Wood River and North Fork sensitive plant surveys on Shoshone National Forest.

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February 2006

Abstract

The primary goals of this project were to provide a sensitive species survey and information baseline in the Wood River and North Fork study areas to use in planning potential prescribed burn/mechanical removal on Shoshone National Forest. Surveys were conducted during the 2004 and 2005 field seasons for six sensitive plant species of the U.S. Forest Service (USFS)-Rocky Mountain Region and all other Wyoming plant species of concern. In addition, all noxious weeds encountered during the survey were documented.

During the 2004 field season, 55 of 84 forest service management units were visited in the North Fork study area. The remaining 29 North Fork units were surveyed in 2005. In addition, 24 units in the Wood River study area were surveyed during 2005. Methods and results from 2004 surveys are discussed in the report, "North Fork sensitive plant surveys on Shoshone National Forest" (Taylor et al 2005). The following summary only highlights results and observations from the 2005 field season.

Surveys were conducted by Amy and Kevin Taylor during 28 days between 21 June-3 August, 2005. All sensitive plant and noxious weed data were recorded on field forms, topographic maps/orthophotos; through digital images; and electronically with data-loggers. Voucher specimens were also collected. Results from the Wood River and North Fork surveys are summarized in attachments (Excel spreadsheets). Results and observations by study area are also highlighted below.

Results will be incorporated into USFS management plans to avoid impacts to sensitive species. This work took place under contract to Wyoming Natural Diversity Database (WYNDD), through a cost-share agreement between the University of Wyoming and the Shoshone National Forest.

Citation:

Taylor, A., K. Taylor, B. Heidel and J. Handley. 2006. Wood River and North Fork sensitive plant surveys on Shoshone National Forest. Prepared for Shoshone National Forest, Cody, WY. Wyoming Natural Diversity Database, University of Wyoming, Laramie, WY.

Introduction

The North Fork of the Shoshone River study area has the highest concentration of endemic species for Wyoming among national forests of USFS Region 2 (Fertig 1998). The six Forest Service (USFS Region 2) sensitive plant species include three narrow state endemics, and two regional endemics (Table 1). The Wood River study area has potential habitat for some of the same species. This project was initiated to document the presence or absence of sensitive plant species, any other Wyoming rare plant species of concern (Keinath et al. 2003), and noxious weeds in the proposed management units.

Table 1. Sensitive Plant Species of the North Fork of the Shoshone River; also representing targets for the Wood River

Scientific Name	**Common Name**	**Range context**
Descurainia torulosa	Wyoming tansymustard	Narrow state endemic
Festuca hallii	Hall's fescue	Peripheral
Penstemon absarokensis	Absaroka beardtongue	Narrow state endemic
Pyrrocoma carthamoides var. *subsquarrosus*	Absaroka goldenweed	Regional endemic
Shoshonea pulvinata	Shoshonea	Regional endemic
Townsendia condensata var. *anomala*	North Fork Easter daisy	Narrow state endemic

The resulting dataset of rare plant records in the North Fork of the Shoshone River is particularly large and complex due to the nature of landscape complexity and high concentration of sensitive species. The pre-existing records for these species have also all been converted into the ArcView- and Oracle-based Biotics software used by WYNDD. Work continued in entering collection records of Erwin Evert, made in the North Fork study area (Taylor et al. 2005). The project results represent a model for integrating and presenting spatially complex data in areas of high biodiversity significance.

Study Area

The general study areas are in the Northern Absaroka Range along the Wood River (Greybull Ranger District), and the North Fork of the Shoshone River (Wapiti Ranger District) of Shoshone National Forest. The Wood River study area spans about36 mi ² at the lower reaches of the Wood River watershed for the Forest. The North Fork study area extends approximately 32 miles from Logan Mountain at the eastern end to the boundary with Yellowstone National Park at the western end, and from 1-7 miles on either side of the river (over 100 mi ²). Both areas span close to 5,000 feet in elevation; and the highest peaks are in the North Park area, exceeding 11,000 feet. The predominant surface geology material in the Wood River valley is mainly igneous rock of the Aycross, Wiggins and Willwood formations (Love and Christiansen 1985). The predominant surface geology material in the North Fork Valley is comprised of the Wapiti Formation (Love and Christiansen 1985). Many of the sensitive species are primarily restricted to substrates derived from this group of Absaroka volcanics.

All of the 24 proposed management units were surveyed in the Wood River study area. A total of 29 proposed management units were surveyed in the North Fork study area, representing all of the rest of the proposed management units that were not surveyed in 2004 (Taylor et al. 2005).

The digital management unit boundaries were available on printouts and digital form in the field. To a lesser extent, data were also collected in the course of accessing these units.

Survey methods were described in the previous study (Taylor et al. 2005). Documentation has been submitted to Shoshone National Forest, including PDA data, herbarium vouchers, digital photographs, field forms, processed and integrated data records, and shapefiles. Voucher specimens have been submitted to the Rocky Mountain Herbarium. Project files, including field notes and duplicate survey forms, are kept at WYNDD and the occurrence data is actively maintained.

Results and Discussion

The following information highlights results in the two study areas. All discrete locations where target species were documented are referred to as "places" for discussion purposes. They might also be referred to as colonies and they correspond with discrete shapefiles (point or polygon) in separate management units. Data on each colony was collected in the field for later determination whether they represent new or expanded occurrences (populations). The results are cross-referenced to the management units in Appendix A.

Wood River study area: 2005 Results

USFS Region 2 Sensitive Species:

Descurainia torulosa (Wyoming tansymustard): 10 places (9 found in management units).

Wyoming Natural Diversity Database (WYNDD) Species of Concern:

Botrychium minganense (Mingan moonwort): 1 place
Castilleja crista-galli (Cock's-Comb paintbrush): 2 places
(species of potential concern)

Noxious Weeds:

Cynoglossum officinale (Houndstongue): 1 place
Cirsium arvense (Canada thistle): 13 places
Cardaria spp. (Hoary cress/Whitetop): 1 place

General comments/observations:

Descurainia torulosa was documented in relative abundance in 9 management units on both the north and south sides of the Wood River. Prior to this survey, only one population was known from the study area. We were not able to relocate the population, which was originally documented as occurring in gravel bars along the confluence of Beaver Creek and Middle Fork of Wood River. Gravel beds are atypical habitat for *Descurainia torulosa*; however, it is possible that the species occurs in suitable cliff habitat found above the confluence.

In the Wood River study area, *Descurainia torulosa* is typically found on steep, sparsely vegetated, south-facing exposures growing at cliff bases, on ledges, in cliff crevices, and very commonly among rocks of volcanic talus slopes. Occurrences range from 7750-9600 feet elevation. Habitat is sparsely vegetated, but other common plant species found in the general area include *Phacelia hastata*, *Elymus spicatus*, *Leucopoa kingii*, *Ribes* spp. (including *Ribes cereum*), *Artemisia tridentata* (probably var. *vaseyana*); and *Angelica* sp., and *Artemisia michauxiana* at higher elevations. Aspen, Douglas-fir, and Rocky Mountain juniper are found occasionally.

Of significant interest, is the relatively large size of *Descurainia torulosa* populations. Particularly on the Wood River's north side, places with over 100 individuals were common. The largest subpopulation of 231+ individuals was found in management unit 19, between 9100-9200 feet. The plants were growing among the rocky rubble of a southeast-facing talus slope. The total population estimates in the Wood River study area, conservatively estimated at 600 plants, total more than have been found on all other known populations on national forests combined. More potential habitat for *D. torulosa* exists throughout the study area and the population sizes are most likely much higher than was documented.

Morphologically, individuals of *Descurainia torulosa* varied in size from less than 10 cm tall with a few stems to highly robust with multiple stems and branches and growing to 35+ cm tall. However, most individuals had the characteristic torulose, appressed fruits and overall gray-green appearance due to stellate hairs. Other *Descuraina* taxa (including *D. incana*) co-occur with *D. torulosa* in some areas. The species concept of *D. torulosa* remains in question. DNA sequencing studies have suggested that *D. torulosa* had genetic affinities with *D. incana* and should be considered a variety of the latter (Bricker and Brown 1998).

Descurainia torulosa would most likely not be affected by fire because of the lack of fuel in its habitat of sparsely vegetated cliffs and talus slopes. Other threats (grazing, recreation, etc.) are also minimal on these harsh cliff s and steep, shifting talus slopes. The Wood River occurrences of *D. torulosa* , however, are not as remote as those locations in the North Fork study area, and can be accessed in half a day.

Townsendia condensata var. condensata was found at three new places in the North Fork study area.

During the Wood River survey nine places of *Townsendia condensata* were encountered. Morphologically, Wood River individuals had characteristics that varied between var. *anomala* and var. *condensata*. Many had multiple heads typical of var. *anomala*, but often times the heads were larger (typical of var. *condensata*) than those found in the North Fork study area. In addition, many individuals had extended leaf bases, a characteristic not present on var. *anomala* individuals from the North Fork. Wood River specimens occupied similar habitats as those collected on the North Fork, but were found at higher elevations (more typical of var. *condensata*).

Varieties were determined after fieldwork. A visit to the Rocky Mountain Herbarium and discussion with botanist Hollis Marriott led to assigning var. *condensata* to all Wood River collections. Variety *anomala* is diploid and has a propensity to spin off polyploids, of which variety *condensata* could be a derivative (Hollis Marriott, personal communication). Thus, it seemed best to be conservative when assigning collections to var. *anomala*. Specimens from the North Fork undoubtedly fit var. *anomala*. Wood River specimens warranted a closer look. The suite of characters for the Wood River specimens aligned closer to var. *condensata* or an intermediate.

Botrychium minganense was documented in management unit 13 on the south side of Wood River. Located in mesic bottomland, most individuals were found growing beneath the shelter of small willows (*Salix* spp.) and in the company of the orchid *Spiranthes romanzoffiana*. *Botrychium minganense* occurs in an area that is away from trees and would most likely not be affected by fire or mechanical removal of trees.

Castilleja crista-galli was documented in management units 24 and 7. Both locations are heavily wooded and populations may be susceptible to fire. While this species is potentially affected by prescribed burn and other timber management practices, and is only known from Park County, the 2004-2005 surveys on the Shoshone National Forest have almost doubled the known number of occurrences (32 extant occurrences and 3 historical occurrences). It is found between 6500-9500 feet, and is sporadic over this wide range of elevations, usually in or near the prevailing Douglas-fir forests. It is being re-ranked as S3 and moved from the list of species of concern to the species of potential concern.

Other species of concern known from the area were surveyed, but not found, including:, *Arabis williamsii* var. *williamsii*, *Erigeron flabellifolius Pedicularis pulchella*, and *Potentilla subjuga*,. Most of these taxa occur in sub-alpine or alpine habitats, while most of the management units in the Wood River study area did not reach these elevations.

Noxious weeds: Houndstongue (*Cynoglossum officinale*), Canada thistle (*Cirsium arvense*), and whitetop/hoary cress (*Cardaria* spp.) were encountered along roads and banks of Wood River. Canada thistle was the most common, numbering over 100 stems in most places. No noxious weeds were found away from the major roads or river drainages.

North Fork study area: 2005 Results

USFS Region 2 Sensitive Species:

Townsendia condensata var. anomala (North Fork Easter daisy): 8 places
Penstemon absarokensis (Absaroka beardtongue): 4 places

Wyoming Natural Diversity Database (WYNDD) Species of Concern:

Castilleja crista-galli (Cock's-comb paintbrush): 8 places
(species of potential concern)
Castilleja nivea (Snow paintbrush): 1 place
(species of potential concern)

Noxious Weeds:

Cirsium arvense (Canada thistle): 5 places
Cirsium vulgare (Bull thistle): 4 places
Cardaria spp. (Hoary cress/Whitetop): 1 place
Centaurea repens (Russian knapweed): 1 place

General comments/observations:
Surveys on the North Fork were initiated in 2004. Another field season was warranted in 2005 to survey management units that were not visited previously due to time constraints and/or access. Three separate 3-day backpacking trips in 2005 facilitated surveys of remote and large management units near the Elk Fork and Green River drainages.

North Fork surveys in 2005 were conducted in late June and late July. Often, both *Penstemon absarokensis* and *Townsendia condensata* var. *anomala* were found in fruit. Although potential

habitat for *Lomatium attenuatum* and *Ipomopsis spicata* ssp. *robruthii* was encountered, both taxa have earlier flowering periods, making identification difficult during the 2005 field dates.

There were no new observations to report on *Penstemon absarokensis* and *Townsendia condensata* var. *anomala.* Habitat descriptions were similar to those found from the previous field season. It was useful to compare *Townsendia condensata* var. *anomala* collections from the North Fork with the *Townsendia* collections from the Wood River.

Castilleja crista-galli appears to be more widespread than known before the 2004 and 2005 field seasons. During 2005, 8 places were documented. Much more potential habitat exists on the North Fork forests. Fire could adversely affect this species in its forest habitat.

Castilleja nivea was documented once in the vicinity of Table Mountain. This species may also occur more frequently in montane grasslands than previously documented.

Noxious weeds were most common near roads, horse trails, structures, and drainages. Very few weeds, other than Canada thistle, were located in forest habitat. Based on the observations made during surveys, it appears that the horse trail along Elk Fork has the greatest potential for noxious weed proliferation. Russian knapweed and other noxious weeds occur along or near the trail. Noxious weeds are still among the greatest potential threats to each of the sensitive species and Wyoming species of concern in the North Fork and Wood River areas. The spread of drought-tolerant invasive species such as spotted knapweed (*Centaura maculosa*) and cheatgrass (*Bromus tectorum*) into dry, open slopes could be particularly severe. Their scarcity is testimony to concerted weed control efforts, which are integral to maintaining the unique endowment of endemic plant species on the Shoshone National Forest.

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Appendix A.

Plant Species Found During 2005 Wood River Plant Surveys
(June 27-July 21, 2005)

		USFS Target Species							WYNDD Species of Concern						Noxious Weeds							Comments
Management Unit	**Date Visited**		*Townsendia condensata* var. *anomala*	*Penstemon absarokensis*	*Descurainia torulosa*	*Shoshonea pulvinata*	*Festuca hallii*	*Pyrrocoma carthamoides* var. *subsquarrosa*		*Botrychium minganense*	*Castilleja crista-galli*	*Castilleja nivea*	*Ipomopsis spicata* ssp. *robruthii*	*Lomatium attenuatum*		Houndstongue - *Cynoglossum officinale*	Leafy Spurge - *Euphorbia esula*	Canada Thistle - *Cirsium arvense*	Bull Thistle - *Cirsium vulgare*	Musk Thistle - *Carduus nutans*	Whitetop - *Cardaria* spp.	Russian Knapweed - *Centaurea repens*	
Unit 21	6/28/2005																	X					Canada Thistle: 100+ individuals along drainages and on roadside.
Unit 16	6/28/2005																	X					Canada Thistle: 5+ indiv. In bottomland.
Unit 10	6/28/2005																						Townsendia condensata found. Determined as type variety..
Unit 8	6/30/2005															X		X			X		Whitetop: 200+ indiv. in disturbed horse-trailer pull-out on south side of road across from Unit 8. Canada Thistle: 125+ indiv. along both sides of road on south edge of Unit 8. Houndstongue: 2 indiv. on south side of road across from Unit 8.
Just North of Unit 8	6/30/2005				X																		Potential Descurainia habitat within Unit 8 as well.
Unit 22	6/30/2005																						No rare plants/weeds found.
Unit 9	6/30/2005				X																		Townsendia condensata found. Determined as type variety..
Unit 12	7/1/2005																						No rare plants/weeds found. Unit 12 is heavily forested other than gravel bars along Wood River.

Management Unit	Date Visited		*Townsendia condensata* var. *anomala*	*Penstemon absarokensis*	*Descurainia torulosa*	*Shoshonea pulvinata*	*Festuca hallii*	*Pyrrocoma carthamoides* var. *subsquarrosa*		*Botrychium* sp.	*Castilleja crista-galli*	*Castilleja nivea*	*Ipomopsis spicata* ssp. *robruthii*	*Lomatium attenuatum*		Houndstongue - *Cynoglossum officinale*	Leafy Spurge - *Euphorbia esula*	Canada Thistle - *Cirsium arvense*	Bull Thistle - *Cirsium vulgare*	Musk Thistle - *Carduus nutans*	Whitetop - *Cardaria* spp.	Russian Knapweed - *Centaurea repens*	
Unit 11	7/1/2005				X													X					Canada Thistle: 420+ indiv. along bottomlands and river's edge. Descurainia torulosa: We were not able to relocate D. Rosenthal's gravel bar collection at confluence of Beaver Creek and Middle Fork of Wood River. However, potential habitat occurs 200 elevation feet above confluence.
Unit 2	7/2/2005																	X					Canada Thistle: 50+ indiv. in seep at base of cliffs. Much potential Descurainia and Townsendia habitat.
Unit 1	7/2/2005																						No rare plants/weeds found. Potential Townsendia habitat.
Unit 24	7/2/2005										X												Unit heavily wooded.
Unit 3	7/3/2005																	X					Canada Thistle: 100+ individuals along edge of pond.
Unit 5	7/4/2005																						Townsendia condensata found. Determined as type variety..
Unit 4	7/4/2005				X																		Extensive Descurainia habitat in Unit 4.
Unit 6	7/5/2005				X																		Townsendia condensata found. Determined as type variety..
Unit 7	7/5/2005				X						X												Much potential Townsendia habitat.
Unit 23	7/5/2005																	X					Canada Thistle: 100+ individuals.

Management Unit	**Date Visited**		*Townsendia condensata* var. *anomala*	*Penstemon absarokensis*	*Descurainia torulosa*	*Shoshonea pulvinata*	*Festuca hallii*	*Pyrrocoma carthamoides* var. *subsquarrosa*		*Botrychium* sp.	*Castilleja crista-galli*	*Castilleja nivea*	*Ipomopsis spicata* ssp. *robruthii*	*Lomatium attenuatum*		Houndstongue - *Cynoglossum officinale*	Leafy Spurge - *Euphorbia esula*	Canada Thistle - *Cirsium arvense*	Bull Thistle - *Cirsium vulgare*	Musk Thistle - *Carduus nutans*	Whitetop - *Cardaria* spp.	Russian Knapweed - *Centaurea repens*	
Unit 18	7/6/2005				X													X					Canada Thistle: 1000+ individuals along creek. Townsendia condensata found. Determined as type variety..
Unit 19	7/6/2005				X																		Townsendia condensata found. Determined as type variety..
Unit 17	7/7/2005				X													X					Canada Thistle: 25+ individuals along creek. Townsendia condensata found. Determined as type variety..
Unit 18	7/7/2005																	X					Canada Thistle: 100+ individuals along creek and around old beaver pond.
Unit 20	7/7/2005																	X					Canada Thistle: 100+ individuals along creek. Most of Unit 20 heavily forested with some grasslands.
Unit 15	7/20/2005				X																		Townsendia condensata found. Determined as type variety..
Unit 14	7/21/2005																	X					Canada Thistle: 200+ individuals along south side of Wood River.
Unit 13	7/21/2005									X								X					Canada Thistle: 1000+ individuals in bottomland on south side of Wood River. Botrychium is most likely B. minganense, but not yet verified.

Appendix B.

Plant Species Found During 2005 North Fork Plant Surveys
(June 22-August 3, 2005)

		USFS Target Species							WYNDD Species of Concern					Noxious Weeds							Comments
Management Unit	**Date Visited**		*Townsendia condensata* var. *anomala*	*Penstemon absarokensis*	*Festuca hallii*	*Descurainia torulosa*	*Shoshonea pulvinata*	*Pyrrocoma carthamoides* var. *subsquarrosa*		*Castilleja crista-galli*	*Castilleja nivea*	*Ipomopsis spicata* ssp. *robruthii*	*Lomatium attenuatum*		Houndstongue - *Cynoglossum officinale*	Leafy Spurge - *Euphorbia esula*	Canada Thistle - *Cirsium arvense*	Bull Thistle - *Cirsium vulgare*	Musk Thistle - *Carduus nutans*	Whitetop - *Cardaria* spp.	Russian Knapweed - *Centaurea repens*	
M32	6/22/2005																					No rare species/weeds found. Mostly forested
R41	6/22/2005		**X**																			Just upslope of M32. More potential habitat exists for Townsendia.
M13	6/22/2005																**X**	**X**				Bull Thistle (2 indiv.), Canada Thistle (200+)
M25	6/22/2005																	**X**				Bull Thistle (25-50 indiv.); Also high cover of cheatgrass around corral and nearby slopes north of lodge buildings.
M9	6/23/2005																**X**					Canada Thistle: 25+ indiv. Along west bank of North Fork. Unit mostly forested. Possible Castilleja crista-galli habitat. Presence of native thistle that could be confused with bull thistle in young stages.
M30	6/23/2005									**X**												Unit mostly forested.
R17	6/23/2005									**X**												Unit mostly forested.
M15	6/24/2005																					Potential Canada Thistle habitat.
R22	6/24/2005																					Potential Townsendia condensata and Penstemon absarokensis habitat. Also potential Castilleja crista-galli habitat.

Management Unit	Date Visited		*Townsendia condensata* var. *anomala*	*Penstemon absarokensis*	*Festuca hallii*	*Descurainia torulosa*	*Shoshonea pulvinata*	*Pyrrocoma carthamoides* var. *subsquarrosa*		*Castilleja crista-galli*	*Castilleja nivea*	*Ipomopsis spicata* ssp. *robruthii*	*Lomatium attenuatum*		Houndstongue - *Cynoglossum officinale*	Leafy Spurge - *Euphorbia esula*	Canada Thistle - *Cirsium arvense*	Bull Thistle - *Cirsium vulgare*	Musk Thistle - *Carduus nutans*	Whitetop - *Cardaria* spp.	Russian Knapweed - *Centaurea repens*	
M26	6/24/2005																					Potential Canada Thistle habitat, as well as Castilleja crista-galli habitat.
R21	6/24/2005																					Potential Townsendia condensata and Penstemon absarokensis habitat.
M29	6/24/2005																X					Canada Thistle: 2000+ indiv., largest concentration beneath power lines.
M27	6/24/2005																X					Canada Thistle: 1000+ indiv., largest concentration beneath power lines.
R2	6/24/2005		X							X												Castilleja found just east of Unit on east side of Fishhawk Creek.
Just west of R2	6/25/2005									X								X				Bull Thistle: 3 indiv. in highly disturbed area (logging and burned slash piles) east of Boy Scout Camp
R23	6/24/2005		X																			
M1	6/25/2005									X												Adoxa moschatellina previously documented by E. Evert.
R1	6/25/2005									X												
Just north of R1	6/25/2005																			X		Cardaria chalapensis: 100 meters off Hwy 14/16/20 on both sides of Buffalo Bill Camp Road.
M22	6/26/2005																					No rare plants/weeds found. Largely forested; potential Castilleja crista-galli habitat.
R4	6/26/2005																					Townsendia condensata var. anomala and Penstemon absarokensis previously documented.

Management Unit	Date Visited		*Townsendia condensata* var. *anomala*	*Penstemon absarokensis*	*Festuca hallii*	*Descurainia torulosa*	*Shoshonea pulvinata*	*Pyrrocoma carthamoides* var. *subsquarrosa*		*Castilleja crista-galli*	*Castilleja nivea*	*Ipomopsis spicata* ssp. *robruthii*	*Lomatium attenuatum*		Houndstongue - *Cynoglossum officinale*	Leafy Spurge - *Euphorbia esula*	Canada Thistle - *Cirsium arvense*	Bull Thistle - *Cirsium vulgare*	Musk Thistle - *Carduus nutans*	Whitetop - *Cardaria* spp.	Russian Knapweed - *Centaurea repens*	
M2	6/26/2005																**X**	**X**				Canada Thistle: 100+ indiv.; Bull Thistle: 2 indiv.; Both species found along old dirt road north of lodge.
MR2	6/26/2005		**X**																			Non-native Senecio sp. found along north side of Hwy. 14/16/20
R44	7/26/2005																					No rare plants/weeds found. Forested with open areas of Idaho fescue grassland and sagebrush-grassland. Potential habitat for Castilleja cristi-galli in forests.
R46	7/27/2005									**X**												Partially forested (in drainages). Most of the remainder is grasslands with some small areas of sagebrush/grassland.
One mile west of R44 & R46	7/27/2005										**X**											Castilleja nivea initially not mapped on computer. Location: T51N R105W S10 nw1/4, on ridge, 8900-9000 ft.; identical grassland habitat to that occurring in R44 and R46.
M31	7/27/2005																					No rare plants/weeds found. Heavily forested; potential Castilleja crista-galli habitat.
R28	7/27/2005		**X**	**X**																		
MR8	7/29/2005																					Potential Canada Thistle and Bull Thistle habitat.
R37	7/29-30/2005		**X**	**X**																		
R9	7/30/2005																					Along east side of horse trail circa 1 1/3 miles south of Hwy 14/16/20; 14 indiv. hand-pulled.

Management Unit	**Date Visited**		*Townsendia condensata* var. *anomala*	*Penstemon absarokensis*	*Festuca hallii*	*Descurainia torulosa*	*Shoshonea pulvinata*	*Pyrrocoma carthamoides* var. *subsquarrosa*		*Castilleja crista-galli*	*Castilleja nivea*	*Ipomopsis spicata* ssp. *robruthii*	*Lomatium attenuatum*		Houndstongue - *Cynoglossum officinale*	Leafy Spurge - *Euphorbia esula*	Canada Thistle - *Cirsium arvense*	Bull Thistle - *Cirsium vulgare*	Musk Thistle - *Carduus nutans*	Whitetop - *Cardaria* spp.	Russian Knapweed - *Centaurea repens*	
R36	8/1/2005		**X**	**X**																		Confirmed previously documented Penstemon absarokensis population.
Just south of R36	8/2/2005		**X**	**X**						**X**												
R43	8/2/2005																					Unit observed from ridge northwest of the unit. Townsendia condensata var. anomala previously documented. Potential Penstemon absarokensis and Castilleja crista-galli habitat.