2005 Ute Ladies'-tresses (*Spiranthes diluvialis*) Monitoring on the South Fork Snake River, Idaho: Fourth Year Results

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ABSTRACT

Ute ladies'-tresses (*Spiranthes diluvialis*) was listed as federally threatened in 1992 because of its geographic rarity and small population sizes, habitat loss and modification, and low reproductive rate. Since 1997, the Idaho Conservation Data Center (IDCDC), U.S. Bureau of Land Management (BLM), and U.S. Forest Service (USFS) have cooperatively inventoried the abundance of Ute ladies'-tresses element occurrences (EOs) on public lands along the South Fork Snake River, approximately 31 km northeast of Idaho Falls. In 2001, habitat monitoring transects were established at all Ute ladies'-tresses EOs located on BLM and USFS lands, and re-sampled in 2002 and 2003. In 2005, 22 transects were re-sampled using the same methodology used in prior years. There were 4,392 plants observed, the highest number observed since inventories were initiated. In 2005, the primary threats to Ute ladies'-tresses along the South Fork Snake River were: noxious and invasive weeds, shrub and tree encroachment, loss of soil moisture, recreation, and other human-caused disturbances. The BLM and USFS have been proactive in addressing most of these threats, by releasing biocontrol agents at most EOs; regulating, educating, and patrolling recreation activities; building exclosures and fences; and prioritizing land acquisition and conservation easement agreements. The objectives of this study were to report on: 1) the status of occupied habitat; 2) disturbances or threats to Ute ladies'-tresses EOs; 3) current and proposed management uses within occupied habitat; and 4) conservation actions used, needed, or planned at the Ute ladies'-tresses EOs.

KEYWORDS

Ute ladies'-tresses, *Spiranthes diluvialis*, South Fork Snake River, Idaho, monitoring, abundance, rare plant, conservation, management, rare plant habitat, Threatened species

SUGGESTED CITATION

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INTRODUCTION

Ute ladies'-tresses (*Spiranthes diluvialis*) is a federally threatened orchid occurring in northern Colorado, southeastern Idaho, southwestern Montana, western Nebraska, southeastern Nevada, northern and south-central Utah, north-central Washington, and eastern Wyoming (Colket et al. 2006). Ute ladies'-tresses is a long-lived perennial forb that reproduces by seed and possibly by asexual reproduction (Fertig et al. 2005). The primary life stages exhibited are seedling, subterranean dormant, above-ground vegetative, and reproductive. The subterranean dormant stage may persist for as long as 4 or more years before transitioning above-ground stages (Fertig et al. 2005). Ute ladies'-tresses flower between early July and late October. The microscopic seeds are dispersed via wind and water (Sipes and Tepedino 1995, Fertig et al. 2005). These tiny seeds are likely short-lived and their successful germination may be associated with the presence of certain mycorrhizal soil fungi (Hildebrand 1998, McGonigle and Sheridan 2004, Fertig et al. 2005).

Ute ladies'-tresses occurs in moist meadow habitats associated with floodplains, oxbows, and stream and river terraces (Colorado, Idaho, Montana, Nebraska, Utah, Wyoming); subirrigated or spring-fed abandoned stream channels and valleys (Colorado, Idaho, Montana, Nevada, Utah); lakeshores (Washington); and human-modified riparian and lacustrine habitats (Colorado, Idaho, Montana, Nebraska, Utah, Washington, Wyoming; Fertig et al. 2005). Rangewide, many element occurrences (EOs) are in riparian habitats of wide valley floodplains at the base of mountains where narrow stream reaches become unconfined (Fertig et al. 2005). An EO is a specific geographic location where "a species or natural community is, or was, present" (NatureServe 2002:10).

Dominant species associated with Ute ladies'-tresses rangewide include: box elder (*Acer negundo*), creeping bentgrass (*Agrostis stolonifera*), water birch (*Betula occidentalis*), woolly sedge (*Carex pellita*), analogue sedge (*Carex simulata*), little green sedge (*Carex viridula*), meadow thistle (*Cirsium scariosum*), redosier dogwood (*Cornus sericea*), tapered rosette grass (*Dichanthelium acuminatum*), inland saltgrass (*Distichlis stricta*), silverberry (*Elaeagnus commutata*), fewflower spikerush (*Eleocharis pauciflora*), beaked spikerush (*Eleocharis rostellata*), quackgrass (*Elymus repens*), smooth horsetail (*Equisetum laevigatum*), Baltic rush (*Juncus balticus*), Torrey's rush (*Juncus torreyi*), scratchgrass (*Muhlenbergia asperifolia*), mat muhly (*Muhlenbergia richardsonis*), witchgrass (*Panicum capillare*), reed canarygrass (*Phalaris arundinacea*), Canada bluegrass (*Poa compressa*), Kentucky bluegrass (*Poa pratensis)*, narrowleaf cottonwood (*Populus angustifolia*), narrowleaf willow (*Salix exigua*), greasewood (*Sarcobatus vermiculatus*), alkali sacaton (*Sporobolus airoides*), and seaside arrowgrass (*Triglochin maritimum*; Fertig et al. 2005). All plant nomenclature is from the U.S. Natural Resources Conservation Service (2006).

In 1992, Ute ladies'-tresses was listed as federally threatened because of its geographic rarity and small population sizes, habitat loss and modification, and low reproductive rate (U.S. Fish and Wildlife Service 1992). At the time of its listing, Ute ladies'-tresses was only known to occur in Colorado and Utah, but has since been discovered in Idaho, Montana, Nebraska, Nevada, Washington, and Wyoming (Fertig et al. 2005, Colket et

al. 2006). In 2004, the U.S. Fish and Wildlife Service (USFWS; 2004) initiated a 5-year review to evaluate delisting Ute ladies'-tresses, largely because of its greater known distribution and population size since it was listed (Fertig et al. 2005). Current and potential threats to Ute ladies'-tresses include: urbanization, road and infrastructure construction, hydrologic development, agricultural conversion of wetlands, introduced weed invasion, pesticide application, pollinator loss, overcollection, livestock and native herbivore grazing, recreation, drought, vegetation succession, fire suppression, and intrinsic rarity of Ute ladies'-tresses and associated mycorrhizae (U.S. Fish and Wildlife Service 1992, Fertig et al. 2005).

In 1996, Ute ladies'-tresses was discovered in riparian habitats on the floodplain of the South Fork Snake River, Idaho (Idaho Conservation Data Center 2006). Since 1997, the Idaho Conservation Data Center (IDCDC), U.S. Bureau of Land Management (BLM), and U.S. Forest Service (USFS) have cooperatively inventoried the abundance and habitat of Ute ladies'-tresses EOs on public lands along the South Fork Snake River. In 2001, habitat monitoring transects were also established at the majority of Ute ladies'-tresses EOs. These transects were re-sampled in 2002, 2003, and 2005. Since the transects were re-sampled in 2005, all of Idaho's Ute ladies'-tresses EOs were reviewed and updated to be more consistent rangewide (Colket et al. 2006). This resulted in the 24 EOs that were previously defined being lumped into 8 EOs (Colket et al. 2006). The 8 EOs currently in the IDCDC database do not include an additional EO discovered in 2005 on the Fort Hall Indian Reservation in Bingham County, Idaho (C. Davis, BLM, personal communication). For the purpose of communication, the 24 former EOs, which were also used in numbering transects, will be referred to as subpopulations in this report.

The objectives of this study were to report on: 1) the status of occupied habitat; 2) disturbances or threats to Ute ladies'-tresses EOs; 3) current and proposed management uses within occupied habitat; and 4) conservation actions used, needed, or planned at the Ute ladies'-tresses EOs. Additional deliverables include photopoint photographs and copies of updated Ute ladies'-tresses EO records.

STUDY AREA

The study area is located in southeastern Idaho, along the South Fork Snake River, approximately 31 km northeast of Idaho Falls (Figures 1-7). Elevation ranges between 1469-1620 m. The climate is semi-arid and mean total precipitation is 45 cm. Mean temperatures range from -12°C in winter months to 29°C in summer months (based on Swan Valley 2E weather station; Desert Research Institute 2006). Soils within the study area are Xeric Torrifluvents and are characterized by mildly alkaline surface and subsurface layers (Moseley 1998). EOs occur on alluvial sand and cobble deposits within the South Fork Snake River floodplain. Narrowleaf cottonwood, silverberry, and narrowleaf willow are the dominant woody species within the study area.

METHODS

EO inventory

Between 1997 and 2005, annual monitoring of Ute ladies'-tresses EOs has involved counting the detectable number of plants and making notations regarding its threats and

habitat conditions (Moseley 1998, 2000; Murphy 2000, 2001*a*,*b*, 2003). Before this report was completed, 2006 Ute ladies'-tresses abundance was also counted at the EOs. Ute ladies'-tresses abundance between 1997 and 2005 was analyzed using the Kruskal-Wallis Rank Sum Test in SPLUS 7.0. Subpopulations where plants had not been counted every year were excluded from analysis. Abundance information was used to update Ute ladies'-tresses EOs in the IDCDC database (Appendix H).

Monitoring transects

In 2001, 23 monitoring transects were permanently established and sampled at Ute ladies'-tresses EOs and associated subpopulations along the South Fork Snake River. In 2002, 22 of the original 23 transects were sampled and 1 new transect was established and sampled. In 2003, 15 of the 24 transects were sampled. In 2005, 22 of the 24 transects were sampled. In 2005, monitoring followed the same methodology used in prior years (Murphy 2001*a*, 2003, 2004).

Transect establishment

In 2001, transect start locations were subjectively located based on EO data (Murphy 2001*a*), maps, and on-the ground observations. Transects were optimally located in large Ute ladies'-tresses EOs and subpopulations representing the range of plant community types, fluvial landform settings, habitat quality, and land uses. Transects were established to run lengthwise through the center of Ute ladies'-tresses subpopulations, which are often linear-shaped and oriented parallel to fluvial features (e.g. channel, moist swale, terrace, etc). Best judgment was used where subpopulations were non-linear.

The transect start was permanently marked with a rebar stake. The location of the rebar stake was measured with a Global Positioning System (GPS) unit and text directions to the rebar stake location were written. Rebar stakes are susceptible to covering by alluvium or removal by humans, so tree tags were used to assist in relocating the rebar stake. The nearest large cottonwood or juniper tree on higher ground, or any other suitable landmark that will most likely remain fixed for a long period of time (e.g. a fencepost), was marked with an aluminum tree tag and nail. The compass bearing (declination corrected to quad map) and distance from the tree tag to the rebar stake was recorded. The transect tape was then laid out in a straight line to the appropriate length. All transect relocation data are in Appendices C- F.

Belt transects were used to sample data in 2.5 x 2.5- or 5 x 5-m^2 sample blocks along both sides of the transect. Sample block size was optimally 5 x 5 m^2, but was narrower if habitat width of the subpopulation was <10 m across. Total transect length varied between 20 and 50 m, depending upon the length of the subpopulation. The belt transects sometimes encompassed small areas outside of the subpopulation habitat (e.g. water, upland vegetation) because the edges are where habitat changes occur (e.g. contraction or expansion of suitable habitat). The transect start was ideally located within about 5 m of the starting and ending habitat edge.

Photopoint monitoring

At the transect midpoint, 4 photos were taken in the following order: 1) from the midpoint to the end; 2) 90° from the transect bearing (right side); 3) 180° from the transect bearing (toward the start); and 4) 270° from the transect bearing (left side). Photos were general habitat and landscape overviews. Photos were taken at the widest angle possible with a "point and shoot" standard in 2001 and 2002 (Murphy 2001*a*, 2003) and a digital camera in 2003 (Murphy 2004) and 2005. See Appendix G for 2005 monitoring photos.

Habitat monitoring procedure

A checklist of direct and indirect habitat changes and threats, both human caused and natural, was developed for the index of habitat change (Appendix A). These habitat attributes were divided into direct and indirect categories. The checklist was developed by using descriptions of habitat conditions supporting Ute ladies'-tresses EOs on the South Fork Snake River (Moseley 1998, 2000; Murphy 2000). The checklist is a list of important habitat attributes that were assumed to affect the persistence of Ute ladies'-tresses. Measurable indicators, or surrogates, for the habitat attributes were assigned numeric classes reflecting different conditions. These attributes were evaluated at both the sample block scale (within sample blocks) and the landscape scale (from transect midpoint). For all attributes (except the population tally, which included 4 classes), the classes were 0, 1, or 2. Zero was the closest to the ideal Ute ladies'-tresses habitat conditions, and 1 and 2 were increasingly less ideal. Classes were entered into the appropriate field in the data sheet. These numeric values contributed toward index output values (means for each attribute and a cumulative mean for each transect). If the habitat attributes change over time, then the output values should reflect the direction and magnitude of that change. The following is a detailed explanation of the habitat and landscape attributes measured (also see Appendix A):

Direct threats and changes to habitat:

Hydrologic and fluvial geomorphic change:

1) Bank erosion: Some Ute ladies'-tresses EOs are threatened by actively eroding cut-banks, meander widening, and flood scouring (Murphy 2000). The distance from the transect midpoint to the nearest actively eroding river channel bank was measured to track the rate of erosion at vulnerable EOs.

2) Deposition: The floods of June 1997 deposited unconsolidated silt, sand, gravel, cobble, or woody debris on some Ute ladies'-tresses EOs (Moseley 1998). If deposits are too deep, Ute ladies'-tresses does not apparently survive. The depth of recent alluvium deposited within the last 10 years was measured (if greater than a trace) in the sample blocks. Recent alluvium is minimally vegetated by pioneer species (much loose sand or rocks are visible).

3) Loss of soil moisture at capillary fringe: Vegetation data collected from Ute ladies'-tresses EOs was analyzed to determine general habitat characteristics. The total cover of mesic graminoid species was always 40% or more (Moseley 1998, 2000; Murphy 2001*a*,*b*). Their presence reflects a specific moisture regime in which Ute ladies'-

tresses prefers to grow. If the site dries due to sand deposition, river down-cutting and a subsequent drop in water table, or other causes, this loss of soil moisture should be reflected in the change in mesic graminoid cover. The total cover of all mesic graminoid species typically associated with Ute ladies'-tresses was measured in the sample blocks. These mesic graminoid species included, but were not limited to: creeping bentgrass, woolly sedge, Nebraska sedge *(Carex nebrascensis*), common spikerush *(Eleocharis palustris*), Baltic rush, swordleaf rush (*Juncus ensifolius*), reed canarygrass, and Kentucky bluegrass*.*

Invasive and noxious weeds:

4) Invasion and colonization of noxious and invasive weedy species: Prior monitoring recognized increased competition from weedy species, both native and exotic, as a threat to Ute ladies'-tresses (Moseley 2000; Murphy 2000, 2001*a*,*b*). The total cover of all highly invasive and noxious weed species typically associated with Ute ladies'-tresses was measured in the sample blocks and relative abundance was measured on the landscape level. These species included, but were not limited to: quackgrass*,* smooth brome *(Bromus inermis*), musk thistle (*Carduus nutans*), diffuse knapweed (*Centaurea diffusa*), spotted knapweed *(C. stoebe*), Canada thistle *(Cirsium arvense*), bull thistle (*C. vulgare*), leafy spurge *(Euphorbia esula*), reed canarygrass, field sowthistle *(Sonchus arvensis*), and common tansy *(Tanacetum vulgare*). Creeping bentgrass and Kentucky bluegrass were not included as weeds because they are nearly always associated with Ute ladies'-tresses on the South Fork Snake River.

Livestock grazing impacts:

5) Hoof prints or scat piles: Cattle (or other livestock) hoof prints or scat piles from this year are indicators of the magnitude and duration of livestock grazing in Ute ladies'-tresses habitat. The number of obvious livestock hoof prints or scat piles were counted in the sample blocks and assigned an appropriate class (Appendix A).

6) Forage utilization: Livestock grazing during the period when Ute ladies'-tresses is aboveground increases the risk of its direct consumption and trampling (Moseley 1998). The utilization of graminoids (reflected by the stubble height) is an indicator of the amount and intensity of recent grazing (Cowley 1992). Stubble height (not including inflorescences) was measured in the sample blocks.

7) Trails and bedding: In intensively grazed areas, cattle often form trails and beds that are repeatedly used. Trails and beds can alter site conditions or directly impact Ute ladies'-tresses. Vegetation may be trampled on lightly used trails or beds or reduced in highly compacted areas (Murphy 2000). Trampled vegetation and/or bare ground (excluding rocks) exposed by livestock trailing or bedding was measured in the sample blocks.

Off-highway vehicle use impacts:

8) Tracking and trailing through population areas: Off-highway vehicles (OHVs) occasionally travel in Ute ladies'-tresses habitat (Murphy 2000, 2001*a*,*b*). OHV use leads to trails with crushed or missing vegetation, potentially detrimental to Ute ladies'-tresses survival. The number of recent tracks and trails caused by OHVs (including, but

not limited to, all-terrain vehicles, motorcycles, mountain bikes, and 4 x 4 vehicles) within Ute ladies'-tresses habitat was measured in the sample blocks, as well as at the landscape scale.

Recreation:

9) Human trails: Recreation use on the South Fork Snake River is growing. One of the most common recreation impacts are trails created by anglers, boaters, campers, and other users (Murphy 2000). The effects of repeated human travel are trampled vegetation (lightly used areas) or bare, compacted soil (heavily used areas). The number of obvious recently used human foot trails was measured both in the sample blocks and at the landscape scale. These human trails can be difficult to distinguish from cattle trails, but they are often associated with campsites or boat landings.

10) Campsite impacts: Sites used for tents, kitchens, fire rings, boat landings, or other activities (e.g. bathrooms or firewood gathering) also occasionally occur in Ute ladies'-tresses habitat (Moseley 2000; Murphy 2000, 2001*a*,*b*). Trampled vegetation and bare ground (soil and gravel, not generally rocks) obviously exposed by recent human camping related activities was measured both in the sample blocks and at the landscape scale.

Other human-caused ground disturbance:

11) Roads, houses, excavation, filling, heavy equipment use, fire fighting, etc.: These potentially destructive activities are uncommon within Ute ladies'-tresses habitat. Ground disturbing activities are common in the landscape surrounding Ute ladies'-tresses habitat. They indicate the encroachment of development and other potential threats to habitat (e.g. weed invasion, vehicle travel, etc.). Ground disturbing activities were measured both in the sample blocks and at the landscape scale. Flood control activities were measured in the "Alteration of Floodplain" section).

Fire:

12) Wildfire: Human or naturally ignited fires, though rare in riparian settings, may directly kill Ute ladies'-tresses or indirectly impact it by altering vegetation succession (positively or negatively; Murphy 2001*a*,*b*). The intensity of recent, noticeable burns was measured both in the sample blocks and at the landscape scale. Vigorous herbaceous growth after a fire can quickly mask burns in riparian settings. Charred stumps of trees and shrubs, as well as a blackened, ashy soil surface, are indicators of recent burns.

Confirmed direct loss of Ute ladies'-tresses individuals:

13) Herbicide spraying, human harvest, disease, or other mortality causes: Dead Ute ladies'-tresses are difficult, or impossible, to observe and the cause of death may be unknown. Herbicide spraying is the most obvious and measurable (but rare) possible cause, but human harvest can also occur (e.g. wildflower picking, medicinal use, propagation). The presence or absence of herbicide spraying in the sample blocks was recorded.

Wildlife activity:

14) Ungulate bedding, trampling, trails, grazing, and shrub browsing; and beaver (*Castor canadensis*) wood cutting and piling: Wildlife trampling, trailing, bedding, browsing, and grazing may have a detrimental short-term impact on Ute ladies'-tresses (Moseley 1998). However, ungulate browsing and beaver activity may positively benefit Ute ladies'-tresses by opening shrub or tree canopies and reducing woody cover. The level of wildlife activity in the sample blocks was measured, although it is difficult to measure its impacts.

Indirect threats and changes to habitat:

Vegetation succession:

15) Competition by tall or invasive forbs (other than noxious weeds): Forb species, both native and exotic, are commonly associated with Ute ladies'-tresses and most do not pose a short-term threat. However, increases in cover of potentially competitive forbs (e.g. American licorice [*Glycyrrhiza lepidota*], black medick [*Medicago lupulina*], or clover [*Trifolium* spp.]) may alter habitat conditions necessary for Ute ladies'-tresses survival (Moseley 1998, 2000; Murphy 2001*a*,*b*). Total cover of all forb species (excluding noxious species previously measured) in each sample block was measured. Horsetail (*Equisetum* spp.) was excluded because it is often associated with Ute ladies'-tresses and does not appear to pose a long-term, detrimental competitive threat.

16) Competition by shrubs and trees: Ute ladies'-tresses does occur in the partial shade of shrubs and trees, but rarely in complete shade. Over time, increased cover of shrubs and trees may alter light and other environmental conditions. The total cover of all woody species in the sample block was measured (individuals did not have to be rooted within the block).

Alteration of floodplain:

17) Levees, rip-rapping, culverts, bridges, causeways, diversions, or other development that alters river hydrology or fluvial geomorphology: The alteration of flood flows, as well as deposition and erosion processes, likely affects the long-term creation and loss of Ute ladies'-tresses habitat (Moseley 2000, Murphy 2000). The alteration of the floodplain also affects groundwater levels that influence Ute ladies'-tresses habitat. The presence or absence of physical structures altering the floodplain of the surrounding landscape was measured.

Population information:

18) Population tally: The abundance of Ute ladies'-tresses present in the sample blocks is not necessarily representative of habitat condition, but it may respond to changes in habitat condition. Ute ladies'-tresses abundance was categorized in 4 population classes.

19) Exclosures, fences, or other measures (including biocontrol insects on noxious weeds): Federal agencies have implemented measures to protect Ute ladies'-tresses at several EOs. In the past, these have been in the form of exclosures or fences to protect plants from livestock grazing, OHVs, or human traffic. More recently, these agencies

have released biological control insects for noxious weeds. The presence or absence of functioning protective measures along, and adjacent to, the transect were recorded.

RESULTS

Ute ladies'-tresses abundance

Inventory of Ute ladies'-tresses EOs along the South Fork Snake River took place during 8-26 August 2005. There were a total of 4,392 plants observed at 19 subpopulations (Table 1). This was the highest number of plants observed since the inventories were initiated in 1996. There were no significant trends in abundance of observed plants using the Kruskal-Wallis Rank Sum Test in SPLUS 7 (Insightful Corporation 2006), either by EO or throughout all South Fork Snake River EOs during 1997-2005. EO 2 has the largest number of plants, followed by EO 6.

Direct and indirect threat attributes

Hydrologic and fluvial geomorphic change

1) Bank erosion was detected at 4 transects in 2005: 006B, 009A, 010A, and 016B (Table 3). Recent slumping was observed 1.3 m downstream from transect 009A. At transect 010A, a boat drop-off area had eroded the bank 30 m from the transect. Bank erosion also occurred 4.6 m from transect 016B. Bank erosion was not detected at transects 006B and 016B before 2005, so these were both new instances of bank erosion. In past monitoring years, bank erosion has also been detected at transects 002A, 013A, and 019A.

2) Deposition was detected at 3 transects in 2005: 004A, 010A, 011A (Table 2). Deposition was not detected at transects 010A and 011A before 2005, but had been observed at 004A in 2001 and 2002. In past monitoring years, deposition has also been detected at transects 002A, 004B, 005A, 009A, 011B, 014A, and 018A.

3) Loss of soil moisture was detected at 12 transects in 2005: 001A, 003A, 003B, 004A, 006A, 007A, 009A, 010A, 011A, 014A, 016B, and 021A (Table 2). Loss of soil moisture was not detected at transects 001A, 003A, and 006A before 2005. Loss of soil moisture had been detected in previous monitoring years at the remaining 9 transects. In past monitoring years, loss of soil moisture was also detected at transects 002A, 004B, 006B, 013A, 017A, and 022A.

Noxious and invasive weeds

4) Invasion and colonization by noxious and invasive weed species was detected at 21 transects in 2005: 001A, 002A, 003A, 003B, 004A, 005A, 006A, 006C, 007A, 009A, 010A, 011A, 011B, 013A, 014A, 016A, 016B, 017A, 019A, and 021A (Tables 2 and 3). Trace noxious and invasive weeds were detected at transect 018A in 2001, but none were observed in 2002 or 2005. In 2005, noxious and invasive weed cover was highest at transects 001A, 002A, 005A, 006B, 009A, 010A, 011A, 011B, 016B, and 021A. Since 2001, the greatest increase in noxious and invasive weed cover has occurred at transects 005A, 011B, 013A, 014A, 016A, 016B, 017A, and 021A. All 22 transects sampled in 2005 had noxious weeds commonly scattered or widespread within 100 m.

Livestock grazing impacts

5) Hoof prints or scat piles were detected at 5 transects in 2005: 002A, 003A, 003B, 006A, and 006B (Table 2). Hoof prints or scat piles were detected at these transects in at least 2 of the 3 previous monitoring years. Hoof prints or scat piles were not detected at the remaining 17 transects, of which 13 had no evidence of hoof prints and/or scat piles since monitoring was initiated in 2001. In past monitoring years, hoof prints or scat piles were also detected at transects 004A, 004B, 005A, 014A, 016A, and 016B.

6) Forage utilization was not detected at any of the 22 transects monitored in 2005 (Table 2). In past monitoring years, forage utilization was detected at transects 002A, 003A, 003B, 004A, 006A, and 006B.

7) Trails and bedding were detected only at 003A in 2005 (Table 2). In past monitoring years, trails and bedding were detected at transects 002A, 003A, 003B, 004A, 004B, 006A, 006B, and 016A.

Off-highway vehicle use

8) Tracking and trailing through population areas by OHVs was not detected at any transects in 2005 (Tables 2 and 3). No transects had OHV use detected within 100 m in 2005. In past monitoring years, OHV use was detected at 003A and within 100 m of transects 003B, 004B, 006B, 007A, 009A, and 014A.

Recreation

9) Human trails were detected at 4 transects in 2005: 009A, 010A, 011A, and 011B (Tables 2 and 3). Human trails were also detected within 100 m of transects 002A, 003A, 004A, 007A, 009A, 010A, 011A, 011B, 013A, 014A, and 016A. In past monitoring years, human trails were also detected at transects 001A, 003A, 004A, 004B, 005A, 007A, and 013A; and within 100 m of 004B, 011A, 016B, 019A, and 021A.

10) Campsite impacts with trampled or missing vegetation were detected at 3 transects in 2005: 009A, 010A, and 011A (Tables 2 and 3). Campsite impacts with trampled or missing vegetation were also detected within 100 m of 002A, 007, 009A, 010A, 011B, and 013A, 014A, and 016A. In past monitoring years, campsite impacts with trampled or missing vegetation were also detected at transects 006B and 013A; and within 100 m of 011A, 016B, and 019A.

Other human ground disturbance

11) Roads, houses, excavation, filling, heavy equipment were not detected at any of the 22 transects monitored in 2005 (Tables 2 and 3). Roads, houses, excavation, filling, and/or heavy equipment were detected within 400 m of transects 001A, 004A, 006A, 006B, and 007A. In past monitoring years, roads, houses, excavation, filling, and/or heavy equipment were also detected at transects 003A; and within 400 m of transects 002A, 003B, 009A, 010A, 011A, 011B, 018A, 019A, and 022A. These disturbances did not necessarily go away at these transects, so methodology should be re-evaluated to insure greater consistency.

Fire

12) Wildfire, human or naturally caused was not detected at or within 100 m of any of the 22 transects in 2005 (Tables 2 and 3). In past monitoring years, wildfire was only detected at transect 006A.

Confirmed mortality

13) Herbicide spraying, human harvest, disease, or other mortality causes of Ute ladies'-tresses were not detected at any of the 22 transects monitored in 2005, nor in any previous monitoring year (Table 2).

Wildlife activity

14) Ungulate bedding, trampling, trails, grazing, and shrub browsing and/or beaver wood cutting, trailing, and piling were detected at 15 transects in 2005: 001A, 002A, 003B, 004A, 005A, 006A, 006B, 006C, 007A, 009A, 010A, 013A, 016A, 017A, and 021A (Table 2). In past monitoring years, wildlife activity was also detected at transects 003A, 004B, 011A, 011B, 014A, 016B, 018A, and 019A.

Vegetation succession

15) Competition by tall or invasive forbs (other than noxious weeds) was detected at 17 transects in 2005: 002A, 003A, 003B, 004A, 006A, 006B, 006C, 009A, 011A, 011B, 013A, 014A, 016A, 016B, 017A, 019A, and 021A (Table 2). An increase in tall and invasive forb cover was not detected at any transect in 2005. In past monitoring years, competition by tall or invasive forbs was also detected at 004B, 005A, 007A, 010A, and 018A.

16) Competition by shrubs and trees was detected at all 22 transects monitored in 2005: 001A, 002A, 003A, 003B, 004A, 005A, 006A, 006B, 006C, 007A, 009A, 010A, 011A, 011B, 013A, 014A, 016A, 016B, 017A, 018A, 019A, 021A, and 022A (Table 2). Transects 005A, 006B, 007A, 011A, 011B, 014A, 016A, and 016B had the greatest increases in shrub and tree cover since 2001.

Alteration of floodplain

17) Levees, rip-rapping, culverts, bridges, causeways, diversions, or other development that alters the hydrology or fluvial geomorphology of the river were detected at 5 transects in 2005: 001A, 003A, 005A, 006C, and 007A (Table 3). In past monitoring years, such development structures were also detected at 003B, 006A, 006B, 018A, 019A, and 022A. These disturbances did not necessarily go away at these transects, so methodology should be re-evaluated to insure greater consistency.

Population information

18) Population tally: There was no plant observed at transects 003A, 004A, 005A, and 010A (Table 2). The following transects had a total of 1-10 plants observed: 001A 006A, 006C, 007A, 009A, 013A, 016A, 017A, 018A, and 019A. Transects 006B and 021A each had a total of 11-24 plants observed. Transects with >24 plants observed were: 003B, 011A, 011B, 014A, and 016B.

19) Exclosures, fences, or other measures present that protect Ute ladies'-tresses from livestock, OHVs, weeds, recreation, or other impacts: Biocontrol treatments had been applied in the in the general area of all transects except 014A, 016A, 016B, 017A, and 018A (Table 3). See Table 4 for more information about 2005 biocontrol treatments.

Summary by EO (as they are located downstream to upstream along the river)

EO 6 (006A; 006B; 006C)

There were 1,384 Ute ladies'-tresses plants counted within EO 6 in 2005 (Table 1, Figure 2). Fresh ungulate scat was observed on transect 006A, likely attributed to both elk (*Cervus elaphus*) and moose (*Alces alces*). Cattle feces deposited before 2005 were observed within transect 006A. Transect 006B had possibly been grazed during spring 2005. Canada thistle and bull thistle occurred within transects 006A, 006B, and 006C. Spotted knapweed, field sowthistle, reed canarygrass, and western hounds' tongue (*Cynoglossum occidentale*) also occurred near the 3 transects. Invasive and noxious weed cover was equal to or more than that observed in past years (Tables 2 and 3). In June 2005, the BLM released *Cassida rubiginosa* (Coleoptera: Chrysomelidae) insects within the EO in the Lorenzo Levee boat ramp area to treat Canada thistle (Table 4). The 3 transects are located near a great feeder canal with levees and ripraps on both sides of the river, indicating considerable alteration of the floodplain. A farm and road are located nearby.

EO 7 (005A; 007A)

There were 12 Ute ladies'-tresses plants observed within EO 7 in 2005, less than in previous years (Table 1, Figure 3). Of these, 1 plant was observed at Railroad Island, the first observation of plants since 2000. Canada thistle and smooth brome occurred at transects 005A and 007A. Field sowthistle, leafy spurge, and reed canarygrass also occurred at transect 007A. Musk thistle also occurred near transect 007A. Invasive and noxious weed cover was equal to or more than that observed in past years (Tables 2 and 3). In June 2005, the BLM released *Cassida rubiginosa* insects within the EO in the Sunnydell area to treat Canada thistle (Table 4). Silverberry density has increased at both transects since last visited in 2003. Transect 005A had no apparent human activities, but there is a levee nearby. Transect 007A had an older OHV trail nearby, but a fence had since been constructed to limit OHV access. The water level in the channel near transect 007A was apparently higher compared to previous years, even though loss of soil moisture was detected along the transect. Transect 007A also had human trails and campsites nearby (Table 2).

EO 1 (001A)

There were 9 Ute ladies'-tresses plants observed within EO 1 in 2005 (Table 1, Figure 4). Canada thistle, bull thistle, and field sowthistle occurred at transect 001A. Invasive and noxious weed cover was similar to observations in past years (Table 2). In August 2005, the BLM released *Cyphocleonus achates* (Coleoptera: Curculionidae) insects in the Heise area near EO 1 (Table 2). A campground and associated roads are located nearby. The EO area seemed drier than previous years. Giant helleborine (*Epipactis gigantea*), a native plant species of conservation concern, was discovered near transect

001A (Appendix H). Giant helleborine is treated as a sensitive species by the BLM, USFS, and the IDCDC (Idaho Conservation Data Center 2006).

EO 2 (002A; 003A; 003B; 009A; 010A; 011A; 011B; 013A; 021A; 022A)

There were 2,288 Ute ladies'-tresses plants observed within EO 2 in 2005 (Table 1; Figure 5). Canada thistle occurred at transects 003A, 003B, 010A, 011B, 013A, and 021A and near transects 002A and 009A. Field sowthistle occurred at transects 003A, 003B, 011A, 011B, and 021A and near transect 002A. Bull thistle occurred at transects 002A, 003A, 003B, 009A, and 010A. Leafy spurge occurred at transect 010A and near transect 009A. Reed canarygrass occurred at transects 002A, 003A, 009A, 010A, 011A, 011B, and 021A. Quackgrass occurred at transect 011A and 011B; smooth brome occurred at transects 009A and 011B; and common tansy occurred at transect 003A. Spotted knapweed occurred at transect 009A and near transects 003A, 003B, 013A, and 021A. Diffuse knapweed occurred near transect 009A. Musk thistle occurred near transects 003A, 003B, 013A, and 021A. Invasive and noxious weed cover was lower than previous years at transect 003A. Invasive and noxious weed cover was higher at transects 009A, 011B, and 021A, and similar to previous years at the remaining transects (Tables 2 and 3). In June 2005, the BLM released *Larinus minutus* (Coleoptera: Curculionidae) and *Cassida rubiginosa* insects to treat spotted knapweed and Canada thistle insects, respectively, at Table Rock Canyon (Table 4). Recent alluvial deposition had occurred at transects 010A and 011A (Table 2). Campsites, fire rings, and trails were located near transects 002A, 003A, 009A, 010A, and 011B. Toilet paper was found at transect 010A. Small amounts of recent cattle grazing sign was observed at transect 003A, and possibly at 002A. In 2005, the USFS built a fence to exclude cattle from the area around transect 002A. Sweetgrass (*Hierochloe odorata*), a native plant species of conservation concern tracked by the IDCDC, was discovered at and near transects 011A and 013A (Appendix H).

EO 14 (014A; 016A; 016B; 017A; 018A)

There were 695 Ute ladies'-tresses plants observed within EO 14 in 2005 (Table 1; Figure 6). Canada thistle and bull thistle occurred at transects 014A, 016A, 016B, and 017A. Field sowthistle occurred at 014A, 016B, and 017A. Quackgrass occurred at transect 014A and reed canarygrass was at 016B. Western hounds' tongue was found near transect 018A. Invasive and noxious weed cover was similar to 2003 at transects 014A, 016A, 016B, and 018A; and higher at 017A (Tables 2 and 3). In 2005, the BLM did not release biocontrol insects in EO 14 (Table 4). Transects 014A and 016A both had a campsite with associated human trails (Table 2). Transect 014A has not had cattle grazing for 4 years because the BLM permittee has chosen not to graze the area. Sweetgrass was also discovered near transect 017A (Appendix H).

EO 4 (004A; 004B; 019A)

There were 7 Ute ladies'-tresses plants observed within EO 4 in 2005, including 1 plant in a new location at Falls Campground (Table 1; Figure 7). Canada thistle and bull thistle occurred at both transects 004A and 019A. Field sowthistle occurred at 019A; and smooth brome and reed canarygrass occurred at 004A (Table 2). In June 2005, the BLM released *Larinus minutus* insects to treat spotted knapweed in the Irwin area

(Table 4). Transect 004A is partially located in an exclosure near Falls Campground. The USFS built another exclosure to exclude cattle from the new location of Ute ladies'-tresses found at Falls Campground.

DISCUSSION

In 2005, the most common threats to Ute ladies'-tresses recorded at the transect scale were: invasive and noxious weeds, shrub and tree encroachment, and loss of soil moisture (Table 2). The most common threats recorded at the landscape scale in 2005 were invasive and noxious weeds, recreation (human trails and campsite impacts), and other human-caused ground disturbance (roads, houses, excavation, filling, etc. (Table 3). Few definite livestock grazing impacts was recorded at transects in 2005, and none were severe. No evidence of wildfire was observed at or near any transects. In addition, other human-caused ground disturbance and Ute ladies'-tresses mortality was not observed in 2005 at the transect scale. Tall and invasive forb competition and wildlife activity were both widespread at the transect scale. However, tall and invasive forb cover was lower than or similar to previous years; and wildlife activity was also similar to previous years.

OHV use was not detected at the transect or landscape scale in 2005, an improvement since 2001 and 2003. In 2004, the BLM and IDCDC observed damage to occupied habitat caused by OHV use at the mainland portion of EO 6 (Annis Island). In response, the BLM implemented a motorized vehicle closure for the affected area that is still being enforced (Fertig et al. 2005; W. Velman, BLM, personal communication). In 2006, the BLM also revisited BLM land on the Snake River near the Fort Hall Indian Reservation, after its discovery there in 2005. No new Ute ladies'-tress tresses locations were discovered and there were only small amounts of marginal habitat (W. Velman, BLM, personal communication).

Noxious and invasive weeds

Noxious and invasive weeds were present at 21 of the 22 transects monitored in 2005, similar to prior years. Noxious and invasive weed colonization and invasion is one of the most widespread threats to Ute ladies'-tresses on the South Fork Snake River (Tables 2 and 3). EO 14 was the only BLM-managed EO where the BLM did not release biocontrol agents in 2005 (Table 4), although they were released at EO 14 in 2004 (W. Velman, BLM, personal communication). EO 14 was the EO with the largest proportion of transects (80%; n=5) with the greatest increase in noxious and invasive weed cover (014A, 016A, 016B, and 017A; Table 2). EO 14 would benefit from future releases of biocontrol agents to control noxious and invasive weeds. Additional high priority areas for biocontrol agent releases are transects 001A (EO 1); 006B (EO 6); 005A (EO7); and 002A, 009A, 011B, 013A, and 021A (EO 2).

Traditional weed management strategies (e.g. herbicides) are detrimental to Ute ladies'-tresses and its pollinators (Sipes and Tepedino 1995, Fertig et al. 2005). It is particularly challenging to manage noxious and invasive weeds because Ute ladies'-tresses' primary pollinator, bumblebees (*Bombus* spp.; Hymenoptera: Apidae), are negatively affected by herbicides throughout the entire growing season (Sipes and Tepedino 1995). Noxious and invasive weeds are the most widespread threat to Ute

ladies'-tresses not only in Idaho, but also rangewide (Fertig et al. 2005). Biocontrol agents are one of the best tools available to control weeds without detrimentally affecting Ute ladies'-tresses or its pollinators. The BLM has been proactive by using biocontrol agents to control noxious and invasive weeds in and near habitat occupied by Ute ladies'-tresses. In 2005, the BLM released biocontrol agents at nearly all Ute ladies'-tresses EOs that occur on BLM-managed lands on the South Fork Snake River.

Shrub and tree competition

Shrub and tree competition primarily was attributed to silverberry, narrowleaf willow, and narrowleaf cottonwood cover increasing in occupied Ute ladies'-tresses habitat. Since 2001, shrub and tree cover has increased at transects 005A, 006B, 007A, 011A, 011B, 014A, 016A, and 016B. Notes recorded in 2005 indicated that shrub and tree cover had also increased at transect 002A. In addition, notes recorded in 2006 mentioned that silverberry had grown to over 4 m tall from 1 to 1.5 m tall during the previous year at transect 007A. In 2006, transects 003A, 003B, and 019A also appeared to have higher silverberry cover since 2005 (W. Velman, BLM, personal communication).

Ute ladies'-tresses is adapted to growing in open to partially shaded habitats that sustain frequent flooding. In the absence of flooding or other surrogate disturbances, shrubs and trees are able to grow until formerly suitable Ute ladies'-tresses habitat becomes too shady for its continued persistence. Vegetation succession through shrub and tree encroachment is a common threat to Ute ladies'-tresses' persistence across its range, particularly in Colorado and Idaho (Arft 1995, Murphy 2001*b*, Fertig et al. 2005). Flooding is a spatially stochastic disturbance that affects some areas more than others, hypothetically creating suitable habitat for Ute ladies'-tresses while currently occupied habitat progressively becomes less suitable over time (Hauer et al. 2004). If suitable habitat is created at the same rate as occupied habitat becomes unsuitable, Ute ladies'-tresses may not be negatively affected as long as it colonizes the new suitable habitats (U.S. Fish and Wildlife Service 1995). However, shrub and tree encroachment will negatively affect the persistence of Ute ladies'-tresses if new suitable habitat is not created through flood events and/or if Ute ladies'-tresses is unable to colonize to new suitable habitats (e.g. due to fragmentation of its riparian corridors).

Recreation

The South Fork Snake River is a popular recreation area for angling, boating, camping, and other uses, with high levels of visitor use every year. In 2005, human trails and/or campsite impacts were detected at 4 transects (009A, 010A, 011A, and 011B), all within EO 2 (Table 2). Human trails and/or campsite impacts occurred within 100 m of 11 transects, or 50% of all transects in 2005 (002A, 003A, 004A, 007A, 009A, 010A, 011A, 011B, 013A, 014A, and 016A; Table 3). Recreation use is a threat to Ute ladies'-tresses through humans trampling and compacting vegetation and substrate, defecating, building fire rings, etc., particularly at EO 2. The BLM has been proactive in managing recreation use on the South Fork Snake River by requiring overnight campers between Conant Boat Access to Lufkin Bottom to carry an approved portable-toilet system and use designated camping areas. The BLM regularly patrols the South Fork Snake River during high visitor use months of July and August to implement its

regulations. In addition, the BLM has been educating the public about river ethics and "leave no trace" practices on free maps and brochures, visitor kiosks, and signage.

Loss of soil moisture

Soil moisture was measured by estimating mesic graminoid cover, of which high levels are typically associated with optimal Ute ladies'-tresses habitat (Murphy 2001*a*). A decrease in mesic graminoid cover may indicate that the subpopulation is becoming drier. Fifty-five percent of all transects, affecting all 6 EOs, sustained a loss of soil moisture (Table 2). Although this percentage is similar or lower than previous years, these results imply that loss of soil moisture is common within occupied habitat along the South Fork Snake River. The loss of soil moisture may result in lessening suitability of currently occupied habitat, with potentially similar repercussions as shrub and tree encroachment.

Other human-caused ground disturbance (roads, houses, excavation, filling, etc)

Other human-caused disturbances (e.g. roads, houses, excavation, filling, heavy equipment use, fire fighting) were not detected at any transect in 2005. However, 23% of the transects had one of these human-caused disturbances within 400 m (001A, 004A, 006A, 006B and 007A; Tables 2 and 3). These disturbances indicate the encroachment of development and associated fragmentation that could negatively alter the flow of pollinators, seeds, and water for Ute ladies'-tresses. In addition, these disturbances contribute to hydrological change, pollution and sediment runoff, and acceleration of invasive and noxious weed colonization and expansion (Fertig et al. 2005). The BLM has prioritized gaining ownership or conservation easements of private lands along the South Fork Snake River likely to be subdivided or developed.

MONITORING RECOMMENDATIONS

The methodology used for Ute ladies'-tresses monitoring does not lend itself to statistical analyses, which would be useful for assessing trends (e.g. greater power in detecting increased noxious weed cover). However, we now have used the current monitoring methodology for 4 years, providing a useful dataset because of its longevity. We recommend modifying the current methodology so that the data collected can be more useful for analyses. In addition, the modifications should be applied so that the data can be seamlessly interpreted across all sampling years. We recommend the following modifications to the Habitat Monitoring Checklist (Appendix A):

- Record each introduced plant species and its cover class. The number of cover classes should be increased while maintaining the current cover class breaks for attributes 4 and 15 (Appendix A). Increasing the number of cover classes improve the data for detecting change in introduced plant species abundance. Continuing the currently used cover class breaks (0, 10, 30, and 50%) will ensure comparisons with past monitoring years can still be made.
- Separate attribute 5 so that livestock hoof prints and scat piles are recorded separately. If there are <10 livestock hoof prints and scat piles, the absolute number should be recorded. In addition, the season of livestock use should be recorded. Livestock use effects to Ute ladies'-tresses appear to be mixed,

although potentially dependent upon season of livestock use. Researchers have observed that summer livestock use reduced Ute ladies'-tresses flowering and fruit production (Arft 1995, Fertig et al. 2005). However, winter livestock use in Colorado appeared to indirectly benefit Ute ladies'-tresses by reducing the cover of competing vegetation (Fertig et al. 2005).

- Change attribute 16 so that each woody species and its cover are recorded. Again, the cover classes should be changed so that there are more cover classes and that the currently used cover class breaks (0 and 10%) are incorporated into the modified cover classes.
- Record the absolute number of reproductive Ute ladies'-tresses plants for attribute 18. In addition, record the number of plants by life stage, including both vegetative and reproductive plants. Past studies have determined that the number of flowering Ute ladies'-tresses is not a representative indication of abundance. However, counting vegetative, flowering, and fruiting individuals does reflect comparatively accurate abundance (Arft 1995, Heidel 2001, Fertig et al. 2005).

Most modifications would improve the data quality of attributes that represent the most imminent, manageable threats to Ute ladies'-tresses (e.g. introduced plant species, shrub and tree encroachment). Increasing the number of cover classes and recording each plant species would improve data analyses capabilities. The time required to monitor each transect may increase with the recommended additions. Several of these additions are already recorded, albeit inconsistently (e.g. abundance, noxious weed species cover), so time would likely not increase substantially.

MANAGEMENT IMPLICATIONS

In 2005, the primary threats to Ute ladies'-tresses along the South Fork Snake River were: noxious and invasive weeds, shrub and tree encroachment, loss of soil moisture, recreation, and other human-caused disturbances. The BLM and USFS have been proactive in addressing most of these threats, by releasing biocontrol agents at most EOs; regulating, educating, and patrolling recreation activities; building exclosures and fences; and prioritizing land acquisition and conservation easement agreements.

Based on the 2005 monitoring results, we recommend the BLM prioritizes the release of biocontrol agents at EOs 2, 7, and 14. We also recommend that the BLM continues its prioritization of recreation management at EO 2. We recommend that shrub and tree encroachment and loss of soil moisture continue to be assessed through monitoring, although we will not suggest specific management actions for addressing these threats due to their intrinsic ecological complexity. Prescribed treatments for reducing shrub and tree encroachment (e.g. using fire, livestock browsing, mechanical harvesting or pruning, etc.) have an unknown effectiveness and may have more negative than beneficial impacts to Ute ladies'-tresses (e.g. accelerating noxious and invasive weed growth). Both shrub and tree encroachment and loss of soil moisture are threats that are associated with hydrological change, possibly associated with the manipulation of water flows at Palisades Dam (U.S. Bureau of Reclamation 2004, Fertig et al. 2005).

In 2004, the U.S. Bureau of Reclamation (BOR) evaluated the effects of its proposed actions for Palisades Dam operation on Ute ladies'-tresses in Idaho. The BOR concluded that Ute'-ladies tresses will likely be slightly adversely affected by the suppression of avulsion and erosion processes on the South Fork Snake River (U.S. Bureau of Reclamation 2004). This biological assessment by the BOR was approved by the U.S. National Marine Fisheries Service and USFWS in March 2005 and will be valid through 2035. Future Ute ladies'-tresses monitoring should take potential effects of BOR actions into consideration when evaluating results.

Monitoring Ute ladies'-tresses along the South Fork Snake River provides information useful for managing its habitat. Effectively managing Ute ladies'-tresses depends upon detecting and responding to threats, particularly the most manageable threats (e.g. recreation). Continued responsive management by the BLM and USFS is important to Ute ladies'-tresses and its long-term persistence.

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Table 1. Abundance of Ute ladies'-tresses EOs along the South Fork Snake River, Idaho (1996-2006).

EO #	Subpopulation #	Subpopulation name	1996 (n=4)	1997 (n=20)	1998 (n=19)	1999 (n=20)	2000 (n=20)	2001 (n=20)	2002 (n=19)	2003 (n=20)	2004 (n=18)	2005 (n=19)	2006 (n=12)
6	6	Annis Island	----	35	2036	1917	726	2557	306	2006	245	1384	235
	8	Lorenzo Levee	----	1	----	----	----	----	----	----	----	----	----
		TOTAL	**----**	**36**	**2036**	**1917**	**726**	**2557**	**306**	**2006**	**245**	**1384**	**235**
7	15	Archer Powerline	----	145	----	----	----	----	----	----	----	----	----
	7	Twin Bridges Island	----	160	108	99	43	36	14	15	0	11	2
	5	Railroad Island	----	9	14	42	17	0	0	0	----	1	----
		TOTAL	----	**314**	**122**	**141**	**60**	**36**	**14**	**15**	**0**	**12**	**2**
1	1	Kelly's Island	12	22	30	30	15	19	15	10	6	9	5
		TOTAL	**12**	**22**	**30**	**30**	**15**	**19**	**15**	**10**	**6**	**6**	**6**
2	9	Mud Creek Bar	----	9	32	71	63	16	20	25	3	9	1
	2	Rattlesnake Point	15	4	23	26	0	19	68	1	38	151	6
	10	TNC Island	----	9	9	118	21	17	13	7	0	0	----
	3	Warm Springs	173	301	80	476	942	522	538	502	1560	1654	----
	22	Black Canyon	----	----	----	50	42	507	236	262	247	309	----
	11	Lufkin Bottom	----	61	96	224	494	184	309	514	261	129	101
	12	Gormer Canyon #5	----	10	0	1	0	0	0	0	0	----	0
	13	Gormer Canyon #4	----	10	11	12	7	7	----	9	10	5	----
	21	Gormer Canyon #3	----	----	8	59	30	76	47	50	79	31	17
		TOTAL	**188**	**404**	**259**	**1037**	**1599**	**1348**	**1231**	**1370**	**2198**	**2288**	**125**
14	14	Pine Creek #5	----	6	14	30	47	24	24	74	120	88	----
	16	Pine Creek #3 & #4	----	18	113	200	103	118	121	353	899	594	615
	17	Lower Conant Valley	----	127	0	40	23	12	12	0	15	4	----
	18	Upper Conant Valley	----	61	15	5	5	1	0	3	0	9	0
		TOTAL	**----**	**212**	**142**	**275**	**178**	**155**	**157**	**430**	**1034**	**695**	**615**
4	19	Lower Swan Valley	----	1	8	4	9	13	27	25	47	2	16
	4	Falls Campground	1	14	5	6	13	5	3	0	7	5	3
	20	Squaw Creek Islands	----	168	2	0	0	0	0	0	----	0	----
		TOTAL	**1**	**183**	**15**	**10**	**22**	**18**	**30**	**25**	**54**	**7**	**19**
		GRAND TOTAL	**201**	**1171**	**2604**	**3410**	**2600**	**4133**	**1753**	**3856**	**3537**	**4392**	**1002**

Table 2. Mean values for habitat attributes calculated for all sample blocks at each transect. Attributes correspond with the "Ute ladies'-tresses habitat monitoring checklist" (Appendix A).

Transect name (number)	EO	Year	Transect Length (m)	Direct Changes/Threats												Indirect Changes			Cumulative mean of transect (tot./16/n)
				Hydrologic & Fluvial Geomorphic Change		Invasive & Noxious Weeds	Livestock Grazing Impacts			OHV Use	Recreation		Other Human Ground Disturb.	Fire	Mortality	Wildlife Activity	Vegetation Succession		Popn. Info.	
				2) Deposition	3) Loss of soil moisture	4) Invasion & colonization by weedy species	5) Hoofprints & scat piles	6) Forage utilization	7) Trails & bedding	8) Tracking & trailing	9) Human trails	10) Campsite impacts	11) Roads, houses, excavation, filling, etc.	12) Wildfire	13) Herbicide spraying or other mortality	14) Ungulate bedding, trails, browsing; beaver	15) Competition by tall & invasive forbs	16) Competition by shrubs & trees	18) Population tally	
Kelly's Island (001A)	1	2001	25	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	1.0	2.8	**0.40**
		2002		0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.3	0.0	0.9	2.8	**0.41**
		2003		not monitored																
		2005		0.0	0.1	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.9	3.0	**0.40**
Rattlesnake Point (002A)	2	2001	30	0.5	0.2	1.5	1.0	1.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.0	1.8	2.5	**0.68**
		2002		0.3	0.1	1.2	0.2	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.1	1.7	2.2	**0.54**
		2003		0.0	0.3	1.3	1.1	0.8	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.5	2.0	3.0	**0.73**
		2005		0.0	0.0	1.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.1	1.8	2.1	**0.47**
Warm Springs Bottom (003A)	2	2001	25	0.0	0.0	1.1	0.9	0.8	0.9	0.0	0.5	0.0	0.3	0.0	0.0	0.4	1.2	1.7	2.6	**0.65**
		2002		0.0	0.0	1.0	0.2	0.0	0.3	0.1	0.2	0.0	0.0	0.0	0.0	2.0	0.0	1.7	2.3	**0.49**
		2003		0.0	0.0	1.0	0.7	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.3	1.4	2.8	**0.52**
		2005		0.0	0.4	0.7	0.9	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.1	3.0	**0.46**
Warm Springs Bottom (003B)	2	2001	40	0.0	0.0	0.9	1.0	0.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.9	1.6	**0.39**
		2002		0.0	0.0	0.7	1.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1.3	0.8	1.6	**0.41**
		2003		0.0	0.1	0.6	1.4	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.8	2.3	**0.48**
		2005		0.0	0.1	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.0	0.5	1.5	**0.31**
Falls Campground (004A)	4	2001	35	0.1	0.2	0.4	0.6	0.2	0.7	0.0	0.1	0.0	0.0	0.0	0.0	0.4	0.4	1.9	2.9	**0.50**
		2002		0.1	0.1	0.6	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.9	1.9	3.0	**0.48**
		2003		not monitored																
		2005		0.1	0.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	2.0	3.0	**0.41**

Table 2 (continued).

Transect name (number)	EO	Year	Transect Length (m)	Direct Changes/Threats													Indirect Changes			Cumulative mean of transect (tot./16/n)
				Hydrologic & Fluvial Geomorphic Change		Invasive & Noxious Weeds	Livestock Grazing Impacts			OHV Use	Recreation		Other Human Ground Disturb.	Fire	Mortality	Wildlife Activity	Vegetation Succession		Popn. Info.	
				2) Deposition	3) Loss of soil moisture	4) Invasion & colonization by weedy species	5) Hoofprints & scat piles	6) Forage utilization	7) Trails & bedding	8) Tracking & trailing	9) Human trails	10) Campsite impacts	11) Roads, houses, excavation, filling, etc.	12) Wildfire	13) Herbicide spraying or other mortality	14) Ungulate bedding, trails, browsing; beaver	15) Competition by tall & invasive forbs	16) Competition by shrubs & trees	18) Population tally	
Falls Campground (004B)	4	2001	20	1.0	0.5	1.4	0.3	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.9	0.6	1.4	2.8	**0.61**
		2002		1.0	0.6	1.4	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.9	0.8	1.1	2.8	**0.56**
		2003		0.5	0.8	1.8	0.8	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.8	1.8	3.0	**0.71**
		2005		not monitored																
Railroad Island (005A)	7	2001	20	0.8	0.8	1.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	1.5	3.0	**0.47**
		2002		0.3	0.0	1.6	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	1.0	0.8	1.8	3.0	**0.53**
		2003		not monitored																
		2005		0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	2.0	3.0	**0.47**
Annis Island (006A)	6	2001	40	0.0	0.0	0.3	1.0	0.1	0.4	0.0	0.0	0.0	0.0	0.8	0.0	0.3	1.3	1.8	2.3	**0.51**
		2002		0.0	0.0	0.2	1.0	0.4	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.8	1.8	2.4	**0.46**
		2003		0.0	0.0	0.1	1.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.7	1.3	1.8	2.2	**0.46**
		2005		0.0	0.1	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.5	1.9	2.8	**0.46**
Annis Island (006B)	6	2001	30	0.0	0.0	0.9	1.7	0.0	0.1	0.0	0.0	0.5	0.0	0.0	0.0	0.0	1.1	0.5	2.2	**0.43**
		2002		0.0	0.0	0.8	1.0	1.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.6	2.9	**0.51**
		2003		0.0	0.1	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.0	2.6	**0.38**
		2005		0.0	0.0	1.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.2	1.3	2.5	**0.44**
Annis Island (006C)	6	2001	30	not monitored																
		2002		0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.8	0.4	2.6	**0.30**
		2003		not monitored																
		2005		0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.2	0.4	2.8	**0.35**

Table 2 (continued).

Transect name (number)	EO	Year	Transect Length (m)	Direct Changes/Threats													Indirect Changes			Cumulative mean of transect (tot./16/n)
				Hydrologic & Fluvial Geomorphic Change		Invasive & Noxious Weeds	Livestock Grazing Impacts			OHV Use	Recreation		Other Human Ground Disturb.	Fire	Mortality	Wildlife Activity	Vegetation Succession		Popn. Info.	
				2) Deposition	3) Loss of soil moisture	4) Invasion & colonization by weedy species	5) Hoofprints & scat piles	6) Forage utilization	7) Trails & bedding	8) Tracking & trailing	9) Human trails	10) Campsite impacts	11) Roads, houses, excavation, filling, etc.	12) Wildfire	13) Herbicide spraying or other mortality	14) Ungulate bedding, trails, browsing; beaver	15) Competition by tall & invasive forbs	16) Competition by shrubs & trees	18) Population tally	
Twin Bridges (007A)	7	2001	25	0.0	0.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3	1.5	2.1	**0.34**
		2002		0.0	0.4	0.6	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	1.0	0.0	1.8	2.4	**0.39**
		2003		not monitored																
		2005		0.0	0.3	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	2.0	2.9	**0.43**
Mud Creek Bar (009A)	2	2001	20	1.0	0.9	0.3	0.0	0.0	0.0	0.0	1.6	0.4	0.0	0.0	0.0	0.0	0.1	1.4	2.8	**0.53**
		2002		0.8	0.4	0.6	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.6	0.8	0.8	2.8	**0.45**
		2003		not monitored																
		2005		0.0	0.6	1.1	0.0	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.4	0.6	0.8	2.5	**0.40**
TNC Island (010A)	2	2001	25	0.0	0.4	1.2	0.0	0.0	0.0	0.0	0.8	0.2	0.0	0.0	0.0	0.0	0.3	0.8	2.7	**0.40**
		2002		0.0	0.1	1.3	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.6	2.8	**0.34**
		2003		0.0	0.3	1.4	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.4	0.2	0.8	3.0	**0.44**
		2005		0.3	0.3	1.5	0.0	0.0	0.0	0.0	1.1	0.5	0.0	0.0	0.0	0.3	0.0	0.7	3.0	**0.48**
Lufkin Bottom (011A)	2	2001	50	0.0	0.4	1.5	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.6	0.7	2.1	**0.33**
		2002		0.0	0.2	1.5	0.0	0.0	0.0	0.0	0.7	0.3	0.0	0.0	0.0	0.8	0.8	0.9	1.5	**0.41**
		2003		0.0	0.3	1.5	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.3	0.8	0.9	1.4	**0.35**
		2005		0.2	0.3	1.7	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.7	1.0	2.1	**0.38**
Lufkin Bottom (011B)	2	2001	30	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.5	0.7	2.6	**0.30**
		2002		0.2	0.0	0.9	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.4	0.5	0.9	2.7	**0.39**
		2003		0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.7	1.0	0.6	2.5	**0.36**
		2005		0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.4	1.0	2.3	**0.34**

Table 2 (continued).

Transect name (number)	EO	Year	Transect Length (m)	Direct Changes/Threats													Indirect Changes			Cumulative mean of transect (tot./16/n)
				Hydrologic & Fluvial Geomorphic Change		Invasive & Noxious Weeds	Livestock Grazing Impacts			OHV Use	Recreation		Other Human Ground Disturb.	Fire	Mortality	Wildlife Activity	Vegetation Succession		Popn. Info.	
				2) Deposition	3) Loss of soil moisture	4) Invasion & colonization by weedy species	5) Hoofprints & scat piles	6) Forage utilization	7) Trails & bedding	8) Tracking & trailing	9) Human trails	10) Campsite impacts	11) Roads, houses, excavation, filling, etc.	12) Wildfire	13) Herbicide spraying or other mortality	14) Ungulate bedding, trails, browsing; beaver	15) Competition by tall & invasive forbs	16) Competition by shrubs & trees	18) Population tally	
Gormer Canyon #4 (013A)	2	2001	20	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.6	0.0	1.8	2.6	**0.36**
		2002		not monitored																
		2003		0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.8	0.1	0.0	0.0	0.0	1.0	0.4	2.0	2.6	**0.48**
		2005		0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.1	2.0	2.5	**0.40**
Pine Creek #5 (014A)	14	2001	30	0.1	1.0	0.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	1.4	2.7	**0.41**
		2002		0.0	0.2	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5	2.0	2.5	**0.42**
		2003		0.2	0.8	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.4	1.9	2.2	**0.45**
		2005		0.0	0.7	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.9	2.1	**0.34**
Pine Creek #3 & #4 (016A)	14	2001	30	0.0	0.0	0.3	1.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.5	1.2	2.8	**0.45**
		2002		0.0	0.0	0.8	1.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.5	1.0	2.9	**0.49**
		2003		0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.7	1.3	2.9	**0.41**
		2005		0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	1.7	2.8	**0.36**
Pine Creek #3 & #4 (016B)	14	2001	40	0.0	0.8	0.8	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.3	1.1	2.6	**0.48**
		2002		0.0	0.0	1.1	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.9	1.1	2.4	**0.48**
		2003		0.0	0.1	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.4	1.3	2.0	**0.46**
		2005		0.0	0.2	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.9	1.6	**0.40**
Lower Conant Valley (017A)	14	2001	25	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.7	1.2	2.7	**0.37**
		2002		0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	2.8	**0.28**
		2003		not monitored																
		2005		0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	1.1	2.8	**0.28**

Table 2 (continued).

Transect name (number)	EO	Year	Transect Length (m)	Direct Changes/Threats													Indirect Changes			Cumulative mean of transect (tot./16/n)
				Hydrologic & Fluvial Geomorphic Change		Invasive & Noxious Weeds	Livestock Grazing Impacts			OHV Use	Recreation		Other Human Ground Disturb.	Fire	Mortality	Wildlife Activity	Vegetation Succession		Popn. Info.	
				2) Deposition	3) Loss of soil moisture	4) Invasion & colonization by weedy species	5) Hoofprints & scat piles	6) Forage utilization	7) Trails & bedding	8) Tracking & trailing	9) Human trails	10) Campsite impacts	11) Roads, houses, excavation, filling, etc.	12) Wildfire	13) Herbicide spraying or other mortality	14) Ungulate bedding, trails, browsing; beaver	15) Competition by tall & invasive forbs	16) Competition by shrubs & trees	18) Population tally	
Upper Conant Valley (018A)	14	2001	20	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.6	1.0	2.9	**0.35**
		2002		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.1	1.0	3.0	**0.32**
		2003		not monitored																
		2005		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.5	**0.28**
Lower Swan Valley (019A)	4	2001	25	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.6	1.8	2.6	**0.41**
		2002		0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.2	2.0	2.8	**0.39**
		2003		not monitored																
		2005		0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.0	2.9	**0.28**
Gormer Canyon #3 (021A)	2	2001	25	0.0	1.4	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.1	2.4	**0.49**
		2002		0.0	0.2	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.2	1.2	2.2	**0.47**
		2003		0.0	0.6	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.1	1.1	2.2	**0.49**
		2005		0.0	0.3	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.7	1.0	2.4	**0.28**
Black Canyon (022A)	2	2001	20	0.0	0.9	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	2.0	1.8	**0.43**
		2002		0.0	0.8	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.3	2.0	2.3	**0.56**
		2003		0.0	0.8	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.3	2.0	1.9	**0.53**
		2005		not monitored																
Total % of Transects Sampled With Value >0 in Category		2001 (n=23)		30	61	96	48	22	35	0	30	17	4	4	0	78	91	100		
		2002 (n=23)		26	44	96	35	13	26	4	39	4	0	0	0	96	83	100		
		2003 (n=15)		13	67	100	33	20	33	0	27	13	0	0	0	87	100	100		
		2005 (n=22)		14	55	95	23	0	0	0	18	14	0	0	0	68	77	100		

Table 3. Values for habitat attributes measured at the landscape scale at each transect. Attributes correspond with the "Ute ladies'-tresses habitat monitoring checklist" (Appendix A).

Transect name (number)	EO	Year	Direct Changes/Threats							Indirect Changes		Total (excluding Bank Erosion category)
			Hydrologic & Fluvial Geomorphic Change	Invasive & Noxious Weeds	OHV Use	Recreation		Other Human Caused Ground Disturbance	Fire	Alteration of Floodplain	Population Information	
			1) Bank Erosion (m to cutbank)	4) Invasion by noxious & invasive weeds	8) Tracking & trailing	9) Human trails	10) Campsite impacts	11) Roads, houses, excavation, filling, etc.	human or naturally caused	17) Levees, rip-rap, culverts, diversions, etc.	19) Exclosures, biocontrol, other protection	
Kelly's Island (001A)	1	2001	n/a	2	0	1	0	2	0	1	1	**7**
		2002	n/a	2	0	1	0	2	0	1	1	**7**
		2003	not monitored									
		2005	n/a	2	0	0	0	1	0	1	1	**5**
Rattlesnake Point (002A)	2	2001	12.1	1	0	1	0	1	0	0	2	**5**
		2002	not meas.	0	0	1	1	1	0	0	2	**5**
		2003	9.8	0	0	0	1	1	0	0	2	**4**
		2005	n/a	1	0	1	1	0	0	0	1	**4**
Warm Springs Bottom (003A)	2	2001	n/a	2	0	1	0	2	0	1	2	**8**
		2002	n/a	2	1	2	0	2	0	2	2	**11**
		2003	n/a	2	0	2	0	2	0	2	1	**9**
		2005	n/a	1	0	1	0	0	0	1	1	**4**
Warm Springs Bottom (003B)	2	2001	n/a	1	0	0	0	1	0	1	2	**5**
		2002	n/a	1	1	0	0	0	0	1	2	**5**
		2003	n/a	2	0	0	0	0	0	1	1	**4**
		2005	n/a	1	0	0	0	0	0	0	1	**2**
Falls Campground (004A)	4	2001	n/a	0	0	2	0	2	0	0	0	**4**
		2002	n/a	1	0	2	0	2	0	0	0	**5**
		2003	not monitored									
		2005	n/a	1	0	1	0	1	0	0	1	**4**
Falls Campground (004B)	4	2001	n/a	2	1	1	0	0	0	0	0	**4**
		2002	n/a	2	0	1	0	0	0	0	0	**3**
		2003	n/a	2	0	1	0	0	0	0	0	**3**
		2005	not monitored									
Railroad Island (005A)	7	2001	n/a	1	0	0	0	0	0	1	2	**4**
		2002	n/a	2	0	1	0	0	0	0	2	**5**
		2003	not monitored									
		2005	n/a	2	0	0	0	0	0	1	1	**4**
Annis Island (006A)	6	2001	n/a	2	0	0	0	2	1	2	2	**9**
		2002	n/a	2	0	0	0	1	0	2	1	**6**
		2003	n/a	2	0	0	0	1	0	2	1	**6**
		2005	n/a	2	0	0	0	2	0	0	1	**5**
Annis Island (006B)	6	2001	n/a	2	1	0	1	2	0	2	2	**10**
		2002	n/a	1	0	0	0	1	0	2	1	**5**
		2003	n/a	2	0	0	0	1	0	2	1	**6**
		2005	7	2	0	0	0	2	0	0	1	**5**

Table 3 (continued).

Transect name (number)	EO	Year	Direct Changes/Threats							Indirect Changes		Total (excluding Bank Erosion category)
			Hydrologic & Fluvial Geomorphic Change	Invasive & Noxious Weeds	OHV Use	Recreation		Other Human Caused Ground Disturbance	Fire	Alteration of Floodplain	Population Information	
			1) Bank Erosion (m to cutbank)	4) Invasion by noxious & invasive weeds	8) Tracking & trailing	9) Human trails	10) Campsite impacts	11) Roads, houses, excavation, filling, etc.	human or naturally caused	17) Levees, rip-rap, culverts, diversions, etc.	19) Exclosures, biocontrol, other protection	
Annis Island (006C)	6	2001	not established in 2001									
		2002	n/a	2	0	0	0	0	0	2	2	**6**
		2003	not monitored									
		2005	n/a	2	0	0	0	0	0	2	1	**5**
Twin Bridges (007A)	7	2001	n/a	1	1	1	1	2	0	1	1	**8**
		2002	n/a	1	1	1	2	2	0	1	1	**9**
		2003	not monitored									
		2005	n/a	1	0	1	1	2	0	1	1	**7**
Mud Creek Bar (009A)	2	2001	1.9	1	2	2	2	1	0	0	2	**10**
		2002	1.6	1	1	1	1	0	0	0	1	**5**
		2003	not monitored									
		2005	1.3	2	0	1	1	0	0	0	1	**5**
TNC Island (010A)	2	2001	23.4	0	0	2	2	0	0	0	2	**6**
		2002	23.3	1	0	2	2	0	0	0	2	**7**
		2003	23.0	1	0	2	2	1	0	0	2	**8**
		2005	30.0	2	0	2	2	0	0	0	1	**7**
Lufkin Bottom (011A)	2	2001	n/a	1	0	1	1	1	0	0	2	**6**
		2002	n/a	2	0	2	2	0	0	0	2	**8**
		2003	n/a	2	0	2	2	0	0	0	2	**8**
		2005	not monitored								1	
Lufkin Bottom (011B)	2	2001	n/a	0	0	1	1	1	0	0	2	**5**
		2002	n/a	1	0	1	1	0	0	0	2	**5**
		2003	n/a	2	0	1	2	0	0	0	2	**7**
		2005	n/a	1	0	2	1	0	0	0	1	**5**
Gormer Canyon #4 (013A)	2	2001	not meas.	1	0	1	1	0	0	0	2	**5**
		2002	not monitored									
		2003	7.0	1	0	2	1	0	0	0	2	**6**
		2005	n/a	2	0	2	1	0	0	0	1	**6**
Pine Creek #5 (014A)	14	2001	n/a	0	1	1	1	0	0	0	2	**5**
		2002	n/a	1	0	1	1	0	0	0	2	**5**
		2003	n/a	1	0	1	1	0	0	0	2	**5**
		2005	n/a	1	0	1	1	0	0	0	1	**4**
Pine Creek #3 & #4 (016A)	14	2001	n/a	2	0	1	1	0	0	0	2	**6**
		2002	n/a	1	0	1	1	0	0	0	1	**4**
		2003	n/a	1	0	1	1	0	0	0	1	**4**
		2005	n/a	1	0	1	1	0	0	0	2	**5**

Table 3 (continued).

Transect name (number)	EO	Year	Direct Changes/Threats							Indirect Changes		Total (excluding Bank Erosion category)
			Hydrologic & Fluvial Geomorphic Change	Invasive & Noxious Weeds	OHV Use	Recreation		Other Human Caused Ground Disturbance	Fire	Alteration of Floodplain	Population Information	
			1) Bank Erosion (m to cutbank)	4) Invasion by noxious & invasive weeds	8) Tracking & trailing	9) Human trails	10) Campsite impacts	11) Roads, houses, excavation, filling, etc.	human or naturally caused	17) Levees, rip-rap, culverts, diversions, etc.	19) Exclosures, biocontrol, other protection	
Pine Creek #3 & #4 (016B)	14	2001	n/a	1	0	1	1	0	0	0	2	**5**
		2002	n/a	2	0	1	1	0	0	0	2	**6**
		2003	n/a	1	0	1	1	0	0	0	2	**5**
		2005	4.6	2	0	0	0	0	0	0	2	**4**
Lower Conant Valley (017A)	14	2001	n/a	1	0	0	0	0	0	0	2	**3**
		2002	n/a	0	0	0	0	0	0	0	2	**2**
		2003	not monitored									
		2005	n/a	1	0	0	0	0	0	0	2	**3**
Upper Conant Valley (018A)	14	2001	n/a	0	0	0	0	2	0	2	2	**6**
		2002	n/a	0	0	0	0	1	0	2	2	**5**
		2003	not monitored									
		2005	n/a	1	0	0	0	0	0	0	2	**3**
Lower Swan Valley (019A)	4	2001	30.5	0	0	0	0	2	0	2	2	**6**
		2002	31.2	0	0	1	1	1	0	1	2	**6**
		2003	not monitored									
		2005	n/a	1	0	0	0	0	0	0	1	**2**
Gormer Canyon #3 (021A)	2	2001	n/a	2	0	1	0	0	0	0	2	**5**
		2002	n/a	2	0	0	0	0	0	0	1	**3**
		2003	n/a	2	0	0	0	0	0	0	1	**3**
		2005	n/a	2	0	0	0	0	0	0	1	**3**
Black Canyon (022A)	2	2001	n/a	1	0	0	0	1	0	1	2	**5**
		2002	n/a	2	0	0	0	0	0	1	2	**5**
		2003	n/a	2	0	0	0	0	0	1	2	**5**
		2005	not monitored									
% of Transects Sampled With Value >0 in Category		2001 (n=23)		74	26	65	43	61	4	43	91	
		2002 (n=23)		83	17	65	43	39	0	39	91	
		2003 (n=15)		93	0	60	53	33	0	33	93	
		2005 (n=22)		100	0	45	36	23	0	23	100	

Table 4. Summary of habitat conditions, threats, and conservation actions accomplished in 2005, for Ute ladies'-tresses EOs on the South Fork Snake River, Idaho.

EO #	Subpopulation #	Subpopulation name	Habitat conditions, threats, and human activities (8/2005)	Conservation actions accomplished in 2005 and/or planned for 2006
6	6	Annis Island	Farm and road are nearby. Possibly grazed in spring. Canada thistle (*Cirsium arvense*), musk thistle (*Carduus nutans*), bull thistle (*Cirsium vulgare*), western hounds' tongue (*Cynoglossum occidentale*), and field sowthistle (*Sonchus arvensis*) are present; and leafy spurge (*Euphorbia esula*) and spotted knapweed (*Centaurea stoebe*) are on road.	06/29/2005: 4 releases of 420 *Cassida rubiginosa i*nsects to treat 5 ac of Canada thistle at Lorenzo boat ramp.
	8	Lorenzo Levee		
7	15	Archer Powerline	A few campsites are present. Canada thistle, bull thistle, musk thistle, western hounds' tongue, field sowthistle, and leafy spurge are present.	06/29/2005: 5 releases of 525 *Cassida rubiginosa* insects to treat 5-7 ac of Canada thistle in Sunnydell area.
	7	Twin Bridges Island		
	5	Railroad Island		
1	1	Kelly's Island	Canada thistle and field sowthistle are present.	08/09-10/2005: 5 releases of 530 *Cyphocleonus achates* insects to treat 5-8 ac of spotted knapweed in Heise area.
2	9	Mud Creek Bar	Recently used toilet paper, fire ring, campsites, and human trails observed at several sites through EO. Cattle grazed Warm Springs Bottom during 6/1 to 7/15. Cattle possibly grazed other areas in late spring or early summer. Canada thistle, musk thistle, bull thistle, common tansy (*Tanacetum vulgare*), field sowthistle, leafy spurge, and spotted knapweed are present.	06/21/2005: 1 release of 105 *Larinus minutus* insects to treat 2 ac of spotted knapweed; and 2 releases of 210 *Cassida rubiginosa* insects to treat 3 ac of Canada thistle at Table Rock Canyon. 6/2005: USFS built fence that prevents cattle from accessing Rattlesnake Point.
	2	Rattlesnake Point		
	10	TNC Island		
	3	Warm Springs		
	22	Black Canyon		
	11	Lufkin Bottom		
	12	Gormer Canyon #5		
	13	Gormer Canyon #4		
	21	Gormer Canyon #3		
14	14	Pine Creek #5	Campsite and slightly used social trail present. Canada thistle, western hounds' tongue, bull thistle, and field sowthistle are present.	N/A
	16	Pine Creek #3 & #4		
	17	Lower Conant Valley		
	18	Upper Conant Valley		
4	19	Lower Swan Valley	Campground road goes near EO. Canada thistle, bull thistle, and field sowthistle are present.	06/21/2005: 2 releases of 210 *Larinus minutus* insects to treat 3 ac of spotted knapweed in Irwin area. 2005: USFS found 1 plant in new location at Falls Campground and built fence to exclude cattle.
	4	Falls Campground		
	20	Squaw Creek Islands		

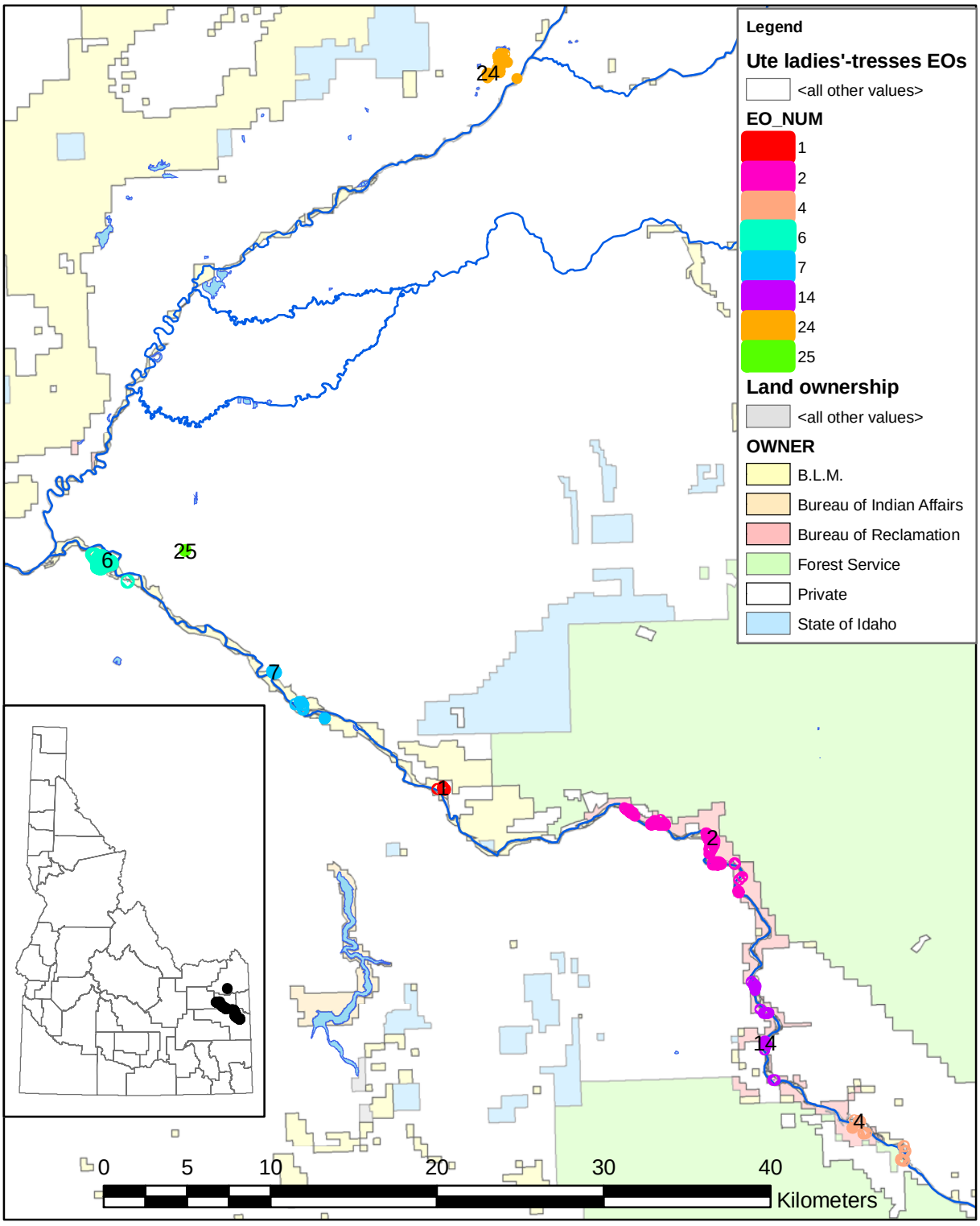

Figure 1. Map of Ute ladies'-tresses EOs in Idaho.

Figure 2. Map of Ute ladies'-tresses EO 6 and associated transects 006A, 006B, 006C (Annis Island). SPATIAL DATA NOT SHOWN.

Figure 3. Map of Ute ladies'-tresses EO 7 and associated transects 005A (Railroad Island) and 007A (Twin Bridges). SPATIAL DATA NOT SHOWN.

Figure 4. Map of Ute ladies'-tresses EO 1 and associated transect 001A (Kelly's Island). SPATIAL DATA NOT SHOWN.

Figure 5. Map of Ute ladies'-tresses EO 2 and associated transects 002 (Rattlesnake Point), 003A and 003B (Warm Springs Bottom), 009A (Mud Creek Bar), 010A (TNC Island), 011A and 011B (Lufkin Bottom), 013A (Gormer Canyon #4), 021A (Gormer Canyon #3), and 022A (Black Canyon). SPATIAL DATA NOT SHOWN.

Figure 6. Map of Ute ladies'-tresses EO 14 and associated transects 014A (Pine Creek #5), 016A and 016B (Pine Creek #3 and 4), 017A (Lower Conant Valley), and 018A (Upper Conant Valley). SPATIAL DATA NOT SHOWN.

Figure 7. Map of Ute ladies'-tresses EO 4 and associated transects 004A and 004B (Falls Campground) and 019A (Lower Swan Valley). SPATIAL DATA NOT SHOWN.