



Vascular Plant Inventory of Selected Alpine Areas in Yellowstone National Park

Natural Resource Technical Report NPS/GRYN/NRTR—2012/651



ON THE COVER

Arnica rydbergii near Snowshoe Pass, Yellowstone National Park
Photograph by: Jennifer Whipple, Yellowstone National Park

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Abstract

High-elevation areas in the Gallatin Mountains and on Cutoff Mountain were investigated (2003-2005) for previously unreported park flora species. Ten new taxa were located: *Anemone tetonensis*; *Antennaria monocephala*; *Claytonia megarhiza*; *Draba crassa*; *Draba globosa*; *Erigeron radicans*; *Minuartia austromontana*; *Oxytropis deflexa* var. *foliolosa*; *Parnassia kotzebuei*; and *Ranunculus pygmaeus*. The exact determination of two *Draba* specimens, one collected at Cutoff Mountain and another at Quadrant Mountain, is still ongoing with some of the *Draba* specimens sent to the Missouri Botanical Garden to be annotated by Dr. Ihsan Al-Shehbaz. Additionally, *Achnatherum pinetorum* was confirmed to occur in the southern Gallatin Range.

Acknowledgments

This project was partially funded through the NPS Greater Yellowstone Network Inventory Program. The author would like to thank the NPS inventory steering committee, Rick Lasko, Mason Reid, Ann Rodman, and Kathy Tonnessen for their help conducting the inventory workshop that identified the need for an alpine plant inventory in Yellowstone National Park. The author would also like to thank Cathie Jean and Lane Cameron from the Greater Yellowstone Network for their help on planning the vascular plant inventory. Gallatin National Forest rangers were immensely helpful with the corral operation and fire cache, especially Wally Wines, Dave Elwood, Monty Simenson, Brian Helms, Bonnie Gafney, and Wendy Hafer. The field crews that scrambled here and there included Heidi Anderson, Ken Aho, Vicki Pecha, Elizabeth Crowe, Cheryl Jaworowski, and John David Sacklin. Finally, Mary Hektner was a tower of strength in shepherding the logistics through the years.

Introduction

One of the goals of the Inventory and Monitoring program of the National Park Service is to have at least a ninety-percent knowledge of the vascular plants of each park unit. The knowledge of the vascular plant flora of Yellowstone National Park is extensive with collections dating back to 1870, but most of the collecting has been focused on areas easily approached from the road system. Botanical surveys during the latter part of the nineteenth century and the early twentieth century were opportunistic, sporadic, and incomplete. An analysis of collecting patterns suggested that in general the areas most under-collected were those approaching treeline or in the alpine zone.

Documentation of the high-elevation flora of the park is made more pressing within the context of global climate change. Species that are currently in restricted habitats associated with remnant ice fields and alpine areas may in the future encounter climatic conditions that could lead to a local extirpation—on a mountain, within a mountain range, or within the entire park.

Documentation of the current flora is necessary as a baseline for future knowledge about floristic changes triggered by changing climate and other factors (such as mountain goats, for example).

Due to the road that had been built to the summit, Mount Washburn has been collected extensively through the years, with specimens scattered throughout herbaria in North America. Accessible areas in the Absaroka Range near the road system, such as Republic Pass and Sylvan Pass, have been investigated, but the southern Absarokas, especially in the Thorofare area, have received less attention. Other under-collected areas included the Two Ocean Plateau area and, especially, the Gallatin Range.

Throughout the Absaroka Range and the Two Ocean Plateau, rock types are predominantly Absaroka volcanics. In the Gallatin Range, however, rock types are more variable, including the presence of sedimentary rocks such as limestone, which suggests a greater likelihood for undocumented taxa. Alpine limestone areas in other mountains of the Greater Yellowstone Area have been found to have unique endemics and arctic/alpine plants that are significantly disjunct from the main portion of their ranges. Access in recent years into the Gallatins had been extremely limited due to restrictions implemented for grizzly bear management purposes and human safety over the central part of the range. These restrictions have effectively curtailed botanical exploration and collecting. The presence of areas of limestone in the Gallatin Range near and above treeline elevated the likelihood that undocumented taxa might be present; therefore, this range was targeted in this study for more extensive survey, especially above 9,000 feet in elevation (Figure 1).



Yellowstone National Park

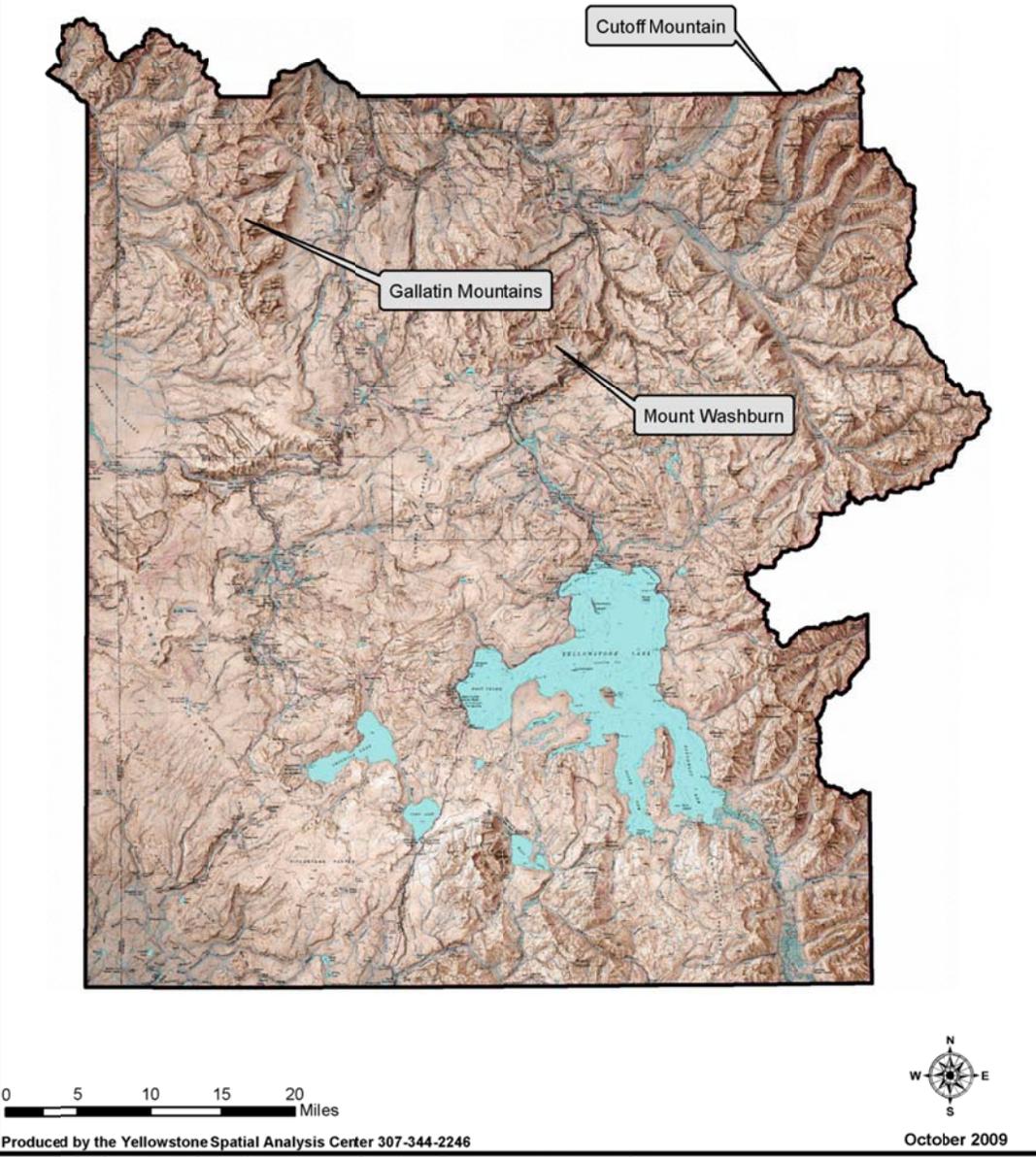


Figure 1. Map of Yellowstone National Park showing the general location of the Gallatin Mountain range and Cutoff Mountain study areas. Mount Washburn, an alpine area widely studied due to having a road built to the summit, is shown for reference only.

Methods

Prior to beginning fieldwork, an extensive analysis of both topographic and geologic maps had suggested possible areas to target survey efforts. An opportunistic helicopter overflight prior to beginning fieldwork allowed a chance to see the proposed study area from the air, providing additional information about accessibility and limestone exposures. The limestone in the vicinity of Fawn Pass (Bannock Peak, Quadrant Mountain) and in the southern portion of the Gallatin Range around Trilobite Ridge was determined to be the highest priority for botanical survey.

Fieldwork in the summer of 2003 included two separate trips into the Gallatin Range. The first trip from July 22 to 29 was based at the Fawn Pass Cabin with supplies brought in by stock. The working crew of six included a packer (Monty Simenson, Dave Elwood) to manage the three horses that remained at the cabin as riding stock, and five botanists (Heidi Anderson, Mary Hektner, Ken Aho, Vicki Pecha, and Jennifer Whipple). Transportation to various field sites utilized horses and foot travel. Some time was lost due to horse complications and inclement weather conditions such as lightning storms. Areas investigated included: Fawn Pass and the ridgeline south of the pass running to the southeast; the northwest ridgeline to the summit of Bannock Peak; the ridge from Fawn Pass to Snowshoe Pass and onto the lower slopes of Gray Peak; the summit of Quadrant Mountain; and the base of the cirque on the north side of Bannock Peak (Figure 3).

The second horse pack trip from August 4 to 7 was based from the Sportsman Lake Cabin to investigate the ridgeline from Electric Pass to Joseph Peak (Figure 4). Personnel included Monty Simenson, packer; Bonnie Gafney, ranger; and Jennifer Whipple, botanist. There was only one day of access to the ridgelines due to horse complications (they left...) and a wildland fire nearby (smokejumpers arrived...). Separately, on August 8 Heidi Anderson climbed Electric Peak looking for additional taxa of interest. The calcareous summit of Antler Peak is inaccessible by either foot or horse, so the decision was made to use a helicopter to access the summit area. Botanists Heidi Anderson and Jennifer Whipple were airlifted on July 10, 2004 for a quick two-hour survey of the summit area, specifically to investigate the possible presence of a rare *Oxytropis* that could have been collected there on July 26, 2001 (Figure 4).

The Trilobite area was targeted for the main field work in 2004, with a base camp established from July 13 to 17 near the trail to Trilobite Lake against the edge of the mountain. The seven field crew members (Heidi Anderson, John David Sacklin, Mary Hektner, Vicki Pecha, Elizabeth Crowe, and Jennifer Whipple) included a geologist (Cheryl Jaworowski) to help the field crew focus on areas that would be most likely to harbor new species to the Yellowstone flora. Pack stock were used to establish the field camp, pack in plant presses, food, and other essentials, but all investigations were done on foot. Sites investigated included: the slope up Trilobite Ridge; Trilobite Lake and the lower slopes of Dome Mountain; and the east slopes of Trilobite Ridge and vicinity of the campsite (Figure 5).

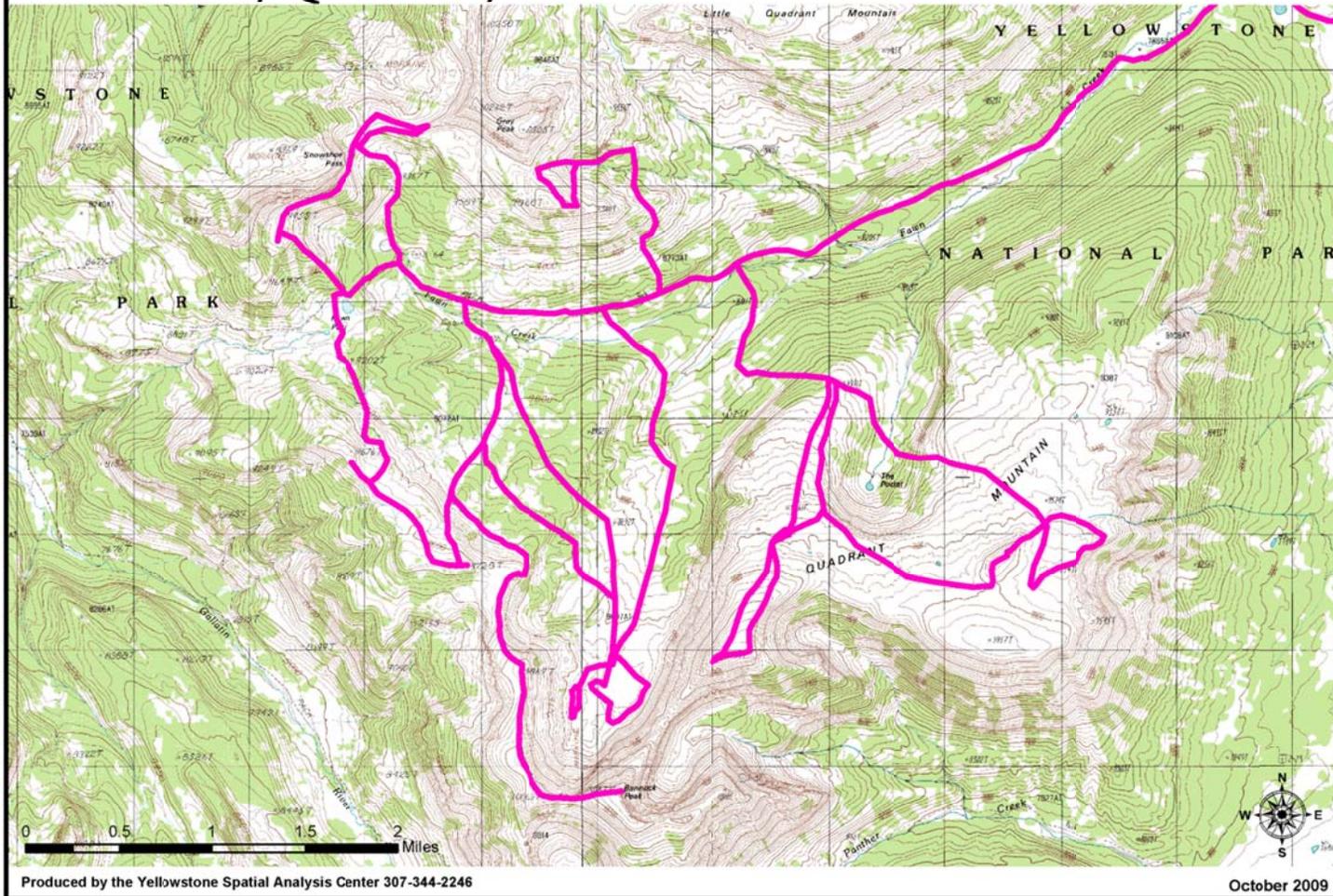


Figure 2. Mary Hektner and Heidi Anderson examining plants above Fawn Pass.

The last horse pack trip was from July 20 to 24, 2005 and again based at the Fawn Pass Patrol Cabin to continue to survey Quadrant Mountain, the west slopes of Gray Peak, and additional investigations of the Bannock cirque. Field personnel were Dave Elwood, packer and Jennifer Whipple, botanist (Figure 6).



Fawn Pass/Quadrant/Bannock Routes



FILE: K/Veg_RarePlants/ArcMap_Projects/Gallatin_Mountains_Plan_Survey/Figure_2_Fawn_Pass_Quadrant_Bannock_Routes

Figure 3. Alpine plant survey routes for the Fawn Pass, Quadrant Mountain, and Bannock Peak areas in Yellowstone National Park.

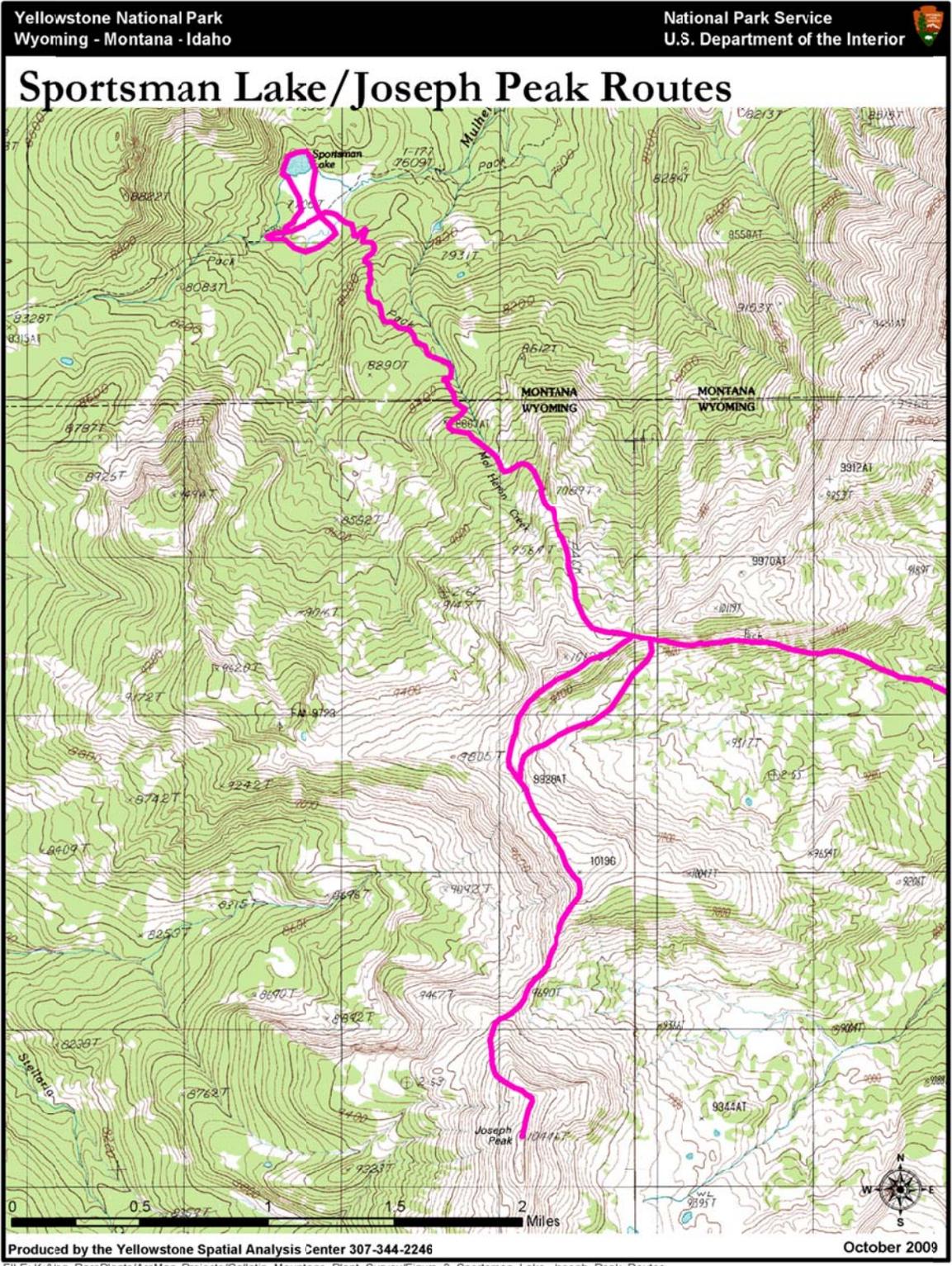


Figure 4. Alpine plant survey routes for Sportsman Lake and Joseph Peak in Yellowstone National Park.

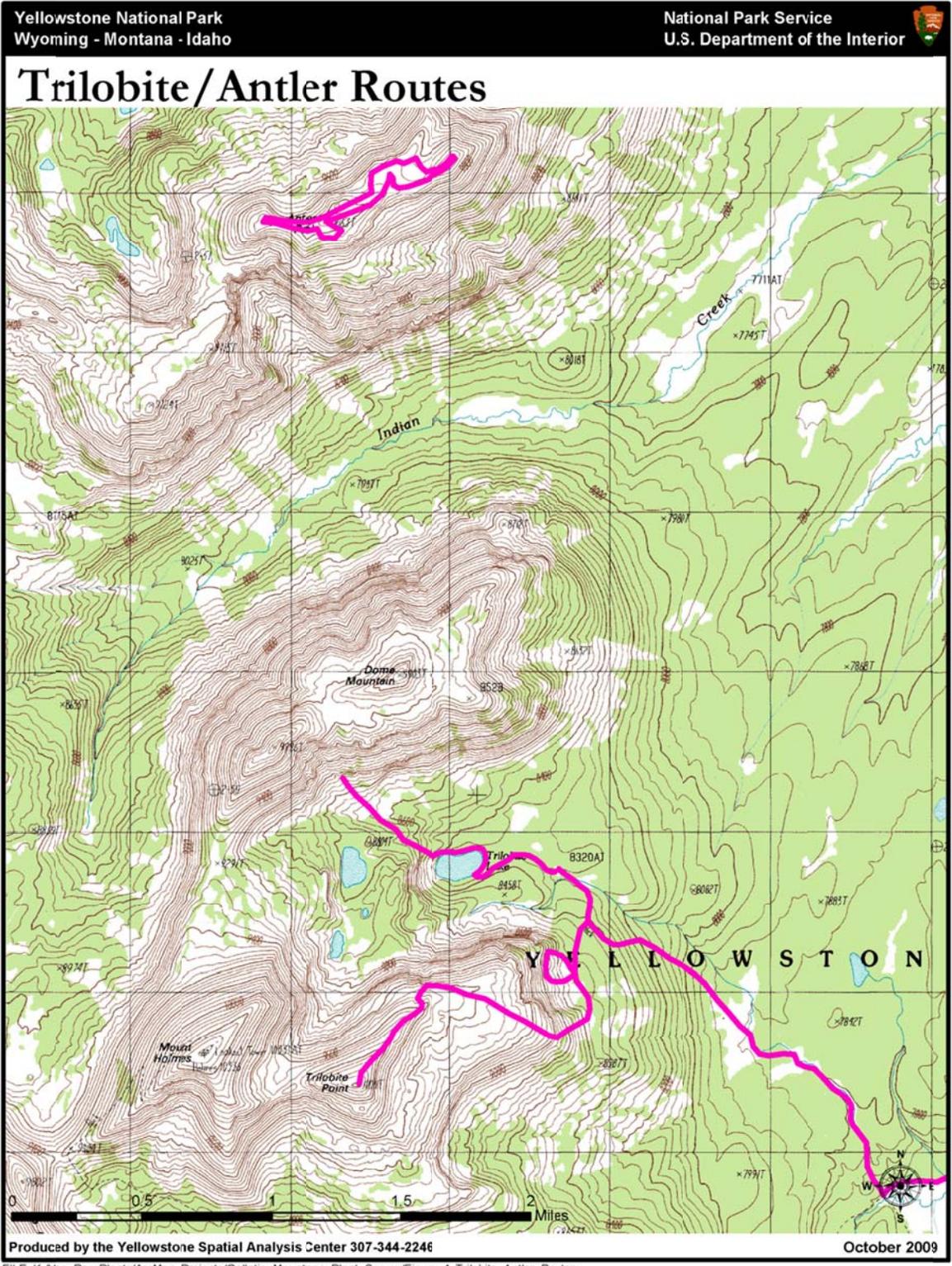


Figure 5. Alpine plant survey routes for Trilobite Point and Antler Peak in Yellowstone National Park.

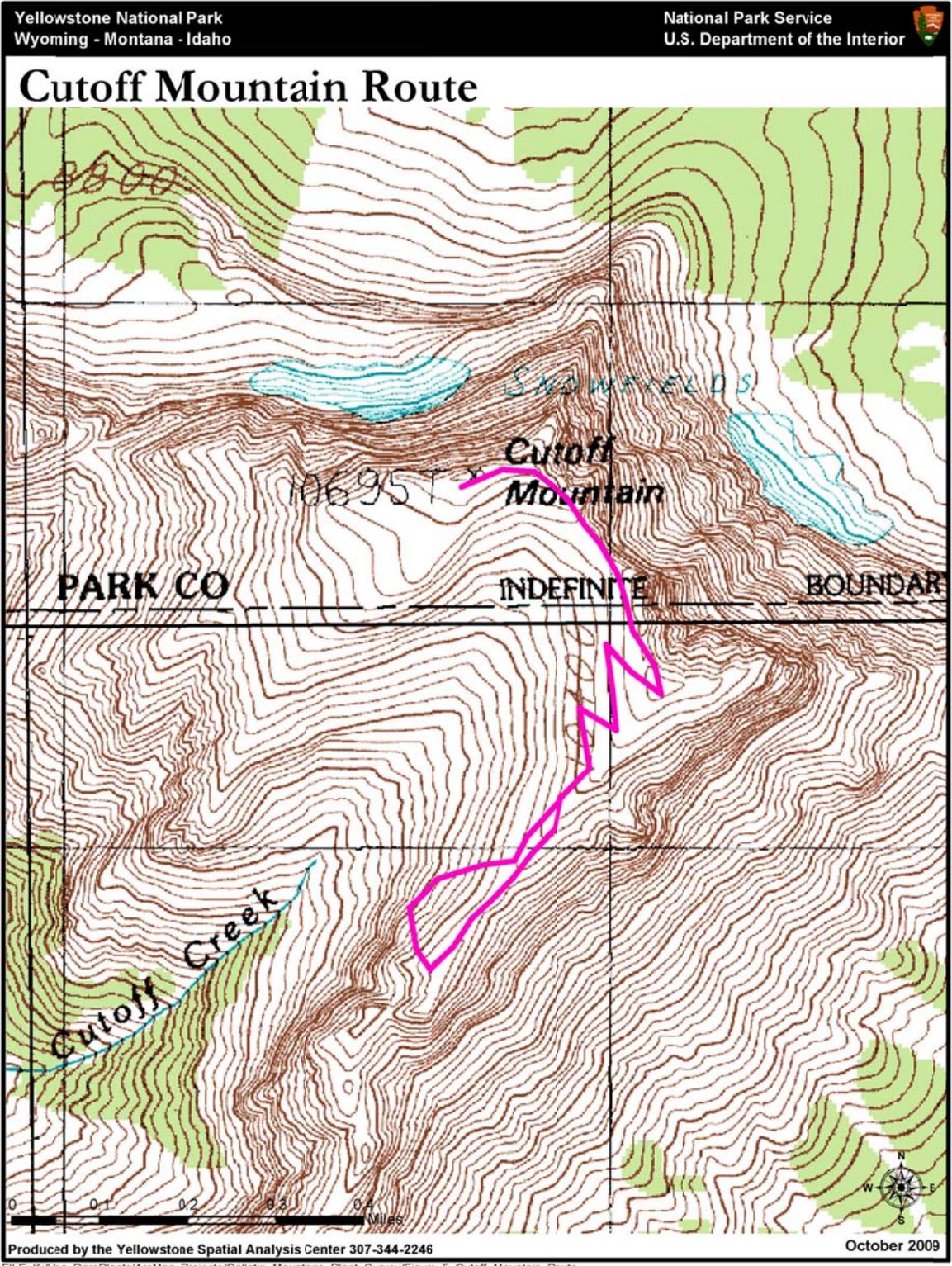


Figure 6. Alpine plant survey routes at Cutoff Mountain in Yellowstone National Park.

Ken Aho, who was studying vegetation near treeline in relation to mountain goats in the northeast portion of the park, had located possible new reports for Yellowstone on the summit area of Cutoff Mountain, which is a peak in the Absaroka Range along the north boundary of the park that is largely inaccessible. Ken Aho and Jennifer Whipple were flown by helicopter to near the summit on July 17, 2003 in order to determine if any of these species were actually in Yellowstone Park since the boundary with the Gallatin National Forest runs close to the summit of the mountain. On July 14, 2005, Heidi Anderson and Jennifer Whipple were again flown by helicopter to the summit region to continue investigations, since there were still two species present on the summit that had not been located in the park (Figure 6).

Results

The fieldwork during the summers of 2003, 2004, and 2005 resulted in 547 collections (460 from the Gallatin Range and 87 from Cutoff Mountain). Most of these specimens were easily identified, but several groups, especially *Draba* and *Erigeron*, needed additional work at the Booth Herbarium at Montana State University (MONT), and the Rocky Mountain Herbarium at the University of Wyoming (RM). The determination of some of the difficult specimens is still ongoing, with some of the *Draba* material sent to the Missouri Botanical Garden to be annotated by Dr. Ihsan Al-Shehbaz.

Documentation of several non-native species present in the Gallatin Mountains was initiated by specimen collection. The first report of *Ranunculus acris* (tall buttercup) in the Gallatin Range was documented at the stock site (WD2) near Sportsman Lake. This species is considered noxious by Montana and is spreading in meadows, especially in the backcountry, which suggests horses are a primary dispersal mechanism. This infestation numbered just two plants which were eradicated. Due to the presence of mature seeds and the fact that there were two plants, this location needs to be monitored in the future to prevent establishment of a nasty infestation.

Twelve new taxa were documented to occur in the park: *Anemone tetonensis*; *Antennaria monocephala*; *Claytonia megarhiza*; *Draba crassa*; *Draba globosa*; *Draba* sp. (Cutoff Mountain), *Draba* sp. (Quadrant Mountain), *Erigeron radicans*; *Minuartia austromontana*; *Oxytropis deflexa* var. *foliolosa*; *Parnassia kotzebuei*; and *Ranunculus pygmaeus*. Of these, seven were located in the Gallatin Range and the other five were located on Cutoff Mountain. Each of these are discussed below.

***Anemone tetonensis* Porter ex Britton (Teton anemone)** [*Anemone multifida* Poir. var. *tetonensis* (Porter ex Britton) C. L. Hitchc.]

Teton anemone was first located on the ridge south of Fawn Pass and later located both in the cirque on the north side of Bannock Peak and in talus on Trilobite Peak. This taxon is distributed at high elevations from central Idaho and southern Montana, south to Utah, with outlier populations in the Blue Mountains of northeastern Oregon and in the Charleston Mountains of Nevada (Hitchcock and Cronquist 1964, Flora of North America 1997). Previously unreported for Yellowstone National Park, the appearance of this anemone on calcareous substrates was not unexpected due to its presence in the Teton Mountains south of the park, in the Absaroka Range east of the park, and in the Beartooth Mountains. Coincidentally, this taxon was also found on calcareous substrate later during the summer of 2003 on the Buffalo Plateau at approximately 9,200 feet elevation along the northern boundary of the park.



Figure 7. *Anemone tetonensis* in Bannock Mountain cirque.

***Antennaria monocephala* DC. ssp. *angustata* (Green) Hultén (Single-head pussytoes)**

Single-head pussytoes was located by Ken Aho on top of Cutoff Mountain on the north face just outside of the park boundary on the Gallatin National Forest. The search in 2003 failed to locate any plants within the park, but a small population was located on the north face of the lower summit of Cutoff Mountain in 2005 in an alpine turf community. This taxon is primarily arctic in distribution, occurring from the Russian Far East (Chukotka Peninsula) across boreal North American to Greenland, and down the Rocky Mountains to Wyoming. Single-head pussytoes is a species of concern in Wyoming (G4G5/S2) with sites known from most of the high-elevation ranges in the northwest part of the state. The population in the park was on the more shaded portions of the north and west-facing slopes of the lower ridgcrest near the summit of Cutoff Mountain. Time constraints due to helicopter pick-up restricted the survey of the surrounding area, but only the one area was discovered with two sites: one site approximately 100 meters by 25 meters, and the other much smaller, about 10 square meters.



Figure 8. *Antennaria monocephala* on Cutoff Peak.

***Claytonia megarhiza* (A.Gray) Parry ex S.Watson (Fell-field claytonia)**

Fell-field claytonia was located on Cutoff Mountain by Ken Aho and confirmed during the 2003 helicopter trip to be actually in the park on fell-field slopes and rocky talus. The population was small and scattered on the south to west-facing slope of the summit region. This species had previously been collected near the south boundary of the park but most of the trail on Big Game Ridge is outside of the park boundary in the Teton Wilderness, so the presence of this species in the park had remained undetermined. Additional populations of fell-field claytonia are to be expected at high locations in the Absaroka Range, and possibly along the south boundary in the vicinity of Mount Hancock. The center of distribution for this species is in the mountain ranges of the western United States continuing up the Rockies into Canada and the arctic (Flora of North America 2003).



Figure 9. *Claytonia megarhiza* on Cutoff Mountain.

***Draba crassa* Rydb. (Thick-leaved draba)**

Thick-leaved draba is a regional endemic known from generally above treeline in the Rocky Mountains from southern Montana to Colorado, and in the Uinta Mountains of Utah. Ken Aho located this species on Cutoff Mountain, but was uncertain as to whether it was within the park. Careful examination of the talus slope and fell field at the park boundary located just a few plants within the approximate boundary of the park. This is the only known location in the park, and most of the population is actually in the Gallatin National Forest. Thick-leaved draba is a Montana plant species of concern (G3G4/S2S3) and is known from Beaverhead, Deer Lodge, Granite, Madison, and Park counties, while in Wyoming the species is known from Absaroka, Wind River, Teton, and Gros Ventre ranges (WYNDD 1999).



Figure 10. *Draba crassa* on Cutoff Mountain.

***Draba globosa* Payson (Beaver-tip draba)**

Beaver-tip draba is a regional endemic of southwestern Montana (Madison and Centennial ranges), Wyoming, central Colorado, south-central Idaho, and northwestern Utah. Frequently found on high elevation calcareous substrates, this species was one of the suspected possible target species for the survey in the Gallatin Range. Sites were located on both Antler Peak and Quadrant Mountain on calcareous substrates. The Quadrant Mountain site was in a rocky creviced area near the summit of the mountain on a gradual north-facing slope. Two different locations were discovered on Antler Peak: one near the summit by a melting south-facing snow bank, the other growing on the northeast-facing slope of the summit in a tundra/meadow. In all three locations, the number of plants was small: about 25 plants near the pond on Quadrant Mountain; at least 20 plants near the snow bank on Antler Peak where more habitat may have been exposed later in the season; and about 25 plants on the northwest slope near the summit, which had recently melted off. Both Antler Peak and Quadrant Mountain may harbor additional sites. Beaver-tip draba is on the Wyoming species of concern list (G3/S2S3) and on the Montana species of concern list (G3/S2S3) from Beaverhead and Madison counties, and on the Idaho list (G3/S2).



Figure 11. *Draba globosa* on Antler Peak.

***Draba* sp. (Cutoff Mountain)**

This taxon is currently being reviewed by the authority on *Draba*, Dr. Ihsan Al-Shehbaz at the Missouri Botanic Garden. This taxon is clearly a new report for the park but the correct identification is pending. The material from Cutoff Mountain lacks any appreciable hairs on the leaves. The inconspicuous plants were located on a moist turf community in shaded nooks and crannies among the rocks, with only about 20 plants located, so very little material was collected, which may contribute to uncertainties about the identification of this population.



Figure 12. *Draba* sp. on Cutoff Mountain.

***Draba* sp. (Quadrant Mountain)**

This plant is an inconspicuous white-flowered mustard that was located on Quadrant Mountain scattered among talus on the north face of the red mound on the eastern side of the flat summit area. The few plants (less than 25) were tucked among boulders (as can be seen in figure 13) in moist soil in an area dominated by *Mertensia ciliata*. Also present were *Polemonium viscosum*, *Erigeron compositus*, *Draba incerta*, and *Saxifraga rivularis*. This taxon does not appear to be represented in the Flora of North American (Flora of North America 2010) key to *Draba* and could represent a previously undescribed entity. Dr. Ihsan Al-Shehbaz who is a noted expert in the *Brassicaceae*, is examining the material.



Figure 13. Red mound on top of Quadrant Mountain, habitat of *Draba* sp.



Figure 14. *Draba* sp. on Quadrant Mountain.

***Erigeron radicans* Hook. (Taproot fleabane)**

Taproot fleabane was located on Antler Peak and Trilobite Point in the Gallatin Range during survey of those areas. The populations were extremely small and scattered among talus and rock outcrops on both peaks, numbering just a few individuals in total, limiting the collections to just single individuals. In-depth survey would be time consuming and difficult since the plants are often hard to locate in the rocks, and the focus of this study was to cover as much ground as possible. Taproot fleabane is found from Alberta and Saskatchewan in Canada, down the Rocky Mountains into Wyoming and Utah, and east to the Dakotas and Nebraska. This species is usually found on calcareous substrates such as limestone, which is the case in the Gallatin Range. Within Wyoming, *Erigeron radicans* is known from northwest Wyoming in the Absaroka, northwest Wind River, Gros Ventre, and Wyoming ranges (WYNDD 1996). Distinguishing this species from *E. ochroleucus* is difficult, and earlier collections from the Gallatin Range that were identified as *E. ochroleucus* may in fact be *E. radicans*. All of the high-elevation specimens of these two taxa need to be carefully examined in the future. *Erigeron* is a notorious genus taxonomically. Unfortunately, no photos were taken since the significance of the specimens was not realized until examined in the herbarium later.



Figure 15. Antler Peak summit area, habitat of *Erigeron radicans*, *Oxytropis deflexa* var. *foliolosa*, *Minuartia austromontana*, and *Draba globosa*.

***Minuartia austromontana* S. J. Wolf & Packer (Rocky Mountain sandwort)**

Rocky Mountain sandwort is usually found on dry rocky calcareous slopes and fell-fields in alpine areas (Flora of North America 2005), which is exactly where it was located in the Gallatin Range. This species was discovered at several locations including Antler Peak, Bannock Peak, and Trilobite Point. There were healthy numbers of plants at these sites, especially on the slopes of Trilobite Point where it occurs in a rocky pavement. Rocky Mountain sandwort occurs from British Columbia and Alberta in Canada, south to Oregon, and east to Wyoming and Utah. The Wyoming sites are primarily concentrated in northwestern Wyoming around Yellowstone National Park, so the presence of this species in the park was not surprising.



Figure 16. *Minuartia austromontana* on Trilobite Point.

***Oxytropis deflexa* var. *foliolosa* (Hook.) Barneby (Nodding alpine locoweed)**

Nodding alpine locoweed is the high-elevation variety of the more commonly encountered *Oxytropis deflexa* var. *deflexa*, which is scattered around the park in meadows and wetland edges. Nodding alpine locoweed was first encountered in fruit on Antler Peak when the summit was visited by helicopter on July 26, 2001. The specimen was just a fragment and the determination was somewhat problematic. The survey on the summit of Antler Peak in July 2004 confirmed the presence of nodding alpine locoweed. Later that summer, a population on Trilobite Point was also discovered. At both sites, the number of individuals is small, with the plants associated with *Dryas octopetala* in a dense tundra-like mat. This taxon is considered to be a glacial relict in tundra and alpine meadow in the southern portion of its range, occurring from Nevada to Colorado north into the arctic with cognate or possibly identical forms in east Asia. This species is currently tracked by Montana (G5T3T5/S2S3) with one known occurrence in the Madison Range, and formerly tracked by the Wyoming Natural Diversity Database where it has been found to be more common, especially on high elevation calcareous substrates in the western portion of the state.



Figure 17. *Oxytropis deflexa* var. *foliolosa* on Trilobite Ridge.

***Parnassia kotzebuei* Cham. ex Spreng (Kotzebue's grass-of-parnassus)**

Kotzebue's grass-of-parnassus was located on steep north-facing slopes above the cirque on the north face of Bannock Peak. Ken Aho used his rock-climbing skills to investigate some of these slopes and found a patch of Kotzebue's grass-of-parnassus and brought it back up to the ridgecrest. The steepness of the terrain prevented exploration of the site by the rest of the field crew, so there are no estimates of population size or photographs of this species. Kotzebue's grass-of-parnassus is circumpolar occurring across the Canadian arctic and Alaska, extending into the western United States including the Ruby Mountains in Nevada, Colorado, Washington Idaho, Montana, and Wyoming where it is primarily known in the mountain ranges in the western portion of the state. This species was one of the target species of the investigation in the Gallatin Range, since it was documented in the Greater Yellowstone Area.



Figure 18. Bannock Peak cirque, habitat of *Parnassia kotzebuei*.

***Ranunculus pygmaeus* Wahlenb. (Pygmy buttercup)**

Pygmy buttercup is an arctic species that occurs from Alaska to Greenland and Spitsbergen with relict populations in locations such as the Alps, stretching south along the mountains of the western cordilleran into the Rockies of Montana, Wyoming, and south to Colorado. Pygmy buttercup was first located by Ken Aho on the north face of Cutoff Mountain in the Gallatin National Forest. The first search of the Yellowstone side of the summit failed to locate any buttercup, but a later search of the north slope of the lower southern summit area successfully located this species. The first site located was on the north side of a large boulder, with additional plants located in the shady areas around nearby boulders. The plants numbered at least 200 individuals in an area approximately 30 meters by 10 meters. Plants were scattered within that area in the alpine turf community. Being restricted to very high elevations, this species is of conservation concern in parts of the Rocky Mountains. There is only one known population in Idaho where it is considered a G5/S1, while it is more common in Wyoming and Montana where it is not currently tracked by the heritage programs.



Figure 19. *Ranunculus pygmaeus* on Cutoff Mountain.

Additional Species Collected

Several other notable collections were made, including the confirmation of *Achnatherum pinetorum* (M. E. Jones) Barkworth, at two locations in the Gallatin Range. A fragment of material had come into the herbarium years previously from a wildlife study conducted in the Gallatin's that appeared to be this species, but there was no information about exact location where the sample fragment was collected. Healthy sites were found on rocky substrates, especially in the Trilobite region.

Draba paysonii J.F. Macbr. var. *paysonii*, is a species of concern in Wyoming (G5T3/S2), was located at two locations: near Fawn Pass, and on the summit of Antler Peak. In both cases there were very few plants growing in the rocky talus, but the individual plants were relatively large, allowing collections to document the presence of this taxon.

A vascular plant species list was generated of all of the species collected in the Gallatin Range during this study (Appendix A). Additionally, a vascular plant species list of all taxa known to occur at or above 9,000 feet in elevation in Yellowstone National Park was initiated (Appendix B), though this list is known to be incomplete at this time. (The lists presented in Appendices A and B are provisional and subject to change.)

Discussion

Botanical exploration of the park is still ongoing. The flora of Yellowstone is clearly well known above the ninety percent level, but there are still new species to be located. The rarest species in the park are the plants that are extremely limited in distribution. The corollary is that these taxa are difficult to locate since they could be scattered almost anywhere, but in recent years most new additions to the park flora have occurred on the barren slopes near and in the Gardiner Basin at the lowest elevations in the park; in wetlands, especially in the Bechler region; and at the highest elevations near and above treeline.

Due to the nearby presence of the Beartooth Mountains and the higher summits of the Absaroka Range east of the park boundary, there is a reservoir of alpine species known to occur on these peaks that have not been located in the park at this time. Some of these alpine species are likely to be present. Among those areas to explore more extensively include additional locations in the Gallatin Range, especially the higher elevation limestone/calcareous outcrops such as Dome Mountain; and the Absaroka Range, especially in the Thorofare region, since remoteness has limited botanical exploration there in the past. Other possible areas of interest are Mount Hancock on the northern edge of Big Game Ridge, the Two Ocean Plateau, and the peaks in the northeast corner of the park, such as Amphitheater Mountain where Ken Aho has located an additional species for the park flora, *Phyllodoce glandulifera*. As demonstrated by this study, areas at treeline and higher elevations into the true alpine zone still harbor numerous species that are extremely limited in distribution. These plants are most likely on north-facing slopes and cliffs and other locations difficult to explore. Whenever possible, high peaks should be carefully examined for additional species that may be lurking in crevices, rock piles, and, of course, in plain view.

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Appendix A: List of Specimens Collected During the 2003, 2004, and 2005 Field Seasons on the Gallatin Range in Yellowstone National Park

Note: This list is provisional and subject to change.

A = Antler Peak
B = Bannock Peak
F = Fawn Pass and vicinity
G = Gray Peak
J = Joseph Peak
Q = Quadrant Mountain
S = Sportsman Lake
T = Trilobite Point and vicinity

ADIANTACEAE

Pellaea breweri D. C. Eaton: Q, T

ASPLENIACEAE

Cystopteris fragilis (L.) Bernh.: B

APIACEAE

Angelica arguta Nutt.: S

Angelica roseana Henderson: F

Bupleurum americanum Coult. & Rose: A, F, J, Q

Lomatium cous (Wats.) Coult. & Rose: J

Lomatium dissectum (Nutt.) Math. & Const. var. *multifidum* (Nutt.) Math. & Const.: T

Lomatium triternatum (Pursh) Coult. & Rose var. *platycarpum* (Torrey) Boivin: F, T

ASTERACEAE

Achillea milleforium L. var. *lanulosa* (Nutt.) Piper: F

Agoseris glauca (Pursh) Raf. var. *dasycephala* (T. & G.) Jeps.: B

Agoseris glauca (Pursh) Raf. var. *laciniata* (Eaton) Smiley: B

Agoseris lackschewitzii Henderson & Moseley: T

Antennaria corymbosa E. Nels.: Q

Antennaria media Greene: B, Q

Antennaria microphylla Rydb.: B

Antennaria umbrinella Rydb.: B, Q

Arnica chamissonis Less var. *foliosa* (Nutt.) Maguire: S

Arnica longifolia Eaton: B

Arnica mollis Hook.: G

Arnica rydbergii Greene: B, F

Artemisia frigida Willd.: B

Artemisia ludoviciana Nutt. var. *latiloba* Nutt.: F

Balsamorhiza sagittata (Pursh) Nutt.: T

Chaenactis alpina (Gray) Jones: F, J

Cirsium eatonii (Gray) Robins.: B, F
Ericameria suffruticosa (Nutt.) Nesom: F
Erigeron acris L. var. *kamtschaticus* (DC.) Herder: G
Erigeron compositus Pursh var. *discoideus* Gray: B, F
Erigeron lonchophyllus Hook.: Q
Erigeron radicans Hook.: A, T
Erigeron rydbergii Cronq.: B, J, Q
Erigeron simplex Greene: B, Q
Erigeron ursinus D. C. Eaton: A, B, F, G
Eriophyllum lanatum (Pursh) Forbes var. *integrifolium* (Hook.) Smiley: T
Hieracium triste Willd. ex Spreng. var. *gracile* (Hook.) Gray: Q
Hulsea algida Gray: J
Oreostemma alpigenum (T. & G.) Greene var. *haydenii* (Porter) Nesom: B, F
Packera dimorphophylla (Greene) Weber & Löve
var. *paysonii* (Barkley) Trock & Barkley: Q
Senecio integerrimus Nutt. var. *exaltatus* (Nutt.) Cronq.: B, F, T
Senecio fremontii T. & J. var. *fremontii*: B, J
Senecio lugens Richardson: B, Q
Solidago multiradiata Ait. var. *scopulorum* Gray: A, B, F
Stenotus acaulis (Nutt.) Nutt.: B, F
Symphyotrichum foliaceum (Lindl. ex DC.) Nesom var. *apricum* (Gray) Nesom: B, F
Taraxacum ceratophorum (Ledeb.) DC.: B
Taraxacum laevigatum (Willd.) DC.: F, B
Taraxacum officinale Weber: T
Taraxacum scopulorum (Gray) Weber: B, G, J
Townsendia alpigena Piper: A, F
Townsendia parryi D. C. Eaton: F, Q
Townsendia spathulata Nutt.: J

BORAGINACEAE

Eritrichium nanum (Vill.) Schrad. ex Gaudin var. *elongatum* (Rydb.) Cronq.: A, J
Hackelia micrantha (Eastw.) Gentry: F, T
Hackelia patens (Nutt.) Johnston var. *patens*: T
Mertensia alpina (Torrey) G. Don: A, Q
Mertensia ciliata (James ex Torrey) G. Don var. *ciliata*: B, T
Mertensia viridis (A. Nels.) A. Nels.: F
Myosotis alpestris Schmidt: B

BRASSICACEAE

Boechea angustifolium (Nutt.) Dorn: Q
Boechea lemmonii (Wats.) Weber var. *lemmonii*: F
Boechea lyallii (Wats.) Dorn: Q
Boechea nuttallii (Robins.) Dorn: A, F, Q
Boechea sparsiflora (Nutt.) Dorn var. *subvillosa* (Wats.) Dorn: T
Cardamine oligosperma Nutt.: J, T
Descurainia incana (Bernh. ex Fisch. & Meyer) Dorn var. *incana*: F

Descurainia incana (Bernh. ex Fisch. & Meyer) Dorn
 var. *macrosperma* (Schulz) Dorn : G
Draba cana Rydb. B, G, Q
Draba crassifolia Grah.: A, G, Q
Draba globosa Payson: A, Q
Draba incerta Payson: F, Q, T
Draba lonchocarpa Rydb. var. *lonchocarpa*: A, B, T
Draba oligosperma Hook.: A, B, F, J, T
Draba paysonii Macbr. var. *paysonii*: A, F
Draba praelta Greene: T
Draba porsildii Mulligan: Q
Erysimum inconspicuum (Wats.) MacM.: T
Physaria didymocarpa (Hook.) Gray var. *didymocarpa*: A, J
Physaria integrifolia (Rollins) Lichvar: J
Smelowskia calycina (Steph. ex Willd.) Meyer
 var. *americana* (Regel & Herder) Drury & Rollins : A, B, Q

CARYOPHYLLACEAE

Cerastium arvense: A, B, J
Eremogone congesta (Nutt.) Ikonnikov var. *congesta*: Q
Minuartia austromontana S.J.Wolf & Packer: A, B, T
Minuartia nuttallii (Pax) Briq. var. *nuttallii*: F
Minuartia obtusiloba (Rydb.) House: A, B, G, Q
Minuartia rubella (Wahl.) Hiem: A, B, T
Sagina saginoides (L.) Karsten G
Silena acaulis (L.) Jacq var. *subacaulescens*: A, B, Q
Stellaria crispa Cham. & Schlecht: S
Stellaria longipes Goldie var. *longipes*: B
Silene parry (Wats.) Hitchc. & Maguirei: F
Stellaria umbellata Turcz.: G

CRASSULACEAE

Sedum lanceolatum Torrey: B, F
Sedum integrifolium (Raf.) A. Nels.: B

CYPERACEAE

Carex albonigra Mack.: G, J
Carex disperma Dewey: S
Carex elynoides Holm.: A, B, G, Q
Carex epapillosa Mack.: G, T
Carex haydeniana Olney: B, F, G, Q, T
Carex illota Bailey: T
Carex micropoda C. A. Meyer: G
Carex microptera Mack.: S
Carex neurophora Mack.: G, S, T
Carex paysonis Clokey: Q

Carex pelocarpa Hermann: B, Q
Carex phaeocephala Piper: B, F, G, Q
Carex raynoldsii Dewey: F, G
Carex rossii Boott: T
Carex rupestris Allioni: T
Carex scirpoidea Michx. var. *pseudoscirpoidea* (Rydb.) Dunlop: A, B
Carex scopulorum Holm: T
Carex subnigricans Stacey: B
Carex tahoensis Smiley: F

ERICACEAE

Arctostaphylos uva-ursi (L.) Spreng: A
Kalmia microphylla (Hook.) Heller var. *microphylla*: T

FABACEAE

Astragalus alpinus L.: F, J, T
Astragalus australis (L.) Lam. var. *glabriusculus* (Hook.) Isely: F, J, Q, T
Astragalus kentrophyta Gray var. *tegetarius* (Wats.) Dorn: A, Q
Astragalus miser Dougl. var. *hylophilus* (Rydb.) Barneby: F
Hedysarum sulphurescens Rydb.: A, B
Oxytropis borealis DC. var. *viscida* (Nutt.) Welsh: A, F
Oxytropis campestris (L.) DC. var. *cusickii* (Greenm.) Barneby: A, B, J, Q, T
Oxytropis deflexa var. *foliolosa* (Hook.) Barneby: A, T
Oxytropis sericea Nutt. var. *speciosa* (T. & G.) Welsh: A, T
Trifolium haydenii Porter: A, F
Trifolium longipes Nutt. var. *reflexum* A. Nels.: T
Trifolium parryi Gray var. *montanense* (Rydb.) Welsh: A, F, G, Q, J

GROSSULARIACEAE

Ribes lacustre (Pers.) Poiret: S
Ribes montigenum McClatchie: F

HYDROPHYLLACEAE

Phacelia hastata Dougl. ex Lehm var. *hastata*: F
Phacelia sericea (Grah. ex Hook.) Gray var. *sericea*: F, G

JUNCACEAE

Juncus drummondii Meyer: B, G, Q
Juncus mertensianus Bong.: G
Luzula parviflora (Ehrh.) Desv.: T
Luzula spicata (L.) DC.: B, G, Q

LILIACEAE

Lloydia serotina (L.) Salisbury ex Reichenback var. *serotina*: A, B
Zygadenus elegans Pursh: A, B

ONAGRACEAE

- Epilobium ciliatum* Raf. var. *glandulosum* (Lehm.) Dorn: G
Epilobium clavatum Trel.: G
Epilobium halleanum Hausskn.: A, B, G, Q
Epilobium saximontanum Hausskn.: G, T

ORCHIDACEAE

- Listera cordata* (L.) R. Br.: T
Platanthera stricta Lindl.: T

OROBANCHACEAE

- Orobanche uniflora* L. var. *occidentalis* (Greene) Taylor & MacBryde: B

PARNASSIACEAE

- Parnassia fimbriata* Konig: B
Parnassia kotzebuei Cham. ex Spreng.: B

PLANTAGINACEAE

- Plantago tweedyi* Gray: F, G

POACEAE

- Achnatherum nelsonii* (Scribn.) Barkw. ssp. *dorei* (Barkw. & Maze) Dorn: T
Achnatherum pinetorum (Jones) Barkw.: T
Calamagrostis purpurescens R. Br.: A
Cinna latifolia (Trevir. ex Goepp.) Griseb.: S
Deschampsia cespitosa (L.) Beauv. var. *cespitosa*: F, Q
Elymus spicatus (Pursh) Gould: F
Festuca brachyphylla Schultes & Schultes var. *coloradensis* (Frederiksen) Dorn: G, J
Melica bulbosa Geyer ex Porter & Coult.: F, T
Phleum alpinum L.: B, Q
Poa alpina L. ssp. *alpina*: A, B, J, Q, T
Poa arctica R. Br. var. *grayana* (Vasey) Dorn: A
Poa cusickii Vasey var. *epilis* (Scribn.) C. L. Hitchc.: B, G, T
Poa fendleriana (Steud.) Vasey ssp. *fendleriana*: T
Poa leptocoma Trin.: S
Poa palustris L.: T
Poa pratensis L.: J, T
Poa rupicola Nash ex Rydb: Q
Poa secunda Presl ssp. *secunda*: A
Podagrostis humilis (Vasey) Björkman: S, T

POLEMONIACEAE

- Phlox multiflora* A. Nels.: A, B, F
Phlox pulvinata (Wherry) Cronq.: A, B, T
Polemonium viscosum Nutt.: A, B

POLYGONACEAE

- Eriogonum ovalifolium* Nutt. var. *purpureum* (Nutt.) Durand.: A, B
Eriogonum umbellatum Torr. var. *dichrocephalum* Gandoger: T
Oxyria digyna (L.) Hill: B, G
Bistorta distortoides (Pursh) Small: B, F
Bistorta vivipara (L.) Delarbre: B

PRIMULACEAE

- Androsace septentrionalis* L. var. *subulifera* Gray: J
Dodecatheon pulchellum (Raf.) Merr. var. *pulchellum*: A

RANUNCULACEAE

- Anemone multifida* Poiret: B, F
Anemone parviflora Michx.: B
Anemone tetonensis Porter ex Britton: F, T
Aquilegia flavescens Wats.: F, T
Ranunculus acris L. var. *acris*: S
Ranunculus eschscholtzii Schlecht. var. *eschscholtzii*: J
Ranunculus eschscholtzii Schlecht var. *eximius* (Greene) Benson: F, G, J
Thalictrum occidentale Gray: S, T

ROSACEAE

- Dryas octapetala* L. var. *hookeriana* (Juz.) Breit.: A, B, T
Geum triflorum Pursh var. *ciliatum* (Pursh) Fassett: B
Geum rossii (R. Br.) Ser. var. *turbinatum* (Rydb.) C. L. Hitchc.: J
Ivesia gordonii (Hook.) T. & G.: F, J, T
Potentilla diversifolia Lehm. var. *diversifolia*: B, F, G, J
Potentilla diversifolia Lehm. var. *perdissecta* (Rydb.) Hitchc.: A, B, T
Potentilla glandulosa Lindl. var. *pseudorupestris* (Rydb.) Breit.: B, F
Potentilla gracilis Dougl. ex Hook. var. *fastigiata* (Nutt.) Watson: T
Potentilla gracilis Dougl. var. *pulcherrima* (Lehm.) Sheld.: B
Potentilla ovina Macoun var. *ovina*: A, Q, T
Potentilla rubricaulis Lehm.: B, F, Q

RUBIACEAE

- Galium bifolium* Wats.: B, G

SALICACEAE

- Salix arctica* Pallas var. *petraea* (Anderss.) Bebb: B, Q
Salix barclayi Anderss.: S
Salix drummondiana Barr. ex Hook. F
Salix eastwoodiae Cock. ex Heller: F
Salix pseudomonticola Ball: S
Salix reticulata L. var. *nivalis* (Hook.) Anderss.: A, T
Salix rotundifolia Trautv. var. *dodgeana* (Rydb.) E. Murray: A
Salix tweedyi (Bebb ex Rose) Ball: F, S

SAXIFRAGACEAE

- Heuchera parvifolia* Nutt. ex T. & G.: T
Lithophragma glabrum Nutt. var. *ramulosum* (Suksd.) Boivin: B
Saxifraga bronchialis L. var. *austromontana* (Wieg.) Piper ex G. N. Jones: T
Saxifraga cespitosa L. var. *minima* Blank.: B, T
Saxifraga odontoloma Piper: B
Saxifraga oppositifolia L.: A, B
Saxifraga rivularis L.: G, Q
Saxifraga rhomboidea Greene: A, Q
Saxifraga subpetala E. Nels.: B
Telesonix heucheriiformis (Rydb.) Rydb.: B

SELAGINELLACEAE

- Selaginella densa* Rydb. var. *scopulorum* (Maxon) R. M. Tryon: A, J, Q

SCROPHULARIACEAE

- Besseyia wyomingensis* (A. Nels.) Rydb.: F
Castilleja cristagalli Rydb.: F, T
Castilleja pallescens (Gray) Greenm.: F
Castilleja pulchella Rydb.: A, B, J
Castilleja rhexifolia Rydb.: B
Castilleja sulphurea Rydb.: B, F
Mimulus suksdorfii Gray: T
Pedicularis bracteosa Benth. var. *paysoniana* (Pennell) Cronq.: T
Pedicularis contorta Benth. var. *contorta*: B
Pedicularis groenlandica Retz.: B
Pedicularis parryi Gray var. *purpurea* C. Parry: B, F, Q
Hybrid between *P. contorta* and *P. parryi*: B
Penstemon attenuatus Dougl. ex Lindl. var. *pseudoprocerus* (Rydb.) Cronq.: B, F, T
Penstemon deustus Dougl. ex Lindl.: T
Penstemon montanus Greene var. *montanus*: F
Penstemon procerus Dougl. ex Grah var. *procerus*: Q
Veronica americana Schwein. ex Benth.: B
Veronica wormskjoldii R. & S.: Q

VALERIANACEAE

- Valeriana acutiloba* Rydb. var. *pubicarpa* (Rydb.) Cronq.: F, G, T
Valeriana occidentalis Heller: T

VIOLACEAE

- Viola adunca* Smith: F
Viola palustri L.: T
Viola praemosa Dougl. ex Lindl. var. *altior* Blank.: F, T

Appendix B: Alpine and Tree Line Vascular Plant Species List in Yellowstone National Park

The determination of tree line is problematic due to the variation among different peaks, ranges, and the various definitions of tree line and alpine. This list documents vascular plants known to occur above 9,000 feet in elevation in the park, recognizing that in some places continuous forest may exist at this elevation. Documentation of high-elevation species is ongoing; numerous taxa are probably not represented on this list, especially at the lower limits near 9,000 feet where, for example, such species as *Festuca idahoensis*, *Elymus spicatus*, *Vaccinium cespitosum*, and *Arnica latifolia* are probably present above 9,000 feet. This list is provisional and subject to change; directed collection should improve this list in the future.

ADIANTACEAE

Pellaea breweri D.C. Eaton

ASPLENIACEAE

Athyrium alpestre (Hoppe) Clairville var. *americanum* Butters

Cystopteris fragilis (L.) Bernh

Dryopteris filix-mas (L.) Schott

ADOXACEAE

Sambucus racemosa L. var. *melanocarpa* (Gray) McMinn

APIACEAE

Angelica roseana Henderson

Bupleuron americanum Coult. & Rose

Ligusticum filicinum Wats.

Lomatium cous (Wats.) Coult. & Rose

Lomatium dissectum (Nutt.) Math. & Const. var. *multifidum* (Nutt.) Math. & Const.

Lomatium triternatum (Pursh) Coult. & Rose var. *platycarpum* (Torrey) Boivin

ASTERACEAE

Achillea millefolium L. var. *lanulosa* (Nutt.) Piper

Agoseris glauca (Pursh) Raf. var. *dasycephala* (T. & G.) Jeps.

Agoseris glauca (Pursh) Raf. var. *laciniata* (Eaton) Smiley

Agoseris lackschewitzii Henderson & Moseley

Antennaria aromatica Evert

Antennaria corymbosa E. Nels.

Antennaria flagellaris (Gray) Gray

Antennaria lanata (Hook.) Greene

Antennaria media Greene

Antennaria microphylla Rydb.

Antennaria monocephala DC.

Antennaria umbrinella Rydb.

Arnica longifolia Eaton

Arnica mollis Hook.

Arnica rydbergii Greene
Artemisia frigida Willd.
Artemisia ludoviciana Nutt. var. *latiloba* Nutt.
Artemisia michauxiana Bess.
Artemisia scopulorum Gray
Chaenactis alpina (Gray) Jones
Cirsium eatonii (Gray) Robins.
Crepis modocensis Greene var. *modocensis*
Ericameria suffruticosa (Nutt.) Nesom
Erigeron acris L. var. *kamtschaticus* (DC.) Herder
Erigeron compositus Pursh
Erigeron formosissimus Greene
Erigeron lonchophyllus Hook.
Erigeron ochroleucus Nutt. var. *scribneri* (Canby ex Rydb.) Cronq.
Erigeron peregrinus (Banks ex Pursh) Greene var. *scaposus* (T. & G.) Cronq.
Erigeron radicans Hook.
Erigeron rydbergii Cronq.
Erigeron simplex Greene
Erigeron ursinus Eaton
Hieracium triste Willd. ex Spreng. var. *gracile* (Hook.) Gray
Hulsea algida Gray
Oreostemma alpigenum (T. & G.) Greene var. *haydenii* (Porter) Nesom
Packera cana (hook.) Weber & Löve
Packera dimorphophylla (Greene) Weber & Löve
var. *paysonii* (Barkley) Trock & Barkley
Packera subnuda (DC.) Trock & Barkley
Packera wernerifolia (Gray) Weber & Löve var. *alpina* (Gray) Dorn
Senecio integerrimus Nutt. var. *exaltatus* (Nutt.) Cronq.
Senecio fremontii T. & J.
Senecio lugens Richardson:
Solidago multiradiata Ait. var. *scopulorum* Gray
Stenotus acaulis (Nutt.) Nutt.
Symphotrichum foliaceum (Lindl. ex DC.) Nesom var. *apricum* (Gray) Nesom
Taraxacum ceratophorum (Ledeb.) DC.:
Taraxacum scopulorum (Gray) Weber
Tephrosia lindstroemii (Ostenf.) Löve & Löve
Tonestus lyallii (Gray) A. Nels.
Townsendia alpigena Piper
Townsendia condensata Parry ex Gray var. *condensata*
Townsendia parryi Eaton
Townsendia spathulata Nutt.

BORAGINACEAE

Eritrichium nanum (Vill.) Schrad. ex Gaudin var. *elongatum* (Rydb.) Cronq.
Mertensia alpina (Torrey) G. Don
Mertensia ciliata (James ex Torrey) G. Don var. *ciliata*

Mertensia viridis (A. Nels.) A. Nels.
Myosotis alpestris Schmidt

BRASSICACEAE

Boechera angustifolium (Nutt.) Dorn
Boechera holboellii (Hornem) Love & Love var. *retrofracta* (Graham) Rydb.
Boechera lemmonii (Wats.) Weber var. *drepanoloba* (Greene) Rollins
Boechera lemmonii (Wats.) Weber var. *lemmonii*
Boechera lyallii (Wats.) Dorn
Boechera microphylla (Nutt.) Dorn var. *microphylla*
Boechera nuttallii (Robins.) Dorn
Boechera sparsiflora (Nutt.) Dorn var. *sparsiflora*
Descurainia incana (Bernh. ex Fisch. & Meyer) Dorn var. *incana*
Descurainia incana (Bernh. ex Fisch. & Meyer) Dorn var. *macrosperma* (Schulz) Dorn
Draba cana Rydb.
Draba crassa Rydb.
Draba crassifolia Rydb.
Draba densifolia Nutt.
Draba fladnizensis Wulfen var. *pattersonii* (O. W. Schulz) Rollins
Draba globosa Payson
Draba incerta Payson var. *incerta*
Draba lonchocarpa Rydb. var. *lonchocarpa*
Draba oligosperma Hook.
Draba paysonii Macbr. var. *paysonii*
Draba paysonii Macbr. var. *treleasii* (Schulz) Hitchc.
Draba porsildii Mulligan
Physaria didymocarpa (Hook.) Gray var. *didymocarpa*
Physaria integrifolia (Rollins) Lichvar
Smelowskia calycina (Steph. ex Willd.) Meyer
var. *americana* (Regel & Herder Drury & Rollins)

CARYOPHYLLACEAE

Cerastium arvense L. ssp. *strictum* Gaudin
Cerastium beeringianum Cham. & Schlecht var. *capillare* Fern. & Wieg.
Eremogone congesta (Nutt.) Ikonnikov var. *congesta*
Eremogone congesta (Nutt.) Ikonnikov var. *lithophila* (Rydb.) Maguire
Minuartia austromontana Wolf & Packer
Minuartia nuttallii (Pax) Briq. var. *nuttallii*
Minuartia obtusiloba (Rydb.) House
Minuartia rubella (Wahl.) Hiern
Sagina saginoides (L.) Karsten
Silene acaulis (L.) Jacq.
Silene parryi (Wats.) Hitchc. & Maguire
Stellaria longipes Goldie var. *longipes*
Stellaria umbellata Turcz.

CRASSULACEAE

- Sedum lanceolatum* Torrey
- Sedum integrifolium* (Raf.) A. Nels.

CYPERACEAE

- Carex albonigra* Mack.
- Carex aquatilis* Wahlenb. var. *aquatilis*
- Carex capitata* L.
- Carex duriuscula* C. A. Meyer
- Carex elynoides* Holm
- Carex epapillosa* Mack.
- Carex haydeniana* Olney
- Carex illota* Bailey
- Carex micropoda* C.A. Meyer
- Carex neurophora* Mack.
- Carex nigricans* C. A. Meyer
- Carex obtusata* Lilj.
- Carex paysonis* Clokey
- Carex pelocarpa* F. J. Hermann
- Carex phaeocephala* Piper
- Carex praeceptorum* Mack.
- Carex raynoldsii* Dewey
- Carex rossii* Boott
- Carex rupestris* Allioni
- Carex scirpoidea* Michx. var. *pseudoscirpoidea* (Rydb.) Dunlop
- Carex scopulorum* Holm
- Carex stenoptila* F. J. Hermann
- Carex subnigricans* Stacey
- Carex tahoensis* Smiley

ERICACEAE

- Arctostaphylos uva-ursi* (L.) Spreng.
- Phyllodoce empetriformis* (Sw.) D. Don
- Phyllodoce glandulifera* (Hook.) Cov.

FABACEAE

- Astragalus alpinus* L.
- Astragalus australis* (L.) Lam var. *glabriusculus* (Hook.) Isely
- Astragalus kentrophyta* Gray var. *tegetarius* (Wats.) Dorn
- Astragalus miser* Dougl. var. *hylophilus* (Rydb.) Barneby
- Hedysarum alpinum* L. var. *americanum* Michx.
- Hedysarum sulphurescens* Rydb.
- Lupinus argentues* Pursh var. *depressus* (Rydb.) C. L. Hitchc.
- Oxytropis borealis* DC. var. *viscida* (Nutt.) Welsh
- Oxytropis campestris* (L.) DC. var. *cusickii* (Greenm.) Barneby
- Oxytropis deflexa* (Pallas) DC. var. *foliolosa* (Hook.) Barneby

Oxytropis lagopus Nutt. var. *lagopus*
Oxytropis parryi Gray
Oxytropis sericea Nutt. var. *speciosa* (T. & G.) Welsh
Trifolium haydenii Porter
Trifolium parryi Gray var. *montanense* (Rydb.) Welsh

GENTIANACEAE

Frasera speciosa Dougl ex Griseb.
Gentianella tenella (Rottb.) Boerner

GROSSULARIACEAE

Ribes montigenum McClatchie

HYDROPHYLLACEAE

Hydrophyllum capitatum Dougl. ex Benth. var. *capitatum*
Phacelia hastata Dougl. ex Lahm. var. *hastata*
Phacelia sericea (Grah. ex Hook.) Gray var. *sericea*

ISOETACEAE

Isoetes bolanderi Engelm.

JUNCACEAE

Juncus drummondii Meyer
Juncus mertensianus Bong.
Juncus parryi Engelm.
Luzula piperi (Coville) Jones
Luzula spicata (L.) DC.

LILIACEAE

Lloydia serotina (L.) Salisbury ex Reichenback var. *serotina*
Zygadenus elegans Pursh

LINACEAE

Linum lewisii Pursh var. *lewisii*

ONAGRACEAE

Epilobium ciliatum Raf. var. *glandulosum* (Lehm.) Dorn
Epilobium clavatum Trel.
Epilobium halleanum Hausskn.
Epilobium saximontanum Hausskn.

OPHIOGLOSSACEAE

Botrychium sp.

OROBANCHACEAE

Orobanche uniflora L. var. *occidentalis* (Greene) Taylor & MacBryde

PARNASSIACEAE

- Parnassia fimbriata* Konig
Parnassia kotzebuei Cham. ex Spreng.

PINACEAE

- Abies bifolia* A. Murray
Picea engelmannii Parry ex Engelm. var. *engelmannii*
Pinus albicaulis Engelm.

PLANTAGINACEAE

- Plantago tweedyi* Gray

POACEAE

- Achnatherum nelsonii* (Scribn.) Barkw. ssp. *dorei* (Barkw. & Maze) Barkw.
Achnatherum pinetorum (Jones) Barkw.
Agrostis mertensii Trin.
Agrostis variabilis Rydb.
Calamagrostis purpurescens R. Br.
Deschampsia cespitosa (L.) Beauv. var. *cespitosa*
Elymus scribneri (Vasey) Jones
Festuca baffinensis Polunin
Festuca brachyphylla Schultes & Schultes var. *brachyphylla*
Festuca brachyphylla Schultes & Schultes var. *coloradensis* (Fredericksen) Dorn
Festuca minutiflora Rydb.
Festuca saximontana Rydb.
Leucopoa kingii (Wats.) W. A. Weber
Melica bulbosa Geyer ex Porter & Coult.
Melica spectabilis Scribn.
Phleum alpinum L.
Poa alpina L.
Poa arctica R. Br. var. *grayana* (Vasey) Dorn
Poa cusickii Vasey var. *epilis* (Scribn.) C. L. Hitchc.
Poa fendleriana (Steud.) Vasey ssp. *fendleriana*
Poa interior Rydb.
Poa pratensis L.
Poa reflexa Vasey & Scribn. ex Vasey
Poa rupicola Nash ex Rydb.
Poa secunda Presl ssp. *secunda*
Podagrostis humilis (Vasey) Björkman
Trisetum spicatum (L.) Richt.
Trisetum wolfii Vasey

POLEMONIACEAE

- Phlox multiflora* A. Nels.
Phlox pulvinata (Wherry) Cronq.
Polemonium pulcherrimum Hook. var. *pulcherrimum*

Polemonium viscosum Nutt.

POLYGONACEAE

Bistorta bistortoides (Pursh) Small
Bistorta vivipara (L.) Delarbre
Eriogonum ovalifolium Nutt. var. *purpureum* (Nutt.) Durand
Eriogonum umbellatum Torr. var. *umbellatum*
Oxyria digyna (L.) Hill
Polygonum austinae Greene

PORTULACACEAE

Claytonia lanceolata Pursh
Claytonia megarrhiza (A.Gray) Parry ex S.Watson
Lewisia pygmaea (Gray) Robins.

PRIMULACEAE

Androsace septentrionalis L. var. *subulifera* Gray
Dodecatheon pulchellum (Raf.) Merr. var. *pulchellum*
Douglasia montana Gray

RANUNCULACEAE

Anemone multifida Poiret
Anemone parviflora Michx.
Anemone tetonensis Porter ex Britton
Caltha leptosepala DC.
Ranunculus eschscholtzii Schlecht. var. *eschscholtzii*
Ranunculus eschscholtzii Schlecht. var. *eximius* (Greene) Benson
Ranunculus eschscholtzii Schlecht. var. *trisectus* (Eastw.) Benson
Ranunculus pygmaeus Wahlenb.
Trollius albiflorus (Gray) Rydb.

ROSACEAE

Dryas octopetala L. var. *hookeriana* (Juz.) Breit.
Geum rossii (R. Br.) Ser. var. *turbinatum* (Rydb.) Hitchc.
Geum triflorum Pursh var. *ciliatum* (Pursh) Fassett
Ivesia gordonii (Hook.) T. & G.
Potentilla diversifolia Lehm. var. *diversifolia*
Potentilla diversifolia Lehm. var. *perdissecta* (Rydb.) Hitchc.
Potentilla glandulosa Lindl. var. *pseudorupestris* (Rydb.) Breit.
Potentilla gracilis Dougl. ex Hook. var. *fastigiata* (Nutt.) Wats.
Potentilla gracilis Dougl. ex Hook. var. *pulcherrima* (Lehm.) Fern.
Potentilla nivea L.
Potentilla ovina Macoun var. *ovina*
Potentilla rubricaulis Lehm.
Sibbaldia procumbens L.

RUBIACEAE

Galium bifolium Wats.

SALICACEAE

Salix arctica Pallas var. *petraea* (Anderss.) Bebb

Salix glauca L. var. *villosa* (Hook.) Anderss.

Salix reticulata L. var. *nivalis* (Hook.) Anderss.

Salix rotundifolia Trautv. var. *dodgeana* (Rydb.) E. Murray

SAXIFRAGACEAE

Heuchera parvifolia Nutt. ex T. & G.

Lithophragma glabrum Nutt. var. *ramulosum* (Suksd.) Boivin

Mitella pentandra Hook.

Saxifraga adscendens L. var. *oregonensis* (Raf.) Breit.

Saxifraga bronchialis L. var. *austromontana* (Wieg.) Piper ex G. N. Jones

Saxifraga cernua L.

Saxifraga cespitosa L. var. *minima* Blank.

Saxifraga flagellaris Willd. ex Sternb. var. *crandalii* (Gand.) Dorn

Saxifraga occidentalis Wats.

Saxifraga odontoloma Piper

Saxifraga oppositifolia L.

Saxifraga rhomboidea Greene

Saxifraga rivularis L.

Saxifraga subpetala E. Nels.

Telesonix heucheriiformis (Rydb.) Rydb.

SELAGINELLACEAE

Selaginella densa Rydb. var. *densa*

Selaginella densa Rydb. var. *scopulorum* (Maxon) R. M. Tryon

SCROPHULARIACEAE

Besseya wyomingensis (A. Nels.) Rydb.

Castilleja crista-galli Rydb.

Castilleja pallescens (Gray) Greene

Castilleja pulchella Rydb.

Castilleja rhexifolia Rydb.

Castilleja sulphurea Rydb.

Collinsia parviflora Lindl.

Pedicularis bracteosa Benth. var. *paysoniana* (Pennell) Cronq.

Pedicularis contorta Benth. var. *contorta*

Pedicularis groenlandica Retz.

Pedicularis parryi Gray var. *purpurea* C. Parry

Penstemon attenuatus Dougl. ex Lindl. var. *pseudoprocerus* (Rydb.) Cronq.

Penstemon montanus Greene var. *montanus*

Penstemon procerus Dougl. ex Grah. var. *procerus*

Penstemon whippleanus Gray

Veronica wormskjoldii R. & S.

VALERIANACEAE

Valeriana acutiloba Rydb. var. *pubicarpa* (Rydb.) Cronq.

VIOLACEAE

Viola adunca Smith

Viola praemosa Dougl. ex Lindl. var. *altior* Blank.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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