

# North Fork sensitive plant surveys on Shoshone National Forest.

Prepared for  
Shoshone National Forest  
Cody, Wyoming

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## **Abstract**

The primary goals of this project were to provide a sensitive species survey and information baseline in the North Fork study area to use in planning potential prescribed burn/mechanical removal on Shoshone National Forest. In addition, all noxious weeds encountered during the survey were documented. Surveys were conducted on the North Fork study area of the Shoshone National Forest from 7 June – 15 July 2004 for six sensitive plant species of the U.S. Forest Service – Rocky Mountain Region and all other Wyoming plant species of concern.

To insure completeness of the sensitive plant data in the study area, Erwin Evert was contracted by Wyoming Natural Diversity Database (WYNDD; University of Wyoming) to provide information from his collection records of all sensitive species and plant species of concern in the study area. His records were cross-checked with information already in the state database maintained by WYNDD, and new records were entered.

Finally, the new Biotics software employed by WYNDD, with its ArcView platform, was updated to include all digitized plant information in the study area. The compiled product of all three efforts represents a large, spatially-explicit dataset in an area of high endemism within Wyoming. . Precise location data and site-specific habitat information will be incorporated into USFS management plans to avoid impacts to sensitive species. This work took place under contract to Wyoming Natural Diversity Database, through a cost-share agreement between the University of Wyoming and the Shoshone National Forest. Data collected are being utilized in the fire plans in defining areas to be avoided.

This report provides background information on the botanical survey and resulting digital files and field forms, and a profile of all associated information processing work.

## **Citation:**

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## **Introduction**

The North Fork of the Shoshone River has a high concentration of USFS Region 2 sensitive plant species, both in absolute numbers of species and the respective numbers of occurrences (Fertig 1998). The six Forest Service sensitive plant species are listed in Table 1 (below). Three of the six USFS Region 2 sensitive species documented are narrow state endemics, and two are narrow regional endemics. The prospect of introducing prescribed burn treatments and mechanical treatments to this landscape is under consideration as part of the Healthy Forests Initiative. 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, particularly as they may be affected by the proposed management treatments.

Table 1. Sensitive Plant Species of the North Fork of the Shoshone River

| <b>Scientific Name</b>                                    | <b>Common Name</b>      | <b>Range context</b> |
|---|-------------------------|----------------------|
| <i>Descurainia torulosa</i>                               | Wyoming tansymustard    | Narrow state endemic |
| <i>Festuca hallii</i>                                     | Hall's fescue           | Peripheral           |
| <i>Penstemon absarokensis</i>                             | Absaroka beardtongue    | Narrow state endemic |
| <i>Pyrocoma carthamoides</i><br>var. <i>subsquarrosus</i> | Absaroka goldenweed     | Regional endemic     |
| <i>Shoshonea pulvinata</i>                                | Shoshonea               | Regional endemic     |
| <i>Townsendia condensata</i><br>var. <i>anomala</i>       | North Fork Easter daisy | Narrow state endemic |

To insure completeness of the sensitive plant data in the study area, Erwin Evert was consulted by the Wyoming Natural Diversity Database (WYNDD; University of Wyoming) regarding his collection records that represent all sensitive species and plant species of concern in the study area. Many of Evert's North Fork collection records over the years have been deposited at the Rocky Mountain Herbarium (RM), within the University of Wyoming, and are duly entered in the WYNDD database. In general, however, WYNDD records do not include most of those Evert collection records not yet databased at the RM, or the records that have not been deposited at the RM.

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 intensive botanical investigations. Concurrently, the pre-existing dataset is being converted into the ArcView and Oracle database platform Biotics software used by WYNDD. The results represent a model for integrating and presenting spatially complex data in areas of high biodiversity significance.

## **Study Area**

The general study area lies in the Northern Absaroka Range along the North Fork of the Shoshone River, is part of the Wapiti Ranger District of Shoshone National Forest. It 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. The area spans approximately 5,000 feet relief; the highest peaks in the area exceed 11,000 feet. The east-west course of the river accentuates the habitat contrasts associated with aspect. The predominant surface geology material is comprised of Absaroka volcanics (Love and Christiansen 1985).

Six sensitive species are concentrated in this area, and their presence represents a high level of endemism in Wyoming (Table 1; Fertig 1998), including species that are primarily restricted to substrates derived from the Absaroka volcanics.

The 84 proposed units for management treatment range in size from 2-1174 acres, potentially including burn treatment, mechanical treatment, or both. The units are mainly within multiple-use management zones of Shoshone National Forest, but 7 of the 84 units are partially or fully within wilderness area boundaries. Most proposed units have extensive tree cover, but there are also some with shrub cover that are proposed for treatment to improve wildlife habitat. The units were determined and mapped by staff of the Shoshone National Forest. The digital management unit boundaries were available on printouts and digital form in the field.

### **Methods**

Surveys were conducted during 23 days between 7 June – 15 July 2004 by Kevin and Amy Taylor to coincide with the phenology of the sensitive species and the other Wyoming species of special concern, when they are most readily located and identified. All previously documented rare plant locations were provided to the surveyors as data printouts and GIS maps printed out from digitized records as quarter-quad maps to correspond with the U.S.G.S. topographic maps (7.5') used in the field.

Locations were documented a programmed PDA unit. Location data were recorded as points or polygons depending on their extent. The species were entered from a pick-list and additional information was recorded in a sensitive species menu or weeds menu, with programming provided by the U.S. Forest Service. The list of fields recorded included:

- Species name
- Examiner
- Date
- Population size (in categories)
- Population distribution pattern
- Collection number

Photographs were taken where target species were found in the management units in order to represent the setting and habitat of the populations, and to provide close-ups of the species. They were taken using digital cameras including an Olympus C-3020 zoom and a Canon S330.

Sensitive plant survey forms were completed for each USFS Region 2 sensitive and other Wyoming species of concern encountered, elaborating on the information stored in the datalogger, and voucher specimens were collected for deposit at RM to represent at least one specimen per species, as well as to verify any questionable determinations. Plant identifications were made using Dorn (1992, 2001) and state species abstracts (posted at <http://uwyo.edu/wyndd>). The annotated checklist by Evert (1991) was used as a guide to the local flora and floristic distribution patterns among upper, mid and lower reaches of the river corridor, and north versus south sides of the valley.

Botanical survey of all units was the original goal. The priorities for fieldwork among the management units were determined by the considering the likelihood for sensitive species potential habitat.

A written record of past collection information was provided by Evert in the fall of 2004 (Evert personal communication 2004) representing all collections he made of the rare species within the North Fork study area (254 collections). Records that were not represented in the database for Wyoming plant species of concern were subsequently processed.

In the past, all occurrences in the WYNDD database have been symbolized by a single dot representing a centrum point, regardless of the extent and complexity of the occurrence distribution pattern. As part of this project, all occurrences in the project area were digitized, and the unique information that accompanies each discrete point or polygon comprising occurrences entered as well. In many cases, information was linked between one or more surveys and collection records to present a refined approximation of what are interpreted to represent sensitive plant populations on the landscape.

Finally, concurrent work on a plant species assessment lead to the additional occurrence records of *Townsendia condensata* var. *anomala* in the study area.

### **Results and Discussion**

Fifty-five of 84 management units were visited representing those that had the highest probability of sensitive plant occurrences (Table 1). As a result of 2004 survey, six USFS Region 2 sensitive species and four other Wyoming taxa of concern were documented during the survey as represented by 59 points and 52 polygons apart from weed results. The electronic files and photo-points documenting the locations of sensitive plant and noxious weeds were submitted at the close of the fieldwork. Sensitive plant forms and vouchers were submitted after the field season.

The sensitive plant survey forms and electronic files produced in this study are being entered in the Biotics Database at WYNDD, and a CD is on file at both WYNDD and the Shoshone National Forest that has a compilation of all electronic files created in this project. Also in 2004, collection label information for 254 specimens of target species from the study area was provided to WYNDD by Erwin Evert. Less than half were not already represented in the WYNDD database. The information on the earlier collection labels of Erwin Evert and the new sensitive plant data documented in the survey work are being incorporated by WYNDD to produce detailed distribution maps and new, expanded, or updated occurrence records.

An overview of survey results by species for USFS Region 2 sensitive species, other Wyoming plant species of concern, and noxious weeds is summarized below. In addition, a summary of sensitive species results and weed results by management unit is presented in Appendix A summarizing the complete fieldwork results. Information on herbarium voucher specimens is presented in Appendix B. The processing of survey results and additional *Townsendia condensata* var. *anomala* collection information is in progress. When all of these data are synthesized, the compiled results will have value in reviewing the status of USFS Region 2 sensitive species, and in updating and expanding state plant species abstracts that provide current distribution information and total numbers of occurrences.

The information that follows on the next page is a summary of 2004 survey results, apart from the data synthesis that is underway. Precise location data and site-specific habitat information will be incorporated into USFS management plans to avoid impacts to sensitive species.

## **USFS Region 2 Sensitive Species Targets:**

***Townsendia condensata* var. *anomala*:** Documented in 24 management units. Flowering and fruiting during survey. Considerable habitat exists throughout, especially in eastern two-thirds of North Fork. Although this taxon was found in great frequency, the number of individuals in a given area was relatively low. This taxon occurs on sparsely vegetated slopes and ridges of volcanic talus in bunchgrass-forb communities, and would most likely not be affected by fire. A population on Flag Peak (R32) could be adversely affected by a frequently used horse trail and use by bighorn sheep. Management unit R40 contains the most extensive *Townsendia condensata* var. *anomala* and *Penstemon absarokensis* habitat of all management units surveyed.

***Penstemon absarokensis*:** Documented in 11 management units in bud, flower, and quite commonly in vegetative state. This species was almost always found growing on barren ridges and the upper portion of steep slopes. It typically occurs on fine volcanic soils, but was also found on rockier talus slopes. Common associates are few, but almost always include bluebunch wheatgrass (*Elymus spicatus*) and ricegrass (*Oryzopsis hymenoides*). This species could be affected by fire where it occurs near the forest edge. Management unit R31 contains one location of 25 individuals in a small Douglas-fir forest opening. R40 also contains *P. absarokensis* in small forest openings. *Penstemon absarokensis*, easily confused with *Penstemon cyaneus*, occurring in similar habitats, can be distinguished from the latter by the presence of sepals with long tapering tips.

***Descurainia torulosa*:** Documented once just outside of management unit R20; on rugged terrain app. one mile east of Gunbarrel Creek and one mile north of Hwy 14/16/20. Sixteen individuals (3 flower/fruit, 13 vegetative) were found on steep south-facing slopes of loose volcanic scree, down-slope from ridgeline cliffs. It was previously known from only 8-11 occurrences. This new location extends the known lower elevation range to 7,450 ft (formerly 7,700-10,500 ft). This species is unlikely to be affected by fires because of the sparsely vegetated, rocky terrain. Similar habitat for *Descurainia torulosa* was found throughout unit R20.

***Shoshonea pulvinata*:** Documented on Logan Mountain with Kent Houston. Ridgelines of calcareous substrates and outcrops; grasses and cushion plants dominate. Mats sheltered by trees have noticeably longer scapes, leaf blades and petioles. Documented (observation and photo) mats growing up through prescribed burn of previous spring. More extensive population surveys are warranted.

***Pyrrocoma carthamoides* var. *subsquarrosa*:** Documented on Logan Mountain with Kent Houston. Open grassland and cushion plant community surrounded by Douglas-fir/limber pine forest on calcareous soils. Locally abundant; plants were in bud on June 23, 2004. More extensive population surveys are warranted.

***Festuca hallii*:** Documented on Logan Mountain with Kent Houston. The habitat is a grassland-cushion plant community on calcareous soils. Very few individuals had inflorescences.

## **Wyoming Species of Concern (tracked by Wyoming Natural Diversity Database):**

***Castilleja crista-galli*:** Documented in four management units. Almost always occurring in or near Douglas-fir forests where populations would be susceptible to fire. One population also occurs along forest edge in a ski run of the Sleeping Giant Winter Sports Area. Ski area impacts

(i.e. development, slope erosion, soil compaction, and weed invasion) could also adversely affect population.

***Castilleja nivea***: Documented on Logan Mountain with Kent Houston. The habitat is a grassland-cushion plant community on calcareous soils. Population estimated at 100-400 individuals. More extensive population surveys are warranted.

***Ipomopsis spicata ssp. robruthii***: Documented in four management units on sparsely vegetated slopes of volcanic scree. Most plants were past-flowering. This taxon is probably more widespread than documented.

***Lomatium attenuatum***: Documented as locally abundant in 10 management units on sparsely vegetated slopes of volcanic scree. Phenology: fruit to past fruiting. This species is easily confused with *Lomatium cous*, which also occurs in the area.

**Weeds**: The following noxious weeds were documented during the survey:

houndstongue (*Cynoglossum officinale*)

leafy spurge (*Euphorbia esula*)

Canada thistle (*Cirsium arvense*) – encountered most often; documented in 13 units.

bull thistle (*Cirsium vulgare*)

musk thistle (*Carduus nutans*)

whitetop (*Cardaria* spp.)

**Management Units Not Surveyed During 2004**: Listed below are the twenty-nine units that were not visited due to time limitations and their lower probability of supporting sensitive plant occurrences.

M9, M30, R17, M22, R1, R4, M2, MR6, M1, M25, R2, R23, M29, M27, M13, R22, M26, R21, M15, M32, R37, R36, R43, R44, R28, M31, R46, R42, MR8.

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## Appendix A. Plant Species (X) Found During North Fork Plant Surveys June 7 – July 15, 2004

| Management Unit | Date Visited | USFS Sensitive Species                           |                               |                             |                            |                       |  | WYNDD Species of Concern       |                         |  |                            | Noxious Weeds                                |                                       |   |                                       |                                      |   | Comments |
|-----------------|--------------|--|-------------------------------|-----------------------------|----------------------------|-----------------------|--|--------------------------------|-------------------------|--|----------------------------|--|---------------------------------------|---|---------------------------------------|--------------------------------------|---|----------|
|                 |              | <i>Townsendia condensata</i> var. <i>anomala</i> | <i>Penstemon absarokensis</i> | <i>Descurainia torulosa</i> | <i>Shoshonea pulvinata</i> | <i>Festuca hallii</i> | <i>Pyrrocoma carthamoides</i> var. <i>subsquarrosa</i> | <i>Castilleja crista-galli</i> | <i>Castilleja nivea</i> | <i>Ipomopsis spicata</i> ssp. <i>robruthii</i> | <i>Lomatium attenuatum</i> | <i>Houndstongue - Cynoglossum officinale</i> | <i>Leafy Spurge - Euphorbia esula</i> | <i>Canada Thistle - Cirsium arvense</i> | <i>Bull Thistle - Cirsium vulgare</i> | <i>Musk Thistle - Carduus nutans</i> | <i>Whitetop - Cardaria</i> spp.   |          |
| MR1             | 6/9/2004     |  |                               |                             |                            |                       |  |                                |                         |  |                            |  |                                       |   |                                       |                                      | No rare species/weeds found.  |          |
| R6              | 6/9/2004     | X  | X                             |                             |                            |                       |  | X                              |                         |  |                            |  |                                       |   |                                       |                                      |   |          |
| R34             | 6/10/2004    | X  |                               |                             |                            |                       |  |                                |                         |  |                            |  |                                       |   |                                       |                                      |   |          |
| R11             | 6/10/2004    |  |                               |                             |                            |                       |  |                                |                         |  |                            |  |                                       |   |                                       |                                      | No rare species/weeds found.  |          |
| M7              | 6/11/2004    |  |                               |                             |                            |                       |  |                                |                         |  |                            |  |                                       |   |                                       |                                      | No rare species/weeds found.  |          |
| R12             | 6/11/2004    | X  |                               |                             |                            |                       |  |                                |                         |  | X                          |  |                                       |   |                                       |                                      | Leafy spurge: 50-100 veg. stalks, 3 in flwr; side canyon 60 meters S. of Cabin #69; 80 meters upslope of dirt road.   |          |
| R31             | 6/12/2004    | X  | X                             |                             |                            |                       |  |                                | X                       |  |                            |  |                                       |   |                                       |                                      | Extensive <i>Townsendia</i> and <i>Penstemon</i> habitat, especially on ridges.   |          |
| R38             | 6/13/2004    | X  | X                             |                             |                            |                       |  |                                | X                       |  |                            |  |                                       |   |                                       |                                      |   |          |
| R35             | 6/14/2004    | X  | X                             |                             |                            |                       |  |                                |                         | X  |                            | X  |                                       | X                                       |                                       |                                      | Weeds: houndstongue-6 flowering; musk thistle-6 basal rosettes; Canada thistle-widespread throughout spring-fed bottomland.   |          |
| R15             | 6/15/2004    | X  |                               |                             |                            |                       |  |                                | X                       |  |                            |  |                                       |   |                                       |                                      | Locations documented on east side of Clearwater Creek; west side not surveyed but appears to have similar habitat.  |          |
| MR2             | 6/16/2004    |  |                               |                             |                            |                       |  |                                |                         |  |                            |  |                                       |   |                                       |                                      | No rare species/weeds found.  |          |
| M24             | 6/16/2004    |  |                               |                             |                            |                       |  |                                |                         |  |                            |  |                                       |   |                                       |                                      | No rare species/weeds found.  |          |
| M3              | 6/16/2004    |  |                               |                             |                            |                       |  |                                |                         |  |                            |  |                                       |   |                                       |                                      | No rare species/weeds found.  |          |
| R5              | 6/16/2004    |  |                               |                             |                            |                       |  |                                |                         |  |                            |  |                                       |   |                                       |                                      | No rare species/weeds found.  |          |
| R40             | 6/16/2004    | X  | X                             |                             |                            |                       |  |                                | X                       |  |                            |  |                                       |   |                                       |                                      | *Most extensive, uninterrupted (by drainage or forest) habitat of <i>Penstemon</i> and <i>Townsendia</i> found during study. <i>Penstemon</i> might be susceptible to fire along forest edge. |          |
| R45             | 6/17/2004    | X  | X                             |                             |                            |                       |  |                                |                         |  |                            |  |                                       |   |                                       |                                      |   |          |

## Appendix A. Plant Species (X) Found During North Fork Plant Surveys June 7 – July 15, 2004

| Management Unit | Date Visited | USFS Sensitive Species                           |                               |                             |                            |                       | WYNDD Species of Concern                              |                                |                         |  | Noxious Weeds              |   |                                       |   |                                       |                                      | Comments  |
|-----------------|--------------|--|-------------------------------|-----------------------------|----------------------------|-----------------------|---|--------------------------------|-------------------------|--|----------------------------|---|---------------------------------------|---|---------------------------------------|--------------------------------------|---|
|                 |              | <i>Townsendia condensata</i> var. <i>anomala</i> | <i>Penstemon absarokensis</i> | <i>Descurainia torulosa</i> | <i>Shoshonea pulvinata</i> | <i>Festuca hallii</i> | <i>Pyrrcoma carthamoides</i> var. <i>subsquarrosa</i> | <i>Castilleja crista-galli</i> | <i>Castilleja nivea</i> | <i>Ipomopsis spicata</i> ssp. <i>robruthii</i> | <i>Lomatium attenuatum</i> | <i>Houndstongue</i> - <i>Cynoglossum officinale</i> | Leafy Spurge - <i>Euphorbia esula</i> | Canada Thistle - <i>Cirsium arvense</i> | Bull Thistle - <i>Cirsium vulgare</i> | Musk Thistle - <i>Carduus nutans</i> |   |
| R39             | 6/18/2004    |  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       |   |                                       |                                      | No rare species/weeds found. Potential habitat for <i>Townsendia</i> .  |
| R13             | 6/18/2004    | X  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       |   |                                       |                                      |   |
| MR9             | 6/18/2004    |  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       |   |                                       |                                      | Not visited because from our vantage point across drainage, area appeared heavily forested with negligible habitat for USFS target species.   |
| R47             | 6/18/2004    |  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       |   |                                       |                                      | Not visited because from our vantage point across drainage, area appeared heavily forested with negligible habitat for USFS target species.   |
| M4              | 6/18/2004    |  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       |   |                                       |                                      | No rare species/weeds found.  |
| R32             | 6/19/2004    | X  |                               |                             |                            |                       |   |                                | X                       |  |                            |   |                                       |   |                                       |                                      | <i>Townsendia</i> locations on Flag Peak ridge could be impacted by wintering bighorn sheep and horse trails.   |
| R41             | 6/20/2004    | X  |                               |                             |                            |                       |   |                                | X                       |  |                            |   | X                                     |   |                                       |                                      | Western half of unit was not surveyed due to time restraints and very steep terrain, but appears to have more habitat for <i>Ipomopsis</i> and <i>Townsendia</i> . Bull Thistle-100-150 basal rosettes in drainage. |
| R8              | 6/22/2004    |  |                               |                             |                            |                       |   |                                |                         |  |                            | X   | X                                     |   | X                                     |                                      | In spring-fed bottomland: Bull Thistle-21-50 basal rosettes; Canada Thistle-300-500 rosettes and stalks; In horse-trailer parking lot: <i>Cardaria chalapensis</i> -100-200 individuals.                            |
| M6              | 6/22/2004    |  |                               |                             |                            |                       | X   |                                |                         |  |                            |   | X                                     |   |                                       |                                      | <i>Castilleja</i> occurs in small upland forest openings along creek and would be impacted by fire. Bull thistle - 10-20 basal rosettes along Green Creek.  |



## Appendix A. Plant Species (X) Found During North Fork Plant Surveys June 7 – July 15, 2004

| Management Unit | Date Visited | USFS Sensitive Species                           |                               |                             |                            |                       |   | WYNDD Species of Concern       |                         |  |                            | Noxious Weeds                                       |                                       |   |                                       |                                      |  | Comments |
|-----------------|--------------|--|-------------------------------|-----------------------------|----------------------------|-----------------------|---|--------------------------------|-------------------------|--|----------------------------|---|---------------------------------------|---|---------------------------------------|--------------------------------------|--|----------|
|                 |              | <i>Townsendia condensata</i> var. <i>anomala</i> | <i>Penstemon absarokensis</i> | <i>Descurainia torulosa</i> | <i>Shoshonea pulvinata</i> | <i>Festuca hallii</i> | <i>Pyrrcoma carthamoides</i> var. <i>subsquarrosa</i> | <i>Castilleja crista-galli</i> | <i>Castilleja nivea</i> | <i>Ipomopsis spicata</i> ssp. <i>robruthii</i> | <i>Lomatium attenuatum</i> | <i>Houndstongue</i> - <i>Cynoglossum officinale</i> | Leafy Spurge - <i>Euphorbia esula</i> | Canada Thistle - <i>Cirsium arvense</i> | Bull Thistle - <i>Cirsium vulgare</i> | Musk Thistle - <i>Carduus nutans</i> | Whitetop - <i>Cardaria</i> spp.  |          |
| M21             | 6/22/2004    |  |                               |                             |                            |                       |   |                                |                         |  |                            |   | X                                     |   |                                       |                                      | Canada thistle-greater than 1000 individuals along Newton Creek. Largest concentration in springs on east side of creek.   |          |
| MR4             | 6/22/2004    | X  | X                             |                             |                            |                       |   |                                |                         |  |                            |   |                                       |   |                                       |                                      |  |          |
| Logan Mountain  | 6/23/2004    |  |                               |                             | X                          | X                     | X   |                                | X                       |  |                            |   |                                       |   |                                       |                                      | Logan Mountain is not a management unit; however the area was visited to officially document rare species (even though Kent Houston knew they already occurred there). The area warrants more plant distribution work.   |          |
| M5              | 6/24/2004    |  |                               |                             |                            |                       |   |                                |                         |  |                            |   | X                                     |   |                                       |                                      | Canada thistle: 100-200 basal rosettes; mostly in drainage and spring that occurs along drainage.  |          |
| R14             | 6/30/2004    | X  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       |   |                                       |                                      |  |          |
| R33             | 6/30/2004    | X  | X                             |                             |                            |                       |   |                                |                         | X  |                            |   |                                       |   |                                       |                                      | Time limitations and very steep terrain kept us from visiting the East half of this unit, which did appear from a distance to have <i>Townsendia</i> , <i>Lomatium</i> , and possibly <i>Penstemon</i> habitat.  |          |
| M12             | 7/1/2004     |  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       |   |                                       |                                      | No rare species/weeds found.   |          |
| R20             | 7/1/2004     | X  | X                             | X                           |                            |                       |   | X                              |                         | X  | X                          |   |                                       |   |                                       |                                      | All aforementioned species were found along a ridge just southeast of R20 while trying to find a route into the management area. Extremely steep and rugged terrain prevented us from entering the unit; however much habitat for the aforementioned species exists. The location of <i>Descurainia torulosa</i> extends the known lower elevation limit for this species to 7450 feet (formerly 7700-10500 ft). |          |

## Appendix A. Plant Species (X) Found During North Fork Plant Surveys June 7 – July 15, 2004

| Management Unit | Date Visited | USFS Sensitive Species                           |                               |                             |                            |                       | WYNDD Species of Concern                              |                                |                         |  | Noxious Weeds              |   |                                       |   |                                       |                                      | Comments  |
|-----------------|--------------|--|-------------------------------|-----------------------------|----------------------------|-----------------------|---|--------------------------------|-------------------------|--|----------------------------|---|---------------------------------------|---|---------------------------------------|--------------------------------------|---|
|                 |              | <i>Townsendia condensata</i> var. <i>anomala</i> | <i>Penstemon absarokensis</i> | <i>Descurainia torulosa</i> | <i>Shoshonea pulvinata</i> | <i>Festuca hallii</i> | <i>Pyrrcoma carthamoides</i> var. <i>subsquarrosa</i> | <i>Castilleja crista-galli</i> | <i>Castilleja nivea</i> | <i>Ipomopsis spicata</i> ssp. <i>robruthii</i> | <i>Lomatium attenuatum</i> | <i>Houndstongue</i> - <i>Cynoglossum officinale</i> | Leafy Spurge - <i>Euphorbia esula</i> | Canada Thistle - <i>Cirsium arvense</i> | Bull Thistle - <i>Cirsium vulgare</i> | Musk Thistle - <i>Carduus nutans</i> |   |
| R3              | 7/2/2004     | X  | X                             |                             |                            |                       |   |                                | X                       |  |                            |   |                                       |   |                                       |                                      |   |
| R4              | 7/2/2004     |  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       |   |                                       |                                      | R4 was not visited because <i>Townsendia</i> and <i>Penstemon</i> had already been well documented throughout the unit.                       |
| MR3             | 7/3/2004     |  |                               |                             |                            |                       |   |                                |                         |  |                            | X   | X                                     |   | X                                     |                                      | Canada thistle, Bull thistle, and White-top ( <i>C. pubescens</i> ) found along dirt road on the west side of Elk Fork.                       |
| R9              | 7/3/2004     | X  |                               |                             |                            |                       |   |                                |                         |  |                            | X   |                                       |   |                                       |                                      | Canada thistle: many patches dispersed in moist areas in drainage.  |
| R10             | 7/3/2004     | X  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       |   |                                       |                                      |   |
| R27             | 7/5/2004     | X  |                               |                             |                            |                       |   |                                | X                       |  |                            |   |                                       |   |                                       |                                      | Large areas of <i>Townsendia</i> and <i>Lomatium</i> habitat.   |
| R25             | 7/5/2004     | X  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       |   |                                       |                                      |   |
| R26             | 7/5/2004     | X  |                               |                             |                            |                       |   |                                | X                       |  |                            |   |                                       |   |                                       |                                      |   |
| R29             | 7/5/2004     | X  |                               |                             |                            |                       |   |                                |                         |  |                            | X   |                                       | X                                       |                                       |                                      | Canada thistle (100-200) and Musk thistle (50-100) found along drainage and in spring.  |
| M23             | 7/6/2004     |  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       |   |                                       |                                      | No rare species/weeds found.  |
| R24             | 7/6/2004     | X  | X                             |                             |                            |                       |   |                                |                         |  |                            |   | X                                     |   |                                       |                                      | Bull thistle occurs in moist soil in drainage. Two other unidentified thistles co-occurred.   |
| R30             | 7/6/2004     |  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       |   |                                       |                                      | R30 not visited. Viewing from R24, Unit R30 did not appear to have suitable habitat for USFS target sensitive species.                        |
| R18             | 7/6/2004     | X  | X                             |                             |                            |                       |   |                                |                         |  | X                          |   |                                       |   |                                       |                                      | Houndstongue: 1 flowering stalk found in drainage and several found along south edge of Highway, slightly east of Sleeping Giant Picnic Area. |

## Appendix A. Plant Species (X) Found During North Fork Plant Surveys June 7 – July 15, 2004

| Management Unit | Date Visited | USFS Sensitive Species                           |                               |                             |                            |                       | WYNDD Species of Concern                              |                                |                         |  | Noxious Weeds              |   |                                       |   |                                       | Comments |   |
|-----------------|--------------|--|-------------------------------|-----------------------------|----------------------------|-----------------------|---|--------------------------------|-------------------------|--|----------------------------|---|---------------------------------------|---|---------------------------------------|----------|---|
|                 |              | <i>Townsendia condensata</i> var. <i>anomala</i> | <i>Penstemon absarokensis</i> | <i>Descurainia torulosa</i> | <i>Shoshonea pulvinata</i> | <i>Festuca hallii</i> | <i>Pyrrcoma carthamoides</i> var. <i>subsquarrosa</i> | <i>Castilleja crista-galli</i> | <i>Castilleja nivea</i> | <i>Ipomopsis spicata</i> ssp. <i>robruthii</i> | <i>Lomatium attenuatum</i> | <i>Houndstongue</i> - <i>Cynoglossum officinale</i> | Leafy Spurge - <i>Euphorbia esula</i> | Canada Thistle - <i>Cirsium arvense</i> | Bull Thistle - <i>Cirsium vulgare</i> |          | Musk Thistle - <i>Carduus nutans</i>  |
| M20             | 7/7/2004     |  |                               |                             |                            |                       |   |                                |                         |  |                            |   | X                                     |   |                                       |          | Canada thistle: greater than 5000 individuals along north side of North Fork of Shoshone River at Sleeping Giant Winter Sports Area.  |
| M19             | 7/7/2004     |  |                               |                             |                            |                       |   |                                |                         |  |                            |   | X                                     |   |                                       |          | Canada thistle: approx. 300-500 along south side of North Fork of Shoshone River and near lodge of Sleeping Giant Winter Sports Area.   |
| M18             | 7/7/2004     |  |                               |                             |                            |                       | X   |                                |                         |  |                            |   |                                       |   |                                       |          | <i>Castilleja</i> occurs along forest edge in ski run; Ski area associated impacts (e.g. development, slope erosion, soil compaction, and weed invasion) may affect population.                                       |
| M11             | 7/7/2004     |  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       |   |                                       |          | No rare species/weeds found; area mostly densely forested.  |
| M10             | 7/7/2004     |  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       |   |                                       |          | No rare species/weeds found; area mostly densely forested.  |
| M17             | 7/7/2004     |  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       |   |                                       |          | No rare species/weeds found; area mostly densely forested.  |
| R16             | 7/7/2004     |  |                               |                             |                            |                       | X   |                                |                         | X  |                            | X   |                                       |   |                                       |          | <i>Castilleja</i> occurs on slopes in forest openings; potentially susceptible to fire. Houndstongue (20 individuals) and Canada thistle (300-500) occurs in shallow south-facing drainage directly below powerlines. |
| R19             | 7/8/2004     |  |                               |                             |                            |                       |   |                                | X                       |  |                            | X   |                                       |   |                                       |          | Canada thistle: greater than 1000 individuals in spring-fed forest clearing.  |

## Appendix A. Plant Species (X) Found During North Fork Plant Surveys June 7 – July 15, 2004

| Management Unit | Date Visited | USFS Sensitive Species                           |                               |                             |                            |                       | WYNDD Species of Concern                              |                                |                         |  |                            | Noxious Weeds                                       |                                       |   |                                       |                                      | Comments   |
|-----------------|--------------|--|-------------------------------|-----------------------------|----------------------------|-----------------------|---|--------------------------------|-------------------------|--|----------------------------|---|---------------------------------------|---|---------------------------------------|--------------------------------------|--|
|                 |              | <i>Townsendia condensata</i> var. <i>anomala</i> | <i>Penstemon absarokensis</i> | <i>Descurainia torulosa</i> | <i>Shoshonea pulvinata</i> | <i>Festuca hallii</i> | <i>Pyrrcoma carthamoides</i> var. <i>subsquarrosa</i> | <i>Castilleja crista-galli</i> | <i>Castilleja nivea</i> | <i>Ipomopsis spicata</i> ssp. <i>robruthii</i> | <i>Lomatium attenuatum</i> | <i>Houndstongue</i> - <i>Cynoglossum officinale</i> | Leafy Spurge - <i>Euphorbia esula</i> | Canada Thistle - <i>Cirsium arvense</i> | Bull Thistle - <i>Cirsium vulgare</i> | Musk Thistle - <i>Carduus nutans</i> |  |
| M14             | 7/8/2004     |  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       | X                                       |                                       |                                      | Canada thistle: greater than 200 individuals in spring and along irrigation ditch.   |
| M16             | 7/8/2004     |  |                               |                             |                            |                       |   |                                |                         |  |                            |   |                                       | X                                       | X                                     |                                      | Canada thistle (300-500) occurs in wet drainage bisected by Pahaska horse trail just east of M16; Bull thistle (2) near Pahaska trailhead east of management unit. |

Appendix B.

**Herbarium label information for  
North Fork of Shoshone River specimens**

Standardized entry information for all specimens (may be abbreviated if needed):

**WY: Park County: Northern Absaroka Range: Shoshone National Forest: North Fork Shoshone River. Amy Taylor #\_\_\_\_, with Kevin Taylor** (Note: Some entries also include other individuals.) If there are any duplicates, please send to Kent Houston, Shoshone National Forest. Thanks!

**9 June 2004:** T52N R107W S14 NW1/4. Circa 31 air miles WSW of Cody, circa 1 air mile N of Hwy 14/16/20 and the North Fork of Shoshone River; Fine volcanic scree on steep slope dominated by *Elymus spicatus* and *Oryzopsis hymenoides*. 6600 ft.

8995 *Ipomopsis spicata* ssp. *robruthii*

8996 *Ipomopsis spicata* ssp. *robruthii*

8997 *Townsendia condensata* var. *anomala*

8998 *Lomatium attenuatum* (note: have Ron verify that it is not L. cous)

8999 *Penstemon absarokensis*

**10 June 2004:** T52 N R106W S22 SW1/4 and S27 NW1/4. Circa 25 air miles WSW of Cody; ½ mile S of Hwy 14/16/20 and the North Fork of Shoshone River; Fine volcanic scree on steep SW-facing slope dominated by *Elymus spicatus* and *Oryzopsis hymenoides*; 6450-6800 ft.

9001 *Townsendia condensata* var. *anomala*

**11 June 2004:** T52N 106W S22 SE1/4 SE ¼. Circa 1/3 mile S of Hwy 14/16/20 and the North Fork of Shoshone River. Fine volcanic scree on SE-facing slope with *Elymus spicatus*, *Oryzopsis hymenoides*, and *Artemisia nova*. 6400 ft.

9002 *Townsendia condensata* var. *anomala*

**12 June 2004:** T52N R105W S18 E1/2 NW1/4. Circa 23 air mile W of Cody; 1.5 miles NW of where Hwy 14/16/20 meets national forest on E side of Forest. Open slope in Douglas-fir/limber pine forest. 7650 ft.

9004 *Lomatium attenuatum*

**12 June 2004:** T52N R106W S13 NE1/4 SE1/4. Circa 24 air miles W of Cody; 1.5 miles NW of where Hwy 14/16/20 meets national forest on east side of forest; 1 mile N of Hwy 14/16/20. SW-facing volcanic rock outcrop in small opening of Douglas-fir/limber pine forest. 7100 ft.

9005 *Lomatium attenuatum*

**12 June 2004:** T52N R106W S13 SE1/4 SE1/4 and S24 NE1/4. Circa 24 air miles W of Cody; ca 0.5 mile N of Hwy 14/16/20; ca 2 miles WNW of where Hwy 14/16/20 meets national forest on east side of forest. SW-facing slope in Douglas-fir forest; loose, volcanic sandy soil. 6000 ft.

9006 *Penstemon absarokensis*

**13 June 2004:** T52N R106W S17 middle of S17. NW of Wapiti Campground circa 27 air miles W of Cody and circa 0.75 miles N of Hwy 14/16/20 and the North Fork Shoshone River. Steep ESE-facing slope of gray volcanic scree; sparsely vegetated with an occasional Douglas-fir, limber pine, and Rocky Mountain juniper. 6500 ft.

9007 *Lomatium attenuatum*

**13 June 2004:** T52N R106W S17 middle of S17. West of Sweetwater Creek, circa 40 air miles west of Cody and circa .75 air miles N of Hwy 14/16/20 and the North Fork of Shoshone River. Barren ridge of red-brown volcanic sand and gravel. Occasional Rocky Mountain juniper and limber pine. 6800 ft.

9008 *Penstemon absarokensis*

**15 June 2004:** T52N R107W S13 SE1/4 NE1/4. East of Clearwater Creek circa 2.5 miles WNW of Wapiti Campground; Circa 29 air miles W of Cody and 1 mile N of Hwy 14/16/20. Sparsely vegetated west-facing slopes of volcanic scree in Douglas-fir/Rocky Mountain juniper forest openings. 6400 ft.

9009 *Lomatium attenuatum*

**16 June 2004:** T52N R107W S14 SE1/4 SW ¼. West of Aspen Creek circa 31 air miles W of Cody and 0.5 mi. N of Hwy 14/16/20. Steep, sparsely vegetated south-facing slopes and ridges on volcanic soils. 6600-7600 ft.

9010 *Townsendia condensata* var. *anomala*

9011 *Penstemon absarokensis*

**16 June 2004:** T52N R107W S14 SE1/4 SW ¼. West of Aspen Creek circa 31 air miles W of Cody and 1.3 mi. N of Hwy 14/16/20. Rocky and sparsely vegetated east-facing slopes on volcanic soils. Common associates include *Oryzopsis hymenoides*, *Haplopappus acoullis*, and *Pseudostuga menziesii*. 7600 ft.

9012 *Lomatium attenuatum* (note: have Ron verify that it is not L. cous)

**17 June 2004:** T52N R108W S23 SE1/4 SW1/4. East of Goff Creek circa 38 air miles W of Cody and circa ¼ mile N of Hwy 14/16/20. Steep SE-facing slope of volcanic scree with *Elymus spicatus*, *Phacelia hastata*, and *Allium textile*. Surrounded by limber pine, Douglas-fir, and Rocky Mountain Juniper. 6600-6800 ft.

9013 *Townsendia condensata* var. *anomala*

**18 June 2004:** T52N R107 S28 NE1/4 SW1/4. West of Blackwater Creek, circa 32 air miles W of Cody and circa 0.5 mi S of Hwy 14/16/20. South-facing slope of volcanic scree with *Elymus spicatus*, *Penstemon eriantherus*, *Antennaria* sp. and scattered *Juniperus scopulorum*. 6700 ft.

9014 *Townsendia condensata* var. *anomala*

**19 June 2004:** T52N R105W S29 SW1/4 NW ¼. Ridges S and W of Flag Peak circa ¼ mile W of Canyon Creek; circa 22 air miles W of Cody and 0.5 air mi S of Hwy 14/16/20. Rocky open ridge dominated by bluebunch wheatgrass and associated with an occasional black sage, Douglas-fir, limber pine, and Rocky Mountain juniper. Volcanic soils. 6700-6850 ft.

9015 *Townsendia condensata* var. *anomala*

**19 June 2004:** T52N R105W S30 SW1/4 NE1/4. Circa ¼ mile W of Lost Creek, circa ¾ mile S of Hwy 14/16/20. West-facing slope of volcanic talus dominated by *Elymus spicatus* and *leucopoa kingii*. 6500 ft.

9016 *Lomatium attenuatum*

**20 June 2004:** T52N R107W S15 SW1/4 SW1/4. Circa 0.5 mile W of Moss Creek, circa 1 mile N of Hwy 14/16/20 and Mummy Cave, circa 32 air miles W of Cody. Sparsely vegetated SW-facing slope of volcanic scree near ridge. 7400 ft.

9017 *Ipomopsis spicata* ssp. *robruthii*

**22 June 2004:** T52N R105W S33 NW1/4 SE1/4. West edge of Green Creek, circa 20 air miles W of Cody and circa 2 ¼ air miles S of Hwy 14/16/20. Small opening in Douglas-fir forest, associated with *Arnica cordifolia*, *Astragalus miser* var. *hylophilus*, *Galium boreale*, and *Fragaria virginiana*. 6700 ft.

9018 *Castilleja crista-galli*

**23 June 2004:** T53N R104W S23 SE1/4 SE ¼; and S26 NW1/4 NE1/4; and S24 S1/2 of SW1/4. Logan Mountain circa 10 air miles W of Cody and circa 4 air miles N of Hwy 14/16/20. Ridgelines of calcareous substrates and outcrops; grasses and cushion plants dominate. Associates include *Leucopoa kingii*, *Eritrichum howardii*, *Artemisia frigida*, *Arenaria hookeri*, *Paronychia sessiliflora*, *Selaginella densa*, and *Hymenoxys acaulis*. Limber pine and Douglas-fir scattered throughout. 7900-8100 ft.

9019 *Shoshonea pulvinata* (with Kevin Taylor and Kent Houston)

**23 June 2004:** T53N R104W S23 SE ¼; and S26 NE ¼; and S24 SW1/4 SW1/4; S25 NE1/4 of NW1/4. Logan Mountain circa 10 air miles W of Cody and circa 4 air miles N of Hwy 14/16/20. Open montane grassland and cushion community surrounded by Douglas-fir/limber pine forest. Associates include *Phlox hoodii*, *Bupleurum americanum*, *Eritrichum howardii*, *Pyrocoma carthamoides* var. *subsquarrosa*, *Artemisia frigida*, and *Hymenoxys acaulis*. Calcareous/limestone substrate. 7900-8100 ft.

9020 *Castilleja nivea* (with Kevin Taylor and Kent Houston)

**23 June 2004:** T53N R104W S24 SW ¼ SW1/4. Logan Mountain circa 10 air miles W of Cody and circa 4 air miles N of Hwy 14/16/20. Montane grassland and cushion community on calcareous soils. Common associates include *Shoshonea pulvinata*, *Leucopoa kingii*, *Carex filifolia*, *Pyrocoma carthamoides* var. *subsquarrosa*, and *Castilleja nivea*. 7900 ft.

9022 *Festuca hallii* (with Kevin Taylor and Kent Houston)

**23 June 2004:** T53 N R104W S23 SE1/4; and S26 NW1/4 NE1/4; and S24 SW1/4 SW1/4; and S25 NE ¼ NW1/4. Logan Mountain circa 10 air miles W of Cody and circa 4 air miles N of Hwy 14/16/20. Open montane grassland and cushion plant community on limestone; surrounded by Douglas-fir/limber pine forest. Associates include *Bupleurum americanum*, *Cymopterus nivalis*, *Hymenoxys acaulis*, *Leucopoa kingii*, *Elymus spicatus*, *Artemisia tridentata*, and *Artemisia nova*. 7900-8100 ft.

9023 *Pyrrocoma carthamoides* var. *subsquarrosa* (with Kevin Taylor and Kent Houston)

**30 June 2004:** T52N R106W S25 NE1/4 SW1/4; Circa 0.5 mile E of Clocktower Creek; circa 0.75 mile S of Hwy 14/16/20. Sparsely vegetated S-facing slope of volcanic talus. Associates include *Elymus spicatus*, *Leucopoa kingii*, *Phacelia hastata*, *Eriogonum ovalifolium*, and *Chrysothamnus nauseosus*. 6900 ft.

9024 *Penstemon absarokensis*

**30 June 2004:** T52N R106W S23 SW1/4 SE1/4. West of Clocktower Creek circa 24 air miles W of Cody and circa 0.5 mi. S of Hwy 14/16/20. Sparsely vegetated NNW-facing slope and ridge of bunchgrasses and cushion plants on gravelly volcanic substrate; surrounded by limber pine. 6200-6450 ft.

9025 *Townsendia condensata* var. *anomala*

**1 July 2004:** T52N R107W S18 SE1/4 SE1/4; and S19 NW1/4 NE1/4. Circa 1.0 mile E of Gunbarrel Creek and circa 1.0 mile N of Hwy 14/16/20; circa 33 air miles W of Cody; just inside North Absaroka Wilderness Boundary. Steep south-facing slopes of volcanic scree, down-slope of ridgeline cliffs. Associated with *Artemisia michauxiana*, *Penstemon deustus*, *Elymus spicatus*, and *Polygonum douglasii*. Three of 16 individuals observed with flowers and torulose siliques; others vegetative. 7450-7600 ft.

9026 *Descurainia torulosa*

**1 July 2004:** T52N R107W S18 SW1/4; and S19 NW1/4. Circa 0.5 mile E of Gunbarrel Creek and circa 1.25 miles N of Hwy 14/16/20; circa 33 air miles W of Cody. Ridge and upper West- and east-facing slopes. Sparsely vegetated rocky volcanic scree dominated by *Elymus spicatus* and *Oryzopsis hymenoides*. 7000-7850 ft.

9027 *Penstemon absarokensis*

**1 July 2004:** T52N R107W S18 SW1/4 SW1/4. East of Gunbarrel Creek and circa 1.25 miles N of Hwy 14/16/20; circa 33 air miles W of Cody. Drainage, NW-facing slopes, and creek canyon in Douglas-fir/lodgepole pine forest. 6600-6900 ft.

9028 *Castilleja crista-galli*

**1 July 2004:** T52N R107W S18 SE1/4 SE1/4. East of Gunbarrel Creek and circa 1.25 miles N of Hwy 14/16/20; circa 33 air miles W of Cody. Bare ground on NW-facing slope; adjacent to meadow in Douglas-fir forest. 6650 ft.



9029 *Lomatium attenuatum* (note: have Ron verify that it is not *L. cous*)

**1 July 2004:** T52N R107W S18 SE1/4; and S18 NW1/4 NE1/4. Circa 0.75 mile east of Gunbarrel Creek and circa 1.0 mile N of Hwy 14/16/20; circa 33 air miles W of Cody. Steep southeast-facing slope of sparsely vegetated volcanic scree. Associates include *Elymus spicatus*, *Oryzopsis hymenoides*, *Cymopterus terebinthinus*, and *Townsendia condensata* var. *anomala*. 7450 ft.

9030 *Ipomopsis spicata* ssp. *robruthii*

**1 July 2004:** T52N R107W S18 SW1/4 SE1/4. Circa 0.5 mile east of Gunbarrel Creek and circa 1.5 mile N of Hwy 14/16/20; circa 33 air miles W of Cody. SSW-facing barren slope of rocky volcanic talus associated with *Elymus spicatus*, *Oryzopsis hymenoides*, and *Phacelia hastata*. 7100-7300 ft.

9031 *Townsendia condensata* var. *anomala*

**2 July 2004:** T52N R108W S22 SE1/4 and W1/2. West of Goff Creek, circa 37 air miles W of Cody; circa 0.5 air mile N of Hwy 14/16/20. Sparsely vegetated southwest-facing slopes and ridges of volcanic talus dominated by *Elymus spicatus*. Associates include *Phacelia hastata*, *Leucopoa kingii*, and *Chrysothamnus nauseosus*; Rocky Mountain juniper and limber pine nearby. 6950-7250 ft.

9033 *Penstemon absarokensis*

**2 July 2004:** T52N R108W S22. West of Goff Creek, circa 37 air miles W of Cody; circa 0.2 air mile N of Hwy 14/16/20. Sparsely vegetated, north-south trending ridge of rocky volcanic substrate. *Elymus spicatus* common. 6500-7250ft.

9034 *Ipomopsis spicata* ssp. *robruthi*

**2 July 2004:** T52N R108W S22. West of Goff Creek, circa 37 air miles W of Cody; circa 0.25 air mile N of Hwy 14/16/20. Sparsely vegetated, north-south trending ridge of gravelly volcanic substrate. *Elymus spicatus* common. 6850-7500 ft.

9035 *Townsendia condensata* var. *anomala*

**5 July 2004:** T52N R105W S36 NE1/4 NW1/4. Circa 1.0 air mile W of Whit Creek and circa 1.75 miles S of Hwy 14/16/20; Circa 19 air miles W of Cody. Steep, sparsely vegetated slopes of volcanic soils. Bunchgrasses and sagebrush scattered throughout. 7050-7400 ft.

9036 *Lomatium attenuatum*

**5 July 2004:** T52N R105W S36 NW1/4 NW1/4. Circa 1.0-2.0 air miles W of Whit Creek and circa 1.0-2.0 air miles So Hwy 14/16/20; Circa 19 air miles W of Cody. Ridges and northeast-facing slopes; Bunchgrass and cushion plant community on volcanic talus. 7100-7250 ft.

9037 *Townsendia condensata* var. *anomala*

**6 July 2004:** T52N R108W S19 NW1/4 NE1/4. Circa 0.25 mile NW of Eagle Creek and circa 0.25 mile SW of Hwy 14/16/20; circa 40 air miles W of Cody. Sparsely vegetated, east-facing slope of sandy-gravelly volcanic soils. Bunchgrass community on periphery of Douglas-fir/limber pine forest. 7100 ft.

9038 *Penstemon absarokensis*

**6 July 2004:** T52N R109W S12 W1/2 and NE1/4. Circa 1/3 air mile E of Grinnell Creek and circa 1/4 air mile N of Hwy 14/16/20; circa 41 air miles W of Cody. Ridges and upper southwest-facing slopes of volcanic talus; sparsely vegetated with *Elymus spicatus*, *Oryzopsis hymenoides*, *Phacelia hastata*, and *Chaenactis douglasii*. 7000-7250 ft.

9039 *Penstemon absarokensis*

**7 July 2004:** T52N R109W S11 NW1/4 SE1/4. Ski Run of Sleeping Giant Winter Sports Area circa 0.5 mile W of Canfield Creek and circa 0.5 mile S of Hwy 14/16/20; circa 44 air miles W of Cody. Northwest-facing, grassy slope (ski run) on edge of Douglas-fir forest. 6900 ft.

9040 *Castilleja crista-galli*

**7 July 2004:** T52N R109W S3 SW1/4 SW1/4. Circa 3/4 air mile W of Shoshone River and Pahaska Tepee and circa 1.4 air mi N of Hwy 14/16/20. Shaded steep banks and rocky bottom of drainage in Douglas-fir forest. 7050 ft.

9041 *Castilleja crista-galli*