grazing, should be monitored as direct threats to Ute ladies'-tresses.

Off-highway Vehicle Use: Off-highway vehicle (OHV) use is currently a minor threat to the Ute ladies'-tresses meta-population. No recent OHV travel through habitat was observed in 2003. The OHV barriers reconstructed in fall 2002 at Warm Springs Bottom and Mud Creek Bar have been effective thus far.

Noxious Weeds and Exotic Species: Currently, noxious weed invasion is an imminent and serious threat to Ute ladies'-tresses on the South Fork Snake River. Competition with spotted knapweed (*Centaurea maculosa*) and Canada thistle (*Cirsium arvense*) at Gormer Canyon #5, and invasion by perennial sowthistle (*Sonchus arvensis*) at the mainland sub-population at Kelly's Island, may be factors in why Ute ladies'-tresses is nearly extirpated from these two occurrences. Competition by noxious weeds and other aggressive exotic species, such as common tansy (*Tanacetum vulgare*), threatens nearly all occurrences. Since monitoring began in 1997, Canada thistle has been documented within occupied habitat at all occurrences except TNC Island, Pine Creek #5, and Lower Conant Valley. Perennial sowthistle has been documented at all but Rattlesnake Point, Mud Creek Bar, TNC Island, Pine Creek #5, Lower Conant Valley, Upper Conant Valley, and Lower Swan Valley occurrences. In 2003, perennial sowthistle was documented within occupied habitat at Annis Island for the first time. In addition, leafy spurge (*Euphorbia esula*) was documented for the first time immediately adjacent to occupied habitat at TNC Island. No major expansions of currently known noxious weed colonies were observed at any occurrences.

Invasion by noxious weeds and competitive exotic species is often symptomatic of soil disturbances. However, moderate to high cover of noxious weeds was observed at occurrences annually disturbed by livestock grazing and recreation activities, as well as at undisturbed occurrences (Murphy 2001a, 2003a). In addition, a flush of exotic weedy species, especially bull thistle (*Cirsium vulgare*), but also occasionally Canada thistle, is sometimes observed after summer cattle grazing is reduced or eliminated. To slow or reverse the spread of noxious weeds, the BLM continued to release biological control agents along the South Fork Snake River from Swan Valley to the confluence with the Henrys Fork. These releases supplemented prior releases of biological control agents for Canada thistle, spotted knapweed, and leafy spurge (Murphy 2000, 2001b, 2003b).

Recreation: Recreation by campers, boaters, and anglers continues to increase on the South Fork Snake River and currently causes local impacts to Ute ladies'-tresses habitat. Six occurrences are directly impacted by recreation activities and another five have recreation impacts immediately adjacent to occupied habitat. Recreation impacts are typically localized, but variable year-to-year. Lufkin Bottom and TNC Island have recreation trails going through occupied habitat that are heavily used during most years. Heavily used campsites are immediately adjacent. Minor recreation trails (used once or only infrequently) traverse occupied habitat at several other occurrences. These trails result in trampled vegetation, but usually do not expose or compact soil. Trampled Ute ladies'-tresses plants were observed at Gormer Canyon #4. A new campfire ring was observed near occupied habitat at Rattlesnake Point. In 2003, the BLM and USFS conducted weekly to bi-weekly river patrols (16 total) in the upper South Fork to maintain dispersed camp areas, ensure compliance with overnight camping and sanitation regulations, and to increase public education with river users. The BLM also developed educational kiosks at the Conant and Byington boat launches, which

address Ute ladies'-tresses conservation needs and advise recreationists on avoiding occurrences.

CONSERVATION INFORMATION—SUMMARY BY OCCURRENCE -

Kelly's Island (001): No human-related habitat disturbances were observed at either the mainland or the island portions of the occurrence in 2003. Unlike 2002, no recreation activity was observed in or adjacent to occupied habitat. Noxious weed cover appeared about the same as 2002. The total number of Ute ladies'-tresses plants observed has decreased each of the last two years at Kelly's Island. The sub-population on the mainland portion of the occurrence has consisted of only a few plants since 2000. The majority of plants are on the island. In a channel immediately upstream from the island portion of the occurrence, dredging occurred and spoils were deposited on the bank. No dredging occurred in the channel where the island portion of the occurrence is found. Beaver and moose trails were observed adjacent to occupied habitat on the island, and moose browsing of shrubs was present. Water birch (*Betula occidentalis*) appears to be invading occupied habitat on the island. A permanent habitat monitoring transect should be established on the island portion of the occurrence to quantify any changes there.

Rattlesnake Point (002): The C-TNF performed allotment compliance inspections in 2003. Evidence of recent suspected unauthorized grazing was observed during monitoring on August 20, 2003. Cattle grazing was not evenly distributed, but graminoids and some forbs were cropped to less than 10 cm stubble height in many areas. In 2004, the pasture that includes the occurrence is scheduled to be rested. Construction of a fence excluding this area of the floodplain from cattle is planned for 2005. Probably because of livestock grazing during the flowering season, only one Ute ladies'-tresses plant was observed. The population persisted after similar late season grazing in 2001. As in 2002, one recent campsite and fire ring was documented within 20 m of occupied habitat. The campfire ring established within 10 m of occupied habitat in 2002 was not used in 2003.

Warm Springs Bottom (003): The C-TNF performed allotment compliance inspections in 2003. Late-season unauthorized grazing by three cow-calf pairs was observed during monitoring on August 15, 2003. The permittee was informed of the presence of cattle on August 15 and cattle were removed. Cattle grazing was not evenly distributed. Graminoids and some forbs were cropped to less than 10 cm stubble height in the central part of the occurrence, but most areas had minimal use. Areas found to be "moderately to heavily utilized" by cattle will be reviewed by the Palisades District Rangeland Specialist and C-TNF Botanist. The C-TNF will continue allotment compliance inspections in 2004. Grazing probably did not reduce the number of observable Ute ladies'-tresses very much. The number of flowering Ute ladies'-tresses observed was slightly less than the last two years. Population monitoring data shows this to be the second largest occurrence on the South Fork Snake River. No OHV use or other recreation activity was documented in or adjacent to occupied habitat in 2003. The OHV barriers reconstructed in fall 2002 effectively prevented OHV access. A beaver dam established in 2002 was still active in 2003. It has flooded a portion of the occurrence behind the old dam, and reduced the area of Ute ladies'-tresses habitat in a small portion of the whole occurrence. The vegetation in the flooded area is becoming dominated by sedge (*Carex*) species, while willow (*Salix*) species vigor is decreasing.

Falls Campground (004): Ute ladies'-tresses were not observed during 2003 monitoring. The number of plants observed at this small population has decreased each of the last three years. No new threats or other habitat changes were documented at the mainland portion of the occurrence. The three main threats on the mainland recreation use, woody vegetation encroachment, and livestock grazing. In 2003, the C-TNF performed allotment compliance

inspections. Cattle-grazing outside the permitted season of use was observed on the island portion in 2003. No other human-related disturbances were observed on the island portion of the occurrence. In 2004, the C-TNF will continue to survey the pasture prior to cattle "on date" (Labor Day) and continue allotment compliance inspections.

Railroad Island (005): No Ute ladies'-tresses have been observed each of the last three years. Conditions appeared dry, but the vegetation was greener than the previous two years. No human-related disturbances or other threats were observed and there were no obvious changes in the cover of invasive or noxious weeds. Heavy moose browsing was observed.

Annis Island (006): In 2003, the number of Ute ladies'-tresses observed at this occurrence recovered from low numbers in 2002 (caused by late-season grazing) to numbers similar to 1998, 1999, and 2001. This occurrence remains the largest in Idaho, with over 2,000 plants. Cattle grazing occurs in the spring and early summer every year prior to the flowering period of Ute ladies'-tresses. The BLM performed allotment compliance and monitoring inspections in 2003 and will continue inspections in 2004. In 2003, overall cattle grazing intensity was variable across the occurrence. No other human-related disturbances were observed. A fire burned a portion of the occurrence in 2001, but the herbaceous layer has since recovered with only trace evidence of the fire remaining. The cover of noxious weeds was similar to, or slightly less than, the prior two years. In 2002, the BLM released biological control agents for leafy spurge (*Aphthona flava*, *A. lacertosa*, and *A. nigriscutis* (Coleoptera: Chrysomelidae)). The BLM plans to release additional noxious weed biological control agents in 2004 based on agent availability. No human-related disturbances or new threats were documented on the island portion of the occurrence.

Twin Bridges (007): From 1997 to 2002, the number of Ute ladies'-tresses observed decreased each year. The number observed in 2003 was about the same as in 2002. The Madison County park portion of the occurrence supports very few plants, with two plants found behind the picnic pavilion in 2003 and none observed in 2002. No OHV travel was documented behind the picnic pavilion. No human-related disturbances or new threats were reported at this occurrence.

Lorenzo Levee (008): This occurrence is located on private land. It has not been revisited since its discovery in 1997.

Mud Creek Bar (009): The number of Ute ladies'-tresses plants observed has increased each of the last three years at Mud Creek Bar. In 2001, a trail was established that went from a boat landing through occupied habitat to a campsite. Since 2001, the habitat has been recovering. No new threats or human-related disturbances, including recreation, were observed in 2003. Noxious weeds (especially spotted knapweed) and competitive tall forbs remain a threat. *Cyphocleonus achates* (Coleoptera: Curculionidae), a biological control agent for spotted knapweed, was released in 2002. The BLM will continue release of knapweed biological control agents in 2004 based on agent availability. Potential Ute ladies'-tresses habitat at Mud Creek Bar continues to be lost to non-human related bank erosion. No recent OHV use was observed at Mud Creek Bar during the last two years. OHV barriers reconstructed in fall 2002 appear effective thus far.

TNC Island (010): The number of Ute ladies'-tresses plants observed has decreased each of the last four years. Recreation trails are present through occupied habitat at the upstream end of the island. Trampling of vegetation along trails increased over 2002 levels. These trails are associated with heavily used campsites and angler access. Moles or gophers were also active in occupied habitat. Several leafy spurge plants were documented adjacent to the campsite at the upstream end, within five meters of occupied habitat. This was the first time

this noxious weed has been documented here. It was hand-pulled, but the habitat should be monitored for resprouting from root fragments.

Lufkin Bottom (011): In 2003, the number of Ute ladies'-tresses plants observed increased by over 200. The total number observed has increased each of the last two years. Lufkin Bottom remains the third largest occurrence on the South Fork Snake River. There is annual trampling of occupied Ute ladies'-tresses habitat along trails used by campers, boaters, and anglers. Debris from fire rings and campsites are also sometimes scattered in occupied habitat (documented in 2003). The amount of recreation disturbance has fluctuated annually. Trampling levels were similar to, or slightly less than in 2002. Although trails occur very close to Ute ladies'-tresses, no trampled plants were confirmed during the last three years. No new threats were documented in 2003. Beaver activity was noted in occupied habitat.

Gormer Canyon #5 (012): No Ute ladies'-tresses have been observed five of the last six years, including the last four years in a row. The habitat is marginal, due to its position on a high, dry terrace. In addition, spotted knapweed and Canada thistle have thoroughly invaded the occurrence. As in 2002, the BLM released knapweed biological control agents (*Cyphocleonus achates*) in 2003. The BLM will continue release of noxious weed biological control agents in 2004 based on agent availability.

Gormer Canyon #4 (013): This occurrence supports a small but apparently stable population of Ute ladies'-tresses. The occurrence was not monitored in 2002. A recreation trail leading from a designated camp traversed occupied habitat. Trampling in occupied habitat was higher than in 2001. Two Ute ladies'-tresses plants were trampled by trail users. The cover of invasive and noxious weeds, especially Canada thistle, has increased from 2001. It is unknown if increases in noxious weeds are related to recreation disturbance or other reasons.

Pine Creek #5 (014): No human-related disturbances or new threats were observed. The lessee did not graze the allotment encompassing this occurrence in 2003. The number of Ute ladies'-tresses observed in 2003 increased by 50 plants (to 74) over the 2002 count. The BLM will continue allotment compliance and monitoring inspections in 2004.

Archer Powerline (015): This occurrence is located on private land. It has not been revisited since its discovery in 1997.

Pine Ck. #3 & #4 (016): The number of Ute ladies'-tresses plants observed increased by over 200 from 2002. The total number of plants has increased each of the last three years. This is the fifth largest occurrence on the South Fork Snake River. The lessee did not graze the allotment encompassing this occurrence in 2003. The BLM will continue allotment compliance and monitoring inspections in 2004. With the lack of cattle grazing, there was a flush of tall, dense sweetclover (*Melilotus* spp.) in portions of habitat. However, overall forb and exotic species cover (including the noxious weed Canada thistle) was slightly lower than in 2002. The BLM will continue release of noxious weed biological control agents for Canada thistle in 2004 based on agent availability. Moles or gophers were active in occupied habitat and moose browsing was evident.

Lower Conant Valley (017): No Ute ladies'-tresses were observed at this occurrence. The number of plants observed has decreased over the last four years. The reason for this trend is not readily explained. No human-related disturbances or other threats were observed in 2003. Although the habitat appeared dry, moisture conditions during summer, 2003 were higher than the prior summer (Idaho State Climate Service 2004, U.S. Geological Survey 2004). This occurrence appears the most vulnerable of all occurrences to moisture stress (Moseley 2000, Murphy 2003b).

Upper Conant Valley (018): This occurrence supports relatively few Ute ladies'-tresses plants. No plants were observed in 2002 and only three observed in 2003. No human-related disturbances or other threats were observed.

Lower Swan Valley (019): The number of Ute ladies'-tresses observed was similar to 2002. From 1999 to 2002, the number of plants had increased each year. No human-related disturbances or new threats were observed in 2003.

Squaw Creek Islands (020): For the fifth consecutive year, there were no Ute ladies'-tresses observed at the mainland and nearest island portions of this occurrence. Late season cattle grazing takes place at this occurrence every year reducing the possibility of observing Ute ladies'-tresses. The island in the main river channel has not been checked in several years, but it is suspected to support only hooded ladies'-tresses.

Gormer Canyon #3 (021): The number of Ute ladies'-tresses observed was similar to 2002. However, a larger percentage of plants were observed on the south slough bank rather than on the north bank, where most plants have been observed in the past. A heavily used wildlife trail runs lengthwise through occupied habitat along the north bank of the slough. Wildlife trampling along the trail was higher than in 2002, although the level of shrub browsing was unchanged. The cover of Canada thistle and perennial sowthistle was similar to 2002. The BLM will continue release of noxious weed biological control agents for Canada thistle in 2004 based on agent availability. No human-related disturbances or new threats were observed.

Black Canyon (022): Since the 2001 discovery of the large sub-population on the mainland, this occurrence has remained the fourth largest (on average) on the South Fork Snake River. The number of Ute ladies'-tresses observed in 2003 was slightly higher than 2002. The cover of noxious weeds (Canada thistle and perennial sowthistle) was similar to 2002 on the island portion of occurrence. Ungulate browsing has kept woody vegetation at similar heights and cover as the previous two years. No human-related disturbances were observed on the island portion. In contrast to the island, recreation is the main threat on the mainland portion of the occurrence. Trampling from use of an established campsite, fire ring, and boat-landing trail (all located about 10 m from occupied habitat) was higher than in 2002.

II. INDEX OF HABITAT CHANGE

Between August 20 and September 3, 2003, monitoring information was collected at 15 of the 24 habitat monitoring transects established in 2001 and 2002. For monitoring information from transects not re-sampled in 2003, see the report "Ute ladies'-tresses (*Spiranthes diluvialis*) habitat on the South Fork Snake River, Idaho—Second year results" (Murphy 2003a). The 15 transects chosen for monitoring in 2003 included the largest Ute ladies'-tresses populations, as well as occurrences with livestock grazing, high levels of recreation, and other imminent threats. Photographs were re-taken at the midpoints of all 15 transects re-sampled in 2003. Photos were also re-taken at the permanent photo-point on the mainland portion of the Black Canyon occurrence. Repeat photos have effectively documented year-to-year habitat changes at several occurrences. The annual monitoring photos are on file at the IDCDC.

No new transects were established in 2003. For most transects, reference tree tags and bearings proved useful in locating re-bar stakes. However, at Rattlesnake Point (002), TNC Island (010), Gormer Canyon #4 (013), Pine Ck. #3 & #4 (016B), and Black Canyon (022), the re-bar marking the start of transects were not relocated. At these transects, new re-bar markers were reestablished as close as possible (estimated to be within one meter) to their original location. For future monitoring, relocation of re-bar would be easier and less time

consuming with the use of a small, portable metal detection device. Transect locations, bearings, and lengths were not altered and no new *Transect Establishment and Environmental Description Data Forms* were completed. At several transects, missing or damaged tree tags (from wildlife or human activity) were replaced. With the exception of Warm Springs Bottom (003A) (altered by beaver-caused flooding), there were no changes in the plant communities traversed by belt transects. There were no changes in the fluvial landforms, soils, hydrologic regime, or other environmental characteristics at transects re-sampled in 2003. No major flood events or other large-scale natural or human-caused changes occurred on the South Fork Snake River in 2003. Appendix 2 summarizes the establishment data and environmental setting for all transects.

HABITAT CONDITIONS—A SUMMARY OF RESULTS BY ATTRIBUTE - Below is a summary of 2003 results by habitat attributes. Population and landscape scale data for all habitat attributes at each transect monitored in 2003 are in Appendix 3 and Appendix 4.

Hydrologic and Fluvial Geomorphic Change

Population Scale: The depth of recent alluvial deposits is one indicator of hydrologic and fluvial geomorphic change measured at the population scale. Loss of soil moisture, indicated by the cover of mesic graminoids, is the other indicator measured. Thirteen percent of transects monitored had evidence of recent alluvial deposition. Evidence was nearly always sand, cobble, or woody debris deposits from June 1997 floods. Each year since this deposition event, sand and cobble have been increasingly incorporated into the soil and less visible through colonizing vegetation. Loss of soil moisture, indicated by mesic graminoid cover below 40%, was recorded in sample blocks at 67% of transects in 2003. No transects averaged less than 40% cover of mesic graminoid species for the whole transect.

Deposition and loss of soil moisture are sometimes related. For example, a large amount of sand deposition may decrease mesic graminoid cover. Deposition and loss of soil moisture were inversely related at one transect in 2003. It is also likely that mesic graminoid cover decreases during drought and with heavy livestock grazing or recreation trampling. For example, more rainfall occurred at nearby weather stations during the summer of 2002 than in the same period in 2001 and 2003 (Idaho State Climate Services 2004). In fact, the summer of 2003 was drier than 2001. Unlike 2003, increased precipitation during the summer of 2002 lead to slightly taller and denser mesic graminoids recorded during monitoring that year.

Landscape Scale: Active bank erosion is the indicator of hydrologic and fluvial geomorphic change measured at the landscape scale. No noticeable bank erosion was observed at any transect in 2003. The measurement of erosion at Rattlesnake Point (002) was erroneous. No evidence of recent erosion was observed.

Invasive and Noxious Weeds

Population Scale: No major changes in the cover of invasive and noxious weeds were observed at transects monitored in 2003. All transects monitored had some invasive and noxious weed cover. Nearly all transects had noxious weeds present (i.e., those designated under Idaho's Noxious Weed Law), often in addition to other invasive species. Several transects had only invasive exotic species, such as bull thistle, common tansy, reed-canary grass (*Phalaris arundinacea*), and smooth brome (*Bromus inermis*). As in 2001 and 2002, Canada thistle was the most common noxious weed, followed by perennial sowthistle (more common on moister soil). In each of the last three years, about half of transects monitored had invasive and noxious weeds averaging over 10% cover. Two transects, Falls Campground (004B) and Pine Creek #3 & #4 (016B), had large increases in the cover of invasive and noxious weeds. No transects had large decreases. Three transects, TNC Island (010), Pine Creek #5 (014), and Pine Creek #3 & #4 (016B), have had increases in the cover

of invasive and noxious weeds each of the last three years. In contrast, both Warm Springs Bottom (003B) and Annis Island (006A) have had small decreases in invasive and noxious weed cover each of the last three years. Changes documented during the last three years may reflect cover and density fluctuations of bull thistle, a common biennial exotic species on the South Fork Snake River. This species can fluctuate in response to variations in the timing and intensity of cattle grazing. Invasion by weeds are often symptomatic of soil-disturbing activities, but changes in weed cover are complex and not explained by disturbance alone.

Landscape Scale: For each of the last two years, the percentage of transects with small colonies of noxious weeds within 100 m was slightly less than the percentage with widespread, large colonies of noxious weeds within 100 m. Overall, 93% of transects monitored had some level of invasion by noxious and invasive weeds within 100 m. The percentage of transects with some level of invasion by noxious and invasive weeds within 100 m has increased slightly each of the last three years. It is difficult to tell if this reflects increases in assessment accuracy, or actual changes in weed levels at the landscape scale.

Livestock Grazing Impacts—Hoof Prints/Scat Piles, Forage Utilization, Trails/Bedding

Population Scale: Ten transects at six occurrences are seasonally grazed by cattle. In 2003, late-season grazing outside the season of permitted use occurred at Warm Springs Bottom (003A and 003B), Rattlesnake Point (002), and Falls Campground (004B). Late-season cattle grazing resulted in higher observable impacts to habitat at three of these four transects. No livestock grazing occurred at Pine Creek #5 (014), nor at both Pine Creek #3 & #4 transects. Grazing impacts were also lower at the two Annis Island transects than in 2002. Late-season grazing presents a direct threat to Ute ladies'-tresses due to the increased chance of grazing and trampling of flowering plants. This probably explains why only one plant was observed at Rattlesnake Point (002) in 2003. In some situations, grazing may reduce competing vegetation to the benefit of Ute ladies'-tresses (Allison 2001, Heidel 2001, Riedel 2002). However, soil compaction and invasion by less palatable forbs and weeds, both sometimes associated with cattle grazing, are threats.

Landscape Scale: Livestock grazing impacts are not measured at the landscape scale.

Off-highway Vehicle Use

Population Scale: No OHV travel was documented at any transect monitored in 2003. The BLM reconstructed OHV barriers at Warm Springs Bottom and Mud Creek Bar in fall 2002 that prevented OHV travel at those sites.

Landscape Scale: No OHV use was documented within 100 m of any transect monitored. Natural barriers (e.g., river channels, steep and brushy banks, etc.) or human-constructed barriers (e.g., at Warm Springs Bottom and Mud Creek Bar) adequately protected the landscape around transects from OHV travel.

Recreation—Human Trails and Camping Impacts

Population Scale: In 2003, 27% of transects monitored had recreation trails through Ute ladies'-tresses habitat. The amount of recreation trailing has decreased slightly each of the last three years at Warm Springs Bottom (003A) and Falls Campground (004B). Two other transects had less recreation trailing in 2003, both at Lufkin Bottom. Recreation trailing increased at two transects (TNC Island 010 and Gormer Canyon (013). Two transects were affected by camping. Camping impacts were related to use of tent sites, fire rings, kitchens, and boat landings. Two plants were trampled by human foot traffic at Gormer Canyon (013), but the flowering stems were not broken off.

Landscape Scale: In each of the last three years, a similar percentage (60 to 70%) of transects had at least one recreation trail within 100 m. In 2003, recreation trails increased within 100 m of only one transect, Gormer Canyon #4 (013). Recreation trails were often (but not always) related to camping areas and boat landings. Fifty-three percent of transects had at least one campsite impact within 100 m. In general, recreation impacts at the landscape scale were most noticeable in the canyon stretch of the South Fork Snake River from Lufkin Bottom area upstream to the Pine Creek areas.

Other Human-caused Ground Disturbance

Population Scale: No recent human-caused ground disturbance (e.g., construction, excavation or filling, etc.) was documented at any transect in 2003.

Landscape Scale: Thirty-three percent of transects monitored in 2003 had some ground disturbing activities within 400 m. No improvements in landscape conditions (i.e., habitat restoration such as removal of roads) were observed. No new disturbances were observed. Roads were the most common form of ground disturbance observed, present near four transects. Roads and other floodplain development may not always directly affect Ute ladies'-tresses habitat, but development is often associated with the increasing risk of other threats (e.g., floodplain alteration, OHV use, weed invasion).

Fire

Population Scale: No fires have occurred on the South Fork Snake River during the last two years. A human-ignited wildfire burned a portion of the Annis Island (006A) transect during late spring 2001. Environmental changes to this transect were minimal in 2002 and 2003, but an increase in the cover of forbs and a slight increase in the cover of woody vegetation indicates that this habitat was recovering from the fire. In both 2001 and 2002, similar numbers of Ute ladies'-tresses were observed blooming within lightly burned areas along Annis Island (006A), while the number of plants observed was slightly higher in 2003. In Colorado, the number of flowering Ute ladies'-tresses consistently increased each year after repeated spring prescribed fires in its habitat (Riedel 2002).

Landscape Scale: No recent fires were documented within 100 m of any transect in 2003.

Alteration of the Floodplain

Population Scale: Alteration of the floodplain is not evaluated at the population scale.

Landscape Scale: Thirty-three percent of transects monitored in 2003 had at least one physical structure influencing river hydrology within 400 m. No new floodplain altering structures were observed. No removal of floodplain-altering structures was documented. Floodplain alteration is often associated with other development (e.g., roads, housing, recreation sites). For example, at Annis Island levees are also used as roads.

Confirmed Mortality of Ute ladies'-tresses—Herbicide Spraying or Other Causes

Population Scale: No confirmed mortality of Ute ladies'-tresses was observed at any transect in any of the last three years of monitoring. No herbicide spraying in Ute ladies'-tresses habitat was observed.

Landscape Scale: Confirmed mortality of Ute ladies'-tresses is not evaluated at the landscape scale.

Wildlife Activity

Population Scale: In 2003, 87% of transects monitored had measurable disturbances from wildlife (e.g., ungulate bedding, trampling or trails, and shrub browsing). Impacts were mostly

limited to vegetation trampling, infrequent bedding, and moderate levels of woody vegetation browsing. Interestingly, there is an apparent inverse relationship between livestock grazing use and wildlife activity. For example, at Rattlesnake Point (002), Warm Springs (003A), and Warm Springs (003B), wildlife activity was lower during 2001 and 2003 when livestock grazing was highest. At Annis Island (006A), a similar pattern occurred—wildlife activity was lowest in 2002 when livestock grazing was highest. In 2003, both transects at Pine Creek #3 & #4 had large increases in wildlife activity when livestock grazing did not occur. The pattern was not observed at Falls Campground (004B) and Annis Island (006B).

Landscape Scale: Wildlife activity is not measured at the landscape scale.

Vegetation Succession—Competition by Tall and Invasive Forbs

Population Scale: All transects monitored in 2003 had tall and invasive forb cover exceeding 30% in at least one sample block. Six transects had large increases in the cover of forbs from 2002, while forb cover decreased at three transects. In 2003, the percentage of transects monitored that averaged between 30 and 50% cover for the entire transect increased. Transects with forb cover averaging 30% or greater usually had high cover of licoriceroot (*Glycyrrhiza lepidota*), black medic (*Medicago lupulina*), and/or clover (*Trifolium* spp.). Changes in forb cover may reflect relationships between cattle grazing, annual climate variation, and competition with mesic graminoids. Soil disturbed by cattle grazing or other activities may facilitate invasion by leguminous forb species. However, cattle also utilize many of these same forbs for forage. Increases in the cover of licoriceroot at several transects in 2003 might indicate that this species is relatively tolerant of drought conditions, especially compared to mesic graminoids that generally decrease under drought. There is no apparent trend between 2001 and 2003 for this attribute. Monitoring data from Colorado indicate that competition from both native and exotic herbaceous species may be more important than previously thought in contributing to the decline of Ute ladies'-tresses populations (Allison 2001, Riedel 2002). For example, in the Colorado study, plots grazed by cattle and mowed for hay in the early summer (i.e., plots with the least competing vegetation) had the highest density of vegetative and flowering Ute ladies'-tresses.

Landscape Scale: Competition by tall and invasive forbs is not evaluated at the landscape scale.

Vegetation Succession—Competition by Shrubs and Trees

Population Scale: Shrub and tree cover exceeding 1% cover was documented at all transects monitored. In 2003, four transects had relatively large increases in woody vegetation cover compared to 2002. The amount of annual shrub growth is often controlled by browsing by ungulates and cattle, as well as beaver activity—all of which can vary in intensity year-to-year. For example, at Warm Springs Bottom (003A) shrubs were dying back due to beaver caused flooding and beaver cutting. Beaver cutting also decreased woody cover at Lufkin Bottom (011B).

Landscape Scale: Competition by shrubs and trees is not evaluated at the landscape scale.

Population Information

Population Scale: The observable population of Ute ladies'-tresses is tallied at the population scale. In 2003, four transects had large increases in the number of plants observed. Three transects had large decreases. Observable populations are related to overall habitat conditions, but they also reflect demographics, prolonged dormancy, shifting phenology, and annual fluctuations in climate and hydrologic conditions. Specific relationships between Ute ladies'-tresses numbers and habitat attributes can not be determined with this habitat monitoring protocol.

Landscape Scale: At the landscape scale, exclosures, fences, or other measures (including release of noxious weed biological control insects) that protect Ute ladies'-tresses populations are recorded. Five transects monitored in 2003 have at least one of these measures implemented. Both transects at Warm Springs received additional protection in 2003, due to the construction of an effective OHV barrier in 2003. No other transects monitored in 2003 received any new protective measures. The most common protective measure is the release of biological control agents for noxious weeds. No additional biological control agents were released at any transects monitored in 2003.

HABITAT CONDITIONS—A SUMMARY OF RESULTS BY TRANSECT – Population and landscape scale results for each transect monitored in 2003 are summarized below. The mean values for each habitat attribute measured at the population scale, as well as the cumulative mean of all attributes at each transect is found in Appendix 3. The values for each habitat attribute measured at the landscape scale, as well as the cumulative values at each transect is found in Appendix 4.

At the population scale, the focus is mainly on large changes between 2002 and 2003 (attribute value means that changed by more than 0.30 and cumulative means that changed by more than 0.05). Five transects had cumulative means that increased by over 0.05 from the prior year of monitoring, three had cumulative means that decreased by over 0.05, while seven remained the same or nearly the same. At the landscape scale, the focus is on attributes that changed from 2002 to 2003. No transects had major changes in the cumulative value, and only two transects had minor changes (changes in the cumulative value of plus or minus two).

Kelly's Island (001)
The habitat monitoring transect was not re-sampled in 2003.

Rattlesnake Point (002)
Population Scale: Due to late-summer livestock grazing in 2003, this transect had a large increase in all three attributes measuring livestock grazing impacts when compared to 2002. Overall grazing impacts were similar to 2001, the last year when late-summer grazing occurred. The effects of livestock grazing, such as forage utilization, browsing of shrubs, and trailing, were evident in repeat photos. The occurrence was rested from livestock grazing in 2002, although some livestock may have traversed the site that year. Grazing sometimes releases forbs from competition with mesic graminoid species. This may explain the increase in tall forb cover (mainly licoriceroot) compared to 2002. The small increase in the cover of invasive and noxious weeds from 2002 levels might also be explained by release from competition with mesic graminoid species. No Ute ladies'-tresses were observed along the transect in 2003, probably due to grazing of flowering stems by cattle. The transect was not directly affected by recreation use in either 2002 or 2003. Overall, increased grazing impacts, increased competition from tall forbs, and a major reduction in the number of Ute ladies'-tresses observed resulted in a relatively large increase in the cumulative mean over 2002. However, the cumulative mean was nearly the same as in 2001.

Landscape Scale: No major changes on the landscape scale were recorded. In 2002, a campfire ring was established about 10 m from the transect start. Although this campfire ring was abandoned in 2003, another campsite was established about 20 m above the transect start on a high terrace. No noxious weed colonies were observed within 100 m. However, this transect had low amounts of other invasive weeds (not noxious weeds) present at the population scale. The distance between the transect and active cutbank was measured in 2003, but the measurement was apparently off from the original transect location. No

accelerated erosion was observed, yet the distance to the bank was measured as 2.3 m less than in 2002.

Warm Springs Bottom (003A)

Population Scale: Only a few minor changes in habitat attributes or threats were recorded. The cumulative mean was nearly the same as in 2002. In late summer 2002, beaver dammed a secondary spring channel about 250 m below the old breached dam adjacent to this transect. Water backed up behind the beaver dam and through a culvert in the dam, flooding the transect 10 cm to 15 cm deep. Water was draining into the main spring channel behind the dam, creating a new drainage channel along the transect. In 2003, the beaver dam was still active and the majority of the transect remained shallowly flooded. Ute ladies'-tresses was not observed in areas of flooding. Due to prolonged flooding and beaver cutting, willows were dying back. Sedge species, creeping spikerush (*Eleocharis palustris*), and baltic rush, all more tolerant of flooding, increased in abundance. Changes in vegetation composition since 2001 are shown in repeat photos. Although this transect had higher amounts of cattle hoof prints and scat piles than in 2002 (when livestock grazing was light), overall livestock impacts were low. This was likely due to the extremely wet conditions. Unlike 2002, no recreation impacts or OHV use were recorded in 2003.

Landscape Scale: This transect had the highest cumulative value at the landscape scale of any transect monitored in 2003. The old dam clearly alters the movement of water through the site. It is located in an area of high recreation activity and relatively close to established roads. This makes the habitat susceptible to impacts from OHVs and recreation (e.g., mostly angler trails). In 2002, OHVs by-passed the barrier on the access trail and traveled across the transect margin. In fall 2002, the OHV barrier was reconstructed to prevent future access from the parking lot. Due to construction of the barrier, the cumulative value for landscape scale attributes decreased in 2003.

Warm Springs Bottom (003B)

Population Scale: Late-season suspected unauthorized cattle grazing occurred at this transect in 2003. As evidenced by the means of all attributes measuring livestock grazing impacts, this transect was the most intensively grazed of all transects monitored. All three attributes measuring livestock grazing impacts increased over both 2001 and 2002 levels. The effects of livestock grazing, including forage utilization, browsing of shrubs, and trailing, were evident in repeat photos. Both the attributes for invasion and colonization by weedy species and competition by tall and invasive forbs decreased. In fact, the attribute for invasive or noxious weeds has decreased each of the last three years. Compared to both 2001 and 2002, this transect had much lower numbers of Ute ladies'-tresses in 2003. This was probably due to grazing of flowering stems by cattle. Mainly because of increased livestock impacts, the cumulative mean increased.

Landscape Scale: The cumulative value decreased slightly in 2003. As at Warm Springs Bottom (003A), the reconstructed barrier protected the area from OHV travel. Noxious weeds were recorded as common and widespread, with large colonies within 100 m. This may be due to a more careful assessment by observers, rather than an actual change in cover and density of noxious weeds at the landscape scale.

Falls Campground (004A)

The habitat monitoring transect was not re-sampled in 2003.

Falls Campground (004B)

Population Scale: Recent livestock hoofprints and scat piles, as well as trails and bedding were recorded. Unlike 2002, no vegetation trampling from recreation trails was observed. A

decreasing population trend was identified in 2003. A slight increase from previous years in the cover of weedy species, especially bull thistle, was observed in repeat photographs. Because of the increase in livestock grazing impacts and increased cover of invasive and noxious weeds, the cumulative mean increased from 2001 and 2002.

Landscape Scale: Habitat attributes did not change at the landscape scale. Along with Gormer Canyon #3 (021), this transect had the lowest cumulative value for landscape scale attributes of all transects monitored. This transect is relatively isolated from recreation impacts by its island location (surrounded by a wide channel wadeable only at low flows). The transect was heavily impacted by 1997 flood deposits and several populations of noxious weeds have colonized flood deposits. The transect is partially located within a livestock grazing exclosure that protects the majority of the Ute ladies'-tresses sub-population.

Railroad Island (005)
The habitat monitoring transect was not re-sampled in 2003.

Annis Island (006A)
Population Scale: Livestock grazing impacts were lower than 2002, but similar to 2001. The decrease in livestock grazing, as evidenced by low forage utilization and minimal trailing, is shown in repeat photos, especially when compared to 2002. Forb cover increased in 2003, possibly because there was less utilization of leguminous forbs by cattle than in 2002. Similar to Warm Springs Bottom (003B), the attribute for invasive or noxious weeds has slightly decreased each of the last three years. Invasion by Canada thistle and perennial sowthistle, the predominant noxious weeds, might be limited by the dense growth of licoriceroot. Overall, the cumulative mean has remained similar for all three years of monitoring.

Landscape Scale: Habitat attributes on the landscape scale were unchanged. A variety of landscape scale threats exist at this transect. There are widespread and/or large colonies of noxious weeds present within 100 m. Noxious weed biological control agents have been released at Annis Island, but their effectiveness is not known. The transect is isolated from the active floodplain by levees. A gravel road exists on top of the levee, allowing OHVs access to the area (although no OHV travel was observed in 2002 or 2003). Levees also create routes for noxious weed invasion.

Annis Island (006B)
Population Scale: Although the Annis Island occurrence was grazed in 2003, there was no evidence of grazing recorded along this transect. The decrease in livestock grazing from 2002, as evidenced by low forage utilization and minimal trailing, is shown in repeat photos. The cattle apparently did not linger in near this transect. This is in contrast to 2002, when this transect was the most intensively grazed of all transects monitored. In 2003, all attributes for livestock grazing impacts decreased sharply resulting in a decrease in the cumulative mean. The cumulative mean was nearly the same as in 2001. However, the cover of invasive and noxious weeds, forbs, and woody vegetation all increased in 2003. This was possibly due in part to decreased livestock utilization of forbs and less livestock browsing. In general, the attributes measuring competing vegetation were somewhat similar to 2001.

Landscape Scale: No major changes on the landscape scale were recorded. This transect also has widespread and/or large colonies of noxious weeds present within 100 m. Noxious weed biological control agents have been released at Annis Island. The transect is also isolated from the active floodplain by levees. A gravel road exists on top of the levee, allowing OHVs access to the area (although OHV travel was observed in 2002 or 2003).

Annis Island (006C)
The habitat monitoring transect was not re-sampled in 2003.

Twin Bridges (007)
The habitat monitoring transect was not re-sampled in 2003.

Mud Creek Bar (009)
The habitat monitoring transect was not re-sampled in 2003.

TNC Island (010)
Population Scale: Portions of this transect are annually trampled by campers and anglers. The number of recreation trails traversing occupied habitat were slightly more than in both 2001 and 2002. Human-caused trails with trampled vegetation were noticeable in both the 2002 and 2003 repeat photographs. A decreasing population trend was identified. The cover of invasive weeds (especially reed-canary grass and bull thistle) has increased slightly each of the last three years. The cumulative mean increased from 2002, but was similar to 2001. This increase was partially explained by the increase in recreation impacts, as well as slight increases in the cover of competing vegetation and weeds.

Landscape Scale: No major changes on the landscape scale were recorded. This transect is predominantly at risk from adjacent heavily used campsites and associated recreation activities. In all three years of monitoring, there were more than one recreation trail and more than two campsite impacts within 100 m. In 2003, it was recognized that an access road on adjacent property owned by The Nature Conservancy is within 400 m. There were two recreation trails leading from this road down through occupied habitat on the river. Active bank erosion was minimal during the three years of monitoring.

Lufkin Bottom (011A)
Population Scale: Only a few minor changes in habitat attributes or threats were recorded in 2003. Campers, boaters, and anglers trampled habitat each of the last three years. Overall, the number of recreation trails increased between 2001 and 2002, and campsite impacts increased to a lesser degree. However, both of these attributes decreased slightly in 2003. The main campsite impacts are from rocks and wood debris scattered in the habitat from an adjacent fire ring. Although mostly unchanged from 2001 levels, this transect has relatively high cover of invasive and noxious weeds. As in 2002, this transect had the most Ute ladies'-tresses observed of any transect, averaging over 10 plants per sample block. The number of plants observed along the transect has increased slightly each of the last three years. The cumulative mean (0.35) was the lowest of all transects monitored. The cumulative mean decreased from 2002, but was similar to 2001. This decrease was partially explained by a decrease in recreation impacts. Less ungulate browsing was also a factor influencing the decrease in the cumulative mean.

Landscape Scale: Habitat attributes on the landscape scale were unchanged. This transect is predominantly at risk from nearby heavily used campsites and associated recreation activities. In 2002 and 2003, there were heavy impacts and/or more than one trail within 100 m. Along with TNC Island (010), this transect had the second highest cumulative value at the landscape scale of all transects monitored.

Lufkin Bottom (011B)
Population Scale: The number of recreation trails was lower in 2003 than in 2002. The cover of invasive and noxious weeds was similar to 2002, but the cover of tall and invasive forbs was much higher than prior years. The amount of ungulate and beaver activity was higher

than in 2002. This possibly explained the decrease in woody vegetation cover. Overall, the cumulative mean was similar to 2002 and only slightly higher than in 2001.

Landscape Scale: The number of campsite impacts within 100 m increased to two or more in 2003. Noxious weeds were recorded as common and widespread, with large colonies within 100 m. This may be due to a more careful assessment by observers, rather than an actual change in the cover and density of noxious weeds at the landscape scale. Increases in these two attributes accounted for the increase in the cumulative value in 2003.

Gormer Canyon #4 (013)

Population Scale: Several major changes in habitat attributes were recorded between 2001 and 2003. This transect was not re-sampled in 2002. In 2003, vegetation was heavily trampled by a recreation trail along the transect. This trail had only trace use in 2001. This trail was clearly visible in repeat photos. The cover of invasive and noxious weeds, especially Canada thistle, also increased. The cover of tall and invasive forbs (mainly black medic) also increased from 2001 levels. It is unknown if forbs and noxious weeds are invading areas trampled by recreation traffic, or if their expansion is due to other reasons. Because of increases in these attributes, the cumulative mean increased in 2003.

Landscape Scale: No major changes on the landscape scale were recorded. The number of recreation trails within 100 m increased to three or more in 2003. Recreation trails connect to the designated campsite located about 75 m downstream. Overall, the isolation of this site in the roadless canyon minimizes landscape scale threats.

Pine Creek #5 (014)

Population Scale: Only a few minor changes in habitat attributes or threats were recorded. The cumulative mean was similar to both 2001 and 2002. In 2003, the lessee did not graze the allotment encompassing this transect. Minimal to zero cattle grazing during the last two years may partially explain slight increases in the cover of invasive weeds (mostly bull thistle) and increased numbers Ute ladies'-tresses observed each of the last three years. The cover of mesic graminoids at this transect appear to be in a dynamic inverse relationship with the cover of variegated scouringrush (*Equisetum variegatum*). For example, slight increases in soil moisture could favor mesic graminoid growth, while slightly drier conditions may favor variegated scouringrush.

Landscape Scale: Habitat attributes on the landscape scale were unchanged. Nearby campsites and trails are the main landscape scale threats.

Pine Ck. #3 & #4 (016A)

Population Scale: The lessee did not graze the allotment encompassing both Pine Creek #3 & #4 transects in 2003. The attributes measuring livestock grazing impacts were much lower than the previous two years. The cover of forbs, especially dandelion (*Taraxacum officinale*) and white clover (*Trifolium repens*) was lower in 2003 than 2002. Due to decreases in these attributes, the cumulative mean was lower than 2002 (but similar to 2001). Unlike Pine Creek #3 &#4 (016B), there were no changes in the cover of invasive and noxious weeds or the number of Ute ladies'-tresses observed.

Landscape Scale: Habitat attributes on the landscape scale were unchanged in 2003. Nearby campsites and trails are the main landscape scale threats.

Pine Ck. #3 & #4 (016B)

Population Scale: The cumulative mean was similar to both 2001 and 2002. During the last three years, this transect had a similar pattern as Pine Creek #5 (014)—that is, as cattle

grazing decreased (indicated by lower numbers of hoofprints and scat piles), both the cover of invasive weeds (especially bull thistle) and the number of Ute ladies'-tresses increased. Repeat photographs showed an increase in canopy size of silverberry compared to 2001 and 2002 photos.

Landscape Scale: No major changes on the landscape scale were recorded. Changes were due to re-evaluations of 2002 data rather than actual landscape-scale habitat changes. The number and size of noxious weed colonies was determined to be lower than recorded in 2002. The fluctuation in this attribute highlights the difficulty some observers have in assessing this attribute at the landscape scale.

Lower Conant Valley (017)
The habitat monitoring transect was not re-sampled in 2003.

Upper Conant Valley (018)
The habitat monitoring transect was not re-sampled in 2003.

Lower Swan Valley (019)
The habitat monitoring transect was not re-sampled in 2003.

Gormer Canyon #3 (021)
Population Scale: The cumulative mean was similar to both 2001 and 2002. Only a few minor changes in habitat attributes were recorded in 2003. The cover of noxious weeds (Canada thistle and perennial sowthistle) slightly decreased. The cover of mesic graminoids also slightly decreased, indicating drier soil moisture conditions than 2002. The relatively high cover of noxious weeds during the last three years is possibly due to invasion of soil disturbed by wildlife. A heavily used wildlife trail runs lengthwise through the middle of this belt transect. The wildlife trail is obvious in repeat photographs. Wildlife trampling was higher than in 2002, although the level of shrub browsing was unchanged. The average cover of woody vegetation was over 10%, but some was attributable to overhanging trees.

Landscape Scale: Habitat attributes on the landscape scale were unchanged. Along with Falls Campground (004B), this transect had the lowest cumulative value at the landscape scale of all transects monitored in 2003. The transect is relatively isolated from recreation impacts. It is located far from the main river channel and away from an infrequently used trail on an adjacent high terrace.

Black Canyon (022)
Population Scale: No habitat attribute changed by a large amount. The cumulative mean was similar to both 2001 and 2002. This transect had the second highest tally of Ute ladies'-tresses observed—a noticeable increase from 2002, but similar to 2001. The only other noticeable change in 2003 was a small decrease in the cover of noxious weeds. However, noxious weed cover remained high.

Landscape Scale: Habitat attributes on the landscape scale were unchanged. Noxious weed colonies, the main threat to this transect, remain large and widespread.

CONCLUSIONS AND RECOMMENDATIONS

Monitoring Ute ladies'-tresses populations and habitat on the South Fork Snake River is an important task that is necessary for conservation planning. Monitoring systematically documents levels of livestock grazing, recreation activities, and other direct and indirect threats affecting the

condition of Ute ladies'-tresses occurrences. Since 1997, annual monitoring on the South Fork Snake River has provided land managers and biologists with valuable information useful for determining:

- the environmental characteristics of habitat
- the long-term viability of both individual populations and the meta-population
- the status and ecological condition of occupied habitat
- disturbances and threats to Ute ladies'-tresses occurrences
- the effects of management and conservation actions in occupied habitat
- conservation actions needed to maintain or improve habitat conditions

This intensive monitoring effort was cooperatively accomplished by the IDCDC, BLM, and C-TNF to meet requirements listed in the *Biological Assessment for the* Ute ladies'-tresses *on the South Fork of the Snake River, Idaho*. The intensity of 2004 monitoring efforts will depend on whether the U.S. Fish and Wildlife Service permits revision of the Biological Assessment of the BLM and C-TNF's Snake River Activity/Operations Plan for Ute ladies'-tresses on the South Fork Snake River. This Biological Assessment, developed in 1997, should be revised to reflect monitoring and research information collected during the past six years.

Based on past monitoring results outlined in this and prior reports, the BLM and C-TNF have incorporated numerous conservation actions. These conservation actions have successfully maintained or improved Ute ladies'-tresses populations and habitat on the South Fork Snake River. These agencies have planned several conservation efforts for 2004:

- To prevent subdivision and resort development, the BLM Upper Snake/South Fork Snake River Land and Water Conservation Fund project is currently in negotiation for acquiring two separate conservation easements, totaling about 1,200 acres, on private lands along the South Fork of the Snake River. Closure of these negotiations is dependent on FY2004 appropriations, as well as landowner willingness.
- The BLM and C-TNF will continue regular river patrols during the high public use season of July through August on the South Fork Snake River.
- The BLM and C-TNF will continue grazing allotment compliance inspections.
- The BLM will continue to release biological control of noxious weeds along the South Fork, if agents are available.
- The BLM will develop educational kiosks at Spring Creek, Palisades Creek, and Palisades Dam, which will address Ute ladies'-tresses conservation and advise recreationists to avoid occurrences.

These proposed conservation actions are sufficient for the short-term conservation of Ute ladies'-tresses on the South Fork Snake River and should be implemented. These actions are likely to benefit the long-term viability of the meta-population as well.

I. OCCURRENCE VISITS

GENERAL ASSESSMENT OF VIGOR, TRENDS, AND STATUS - The total number of Ute ladies'-tresses observed on the South Fork Snake River in 2003 was the second highest since inception of monitoring. Similar numbers of occurrences had more plants observed in 2003 when compared to 2002. Similar numbers of occurrences had fewer plants or remained nearly the same compared to 2002. Also similar to the last few years, five occurrences had zero Ute ladies'-tresses observed. The largest occurrences on the South Fork Snake River are still Annis Island, Black Canyon, Lufkin Bottom, Pine Creek #3 & #4, and Warm Springs Bottom. These occurrences should remain high priorities for monitoring and conservation. The Chester Wetlands occurrence is also very important and valuable for the long-term

recovery of the species in Idaho. With the addition of the Thornton-Texas Slough occurrence discovered in 2003, the total number of Ute ladies'-tresses occurrences in Idaho is 24.

The types of threats to the Ute ladies'-tresses meta-population have not changed much over time, and no new threats were observed in 2003. Invasion by noxious weeds and invasive exotic species is still probably the most serious imminent threat to Ute ladies'-tresses on the South Fork Snake River. Recreation by campers, boaters, and anglers continues to increase and is currently the next most important threat to habitat. Each year, at least one occurrence is affected by late-season cattle grazing, although the magnitude of impact varies and populations persist in the following year. Hydrologic alteration by Palisades Dam, combined with floodplain development, represents a long-term threat to the viability of the meta-population. If water management on the South Fork Snake River is altered to create a more natural (pre-dam) hydrograph, the meta-population could benefit in the long-term.

II. INDEX OF HABITAT CHANGE

In 2003, data was collected at 15 of the 24 permanent habitat monitoring transects. No major habitat changes were documented at the landscape scale. As in 2001 and 2002, no major flood events or other large-scale natural or human-caused floodplain alterations occurred on the South Fork Snake River. Only a few major habitat changes were documented over the one-year monitoring period at the population scale. Unlike 2002, no major changes in invasive and noxious weed levels were observed and no OHV travel was documented. Some important habitat changes and observations at the population scale included:

- Five transects had cumulative means that increased by over 0.05 when compared to the prior year of monitoring, possibly indicating an overall decline in habitat conditions. Three transects had cumulative means that decreased by over 0.05, possibly indicating an overall improvement in habitat conditions. Seven remained the same or nearly the same.
- Late-season cattle grazing occurred at four transects, resulting in higher impacts to habitat than in 2002. No livestock grazing occurred at three transects that are typically grazed every year. The index of habitat change captures changes in annual grazing impacts (especially late-season grazing) well.
- The amount of recreation trailing decreased from 2002 levels at four transects. Recreation trails increased at two transects. Only one transect had associated campsite impacts at the population scale.

The index of habitat change methods for monitoring Ute ladies'-tresses habitat were designed to be relatively quick, easily repeatable, and objective. Attributes requiring vegetative cover estimation (e.g., mesic graminoid, forb, woody vegetation, and weeds), as well the estimate of wildlife activity, changed more than expected at some transects in 2002. In 2003, fewer transects had large changes in these attributes. For many other attributes, the 2003 results were often similar to 2001. This possibly indicates that a baseline incorporating year-to-year variation (caused by environmental factors, such as climate variation, and observer error) has been established after three years of monitoring. While it is important to document the level of wildlife activity along transects, wildlife activity has both positive and negative effects on Ute ladies'-tresses habitat. This attribute may be skewing the calculation of the cumulative mean. Future calculations could exclude wildlife activity.

Established permanent monitoring transects measure only a sub-sample of the entire Ute ladies'-tresses habitat on the South Fork Snake River. At large occurrences, currently established transects do not measure the habitat condition of the entire occurrence. New transects may be needed at additional sub-populations. Unless transects are established at most sub-populations, additional threat and condition observations must continue. It is recommended that the index of habitat-change method be utilized for at least the next one to

three years of monitoring to assess its effectiveness for measuring habitat change. Transects at the largest, core occurrences on the South Fork Snake River should be monitored (e.g., Annis Island, Warm Springs Bottom, Black Canyon, Lufkin Bottom, and Pine Creek #3 & #4). I recommend that transects with imminent habitat threats or changes be re-sampled in 2004, especially those with only two years of baseline habitat data. These include Kelly's Island (001), Falls Campground (004A), Twin Bridges (007), and Mud Creek Bar (009). In addition, I recommend that Annis Island (006C) be re-sampled because it has only one year of baseline habitat data.

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Appendix 1

Ute ladies'-tresses Habitat Monitoring Checklist

Spiranthes diluvialis Habitat Monitoring Checklist

Direct Threats and Changes to Habitat	**Attribute Type**	**Indicator or Surrogate Measured**	**"A" Transect Scale Indicator Values** ***Evaluation within 5 x 5 m sample blocks Recorded in Table "A" of Tally Sheet***	**"B" Landscape Scale Indicator Values** ***Evaluation within specific radius of the transect mid-point; Recorded in Table "B" of Tally Sheet***
Hydrologic and Fluvial Geomorphic Change	1) Bank erosion (e.g., cut-banks, meander widening, flood scouring)	Distance (perpendicular) from nearest actively eroding river channel (marked at lower limit line of terrestrial vegetation) to transect mid-point **(if 30 m or less).**	Not measured	Measured distance, perpendicular from mid-point of transect to nearest active river channel. Describe erosion in comments.
	2) Deposition (e.g., recent sand, woody debris, or other alluvium)	Depth of recent alluvial deposits (e.g., unconsolidated silt, sand, gravel, cobble, or woody debris) deposited in the last 10 years (date estimated). Must be more than trace deposits.	0=0 to 5 cm (trace amounts in block) 1=5 to 15 cm 2=16 or more cm	Not measured
	3) Loss of soil moisture at capillary fringe caused by river down-cutting and subsequent drop in water table	Total cover of all mesic graminoid species typically associated with *Spiranthes diluvialis*. These species include, but are not limited too: *Agrostis stolonifera*, *Carex lanuginosa*, *C. nebrascensis*, *Eleocharis palustris*, *Juncus balticus*, *J. ensifolius*, *Muhlenbergia* spp., *Phalaris arundinacea*, and *Poa pratensis.*	0=40% or more cover 1=3 to 39% cover 2=less than 3% cover	Not measured
Invasive and Noxious Weeds	4) Invasion and colonization by noxious and invasive weedy species	Total cover of all highly invasive and noxious weed species typically associated with *Spiranthes diluvialis*. These species include, but are not limited too: *Agropyron repens*, *Bromus inermis*, *Carduus nutans*, *Centaurea diffusa*, *C. maculosa*, *Cirsium arvense*, *C. vulgare*, *Euphorbia esula*, *Phalaris arundinacea*, *Sonchus arvensis*, and *Tanacetum vulgare*. Do **not** consider *Agrostis stolonifera* and *Poa pratensis* here. **Indicate the species present in the comments.**	0=zero 1=less than 10% cover 2=10% or more cover	Within 100 m radius: 0=none, or only widely scattered noxious weeds; no colonies present **(only consider noxious weeds, do not include other invasive spp.**, e.g., ***Phalaris arundinacea*)** 1=noxious weeds commonly scattered, but only small colonies present 2=noxious weeds common & widespread, typically large colonies
Livestock Grazing Impacts	5) Hoof prints and scat piles	Number of obvious hoof prints and scat piles from this year.	0=ungrazed 1=less than 10 prints or scat piles 2=more than 10 prints or scat piles	Not measured
	6) Forage Utilization	Stubble height of graminoids (leaves, not inflorescences) in cm (estimated with ruler at center of each 5 x 5 m sample block)	0=over 10 cm or ungrazed 1=5 to 10 cm 2=less than 5 cm	Not measured
	7) Trails and bedding (e.g., trampled or missing vegetation)	Trampled vegetation and/or bare ground (soil and gravel, not generally rocks) obviously exposed by livestock trailing or bedding (if the area is ungrazed, then assume the cause is recreation). The number of trails and beds from this year is measured.	0=ungrazed 1=one trail or bed with trampled vegetation & minimal bare ground 2=one or more trail or bed; or trail/bed with noticeable bare soil	Not measured
Off-Highway Vehicle Use Impacts	8) Tracking and trailing through population areas	Number of track sets/trails through the sample block caused by OHVs (including, but not limited to, all-terrain vehicles, motorcycles, mountain bikes, and 4 x 4 vehicles) during this year. This doesn't include heavy equipment (e.g., dozers).	0=none 1=one track set 2=two or more tracks	Within 100 m radius: 0=none visible 1=one to three track sets 2=more than three track sets

Direct Threats and Changes to Habitat	**Attribute Type**	**Indicator or Surrogate Measured**	**"A" Transect Scale Indicator Values** ***Evaluation within 5 x 5 m sample blocks Recorded in Table "A" of Tally Sheet***	**"B" Landscape Scale Indicator Values** ***Evaluation within specific radius of the transect mid-point; Recorded in Table "B" of Tally Sheet***
Recreation	9) Human trails	Number of recent foot trails through the sample block from this year (these can sometimes be difficult to distinguish from cattle trails; look for cattle sign).	0=none 1=one trail with trampled vegetation, minimal bare ground 2=more than one trail; or one trail with noticeable bare soil	Within 100 m radius: 0=none 1=one to three trails visible 2=more than three trails
	10) Campsite impacts (e.g., tent sites, kitchens, fire rings, boat land-ings, woodcutting etc.) with trampled or missing vegetation	Trampled vegetation and bare ground (soil and gravel, not generally rocks) recently exposed by human recreation activities (including, but not limited to, tent sites, kitchens, campfire rings, wood cutting, and boat landings) from this year. The number of campsites impacts is measured.	0=zero impacts 1=one distinct campsite impact, with or w/out bare ground (trampled vegetation) 2=more than one campsite impact, or one campsite impact with bare soil exposed	Within 100 m radius: 0=no impacts (zero campsites or associated impacts visible) 1=one to two campsites or associated impacts visible 2=more than two campsites, or associated impacts widespread and noticeable
Other Human Caused Ground Disturbance	11) Roads, houses, excavation, filling, heavy equipment (e.g., blading, road building, fire fighting, etc.). Flood control activities not considered here (see Alteration of Floodplain section)	Bare ground (soil and gravel, not generally rocks) obviously exposed or deposited by human activities this year, or presence/ absence in the landscape. The number of ground disturbing impacts is measured. **Note type and extent in comments**.	0=no sign 1=one distinct human impact 2=more than one	Within 400 m radius: 0=no impacts (zero impacts related to excavation, filling, firefighting, and/or heavy equipment visible) 1=trace impacts visible (minimal or peripheral disturbance only) 2=impacts noticeable & large scale (one or more)
Fire	12) Wildfire, human or naturally caused	Burn intensity of recent, noticeable burns. Look for charred stumps of trees and shrubs and blackened, ashy soil surface. Herbaceous growth can mask burns quickly in riparian settings.	0=unburned 1=light burn of herbaceous understory & duff layer present; minimal impact to shrubs and no "sterilized" soil 2=heavy burning of herbaceous understory and/or woody overstory	Within 100 m radius: 0=unburned 1=majority of the burned area is a light burn of herbaceous understory with minimal impact to woody vegetation 2=majority of area is heavily burned, woody vegetation & herbaceous & duff layer mostly removed
Confirmed Direct Loss of *Spiranthes diluvialis* Individuals	13) Herbicide spraying, human harvest, disease, or other mortality causes	Dead *Spiranthes diluvialis* are difficult, or impossible, to observe; the cause of death may be unknown. Herbicide spraying is the most obvious cause, but human or wildlife may also kill plants. **Note any mortality in comments.**	0=no mortality 1=<3% of herb cover sprayed with herb-icides; trace mortality 2=≥3% of herb cover sprayed; noticeable mortality of plants	Not measured
Wildlife Activity	14) Ungulate bed-ding, trampling, trails, grazing, and shrub browsing; beaver wood cut-ting, trailing, and piling.	Wildlife trampling, trailing, bedding, and grazing are most noticeable in areas ungrazed by livestock. The number of wildlife trails and beds and the amount of browsing are measured. **Note wildlife species (if known) in comments.**	0=no noticeable wildlife use, or only trace shrub browsing may be evident 1=one to two wildlife beds and/or trails with trampled vegetation and/or bare ground; moderate browsing 2=more than two trails and/or beds; trampling & grazing is common; heavy browsing	Not measured

Direct Threats and Changes to Habitat	**Attribute Type**	**Indicator or Surrogate Measured**	**"A" Transect Scale Indicator Values** ***Evaluation within 5 x 5 m sample blocks Recorded in Table "A" of Tally Sheet***	**"B" Landscape Scale Indicator Values** ***Evaluation within specific radius of the transect mid-point; Recorded in Table "B" of Tally Sheet***
Vegetation Succession	15) Competition by tall or invasive forbs (other than noxious weeds)	Total cover of all forb species in the sample block, **other than noxious weeds (but including other exotic spp.**, e.g., ***Cirsium vulgare, Trifolium*** spp., etc.); **do not include *Equisetum*** spp. (*Equisetum* spp. are often associated with *Spiranthes diluvialis* and do not pose a long-term detrimental competitive threat).	0=less than 30% total cover 1=30 to 50% cover 2=over 50% cover	Not measured
	16) Competition by shrubs and trees	Total cover of all woody species (individuals do not have to be rooted within the sample block), including all shrubs and *Populus angustifolia* (or other tree species).	0=less than 1% cover 1=1 to 10% cover 2=more than 10% cover	Not measured
Alteration of Floodplain	17) Levees, rip-rapping, culverts, bridges, cause-ways, diversions, or other develop-ment that alters the hydrology or fluvial geomorph-ology of the river	Number of floodplain alterations within the landscape.	Not measured	Within 400 m radius: 0=none present 1=one alteration causing minimal impact to river flow within floodplain 2=more than one alteration, or a single large one causing noticeable alteration
***Spiranthes diluvialis* Conservation Information**				
Population Information	18) Population tally	Is *Spiranthes diluvialis* present?	0=25 or more plants 1=11 to 24 plants 2=1 to 10 plants 3=0 plants	Not measured
	19) Exclosures, fences, or other measures (including bio-control insects for noxious weed control) present that protect *Spiranthes diluvialis* from livestock, OHVs, weeds, recreation, or other potential impacts	Presence or absence along and adjacent to transect and the effectiveness of the protective measure.	Not measured	Within 100 m radius: 0=exclosure or other measure present protecting the majority of the sub-population; biocontrol insects effectively controlling noxious weeds 1=exclosure or other measure present, but it does not protect the majority of the sub-population (impacts not fully excluded); noxious weed biocontrol insects released, but not yet effective 2=no exclosures or other measures present

Appendix 2

Summary of establishment data and environmental setting of all habitat monitoring transects

Summary of establishment data and environmental setting of all habitat monitoring transects.

Occurrence (Transect Number)	Transect Length (m) (n = # of sample blocks)	Transect Bearing (degrees)	Plant Communities Traversed by Transect	Fluvial Landforms Where Transect is Located
Kelly's Island (001)	25 (n = 10)	4	*Elaeagnus commutata; Carex lanuginosa; Eleocharis rostellata*	floodplain wetland; flood overflow channel, without perennial water
Rattlesnake Point (002)	30 (n = 12)	135	*Salix exigua/*mesic graminoid*; Agrostis stolonifera-Poa pratensis*	main river channel bank; fluvial terrace
Warm Springs Bottom (003A)	25 (n = 10)	27	*Salix exigua/*mesic graminoid*; Carex nebrascensis-Eleocharis palustris*	spring-fed channel; beaver pond; borrow pit
Warm Springs Bottom (003B)	40 (n = 16)	330	*Salix exigua/*mesic graminoid*; Carex lanuginosa; Agrostis stolonifera-Poa pratensis*	abandoned meander, without perennial water; flood overflow channel
Falls Campground (004A)	35 (n = 14)	248	*Elaeagnus commutata; Carex lanuginosa*	abandoned meander/oxbow, without perennial water; flood overflow channel
Falls Campground (004B)	20 (n = 8)	265	*Elaeagnus commutata; Agrostis stolonifera-Poa pratensis; Equisetum variegatum*	flood overflow channel, without perennial water; depositional/aggrading area
Railroad Island (005)	20 (n = 8)	126	*Elaeagnus commutata; Agrostis stolonifera-Poa pratensis; Equisetum variegatum*	backwater slough; flood overflow channel, with perennial water; fluvial terrace
Annis Island (006A)	40 (n = 16)	324	*Populus angustifolia/*mesic graminoid*; Salix exigua/*mesic graminoid*; Carex lanuginosa*	abandoned meander/oxbow, with perennial water; floodplain wetland; borrow pit
Annis Island (006B)	30 (n = 12)	283	*Agrostis stolonifera-Poa pratensis; Carex lanuginosa; Equisetum variegatum*	abandoned meander/oxbow, with perennial water; floodplain wetland; borrow pit
Annis Island (006C)*	30 (n = 12)	98	*Agrostis stolonifera-Poa pratensis; Equisetum laevigatum*	flood overflow channel, with perennial water; abandoned meander/oxbow; fluvial terrace
Twin Bridges (007)	25 (n = 10)	304	*Elaeagnus commutata; Agrostis stolonifera-Poa pratensis; Equisetum variegatum*	backwater slough; flood overflow channel, with perennial water; fluvial terrace
Lorenzo Levee (008)	n/a	n/a	n/a	n/a
Mud Creek Bar (009)	20 (n = 8)**	131	*Agrostis stolonifera-Poa pratensis*	main river channel bank; eroding cutbank; fluvial terrace
TNC Island (010)	25 (n = 10)	290	*Agrostis stolonifera-Poa pratensis; Equisetum laevigatum*	backwater slough; flood overflow channel, with perennial water
Lufkin Bottom (011A)	50 (n = 20)	294	*Salix exigua/*mesic graminoid*; Equisetum variegatum*	secondary river channel bank; flood overflow channel; fluvial terrace

continued.

Occurrence (Transect Number)	Transect Length (m) (n = # of sample blocks)	Transect Bearing (degrees)	Plant Communities Traversed by Transect	Fluvial Landforms Where Transect is Located
Lufkin Bottom (011B)	30 (n = 12)	81	*Agrostis stolonifera-Poa pratensis*	backwater slough; fluvial terrace
Gormer Canyon #5 (012)	n/a	n/a	n/a	n/a
Gormer Canyon #4 (013)	20 (n = 8)	51	*Salix exigua/*mesic graminoid	main river channel bank; fluvial terrace
Pine Creek #5 (014)	30 (n = 12)	180	*Salix exigua/*mesic graminoid*; Salix lutea/*mesic graminoid*; Equisetum variegatum*	flood overflow channel, without perennial water; floodplain wetland
Archer Powerline (015)	n/a	n/a	n/a	n/a
Pine Ck. #3 & #4 (016A)	30 (n = 12)	329	*Elaeagnus commutata; Agrostis stolonifera-Poa pratensis*	abandoned meander/oxbow, without perennial water; flood overflow channel
Pine Ck. #3 & #4 (016B)	40 (n = 16)	90	*Elaeagnus commutata; Agrostis stolonifera-Poa pratensis; Equisetum variegatum*	backwater slough; flood overflow channel, with perennial water; floodplain wetland
Lower Conant Valley (017)	25 (n = 10)	213	*Elaeagnus commutata; Agrostis stolonifera-Poa pratensis*	abandoned meander/oxbow, without perennial water; flood overflow channel
Upper Conant Valley (018)	20 (n = 8)	262	*Elaeagnus commutata*	abandoned meander/oxbow, without perennial water; flood overflow channel
Lower Swan Valley (019)	25 (n = 10)	253	*Elaeagnus commutata*	secondary river channel bank; fluvial terrace
Squaw Creek Islands (020)	n/a	n/a	n/a	n/a
Gormer Canyon #3 (021)	25 (n = 10)**	305	*Salix exigua/*mesic graminoid*; Equisetum variegatum*	spring-fed channel; flood overflow channel, with perennial water; fluvial terrace
Black Canyon (022)	20 (n = 8)	211	*Salix exigua/*mesic graminoid*; Equisetum variegatum*	alluvial/point bar; flood overflow channel, with perennial water

* = established in 2002

** = transect width is 5 m instead of 10 m.

Appendix 3

Mean values for habitat attributes calculated for all sample blocks at each transect

Mean values for habitat attributes* calculated for all sample blocks at each transect. The cumulative mean of all attributes, as well as population trend, is also included.

Occurrence (Transect Number)	Year of Monitoring	Apparent Population Trend (3 years in same direction)	Direct Changes/Threats													Indirect Changes			Cumulative Mean for Transect
			Hydrologic & Fluvial Geomorphic Change		Invasive & Noxious Weeds	Livestock Grazing Impacts			OHV Use	Recreation		Other Human Ground Disturb.	Fire	Mortality	Wildlife Activity	Vegetation Succession		Pop. Info.	
			Deposition	Loss of soil moisture	Invasion by weedy species	Hoofprints & scat piles	Forage utilization	Trails & bedding	Tracking & trailing	Human trails	Campsite impacts	Roads, houses, excavation, filling	Wildfire	Herbicide spraying or other mortality	Ungulate beds, trails, browsing; beaver	Competition by forbs	Competition by shrubs & trees	Population tally	
Kelly's Island 001	2001	-?	0.00	0.00	1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.00	1.00	2.80	0.40
Kelly's Island 001	2002	-	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.30	0.00	0.90	2.80	0.41
Kelly's Island 001	2003	-	not re-sampled																
Rattlesnake Point 002	2001	?	0.50	0.17	1.50	1.00	1.25	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.75	1.00	1.75	2.50	0.68
Rattlesnake Point 002	2002	+?	0.33	0.08	1.17	0.17	0.00	1.17	0.00	0.00	0.00	0.00	0.00	0.00	0.83	1.08	1.67	2.17	0.54
Rattlesnake Point 002	2003	?	0.00	0.25	1.25	1.08	0.75	1.42	0.00	0.00	0.00	0.00	0.00	0.00	0.50	1.50	2.00	3.00	0.73
Wrm Spgs Bott. 003A	2001	?	0.00	0.00	1.10	0.90	0.80	0.90	0.00	0.50	0.00	0.30	0.00	0.00	0.40	1.20	1.70	2.60	0.65
Wrm Spgs Bott. 003A	2002	?	0.00	0.00	1.00	0.20	0.00	0.30	0.10	0.20	0.00	0.00	0.00	0.00	2.00	0.00	1.70	2.30	0.49
Wrm Spgs Bott. 003A	2003	?	0.00	0.00	1.00	0.70	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00	1.80	0.30	1.40	2.80	0.52
Wrm Spgs Bott. 003B	2001	?	0.00	0.00	0.88	1.00	0.75	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.88	1.63	0.39
Wrm Spgs Bott. 003B	2002	?	0.00	0.00	0.69	1.00	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88	1.25	0.75	1.63	0.41
Wrm Spgs Bott. 003B	2003	?	0.00	0.13	0.56	1.44	0.81	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88	0.75	2.25	0.48
Falls Campgd. 004A	2001	?	0.14	0.21	0.43	0.57	0.21	0.71	0.00	0.07	0.00	0.00	0.00	0.00	0.36	0.43	1.93	2.93	0.50
Falls Campgd. 004A	2002	-?	0.14	0.07	0.64	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.79	0.86	1.86	3.00	0.48
Falls Campgd. 004A	2003	-	not re-sampled																
Falls Campgd. 004B	2001	?	1.00	0.50	1.38	0.25	0.00	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.88	0.63	1.38	2.75	0.61
Falls Campgd. 004B	2002	-?	1.00	0.63	1.38	0.00	0.00	0.00	0.00	0.38	0.00	0.00	0.00	0.00	0.88	0.75	1.13	2.75	0.56
Falls Campgd. 004B	2003	-	0.50	0.75	1.75	0.75	0.00	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.88	0.75	1.75	3.00	0.71
Railroad Island 005	2001	-?	0.75	0.75	1.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.13	1.50	3.00	0.47
Railroad Island 005	2002	-	0.25	0.00	1.63	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	1.00	0.75	1.75	3.00	0.53
Railroad Island 005	2003	-	not re-sampled																
Annis Island 006A	2001	?	0.00	0.00	0.25	1.00	0.13	0.44	0.00	0.00	0.00	0.00	0.75	0.00	0.31	1.25	1.75	2.25	0.51
Annis Island 006A	2002	?	0.00	0.00	0.19	1.00	0.44	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.75	1.75	2.38	0.46
Annis Island 006A	2003	?	0.00	0.00	0.13	1.06	0.13	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.69	1.31	1.81	2.19	0.46
Annis Island 006B	2001	?	0.00	0.00	0.92	1.67	0.00	0.08	0.00	0.00	0.50	0.00	0.00	0.00	0.00	1.08	0.50	2.17	0.43
Annis Island 006B	2002	?	0.00	0.00	0.75	1.00	1.33	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.50	0.58	2.92	0.51
Annis Island 006B	2003	?	0.00	0.08	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	1.00	2.58	0.38

continued.

Occurrence (Transect Number)	Year of Monitoring	Apparent Population Trend (3 years in same direction)	Direct Changes/Threats													Indirect Changes			Cumulative Mean for Transect
			Hydrologic & Fluvial Geomorphic Change		Invasive & Noxious Weeds	Livestock Grazing Impacts			OHV Use	Recreation		Other Human Ground Disturb.	Fire	Mortality	Wildlife Activity	Vegetation Succession		Pop. Info.	
			Deposition	Loss of soil moisture	Invasion by weedy species	Hoofprints & scat piles	Forage utilization	Trails & bedding	Tracking & trailing	Human trails	Campsite impacts	Roads, houses, excavation, filling	Wildfire	Herbicide spraying or other mortality	Ungulate beds, trails, browsing; beaver	Competition by forbs	Competition by shrubs & trees	Population tally	
Annis Island 006C	2001	?	not established																
Annis Island 006C	2002	?	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.75	0.42	2.58	0.30
Annis Island 006C	2003	?	not re-sampled																
Twin Bridges 007	2001	-	0.00	0.50	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.30	1.50	2.10	0.34
Twin Bridges 007	2002	-	0.00	0.40	0.60	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	1.00	0.00	1.80	2.40	0.39
Twin Bridges 007	2003	?	not re-sampled																
Mud Creek Bar 009	2001	-?	1.00	0.88	0.25	0.00	0.00	0.00	0.00	1.63	0.38	0.00	0.00	0.00	0.00	0.13	1.38	2.75	0.53
Mud Creek Bar 009	2002	?	0.75	0.38	0.63	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.63	0.75	0.75	2.75	0.45
Mud Creek Bar 009	2003	+?	not re-sampled																
TNC Island 010	2001	-?	0.00	0.40	1.20	0.00	0.00	0.00	0.00	0.80	0.20	0.00	0.00	0.00	0.00	0.30	0.80	2.70	0.40
TNC Island 010	2002	-	0.00	0.10	1.30	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.60	2.80	0.34
TNC Island 010	2003	-	0.00	0.30	1.40	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.40	0.20	0.80	3.00	0.44
Lufkin Bottom 011A	2001	?	0.00	0.40	1.45	0.00	0.00	0.00	0.00	0.10	0.15	0.00	0.00	0.00	0.00	0.55	0.65	2.05	0.33
Lufkin Bottom 011A	2002	?	0.00	0.15	1.50	0.00	0.00	0.00	0.00	0.65	0.30	0.00	0.00	0.00	0.80	0.75	0.90	1.50	0.41
Lufkin Bottom 011A	2003	+	0.00	0.30	1.50	0.00	0.00	0.00	0.00	0.30	0.20	0.00	0.00	0.00	0.30	0.80	0.85	1.35	0.35
Lufkin Bottom 011B	2001	?	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.50	0.67	2.58	0.30
Lufkin Bottom 011B	2002	?	0.17	0.00	0.92	0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.00	0.42	0.50	0.92	2.67	0.39
Lufkin Bottom 011B	2003	+	0.00	0.00	0.83	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.67	1.00	0.58	2.50	0.36
Gormer Cany. #4 013	2001	?	0.00	0.13	0.50	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.63	0.00	1.75	2.63	0.36
Gormer Cany. #4 013	2002	?	not re-sampled																
Gormer Cany. #4 013	2003	?	0.00	0.00	0.88	0.00	0.00	0.00	0.00	0.75	0.13	0.00	0.00	0.00	1.00	0.38	2.00	2.63	0.48
Pine Creek #5 014	2001	?	0.08	1.00	0.25	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.25	1.42	2.67	0.41
Pine Creek #5 014	2002	?	0.00	0.17	0.50	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.50	2.00	2.50	0.42
Pine Creek #5 014	2003	?	0.17	0.75	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.08	0.42	1.92	2.17	0.45
Pine Ck. #3 & #4 016A	2001	?	0.00	0.00	0.25	1.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.17	1.50	1.17	2.83	0.45
Pine Ck. #3 & #4 016A	2002	+?	0.00	0.00	0.75	1.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.50	1.50	1.00	2.92	0.49
Pine Ck. #3 & #4 016A	2003	+	0.00	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.83	0.67	1.33	2.92	0.41

continued.

Occurrence (Transect Number)	Year of Monitoring	Apparent Population Trend (3 years in same direction)	Direct Changes/Threats													Indirect Changes			Cumulative Mean for Transect
			Hydrologic & Fluvial Geomorphic Change		Invasive & Noxious Weeds	Livestock Grazing Impacts			OHV Use	Recreation		Other Human Ground Disturb.	Fire	Mortality	Wildlife Activity	Vegetation Succession		Pop. Info.	
			Deposition	Loss of soil moisture	Invasion by weedy species	Hoofprints & scat piles	Forage utilization	Trails & bedding	Tracking & trailing	Human trails	Campsite impacts	Roads, houses, excavation, filling	Wildfire	Herbicide spraying or other mortality	Ungulate beds, trails, browsing; beaver	Competition by forbs	Competition by shrubs & trees	Population tally	
Pine Ck. #3 & #4 016B	2001	?	0.00	0.81	0.81	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	1.31	1.06	2.56	0.48
Pine Ck. #3 & #4 016B	2002	+?	0.00	0.00	1.06	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	1.94	1.06	2.40	0.48
Pine Ck. #3 & #4 016B	2003	+	0.00	0.13	1.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.25	1.38	1.31	2.00	0.46
Low. Conant Vall. 017	2001	-?	0.00	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.70	1.20	2.70	0.37
Low. Conant Vall. 017	2002	?	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.50	0.50	2.80	0.28
Low. Conant Vall. 017	2003	-?	not re-sampled																
Up. Conant Valley 018	2001	-	0.13	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88	0.63	1.00	2.88	0.35
Up. Conant Valley 018	2002	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.13	1.00	3.00	0.32
Up. Conant Valley 018	2003	?	not re-sampled																
Lower Swan Vall. 019	2001	+?	0.00	0.00	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.60	1.80	2.60	0.41
Lower Swan Vall. 019	2002	+	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.20	2.00	2.80	0.39
Lower Swan Vall. 019	2003	?	not re-sampled																
Gormer Cany. #3 021	2001	?	0.00	1.40	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.10	2.40	0.49
Gormer Cany. #3 021	2002	?	0.00	0.20	1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10	1.20	1.20	2.20	0.47
Gormer Cany. #3 021	2003	?	0.00	0.60	1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	1.10	1.10	2.20	0.49
Black Canyon 022	2001	?	0.00	0.88	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.38	2.00	1.75	0.43
Black Canyon 022	2002	?	0.00	0.75	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.25	2.00	2.25	0.56
Black Canyon 022	2003	?	0.00	0.75	1.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.25	2.00	1.88	0.53
Total % of Transects Sampled With Value >0 in Catagory	2001		30	61	96	48	22	35	0	30	17	4	4	0	78	91	100		
	2002		26	44	96	35	13	26	4	39	4	0	0	0	96	83	100		
	2003		13	67	100	33	20	33	0	27	13	0	0	0	87	100	100		

* attributes correspond with the "Ute ladies'-tresses Habitat Monitoring Checklist"; numeric values represent classes (0, 1, or 2, except for population tally which is 0, 1, 2, 3) that reflect different habitat conditions.

Appendix 4

Values for habitat attributes measured at the landscape scale for each transect

Values for habitat attributes* measured at the landscape scale for each transect.

Occurrence (Transect #)	Year	Direct Changes/Threats							Indirect Changes		Total (excluding Bank Erosion category)
		Hydrologic and Fluvial Geomorphic Change	Invasive & Noxious Weeds	Off-Highway Vehicle Use	Recreation		Other Human Caused Ground Disturbance	Fire	Alteration of Floodplain	Population Information	
		Bank Erosion (m to cutbank)	Invasion by noxious & invasive weeds	Tracking & trailing	Human trails	Campsite impacts	Roads, houses, excavation, filling, etc.	Wildfire, human or naturally caused	Levees, rip-rap, culverts, diversions, etc.	Exclosures, biocontrol, other protection	
Kelly's Island (001)	2001	n/a	2	0	1	0	2	0	1	1	7
Kelly's Island (001)	2002	n/a	2	0	1	0	2	0	1	1	7
Kelly's Island (001)	2003	not re-sampled									
Rattlesnake Point (002)	2001	12.1	1	0	1	0	1	0	0	2	5
Rattlesnake Point (002)	2002	n/a	0	0	1	1	1	0	0	2	5
Rattlesnake Point (002)	2003	9.8	0	0	0	1	1	0	0	2	4
Warm Spgs Bottom (003A)	2001	n/a	2	0	1	0	2	0	1	2	8
Warm Spgs Bottom (003A)	2002	n/a	2	1	2	0	2	0	2	2	11
Warm Spgs Bottom (003A)	2003	n/a	2	0	2	0	2	0	2	1	9
Warm Spgs Bottom (003B)	2001	n/a	1	0	0	0	1	0	1	2	5
Warm Spgs Bottom (003B)	2002	n/a	1	1	0	0	0	0	1	2	5
Warm Spgs Bottom (003B)	2003	n/a	2	0	0	0	0	0	1	1	4
Falls Campground (004A)	2001	n/a	0	0	2	0	2	0	0	0	4
Falls Campground (004A)	2002	n/a	1	0	2	0	2	0	0	0	5
Falls Campground (004A)	2003	not re-sampled									
Falls Campground (004B)	2001	n/a	2	1	1	0	0	0	0	0	4
Falls Campground (004B)	2002	n/a	2	0	1	0	0	0	0	0	3
Falls Campground (004B)	2003	n/a	2	0	1	0	0	0	0	0	3
Railroad Island (005)	2001	n/a	1	0	0	0	0	0	1	2	4
Railroad Island (005)	2002	n/a	2	0	1	0	0	0	0	2	5
Railroad Island (005)	2003	not re-sampled									
Annis Island (006A)	2001	n/a	2	0	0	0	2	1	2	2	9
Annis Island (006A)	2002	n/a	2	0	0	0	1	0	2	1	6
Annis Island (006A)	2003	n/a	2	0	0	0	1	0	2	1	6
Annis Island (006B)	2001	n/a	2	1	0	1	2	0	2	2	10
Annis Island (006B)	2002	n/a	1	0	0	0	1	0	2	1	5
Annis Island (006B)	2003	n/a	2	0	0	0	1	0	2	1	6

continued.

Occurrence (Transect #)	Year	Direct Changes/Threats							Indirect Changes		Total (excluding Bank Erosion category)
		Hydrologic and Fluvial Geomorphic Change	Invasive & Noxious Weeds	Off-Highway Vehicle Use	Recreation		Other Human Caused Ground Disturbance	Fire	Alteration of Floodplain	Population Information	
		Bank Erosion (m to cutbank)	Invasion by noxious & invasive weeds	Tracking & trailing	Human trails	Campsite impacts	Roads, houses, excavation, filling, etc.	Wildfire, human or naturally caused	Levees, rip-rap, culverts, diversions, etc.	Exclosures, biocontrol, other protection	
Annis Island (006C)	2001	not established in 2001									
Annis Island (006C)	2002	n/a	2	0	0	0	0	0	2	2	6
Annis Island (006C)	2003	not re-sampled									
Twin Bridges (007)	2001	n/a	1	1	1	1	2	0	1	1	8
Twin Bridges (007)	2002	n/a	1	1	1	2	2	0	1	1	9
Twin Bridges (007)	2003	not re-sampled									
Mud Creek Bar (009)	2001	1.9	1	2	2	2	1	0	0	2	10
Mud Creek Bar (009)	2002	1.6	1	1	1	1	0	0	0	1	5
Mud Creek Bar (009)	2003	not re-sampled									
TNC Island (010)	2001	23.4	0	0	2	2	0	0	0	2	6
TNC Island (010)	2002	23.3	1	0	2	2	0	0	0	2	7
TNC Island (010)	2003	23.0	1	0	2	2	1	0	0	2	8
Lufkin Bottom (011A)	2001	n/a	1	0	1	1	1	0	0	2	6
Lufkin Bottom (011A)	2002	n/a	2	0	2	2	0	0	0	2	8
Lufkin Bottom (011A)	2003	n/a	2	0	2	2	0	0	0	2	8
Lufkin Bottom (011B)	2001	n/a	0	0	1	1	1	0	0	2	5
Lufkin Bottom (011B)	2002	n/a	1	0	1	1	0	0	0	2	5
Lufkin Bottom (011B)	2003	n/a	2	0	1	2	0	0	0	2	7
Gormer Canyon #4 (013)	2001	n/a	1	0	1	1	0	0	0	2	5
Gormer Canyon #4 (013)	2002	not re-sampled									
Gormer Canyon #4 (013)	2003	7.0	1	0	2	1	0	0	0	2	6
Pine Creek #5 (014)	2001	n/a	0	1	1	1	0	0	0	2	5
Pine Creek #5 (014)	2002	n/a	1	0	1	1	0	0	0	2	5
Pine Creek #5 (014)	2003	n/a	1	0	1	1	0	0	0	2	5
Pine Creek #3 & #4 (016A)	2001	n/a	2	0	1	1	0	0	0	2	6
Pine Creek #3 & #4 (016A)	2002	n/a	1	0	1	1	0	0	0	1	4
Pine Creek #3 & #4 (016A)	2003	n/a	1	0	1	1	0	0	0	1	4

continued.

Occurrence (Transect #)	Year	Direct Changes/Threats							Indirect Changes		Total (excluding Bank Erosion category)
		Hydrologic and Fluvial Geomorphic Change	Invasive & Noxious Weeds	Off-Highway Vehicle Use	Recreation		Other Human Caused Ground Disturbance	Fire	Alteration of Floodplain	Population Information	
		Bank Erosion (m to cutbank)	Invasion by noxious & invasive weeds	Tracking & trailing	Human trails	Campsite impacts	Roads, houses, excavation, filling, etc.	Wildfire, human or naturally caused	Levees, rip-rap, culverts, diversions, etc.	Exclosures, biocontrol, other protection	
Pine Creek #3 & #4 (016B)	2001	n/a	1	0	1	1	0	0	0	2	5
Pine Creek #3 & #4 (016B)	2002	n/a	2	0	1	1	0	0	0	2	6
Pine Creek #3 & #4 (016B)	2003	n/a	1	0	1	1	0	0	0	2	5
Lower Conant Valley (017)	2001	n/a	1	0	0	0	0	0	0	2	3
Lower Conant Valley (017)	2002	n/a	0	0	0	0	0	0	0	2	2
Lower Conant Valley (017)	2003	not re-sampled									
Upper Conant Valley (018)	2001	n/a	0	0	0	0	2	0	2	2	6
Upper Conant Valley (018)	2002	n/a	0	0	0	0	1	0	2	2	5
Upper Conant Valley (018)	2003	not re-sampled									
Lower Swan Valley (019)	2001	30.5	0	0	0	0	2	0	2	2	6
Lower Swan Valley (019)	2002	31.2	0	0	1	1	1	0	1	2	6
Lower Swan Valley (019)	2003	not re-sampled									
Gormer Canyon #3 (021)	2001	n/a	2	0	1	0	0	0	0	2	5
Gormer Canyon #3 (021)	2002	n/a	2	0	0	0	0	0	0	1	3
Gormer Canyon #3 (021)	2003	n/a	2	0	0	0	0	0	0	1	3
Black Canyon (022)	2001	n/a	1	0	0	0	1	0	1	2	5
Black Canyon (022)	2002	n/a	2	0	0	0	0	0	1	2	5
Black Canyon (022)	2003	n/a	2	0	0	0	0	0	1	2	5
% of Transects Sampled With Value >0 in Category	2001		70	26	65	44	61	4	44	91	
	2002		86	18	68	46	41	0	41	96	
	2003		93	0	60	53	33	0	33	93	

* The attribute types and numeric values correspond with those in the "Ute ladies'-tresses Habitat Monitoring Checklist". The values represent classes (e.g., 0, 1, or 2, except for the bank erosion attribute which was an actual distance) that reflect different habitat conditions.

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