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Botanical Survey of Selected Sites in the White Mountains National Recreation Area and the Steese National Conservation Area, Yukon-Tanana Uplands, Alaska

Carolyn Parker, Alan R. Batten, James D. Herriges, Jr.



Cover Photo

Eritrichium splendens. This beautiful dwarf forget-me-not was growing on limestone rock outcrops near Mount Swatka in the White Mountains National Recreation Area (photo by Carolyn Parker).

Authors

Carolyn L. Parker and Alan R. Batten are research associates with the University of Alaska Museum Herbarium. James D. Herriges, Jr. is a wildlife biologist with the Bureau of Land Management, Northern Field Office in Fairbanks, Alaska.

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Abstract

The Bureau of Land Management is mandated to preserve biodiversity and prevent extinction of rare species on public lands. Baseline resource inventories focusing on rare and sensitive taxa improve our knowledge of their abundance and distribution and are essential for making sound management decisions. permanently curated specimens document the occurrence of all plants and are available for review by botanists. Electronically databased collection information can be readily shared with relevant agencies and researchers. These steps become invaluable when the areas of concern are remote and not easily revisited.

The Yukon-Tanana Uplands in interior Alaska are within the glacial refugium Beringia, a large region stretching from the MacKenzie River in Canada to the Lena River in Siberia. This region was connected by the exposed continental shelf during the Quaternary full glacials, yet remained free of continental ice sheets. The uplands are known to be rich in plants endemic (restricted in distribution) to Beringia and several are currently listed as rare to critically imperiled at the state and global level by the Alaska Natural Heritage Program (AKNHP). However, much of the area is remote and poorly known botanically.

The White Mountains National Recreation Area and the Steese National Conservation Area are managed by BLM-Alaska's Northern Field Office. Together they include a large portion of the Uplands landscape. Twelve sites within these BLM management units that were known or suspected to support rare plants were surveyed by botanists during the summers 1994-1996. Most sites were in the alpine and subalpine zones, where habitats known to support rare and endemic plants are most common. At each site the vegetation was described and all vascular plants observed were listed. At the first two sites all species encountered were collected as herbarium specimens. Collecting at the remaining sites was limited to taxa that had not been found previously during the survey, were difficult to identify in the field, or that were found in uncommon habitats or plant assemblages. Collections were made and additional habitat information was noted whenever populations of potentially sensitive plants were located.

The resulting inventory documents the vascular flora of the alpine and subalpine zones of the Yukon-Tanana Uplands with 990 plant specimens representing 382 taxa. Sixteen plants listed as critically imperiled (S1) to rare (S3) by the AKNHP were found and their known distribution and habitat preferences within the Uplands are summarized. Three species, *Draba densifolia*, *Poa porsildii*, and *Montia bostockii*, were found to be more common than previously thought in at least a portion of the area surveyed. Six species were recorded as new to the Yukon-Tanana Uplands flora, including *Draba ruaxes*, ranked imperiled (S2). Minor to moderate range extensions within the Uplands are documented for nine additional plants, including *Festuca lenensis*, ranked imperiled to rare (S2S3), and *Trisetum sibiricum* spp. *litoralis*, ranked imperiled (S2). Our knowledge of the sensitive vascular plant species in the Uplands has been greatly enhanced as a result of this survey.

Recommendations for management addressing the potential sources of impacts on known populations of rare plants are offered, along with suggestions for future inventories.

Acknowledgements

Funding for the survey was provided by BLM-Alaska Northern Field Office, Fairbanks, with recipient support from the University of Alaska Museum Herbarium, Fairbanks, under a cooperative agreement established in 1994.

We are very grateful to Brian Bogaczyk, former BLM-Alaska Northern Field Office, who initiated and supported this survey. Jim Herriges oversaw all field logistics for three summers and continued to work very closely with the Museum Herbarium staff in all stages of the project and report preparation. The University of Alaska Museum Herbarium, Fairbanks, was represented on each trip through the participation of research associates Carolyn Parker and Alan Batten. David Murray, Curator Emeritus, was involved in field work for a portion of two summers and Barbara Murray, Research Professor, for a portion of one trip. Carolyn Parker identified, processed, and databased the collections. During our three seasons, several individuals participated in a portion of the fieldwork: Rob Lipkin and George West, AKNHP-ENRI, University of Alaska, Anchorage; Debbie Blank, BLM-Alaska Anchorage Field Office; Virginia Moran and Michael Emers, USFWS; Glen Juday and Susan Willsrud, University of Alaska, Fairbanks; John Cook and Vicki DeGuenther, BLM-Alaska Northern Field Office. Cindy Hamfler and Stan Bloom, were responsible for report lay-out and formatting, with Sharon Wilson and Craig McCaa making edits.

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INTRODUCTION

Purpose

The Bureau of Land Management (BLM) strives for the maintenance of natural biodiversity and recognizes its legal responsibility to prevent rare plant and animal species from being threatened or endangered with extinction. To accomplish this, it is essential to inventory and document the vascular flora and plant communities of all lands under BLM management. Alaska's flora is still poorly known and this is especially true for the more remote regions of the state that are seldom, if ever, visited by botanists. It is especially important to support inventories in these areas and to record the occurrence of taxa that are currently, or potentially could be, listed as

threatened or endangered by the U.S. Fish and Wildlife Service (USFWS), including sensitive species being tracked by the Alaska Natural Heritage Program (AKNHP). Sound management decisions can only be made when the abundance, specific locations, distribution, and habitat preferences are known for any sensitive taxa found in the area. It is also necessary to know the statewide, national, and global distribution of rare taxa, and each local survey contributes to that knowledge. The purpose of the series of surveys reported here was to improve our knowledge of the vascular flora of the White Mountains and Steese areas, concentrating on rare species.

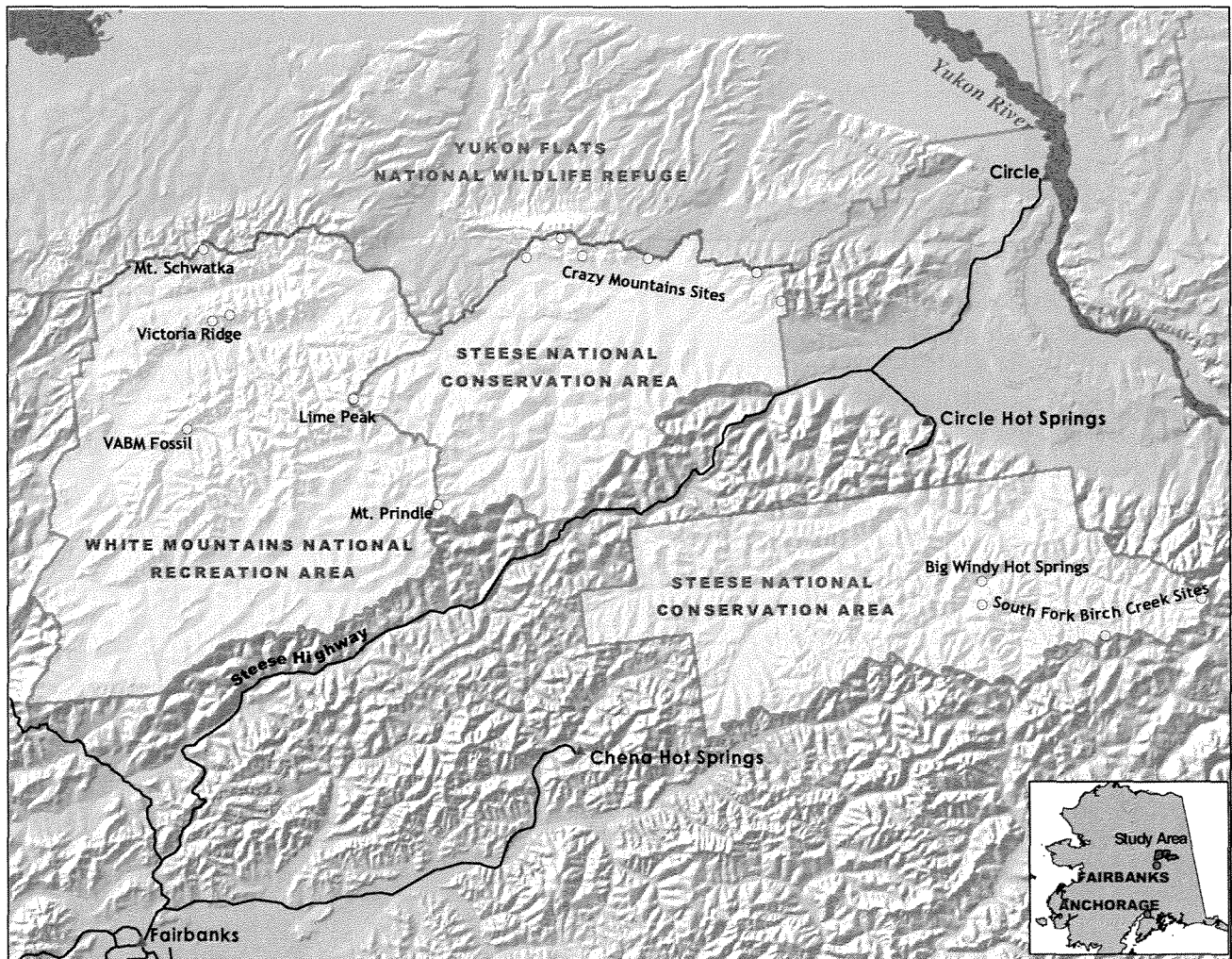


FIGURE 1. Map of survey sites (yellow circles) in the White Mountains National Recreation Area and Steese National Conservation Area

Landscape and Public Use

The Yukon-Tanana (Y-T) Uplands, the dominant physiographic feature in east-central Alaska, includes both the White Mountains National Recreation Area (WMNRA) and the Steese National Conservation Area (SNCA) (Fig. 1). The landscape is characterized by rounded to rugged contiguous alpine ridges and domes dissected by well-developed streams draining to the Tanana and Yukon rivers. Most of the BLM-managed area within the Yukon-Tanana Uplands is remote. Limited access is available from along several unimproved roads and established trails originating from the Steese and Elliott highways, by small water craft along Beaver and Birch creeks, and by small plane at a few scattered bush strips. Winter access is greatly facilitated by skiing, dog sledding and snowmachining, and through a network of BLM-maintained winter trails and public use cabins. Activities within the managed areas include mining, hunting, fishing, trapping, hiking, snowmachining, skiing, river floating and camping.

Geology and Glacial History

The ancient Yukon-Tanana terrane underlies most of the region. Bedrock consists primarily of a variety of highly metamorphosed schists, quartzites, and gneisses with scattered intrusions of younger granitic rocks (Foster *et al.* 1994). The north and northwest margin of the surveyed region is underlain by a highly faulted zone that includes fragments of the Wickersham, White Mountains, Livengood, and Crazy Mountains terranes. Bedrock here is diverse and includes massive limestones, basalts, marbles, sedimentary rocks, and serpentine (Dover 1994). The entire region remained unglaciated during the Quaternary period with the exception of a few small centers of alpine glaciation at the highest elevations (Pewe *et al.* 1967, Weber, pers. comm.).

History of Botanical Surveys

The earliest significant collections from the Yukon-Tanana Uplands are those of Edith Scamman, who spent a portion of several summers from 1937 to 1954 in the vicinity of Eagle Summit (Scamman 1940, Hultén 1940). She shared her specimens with noted botanists Eric Hultén, Merritt Fernald, Nicholas Polunin, and Stanley Welsh, each of whom had an active interest in northern

and circumpolar regions. Scamman's collections from Eagle Summit helped confirm floristic connections linking interior Alaska and northeastern Asia. In addition, two previously unknown species that were first collected by her at Eagle Summit were named in her honor by Hultén: *Claytonia scammaniana* (Scamman's Spring Beauty) and *Oxytropis scammaniana* (Scamman's Oxytrope) (Hultén 1939, 1946). Her collections are held at the Gray Herbarium (GH), Harvard University, where she was a research associate, and several duplicate specimens are at the University of Alaska Museum Herbarium, Fairbanks (ALA).

Olaf Gjærevoll's published inventory of the Lime Peak and Fossil Creek area during the summers of 1953 and 1959 remains a classic of early Alaskan botanical literature and the most thorough survey from this region (Gjærevoll 1958, 1963 and 1967). He was accompanied during portions of his trip by lichenologist Hildur Krog and bryologist Herman Persson. Their respective collections have also been published (Krog 1962, Persson and Gjærevoll 1957). Olaf Gjærevoll worked closely with noted northern botanists Erling Porsild and Eric Hultén while processing his Alaska material, and this collaboration resulted in a significant contribution to our knowledge of the flora of the area. His trip was sponsored by the Arctic Institute of North America and the Norwegian Council for Science and Humanities, and his collections are held at Trondheim, Norway (TRH).

The Eagle Summit area, accessible by the Steese Highway, was the focus of several ecological studies under the International Biological Programme-U.S. Tundra Biome Study program in the 1970's. Several small plant collections were made by various researchers at this time and many are at ALA. This area is in the heart of the Y-T Uplands; however, it lies within a narrow highway corridor that is managed by the state of Alaska and is surrounded by BLM-managed land. A list of species from three of the Tundra Biome study sites within Alaska, including Eagle Summit, has been published (Murray and Murray 1978). Hamet-Ahti (1971) submitted a plant list that included collections from Eagle and Twelvemile summits. These are held at the University of Helsinki Herbarium, Finland (H).

Studies investigating selected Research Natural Areas (RNA) in the Y-T Uplands resulted in small collections from four sites (Juday 1985, 1988, 1989, 1992, 1998).

These efforts were supported jointly by the BLM, the U.S. Forest Service, and the University of Alaska Fairbanks. Collections documenting these reports are held at ALA.

Vegetation

Boreal forest (taiga) and upland tundra are the dominant vegetation types in all of interior Alaska, including the Y-T Uplands (Viereck *et al.* 1992). In the alpine areas, dry, broad ridge tops are dominated by dwarf scrub and ericaceous dwarf scrub tundra vegetation. Mesic to moist saddles, slopes, and snow-melt meadows support mesic graminoid herbaceous and open, low scrub vegetation. Rock-dominated sites support alpine herbs.

Although this survey focused on upland tundra, many visits were made to treeline and subalpine habitats where they intergrade with the alpine. White spruce is the tree species most common on the upper slopes, but a well-defined treeline does not exist in this region. Stringers or scattered clumps of white spruce trees often follow south-facing drainages and slopes up to 1070 m (3500 ft) elevation, where they exist adjacent to and within the alpine vegetation. Conversely, at elevations well below treeline, slopes dominated by large rock outcrops and scree often support alpine vegetation, or at least many alpine taxa. A few dwarf white spruce, less than a meter tall, are consistently found on all but the highest and most barren ridges. North-facing slopes, however, often are essentially treeless, supporting only closed or open tall shrub into the lower subalpine zone. Aspect, moisture, and soil development appear to exert significant control over the vegetation throughout the broad elevation range of 610-1070 m (2000-3500 ft) that may support either boreal forest or upland tundra.

Floristics

The Y-T Uplands are situated midway between the Arctic Slope and Brooks Range, and the Alaska Range, and therefore support a flora enriched by both North American alpine and circumpolar arctic taxa. Species having a predominantly arctic distribution, but reaching their southern range limit in the uplands include *Chrysanthemum integrifolium*, *Oxytropis arctica*, *Trisetum sibiricum* ssp. *litorale*, *Pedicularis albolabiata* and *Novosieversia glacialis*. Conversely, taxa reaching their northernmost distribution here include *Angelica*

lucida, *Hieracium triste*, *Veronica wormskjoldii*, and *Viola renifolia* var. *brainerdii*.

The Y-T Uplands are also rich in Beringian endemics, species whose entire distribution is restricted within the large contiguous landmass known as Beringia, which remained unglaciated during the Quaternary glacial periods. Beringia included most of interior and northern Alaska, Yukon Territory, Canada, eastern Asia (Russian Far East), and the exposed continental shelf (the Bering Land Bridge) which connected them. Many of these taxa are even more narrowly restricted to East Beringia, and are found only in the eastern, North American portion of this unglaciated refugium. Of floristic significance are the long periods of biological isolation within a restricted area, the potential for immigration across the exposed land bridge, and the rapid changes in climate and vegetation that repeatedly occurred between glacial epochs during the Quaternary period. It has been suggested that Beringian endemics may have originated (speciated) in Beringia during this period under these conditions, or that their ranges, once much broader, were reduced and confined to this area during the last full glacial and did not expand afterward (Hultén 1937, Murray 1981). Those species displaying a predominantly Asian distribution are believed to have reached Alaska across the exposed land bridge and persisted here without expanding their range southeastward within North America. Only a few predominantly North American taxa (e.g. *Smelowskia*) seem to have migrated westward into Asia. Regardless, the current distributions of these endemic species seem tied to the Quaternary history of interior Alaska and may offer clues to the climate and vegetation of that period. Several of these endemic species are considered sensitive by AKNHP.

Objectives

The primary objectives of this survey were:

1. to document the occurrence, habitat, and abundance of rare plants in the White Mountains National Recreation Area and Steese National Conservation Area, focusing on species that are listed as a species of concern by U.S. Fish and Wildlife Service or ranked as critically imperiled to rare in Alaska (S1-S3) by the AKNHP.
2. to conduct a relatively complete inventory of the alpine flora at several sites selected as potentially supporting uncommon and sensitive species within the

White Mountains National Recreation Area and the Steese National Conservation Area.

3. to process and maintain a permanent voucher collection of this flora to be held at the University of Alaska Museum Herbarium (ALA), Fairbanks.
4. to create and maintain a database of the collection information that is available to BLM through the Northern Plant Documentation Center (at ALA).
5. to provide detailed information concerning species tracked by AKNHP for inclusion into their database.

Additional activities carried out during this inventory by individual participants (but not reported here) included observations on wildlife movements and behavior, small mammal and insect survey collections, archaeological inventories, forest growth studies, and the collection of cryptogams.

Methods

Sites were selected because they were known or potential localities for sensitive plant species, or because they were remote and therefore lacked any previous botanical investigation (Fig. 1). Areas easily reached by the Steese Highway, such as Eagle and Twelvemile summits, were not included as they have been frequently visited by botanists and the land adjacent to the highway is not under BLM management. Most sites were visited for 2 to 4 days with at least 2 to 4 workers recording the vegetation and making plant collections. At each site the effort was made to visit all habitats available at that site with special attention to those habitats suspected to support sensitive plants. All plant species observed were listed, the vegetation was described, and representative herbarium collections were made.

For purposes of this inventory, taxa are considered sensitive if they are ranked as critically imperiled (S1), imperiled (S2), or rare (S3) at the state level by AKNHP (This is not equivalent to the BLM-Alaska sensitive species list). These categories have been assigned based on species range, abundance, number of occurrences, degree of threat, and the level of protection offered to rare taxa under existing land management policy. They are reviewed periodically by AKNHP as botanists working in the field throughout Alaska document new localities and provide additional information. The categories are defined as follows (*from* Lipkin and Parker 1995):

S1: critically imperiled in the state because of extreme rarity or because of some factor making it especially vulnerable to extirpation from the state.

S2: imperiled in the state because of rarity or because of some factor making it very vulnerable to extirpation from the state.

S3: rare to uncommon in the state.

S4: apparently secure in the state, with many occurrences.

S5: demonstrably secure in the state, but not yet verified.

The global rankings assigned by AKNHP are defined similarly, but reflect the taxon's status throughout its entire range (Appendix D).

When sensitive taxa were found in the field, voucher collections were taken and the habitat, including associated species, was described. Care was taken not to endanger populations having only a few individuals by removing only enough material to document an occurrence.

At two sites, Lime Peak and Mount Schwatka, the attempt was made to make a complete collection of all alpine plant species. At the remaining sites, collecting was more selective, and the most common and easily identified taxa were simply noted as observations. Vegetation cover is described whenever possible using the classification system published by Viereck *et al.* (1992). Vegetation boundaries are rarely discreet and the standardized categories suggested by Viereck *et al.* are broad. Additional descriptive comments on the vegetation are therefore often included.

Nomenclature follows used at the University of Alaska Museum Herbarium (ALA). Synonyms are included in both this report and the accompanying list when the scientific names differ from those published in Hultén (1968), the most frequently used reference for our region (Appendix B). Common names for plants are not standardized, and the names used here are gathered from diverse sources.

All plant collections were processed and filed at the University of Alaska Museum Herbarium using standard herbarium procedures. Collection label information is databased in 4th Dimension, Version 3.5.

Documenting field inventories with permanent herbarium collections is critical in light of the remoteness of some areas and the difficulty and expense of revisiting

them. The specimen remains as a physical record of the occurrence of a taxon in an area and supports any lists, maps, or other references published concerning that occurrence. Curated specimens can easily be reviewed, and if necessary, taxonomic revisions made. Collections are also a source of seeds, pollen, and plant tissue for molecular and biochemical analysis. Collection information, such as location, date, and habitat, is readily available in computer databases to all agencies involved in resource management.

RESULTS

Sensitive Vascular Plant Species of the Area

The following plant species were considered critically imperiled, imperiled, or rare (S1, S2, S3 respectively) in 1996 at the state level by the Alaska Natural Heritage Program (AKNHP). They are now documented, or have been reported from, BLM-managed land in the Y-T Uplands. Global rankings (G1, G2, etc.) are included here for comparison. Collections of these taxa made during this survey document most of these records and are held at the University of Alaska Museum Herbarium (ALA).

Collection information is electronically databased with the Northern Plant Documentation Center at ALA. Complete locality, habitat, and abundance information has been databased as Element Occurrence Records (EOR) with AKNHP. Comments on the appearance of each of these taxa at the sites where it was noted can be found in the site descriptions (Appendix A). Additional taxa discussed below have been cited in the literature (Williams and Lipkin 1991), but were not collected during our survey. Nomenclature follows that currently used at ALA, and synonyms are given where names differ from those published in Hultén (1968).

Since the completion of this survey in 1996, AKNHP has made the following changes in rankings (based on new data on species abundance, including the new localities reported here):

- Douglasia gormanii* Constance ranked S3, previously S2S3
- Festuca lenensis* Drobov ranked S3, previously S2S3
- Cystopteris montana* (Lam.) Bernh. ranked S4, previously S3

SPECIES DOCUMENTED IN THIS SURVEY

Draba densifolia Nutt. (Brassicaceae, Mustard Family)

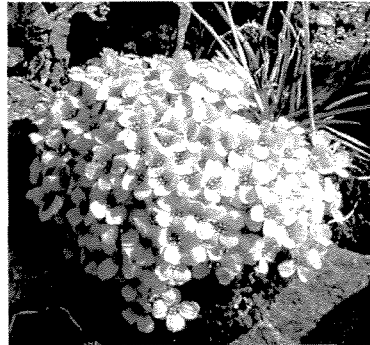


FIGURE 2. *Draba densifolia* cushion (approximately 8 cm in diameter) showing brilliant yellow blossoms in June. It is a much less conspicuous cushion plant when not flowering. Photo by J. Herriges.

Western North American taxon ranked S1 (G5). This bright yellow-blossomed cushion plant was observed in scattered to frequent abundance on fellfields and ridge tops at Lime Peak (Parker *et al.* 4719, 4768, 4858) and Mount Prindle (Batten *et al.* 94-109). Gjærevoll (1963) reported it being abundant at both Lime Peak, and at Mount Harper, which is located in the southeastern portion of the uplands. These are the only known localities within the uplands for this taxon. A specimen from Horn Mountain, eastern Alaska Range, is the sole additional collection at ALA from Alaska.

D. densifolia is very similar in appearance to *D. stenopetala*. Earlier references to the occurrence of *D. densifolia* in the central Alaska Range and at Unalakleet (Porsild 1939, Hultén 1941-1950) have not been supported by more recent collecting, and the redetermination of herbarium specimens (Porsild 1966, ALA) found them to be *D. stenopetala* in most cases. Considerable confusion exists concerning the distinction between *D. densifolia* and the closely related *D. paysonii*, which has also been reported from the Y-T Uplands (Williams and Lipkin 1981, Juday 1988, *but see* Hultén 1973). A review of Alaskan specimens held at ALA, including those labeled *D. paysonii* and cited in the above references, suggests all Y-T Uplands specimens should be

considered as *D. densifolia* under the taxonomic treatments of Hitchcock (1941), Mulligan (1971, 1976), and Rollins (1993). Likewise, one specimen at ALA from Whatcom Co., Washington labeled *D. densifolia* fits clearly into *D. paysonii* under these same treatments. Characters that help separate these two taxa are as follows:

D. densifolia: numerous long, conspicuous, simple cilia on leaf margins; simple to rarely branched hairs on stems and pedicels; sepals with simple hairs; upper leaf surfaces glabrous or sparsely pubescent with simple or few-branched hairs.

D. paysonii: leaf margin cilia sometimes forked and not overly conspicuous in overall foliage; branched to stellate hairs on stems and pedicels; sepals with branched hairs; upper leaf surfaces usually with simple or branched hairs. Limited variation in leaf pubescence exists among the few specimens of *D. densifolia* examined at ALA; material from throughout the combined range of both *D. densifolia* and *D. paysonii* should be reviewed to determine if they are conspecific, or represent two distinct taxa.

***Phlox hoodii* Richardson** (Polemoniaceae, Phlox Family)

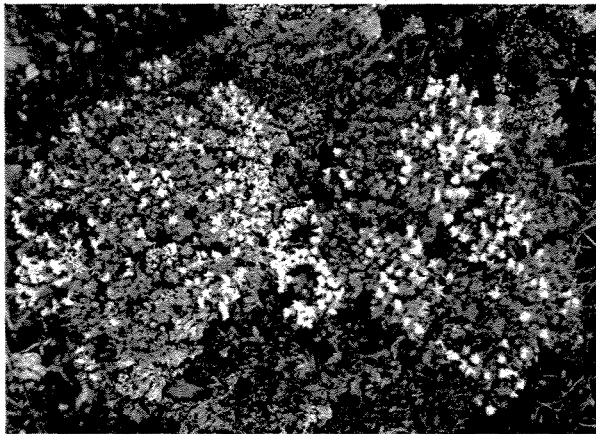


FIGURE 3. *Phlox hoodii* grows as a small cushion plant in open, dry, rocky habitats. The white flowers and silvery-white foliage are distinctive. Photo by A. Batten.

North American species ranked S1S2 (G5). This species was collected on a large, south-facing marble outcrop below treeline in the Yukon Fork Birch Creek headwaters (Parker *et al.* 6505A). It was abundant at this site, where it was growing with subarctic steppe species

such as *Elytrigia spicata*, *Minuartia yukonensis*, and *Bupleurum triradiatum*. The relationship between this taxon and *P. richardsonii* (= *P. sibirica* ssp. *richardsonii*) is unclear. The treatments offered by Hultén (1968) and Porsild (1975) differ from each other and use morphological characters that are not easily distinguished on herbarium specimens. Porsild (1975) also emphasizes ecological and geographical distinctions. Our collection from Yukon Fork appears to be identical to other ALA collections from similar habitats along the central Yukon and Porcupine river valleys, as well as to specimens of *P. hoodii* from the central Rocky Mountains at the National Herbarium of Canada, Ottawa (CAN) reviewed by C. Parker. Characteristics considered here as diagnostic for *P. hoodii* include white flowers and needle-shaped leaves that turn white on drying and have a groove on the upper surface as well as a distinct, white awn at the tip.

***Minuartia biflora* (L.) Schinz & Thell** (Caryophyllaceae, Pink Family)

Northern circumpolar distribution ranked S2 (G5). Plants were collected from moist, open, alpine microsites at Mount Prindle (Batten *et al.* 94-106) and South Fork Birch Creek (Parker *et al.* 6472). Another Y-T Uplands specimen held at ALA was collected at the head of Sourdough Creek near Mount Prindle (Halliday A329/75). Additional Alaska collections at ALA are from the eastern Brooks Range, Alaska Range, Chugach Mountains, and southeastern Alaska. It is likely this tiny plant is often overlooked and its abundance and distribution underestimated.

***Poa porsildii* Gjærevoll**

(Poaceae, Grass Family)

= *P. vaseyochloa* Scribner *sensu* Hultén

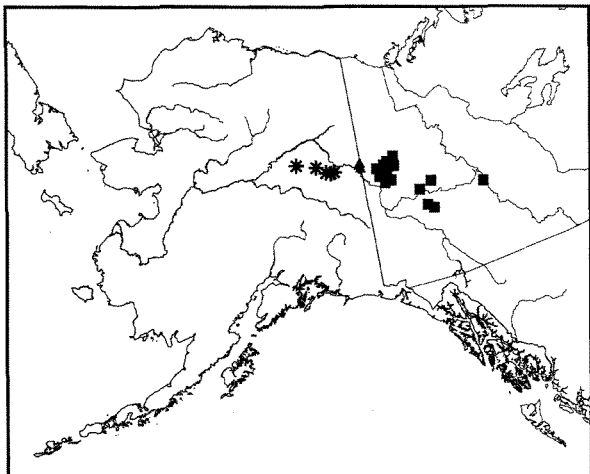


FIGURE 4. The distribution of *Poa porsildii* in Alaska and Yukon, Canada. Squares indicate citations from Cody (1996). Triangles indicate existing ALA collections from Alaska prior to this survey. Stars show new records documented during this study.

East Beringian endemic ranked S2 (G3). Prior to this survey the occurrence of *Poa porsildii* in Alaska was known only through literature citations from Lime Peak (Gjærevoll 1956, 1958), Eagle Summit (Hamet-Ahti 1971), and Mastodon Dome (Hultén 1967). It was previously ranked S1 by the AKNHP. A uniquely dioecious *Poa*, it was collected in the White Mountains (Parker and Herriges 5634) and at each of the three South Fork Birch Creek localities (Parker *et al.* 6378, 6436, 6454, 6493, 6562). It was searched for at all sites we visited and when found, was consistently growing in moist to mesic herbaceous-heath or tussock tundra, often associated with gelifluction lobe fronts or snow melt areas. It appeared to be rare in the White Mountains, where only a single clump was found; however in the South Fork Birch Creek area flowering plants were abundant whenever the species was encountered and some patches were extensive (more than 0.4 ha [1 acre]).

P. porsildii was first described by Gjærevoll (1956, 1958) based on his Lime Peak collections as well as specimens he reviewed from northern Yukon, Canada. It may be closely related to *P. vaseyochloa* Scribn. of the Pacific Northwest but is not synonymous with it as implied by Hultén (Porsild 1975, Hultén 1967, 1968). Droopy panicle branches, lack of floret pubescence, and a dioecious habit make this early flowering grass distinctive

among all northern *Poas*. Recent collections at ALA have documented additional Alaska localities in the Ogilvie Mountains (Cook *et al.* 1993, Parker 1997), and Eagle Summit (Parker and Batten 6962), and there are many known localities in central Yukon, Canada (Cody 1994, ALA). The combined findings of this survey, and these additional records, have resulted in the change in rank from S1 to S2 assigned by the AKNHP. This very narrowly restricted East Beringian endemic seems to be at its western distribution boundary in the Y-T Uplands, however it is well-established here.

Ranunculus glacialis* L. var. *chamissonis

(Schlechter) L.D. Benson

(Ranunculaceae, Buttercup Family)

= *R. glacialis* L. ssp. *chamissonis* (Schlechter) Hultén



FIGURE 5. *Ranunculus glacialis* var. *chamissonis* is found in moist to wet, open herbaceous alpine tundra. The pink to red petals are unique among Alaskan 'buttercups' which are otherwise white or yellow. Photo by C. Parker.

Beringian endemic ranked S2 (G4T3T4). This rare species is documented by only a few, widely scattered collections from western Alaska and the Mount Prindle area in the Y-T Uplands. Our collections are from Lime Peak (Parker *et al.* 5497) and Mount Prindle (Batten *et al.* 94-112). Plants were growing in moist to wet herbaceous sites and only a few individuals were observed at both localities.

***Trisetum sibiricum* Rupr. ssp. *litorale* (Rupr.) Rosch.**

(Poaceae, Grass Family)

Circumpolar arctic distribution ranked S2 (G5T4Q). Our specimen was collected from a disturbed, moist site within shrub heath along a small drainage below Mount Schwatka (Parker *et al.* 5079). This species was also collected by Gjærevoll (1958) on a damp gelifluction hillside in the White Mountains. Additional scattered

localities known are in southeastern interior Alaska and on the arctic coast at Ogotoruk Creek and Kongatuk River (ALA). It is reported to be common and widespread in the Russian Arctic (Tolmachev and Packer 1995).

***Douglasia arctica* Hook.**
(Primulaceae, Primrose Family)

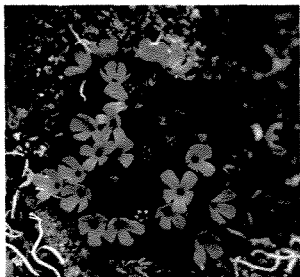


FIGURE 6. *Douglasia arctica* is a small cushion plant with deep pink flowers. It is typically found in open, rocky habitats. Photo by C. Parker.

Northern East Beringian endemic ranked S2S3 (G3). Collected during our survey at Mount Schwatka (Parker *et al.* 4894, 4995, 5018), White Mountains (Parker and Herriges 5620), and Victoria Mountain ridge (Murray 12068). Growing on fellfield and screes on both calcareous and acidic rock. Individual cushions are usually widely scattered. Additional upland collections are reported from the White Mountains by Gjærevoll (1967) and held at ALA from Eagle Summit, Fossil Creek, and Kathul Mountain. Also known from the Ogilvie Mountains and Mackenzie Delta, Canada (Cody 1994). This species grows in open, rocky habitats from low elevations to the alpine.

***Douglasia gormanii* Constance**
(Primulaceae, Primrose Family)

Southern East Beringian endemic ranked S2S3 (G3). A single collection was made in the West Crazy Mountains (Batten *et al.* 94-224, 94-233) where it was growing on screes and exposed ridges. Additional Y-T Uplands collections at ALA are from the Elliott Highway and Eagle Creek. The taxon is more common in the eastern Alaska Range and western Yukon, Canada, and is usually found growing in low rocky alpine tundra and screes.

***Draba ruaxes* Payson & H. St. John**
(Brassicaceae, Mustard Family)
= *D. exalata* Ekman sensu Hultén, *D. ventosa* A. Gray
var. *ruaxes* (Payson & H. St. John) Hitchc.



FIGURE 7. *Draba ruaxes* is found in alpine screes throughout its range. Photo by C. Parker.

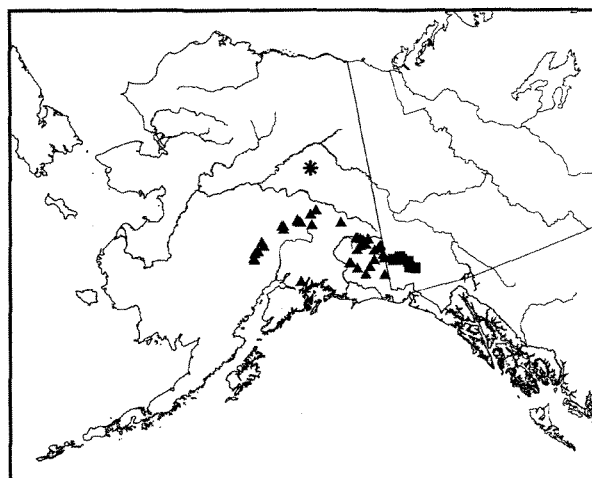


FIGURE 8. The distribution of *Draba ruaxes* in Alaska and Yukon, Canada. Squares indicate citations from Cody (1996). Triangles indicate existing ALA collections from Alaska prior to this survey. Star shows the northernmost known location for the species, a new record documented during this study.

Northwestern North American taxon ranked S2S3 (G3). Collected at White Mountains on limestone rubble where it was very scarce (Parker and Herriges 5689, 5692). This species is known from the Alaska Range and the Wrangell-St. Elias Mountains, where it grows on unstable alpine screes. Our White Mountains collection documents a northward range extension, and the first record for this taxon in the Y-T Uplands. The taxonomic relationship between this species, *D. ventosa* of western North America, and *D. exalata* Ekman of the Seward Peninsula (Porsild 1939) has been reviewed (Mulligan

1971, Hultén 1973) and their taxonomic treatment supports the determination of our collection as *D. ruaxes*. Additional recent collections from the Alaska Range and Wrangell-St. Elias Mountains have resulted in a rank change from S2 to S2S3.

***Festuca lenensis* Drobov**
(Poaceae, Grass Family)

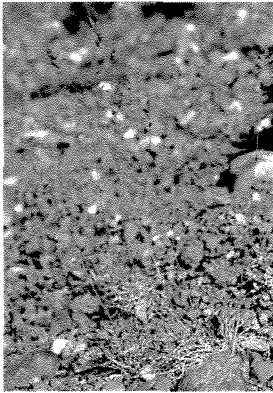


FIGURE 9. *Festuca lenensis* with tufts of linear, glaucous-green leaves, visible here along the base of the picture. Photo by C. Parker.

Beringian endemic ranked S2S3 (G4). Our collections were found on limestone outcrops and screes at Mt. Schwatka (Parker *et al.* 4916, 4945) and on a disturbed sheep station on limestone at Victoria Mountain ridge (Parker *et al.* 5698, Murray 12062). This taxon has only recently been recognized as occurring in North America and has been previously reported as *F. ovina* ssp. *alaskana* (Holmen 1964) and *F. auriculata* (Frederiksen 1983). A summary review of Canadian Fescue has been offered by Aiken and Darbyshire (1990), which includes these names as synonyms of *F. lenensis*. The combined characters of large anthers (> 2 mm), a few to many scabrous leaves, and stiff glaucous linear foliage are distinctive for this species. It is known from dry, rocky and subarctic steppe habitats throughout Beringia. Additional Alaska specimens at ALA are from Kathul Mountain, Ogilvie Mountains, Porcupine River, Wood River Buttes, central Arctic Foothills, and Nulato Hills. Future surveys and careful redetermination of existing herbarium collections may show this taxon to be more abundant and widespread in Alaska's flora.

***Oxytropis huddelsonii* A. Pors.**
(Fabaceae, Pea Family)



FIGURE 10. *Oxytropis huddelsonii* with diagnostic fruits visible. Photo by C. Parker.

East Beringian endemic ranked S2S3 (G3). Our specimen was collected on a rock outcrop along a ridge top at treeline above Yukon Fork Birch Creek headwaters (Parker *et al.* 6511). A few scattered individuals were found at this single locality. This species is closely related to *O. bryophila*, which is common in the uplands. However, Welsh (1967) argues that the two species are distinct based primarily on fruit characters. Legumes of *O. huddelsonii* are 1-loculed and usually glabrous to sparsely strigose, in contrast to those of *O. bryophila* which are 2-loculed and more pubescent. Additional ALA collections are from the Alaska Range, eastern Yukon-Tanana Uplands, Wrangell-St. Elias Mountains, Tetlin Mountains, Chugach Range, and several Yukon, Canada localities. The occurrences cited for the Y-T Uplands in Williams and Lipkin (1991) could not be traced.

***Campanula aurita* E. Greene**
(Campanulaceae, Harebell Family)

East Beringian endemic ranked S3 (G3G4). Our specimens were collected at Mt. Schwatka (Parker *et al.* 4912) and the East Crazy Mountains (Batten *et al.* 95-293) on calcareous rock outcrops and screes. Additional ALA collections were from the Y-T Uplands, central Brooks Range, and mountains of Yukon and western Northwest Territories, Canada. Where found here, *C. aurita* was commonly associated with open calcareous sites, and individual plants were widely scattered.

***Cystopteris montana* (Lam.) Bernh.**
(Aspleniaceae, Shield Fern Family)

Northern circumpolar taxon ranked S3 (G5). This delicate fern was collected in moist, herbaceous sites in the White Mountains (Parker and Herriges 5693) and at South Fork Birch Creek (Parker *et al.* 6515). It has also been reported by Gjærevoll (1958) from a moist calcareous treeline site in the White Mountains. Additional ALA collections are from Eagle Summit, as well as from several scattered sites in interior, south-central, and southeastern Alaska.

***Minuartia yukonensis* Hultén**
(Caryophyllaceae, Pink Family)

East Beringian endemic ranked S3 (G3G4). This plant was collected in the Yukon Fork Birch Creek headwaters on a large, south-facing marble outcrop just below tree line (Parker *et al.* 6503). It was growing with other subarctic steppe taxa such as *Elytrigia spicata*, *Potentilla hookeriana*, and *Bupleurum triradiatum*. Additional ALA collections from Alaska are from similar dry, alpine or steppe sites in the Y-T Uplands, Brooks Range, and Alaska Range. Hultén (1973) notes that the species is not known from the Russian Far East as an earlier map has indicated (Hultén 1968).

***Montia bostockii* (A. Pors.) Welsh**
(Portulacaceae, Purslane Family)
= *Claytonia bostockii* A. Pors.



FIGURE 11. *Montia bostockii*. Photo by M. Tachibana.

East Beringian endemic ranked S3 (G3). This species was found at each of the three South Fork Birch Creek localities we visited and collected from two of them (Parker *et al.* 6404, 6433, 6501). These are the first

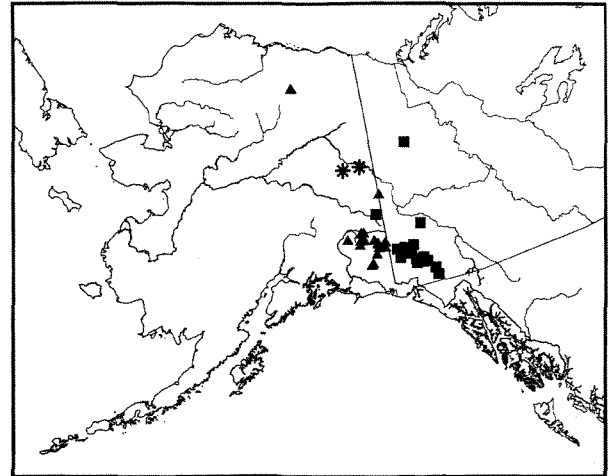


FIGURE 12. The distribution of *Montia bostockii* in Alaska and Yukon, Canada. Squares indicate citations from Cody (1996) and Hultén (1968). Triangles indicate existing ALA collections from Alaska prior to this survey. Stars show new records documented during this survey. Although within range for the species, they represent a significant find for this taxon.

records for the central Y-T Uplands. *M. bostockii* was consistently found shallowly rooted in wet to moist mossy depressions within tussock or heath tundra on ridge tops and upper slopes. Most populations consisted of 10 to 70 plants, but one site supported approximately 300 individuals. Found in the same habitat as *Claytonia tuberosa* but rarely co-existing with it. Several widely scattered populations were noted in the area and the taxon seemed well established. *M. bostockii* is doubtfully distinct from *M. vassilievii* (Kuzen.) O. Nilss. of the Russian Far East (McNeill and Findlay 1971, Hultén 1973, but see Nilsson 1971) and from recent specimens from Wrangel Island (see Hultén 1973). Additional ALA collections are from the central Brooks Range (single locality at Toolik Lake), in the vicinity of Boundary in eastern Y-T Uplands, Tetlin Mountains, and Wrangell-St. Elias Mountains of Alaska and Yukon. The numerous records from southeastern interior Alaska have resulted in the recent rank change from S2S3 to S3.

***Phalaris arundinacea* L.**
(Poaceae, Grass Family)

A cosmopolitan taxon which is rare in Alaska however, and ranked S3 (G5). This grass was collected at Big Windy Hot Springs, where it was the dominant species in a small seepage meadow associated with both

hot and cool springs (Parker *et al.* 6612). Additional ALA specimens are from Kanuti Hot Springs and widely scattered localities in south-central and southeastern Alaska. The species was also subsequently observed at Tolovana Hot Springs in the western Y-T Uplands (Parker, pers. comm.).

SPECIES REPORTED IN THE LITERATURE

The following taxa are cited in the literature as occurring in the Y-T Uplands, but were not observed during this survey. Some may be exceedingly rare and should be watched for in future surveys. Others have undergone taxonomic review and can no longer be considered valid taxa. A few were cited, or identified incorrectly, and their occurrence in the Y-T Uplands is doubtful.

***Draba paysonii* J.F. McBr.** (Brassicaceae, Mustard Family)

Ranked SIS2 and cited in Williams and Lipkin (1991). See discussion above under *D. densifolia*. *Draba paysonii* shows a Cordilleran distribution and could possibly be in Alaska, although its occurrence has yet to be confirmed.

***Phlox richardsonii* Hook.** (Polemoniaceae, Phlox Family)

= *P. sibirica* L. ssp. *richardsonii* (Hook.) Hultén

East Beringian endemic ranked S2 (G4T2T3Q). Williams and Lipkin (1991) list this taxon (as *P. sibirica* ssp. *richardsonii*) from the White Mountains based on collections published by Gjærevoll (1967). He described it as being common on alpine limestone. A review of his specimen might confirm its occurrence here, however Gjærevoll's description of his material, the habitat, and associated species, could also apply to *P. alaskensis* (= *P. sibirica* ssp. *sibirica*), which was found scattered in the area during our survey. *P. richardsonii* should be watched for in future surveys.

***Carex eburnea* Boott** (Cyperaceae, Sedge Family)

North American boreal taxon ranked S2S3 (G5). A specimen was collected at Serpentine Slide by G. Juday (Juday s.n.; Juday 1992). Additional upland collections at ALA are from a limestone ridge near Globe Creek, Elliott Highway, and limestone scree at Takoma Bluff on the Yukon River. This sedge is uncommon in Alaska and Yukon, but more common southward (Williams and Lipkin 1991). The species is generally reported from dry, open, calcareous habitats. Not collected during our survey but should be watched for in the area.

***Juncus tenuis* Willd.** (Juncaceae, Rush Family)

Cosmopolitan distribution ranked S2S3 (G5). This species was collected by Gjærevoll (1958) from Beaver Creek in the White Mountains. Gjærevoll described his material as atypical and questioned his own determination. The species is known from southeastern Alaska growing in moist, open, low-elevation sites, and in light of Gjærevoll's record, should be watched for in similar habitats in the Y-T Uplands.

Saxifraga adscendens* L. ssp. *oregonensis (Raf.) Bacigalupi (Saxifragaceae, Saxifrage Family)

North American distribution ranked S2S3 (G5T4T5). This species was reported from Eagle Summit by Scamman (1940). Her collection, assumed to be at the Harvard University Herbaria (GH), has not been verified. Collections at ALA are from the Ogilvie Mountains, Alaska Range, and areas southward within Alaska. It should be watched for in the Y-T Uplands in future surveys.

***Draba stenopetala* Trautv.** (Brassicaceae, Mustard Family)

Beringian endemic ranked S3 (G3). Williams and Lipkin (1991) list this species as reported from Lime Peak but a search through their citations could not confirm the record. It was not collected by Gjærevoll (1963) and the locality dots for the Y-T Uplands in Hultén (1968) may represent localities for *D. densifolia*, which Hultén

considered synonymous with *D. stenopetala* at the time (see Hultén 1941-1953). It could certainly occur in the Y-T Uplands and should be watched for.

***Carex franklinii* Boott**
(Cyperaceae, Sedge Family)

This taxon has been subsumed into *C. petricosa* Dewey (Ball and Zoladz 1994) and is no longer tracked by AKNHP. It is cited in Williams and Lipkin (1991) based on collections made by Gjørevoll (1958) and identified by him as *C. franklinii*.

Saxifraga nelsoniana* D. Don ssp. *porsildiana
(Calder & Savile) Hultén
(Saxifragaceae, Saxifrage Family)

= *S. punctata* L. ssp. *porsildiana* Calder & Saville

Ranked S2 (G5T3T4). This North American taxon has been subsumed into *S. nelsoniana* D. Don ssp. *pacifica* Hultén in an unpublished treatment to be submitted to Flora of North America Project (P. Elvander, pers. comm.). It was cited in Williams and Lipkin (1991) based on a collection from Cache Mountain published by Gjørevoll (1963).

Summary

A total of 990 specimens, documenting 382 taxa, were collected during our 3-season survey of selected sites on BLM-managed land in the Yukon-Tanana Uplands. These collections are permanently curated, and specimen label data electronically databased, at the University of Alaska Museum Herbarium (ALA). This database will be continuously updated as new collections are acquired for the region. A copy of the electronic database is archived at BLM-Northern Field Office, Fairbanks. Access to both the collections, and the electronic information associated with them, is available to federal and state agencies.

Localities for sixteen taxa ranked as rare (S3) to critically imperiled (S1) by the Alaska Natural Heritage Program (AKNHP) were found and documented. Information concerning these localities, species abundance, and habitat was recorded and this information is presented in this report and has been incorporated into the AKNHP database. Most of these occurrences

represent new localities and expanded ranges for these species. As a result of this survey, a significant contribution has been made to our knowledge concerning the distribution and abundance of *Poa porsildii*, *Festuca lenensis*, *Draba ruaxes*, *Trisetum sibiricum* ssp. *litorale* and *Montia bostockii*. The AKNHP rankings of *Poa porsildii* and *Montia bostockii* have been changed from S1 to S2 and from S2S3 to S3, respectively, reflecting the new information made available from this, and similar, intensive floristic surveys within Alaska.

Six taxa are recorded as new to the Y-T Uplands flora: *Erigeron grandiflorus*, *Draba ruaxes*, *Carex marina*, *Saxifraga caespitosa*, *Arabis hirsuta* ssp. *pyncocarpa*, and *Thelypteris phegopteris*. Minor to moderate range extensions within the Y-T Uplands and interior Alaska are documented for 9 additional taxa.

Beringian endemics, having a distribution ranging from the Mackenzie River in Canada to the Lena River in Russia, make up 20% of this documented flora and approximately one third of these, in turn, are East Beringian endemics, restricted in distribution to interior Alaska and Yukon, Canada. This high rate of endemism in the Y-T Uplands flora is thought to reflect a Quaternary history of repeated, and alternating, immigration opportunities from northeastern Asia and from continental North America, followed by isolation from those source areas (the 'revolving door' effect). The abundance of endemics in this upland flora suggests the area is a potential natural laboratory for studies investigating biological processes relating to isolation and climatic change.

New records for species distribution and abundance, which can be expected when remote sites are surveyed in Alaska, indicate the degree to which the flora is still poorly known, especially from in more remote portions of the state. These combined findings, and the resulting changes in rankings of rarity, underscore the need to support additional intensive floristic inventories throughout Alaska.

IMPLICATIONS AND RECOMMENDATIONS FOR MANAGEMENT

Protection of Sensitive Species

This botanical inventory has contributed significantly to the knowledge of the distribution and abundance of sensitive vascular plants on BLM-managed land in the Yukon-Tanana Uplands and thereby our ability to make informed management decisions. No taxa listed as threatened, endangered, or a species of concern by U.S. Fish and Wildlife Service were found; hence, no immediate restrictions on land use activities are thought to be necessary in the near future to protect any plant species and avoid listing as threatened or endangered. However, sixteen taxa listed as critically imperiled to rare by the Alaska Natural Heritage Program (AKNHP) were located.

The known range for several of these taxa is now expanded as a result of this inventory, thereby decreasing concern about their continued viability. However, the rarity of these sixteen species still warrants special management consideration. In addition to ensuring species viability, the maintenance of individual local populations of these species will aid in maintaining the overall biodiversity of the area. The information gained in this survey will also benefit statewide conservation planning and land management.

Sensitive Species and Potential Threats

We recommend that BLM managers remain aware of the location and habitats of these species and manage activities to maintain existing local populations. To aid in this endeavor, an electronic database of all collection information for the vicinity of the White Mountains National Recreation Area and the Steese National Conservation Area has been provided to BLM. A discussion of several of the most sensitive species, the habitats on which they occurred, and potential threats follows:

Draba densifolia is the only species known from the Y-T Uplands which is currently ranked critically imperiled (S1) by the AKNHP. It is common and often abundant on rocky or gravelly alpine ridge tops in the vicinity of Lime Peak, and scattered to common in abundance, though less extensive, in the same habitat near Mt. Prindle. However, it was not found at any other survey site and has not been collected from the Eagle Summit area. The only additional records for Alaska are

from Mt. Harper (southeastern Y-T Uplands) and the eastern Alaska Range, both outside of BLM-managed lands. Although small and inconspicuous when not flowering, this species should be watched for by all field workers in rocky, alpine ridges and slopes. Potential threats would include extensive open-pit mining or public road construction that would facilitate access and increased visitation to these specific areas at the scale now observed at Eagle Summit on the Steese Highway. This level of concern could be lowered if additional populations of *Draba densifolia* are found in the region. The current low level of visitation in the vicinity of Lime Peak and Mt. Prindle is not believed to be threatening to the species at either site.

Poa porsildii was first found during this survey in the VABM Fossil vicinity of the White Mountains, and represents the first specimen of the species at ALA. It was also collected in the South Fork Birch Creek drainage and has been reported from the vicinity of Lime Peak, Eagle Summit, and Mastodon Dome. Its ranking by AKNHP was recently changed from critically imperiled (S1) to imperiled (S2), based partly on the results of this survey and on recent findings in the western Ogilvie Mountains near the Alaska-Yukon border (Cook *et al.* 1993, Parker 1997).

Our single collection from the White Mountains was made early in the season so its abundance in this area is unknown, though we suspect it is not common, as our focused effort to look for the species at Lime Peak and Mt. Prindle were unsuccessful. It was common and abundant on gelifluction lobes and moist, herbaceous slopes in the South Fork Birch Creek drainage, however, and was consistently found in these habitats. Field workers should continue to watch for this species, especially in the western Y-T Uplands, where its abundance and distribution remains poorly known. Its preferred habitat, moist to wet, herbaceous slopes, is unlikely to be impacted by current or moderately increased visitation levels as these habitats are not favored for most activities such as hiking, riding, tent sites, and aircraft landing. However, heavy use by livestock in a restricted area over 1 or more growing seasons could potentially threaten a local population, as the vegetation

associated with *Poa porsildii* would be attractive to grazers.

Phlox hoodii, ranked S1S2, was found on a steep, south-facing rock outcrop in the headwaters of the Yukon Fork of the South Fork of Birch Creek. The remoteness of this site, and the steepness of the substrate, combine to offer this population a reasonable level of protection at this time. This, and similar very dry, steep, south-facing sites typically support a unique assemblage of subarctic steppe (dry forb-grassland) taxa, including *Campanula aurita* and *Minuartia yukonensis*, both ranked S3, and *Festuca lenensis*, ranked S2S3, all found during our survey at various sites. These habitats, and the subarctic steppe taxa they support, are known from along the larger river drainages of interior Alaska, but are relatively rare on BLM-managed lands in the Y-T Uplands. They contribute significantly to the biodiversity of this region as they often support uncommon insect, mammal, and bird biotas as well. We recommend that such habitats be offered a level of protection, especially if these sensitive species are found growing on them.

Minuartia biflora, ranked S2, is a small and inconspicuous plant. It is probably often overlooked by botanists and more common in frequency than suspected. Our survey found it at Mt. Prindle and South Fork of Birch Creek, and it is known from several scattered localities throughout Alaska. It should be documented if found, but no specific management recommendations are offered at this time.

The distributions within the Y-T Uplands of *Ranunculus glacialis* var. *camissonis* and *Trisetum sibiricum* ssp. *litorale*, both ranked S2, are still poorly known. Our collection of *R. glacialis* var. *camissonis* near Mount Prindle confirmed a previous record and the Lime Peak collection represents a new locality. These are the only known sites for this taxon in the Y-T Uplands. At both sites only a few plants were found growing in moist to wet, low-growing graminoid alpine meadows. *T. sibiricum* ssp. *litorale*, ranked S2, is only known in the Y-T Uplands from our Mount Schwatka collection and from a literature record of its occurrence in the White Mountains. At both sites this taxon was growing in moist to wet slopes associated with gelifluction lobes or small drainages. Both taxa should be considered rare at this time and all new localities documented. We recommend that a search be conducted for these taxa prior to any

development that would result in the complete disturbance or destruction of a large area of alpine wet meadow, in order to avoid the destruction of a local population.

Montia bostockii and *Cystopteris montana*, both ranked S3, were found in the South Fork Birch Creek area. Both were consistently found in moist to wet herbaceous, or heath-herbaceous alpine meadows. Although these taxa are now known to be more widespread throughout their range, all new localities found within the Y-T Uplands should be documented.

Fire Management

The rare plant species now known to occur in the alpine and subalpine of the Y-T Uplands are unlikely to be impacted adversely by normal fire cycles. All are perennials, having roots or rhizomes below ground from which they can resprout, and most grow in moist, and/or low vegetation classes which would not carry a fire, or at most, would burn lightly. Although our inventory included only two low elevation boreal sites (Preacher Creek steppe bluff and Big Windy Hot Springs) the boreal flora as a whole is well adapted to fire cycles, and species growing at springs, and on bluff habitats, are unlikely to be impacted as well. Fire suppression is not considered necessary for the preservation of these taxa. Large fire control camps, although not likely to be established in habitats supporting rare species, should be situated in previously disturbed areas, where possible.

Mining

Our inventory did not include the streamside habitats where placer mining activities occur and none of the rare plants we encountered in the alpine and subalpine areas are known to typically occur in such habitats. We believe it is unlikely placer mining in the Y-T Uplands region is a threat to any populations of these taxa.

Large, open pit mining on the highest alpine ridges could seriously impact species such as *Draba densifolia* which are restricted to these habitats. We recommend that plans for any such activity be carefully reviewed to insure that large portions of the lands supporting these taxa remain undisturbed, insuring their populations will persist.

Roads and Recreational Access

Narrow, linear features such as roads, OHV trails, and established hiking trails are unlikely to endanger any known rare plant populations. The small campgrounds or camping sites associated with the existing routes, or a moderate level of new routes, should also not seriously impact these populations. In the Lime Peak or Mt. Prindle summit area, any plans to develop greatly improved access (public road, airstrip), large camping areas, or similar disturbance would generate the same concerns as discussed above for open-pit mining.

Future Botanical Survey Work

Although this study vastly increased our knowledge of the Y-T Uplands flora, the twelve sites we visited cover only a very small portion of the total area managed by BLM-Northern Field Office. Logistics and resources prohibit a thorough coverage of the area. However, the following suggestions are offered for future botanical inventory work.

1) The following localities are believed to potentially support populations of sensitive plant species and should be considered for future surveys:

- White Mountains (vicinity of VABM Fossil) and Mt. Prindle. Our visits to these sites were brief, yet floristically rewarding and further survey work is recommended.
- Cache Mountain and Victoria Mountain are high alpine sites within the Y-T Uplands that should be surveyed for all the taxa discussed above, especially *Draba densifolia*. Cache Mountain was visited briefly by the Swedish botanist Olaf Gjørevoll in 1953; there are no known collections from Victoria Mountain.
- The Pinnell Mountain Trail, which runs from Twelvemile Summit to Eagle Summit, lies mainly within the Steese National Conservation Area and is easily accessed by the Steese Highway. Although this route is an established, improved hiking/camping trail, and traverses some of the highest alpine ridges in the vicinity, it has not been carefully visited by botanists with concerns for locating rare plant populations.

2) Two types of habitats, though limited in area, were observed to support a diversity of plant species and should be surveyed in other areas. They also serve as important

wildlife habitat, and deserve special consideration in management. These are:

- Areas of concentrated Dall sheep use (such as protective rock outcroppings and salt licks) seem to be rich in plant species, including several species not commonly found otherwise in the region. Examples we surveyed include a salt lick on upper Mascot Creek southwest of Lime Peak, the limestone ridge northwest of Mt. Schwatka, and the alpine rock outcrops on the ridges between Big Windy Creek and Puzzle Gulch. Such areas should receive some level of protection not only for the Dall sheep populations which are dependent on them, but for the plant diversity they support.
- Steep, south-facing slopes, bluffs, and rock outcrops throughout interior Alaska support a treeless or open woodland, subarctic steppe community that may vary in plant species composition from one site to another, but consistently includes several taxa usually not found elsewhere. Examples we visited during this survey include a bluff near Preacher Creek, lower limestone slopes near Mt. Schwatka and VABM Fossil, and a rock outcropping at the headwaters of the Yukon Fork of the South Fork of Birch Creek. These habitats are often used by brown bear, black bear, and Dall sheep in early spring as they offer nutritious new plant growth. Such areas should be given some level of protection both for the rare or unusual taxa they support and as seasonally critical habitat for wildlife.

3) The boreal forest, bogs, and other low elevation vegetation zones were not covered in this survey. Though they are considered less likely to support rare taxa, a long-term management policy for the region should include these zones in future floristic and habitat studies.

4) This inventory covered the vascular flora only. The non-vascular, or cryptogam, flora (which includes mosses, liverworts, and lichens) make up a large and important component of most plant communities in the area. These plants play essential roles in the processes of succession, soil formation, and nitrogen-fixation. Lichens are an important winter food item for caribou. Mosses often play a role in controlling slope drainage and permafrost depth. Although no moss, liverwort, or lichen taxa are listed as rare in Alaska, this is probably due to an overall ignorance of the cryptogam flora in the state. Long-term management policy should acknowledge the importance

these plants play in the Y-T Uplands ecosystems and consider including them in future inventories.

5) Resources and time are too often limiting. We recommend that, where possible, a trained botanist be included on trips which are focused on other activities, thus taking the opportunity to share logistics in the field. This is encouraged when the habitat types and localities noted above are being visited. It is critical that plant collections which can be verified are made to document occurrences, especially when rare taxa are thought to be present.

Summary

This survey has documented new occurrences of several rare taxa, and the range and frequency of many of these taxa were shown to be greater than previously known. However, the ranges, abundance, and habitat preferences of much of Alaska's rare flora are still poorly known. We believe that with continued attention to, and consideration for, our rare plant flora and overall species diversity, land managers will be able to make sound decisions that can both accommodate a variety of land users and conserve our native plant heritage.

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APPENDIX A:

DESCRIPTIONS OF SURVEY LOCALITIES

Following are descriptions of the individual site visits made during this floristic survey of the Yukon-Tanana Uplands. Participants, dates, geology, previous collections, vegetation and floristics are noted for each site. In addition, topographic map figures and characteristic landscape scenes are provided. For convenience, the two areas visited in the Crazy Mountains (East and West Crazy Mountains) and the three areas visited within the South Fork of the Birch Creek drainage are combined into single sections.

These descriptions and maps document the exact areas and habitats covered at each site in the event they are revisited. They also demonstrate the diverse landscapes, vegetation types, and rare and unusual plant distributions found at each. It is hoped that they will prove useful both for workers who may visit these sites and for the selection of new potential survey sites.

Lime Peak (Rocky Mountain) *vicinity*

Participants:

- Jim Herges, BLM, Northern Field Office, Fairbanks
- Carolyn Parker, University of Alaska Museum Herbarium, Fairbanks
- Alan Batten, University of Alaska Museum Herbarium, Fairbanks
- Deborah Blank, BLM, Anchorage Field Office, Anchorage
- Virginia Moran, USFWS, Ecological Services, Anchorage
- George West, Alaska Natural Heritage Program, University of Alaska Anchorage

Dates: 9-13 June 1994. Alan Batten, accompanied by Winston Hobgood and Vicki DeGuenther (BLM), revisited the area for a few hours on 19 July 1994.

Location: Lime Peak (USGS Circle Quadrangle (C-6) 65°38'N, 146°46'W) (Rocky Mountain on some USGS topographic maps), in the western Y-T Uplands, is the highest point on the divide between the Beaver and Preacher creek drainages. The peak lies on the boundary between the Steese National Conservation Area (SNCA) and the White Mountains National Recreational Area (WMNA). Most of the current survey was carried out within WMNA, south and west of the summit (Figure A-2).

Geology: A massive Tertiary-Cretaceous intrusion consisting of light-colored, coarse-grained granite is the primary bedrock of the Lime Peak area (Smith and Pessel 1987). Older metamorphic bedrock skirts this intrusion. These surfaces were also visited where the bedrock is exposed on two ridges two miles south of Lime Peak. Differential weathering in the granite has produced a series of spectacular tors scattered along the major ridges, which give this landscape a distinctive appearance (Figure A-1). The summit of Lime Peak consists of one of the larger clusters of tors in the area.

Previous collections: Norwegian botanist Olav Gjærevoll collected extensively in the Lime Peak region (referred to as Lion Peak in his publications) during the summer of 1953. He was accompanied by lichenologist Hildur Krog. Their floristic works were published (Gjærevoll 1958, 1963, 1967; Persson and Gjærevoll 1957, Krog 1962) and his herbarium specimens are at Trondheim, Norway (TRH). Gjærevoll's publications include the earliest thorough discussions of the vegetation and floristics of

interior Alaska and are frequently referred to by Alaska botanists today.

Vegetation: Dryas tundra dominated the ridgetops and upper slopes throughout the area. *Dryas octopetala*, *Diapensia lapponica*, and fruticose lichens were often abundant. The occurrence of frost boils, sorted circles and stripes, and uptilted rocks indicated frost activity is common. Swales and depressions that hold meltwater longer into the summer supported dryas-sedge tundra, enriched with herbaceous species including *Anemone narcissiflora*, *Carex bigelowii*, and *Artemisia arctica*.

Lower slopes and broader swales supported mesic shrub birch-ericaceous shrub on the drier sites and shrub birch-willow where more moisture is available. Taxa that were abundant included *Betula glandulosa*, *Salix planifolia* ssp. *pulchra* and *Vaccinium uliginosum*. A few moist depressions supported mesic graminoid herbaceous tundra dominated by *Dryas alaskensis*, *Festuca altaica*, *Carex microchaeta* and *Eriophorum angustifolium*. Open tall scrub willow, dominated by *Alnus viridus* ssp. *crispa* and *Salix alaxensis*, followed the stream drainages up into the alpine zone.

Azonal habitats that supported species otherwise uncommon included small patches of herbaceous and shrub vegetation at the base of the larger tors where additional moisture and shelter are available, late-lying snowbanks, warm, south-facing lower slopes supporting several boreal taxa and open white spruce woodland, and a mineral lick on Mascot Creek that was highly disturbed by sheep activity and rich in forbs. All areas showing evidence of frequent sheep occupancy, such as bedding sites and an accumulation of droppings, displayed plant growth that was extremely lush and rich in forbs relative to the adjacent vegetation.

Floristics: Two taxa tracked by AKNHP and several East Beringian endemics were collected. *Ranunculus glacialis* var. *camissonis*, listed S2, (Figure 5) was growing in a snowmelt meadow south of the summit of Lime Peak. The species was also found growing in a wet sedge meadow in the Mount Prindle area in July 1994 (this report). A Beringian endemic and rare in Alaska, this taxon is known from only a few Seward Peninsula and interior Alaska localities.

Draba densifolia, listed S1 (Figure 2), showed scattered to frequent abundance on the ridgetop dryas tundra throughout the areas underlain by granite. It was very rare, however, on the two adjacent ridges of metamorphic bedrock where the vegetation was otherwise similar. The plants were in full flower and the small tight cushions, covered with bright yellow blossoms, were very conspicuous during our visit.

Arenaria chamissonis was found growing on metamorphic bedrock 3 km south of Lime Peak. This is the second record in the Y-T Uplands for this Beringian endemic which is otherwise known only from a few scattered alpine localities in Alaska and Chukotka, Russia.

Potentilla elegans frequently formed lush patches in moist, sheltered microsites along the bases, and in crevices of, the granite tors. This Beringian endemic is rarely collected, and seldom found in the abundance it displayed here.

Salix chamissonis, another Beringian endemic, was common to abundant in mesic shrub birch-willow vegetation, and seemed to fill the niche usually held by *S. arctica*. Efforts to locate *S. arctica* during this visit failed, however it is interesting that Gjærevoll (1963) noted *S. arctica* (as *S. torulosa*) to be common in the Lime Peak area while he recorded *S. chamissonis* occurring only in the Sourdough Creek and Mastodon Dome areas to the south and east, respectively. *Salix chamissonis* is very similar in appearance to the very common dwarf willow *S. arctica*; the primary distinctive feature being the finely serrated leaf margins of *S. chamissonis*. This character could be easily overlooked in the field, and it is possible the real distribution of *S. chamissonis* is underestimated for the Y-T Uplands.

Conclusions: Although the vicinity of Lime Peak had been previously visited by Olav Gjærevoll, several additional taxa were recorded for this area, including the uncommon Beringian endemics *Saxifraga foliosa*, *Salix chamissonis*, *Arenaria chamissonis* and *Potentilla elegans*. *Poa porsildii*, a narrowly restricted East Beringian endemic, was first described by Gjærevoll (1958) after he compared material he had collected from Lime Peak with misidentified material of the same taxon collected in Yukon Territory, Canada, by A.E. Porsild. Our efforts to relocate the species here were unsuccessful, but it was found later during this survey in the White Mountains area and the South Fork Birch Creek drainage (this report).

Draba densifolia and *Ranunculus glacialis* var. *camissonis*, the two taxa found here that are listed by AKNHP, were also both found in the Mount Prindle vicinity (this report), but nowhere else in the Uplands during this survey, although Gjærevoll (1963) records *D. densifolia* from Mount Harper, 200 km to the southeast. This pattern of apparent localized distribution of sensitive plants within the Y-T Uplands is repeated throughout this survey.



FIGURE A-1. Lime Peak (Rocky Mountain) vicinity. Ridge above Mascot Creek, 5 km southwest of Lime Peak summit. Dryas tundra and dryas-sedge tundra dominate the ridgetop vegetation. Granite tors, seen in background, are scattered throughout the area and are prominent features on the landscape. Photo by Carolyn Parker.

Vascular Plant Species Collected or Observed in Alpine and Subalpine Habitats in the Vicinity of Lime Peak

Acomastylis rossii	Cystopteris fragilis	Luzula confusa	Salix alaxensis
Aconitum delphinifolium	Deschampsia cespitosa	Luzula kjellmaniana	Salix brachycarpa ssp.
Alnus viridis ssp. crispa	Diapensia lapponica	Luzula multiflora	niphoclada
Andromeda polifolia	Dodecatheon frigidum	Luzula wahlenbergii	Salix chamissonis
Androsace chamaejasme	Draba densifolia	Lycopodium alpinum	Salix phlebophylla
Anemone drummondii	Draba fladnizensis	Lycopodium annotinum	Salix planifolia ssp. pulchra
Anemone narcissiflora	Draba glabella	Lycopodium clavatum	Salix polaris
Anemone parviflora	Dryas alaskensis	Minuartia arctica	Salix reticulata
Anemone richardsonii	Dryas octopetala	Minuartia macrocarpa	Saussurea angustifolia
Angelica lucida	Dryopteris fragrans	Orthilia secunda	Saxifraga bronchialis
Antennaria friesiana	Empetrum hermaphroditum	Oxyria digyna	Saxifraga calycina
Antennaria monocephala	Epilobium angustifolium	Oxytropis bryophila	Saxifraga cernua
Arctagrostis latifolia	Epilobium latifolium	Oxytropis scammaniana	Saxifraga foliolosa
Arctous alpina	Equisetum arvense	Papaver macounii	Saxifraga hieracifolia
Arenaria chamissonis	Equisetum silvaticum	Parrya nudicaulis	Saxifraga nelsoniana
Arnica griscomii ssp. frigida	Eriophorum angustifolium	Pedicularis capitata	Saxifraga reflexa
Artemisia arctica	Eriophorum callitrix	Pedicularis labradorica	Saxifraga rivularis
Artemisia borealis	Eriophorum vaginatum	Pedicularis lanata	Saxifraga tricuspidata
Astragalus umbellatus	Eutrema edwardsii	Pedicularis langsдорffii	Selaginella sibirica
Betula glandulosa	Festuca altaica	Pedicularis oederi	Senecio atropurpureus ssp.
Betula nana	Festuca brachyphylla	Pedicularis verticillata	frigidus
Bistorta plumosa	Gentiana algida	Petasites frigidus	Senecio kjellmanii
Bistorta vivipara	Gentiana glauca	Picea glauca	Senecio tundricola
Calamagrostis canadensis	Gymnocarpium dryopteris	Poa abbreviata	Sibbaldia procumbens
Campanula lasiocarpa	Hieracium triste	Poa arctica	Silene acaulis
Cardamine bellidifolia	Hierochloa alpina	Poa paucispicula	Solidago multiradiata
Cardamine purpurea	Huperzia selago	Podistera macounii	Spiraea stevenii
Carex bigelowii	Juncus biglumis	Polemonium acutiflorum	Stellaria laeta
Carex capillaris	Juncus castaneus	Potentilla elegans	Synthyris borealis
Carex lachenalii	Juncus triglumis	Potentilla hyparctica	Taraxacum ceratophorum
Carex membranacea	Lagotis glauca	Potentilla nivea	Tofieldia coccinea
Carex microchaeta	Ledum groenlandicum	Potentilla uniflora	Trisetum spicatum
Carex misandra	Ledum palustre ssp.	Pyrola asarifolia	Vaccinium uliginosum
Carex podocarpa	decumbens	Pyrola grandiflora	Vaccinium vitis-idaea
Carex scirpoidea	Linnaea borealis	Ranunculus glacialis var.	Valeriana capitata
Carex williamsii	Lloydia serotina	camissonis	Veronica wormskjoldii
Cassiope tetragona	Loiseleuria procumbens	Ranunculus nivalis	Viola epipsila
Castilleja hyperborea	Lupinus arcticus	Ranunculus sulphureus	Woodsia ilvensis
Cerastium beeringianum	Luzula arctica	Rhodiola integrifolia	
Claytonia sarmentosa	Luzula arcuata ssp.	Rhododendron lapponicum	
Corydalis pauciflora	unalaschensis	Ribes triste	

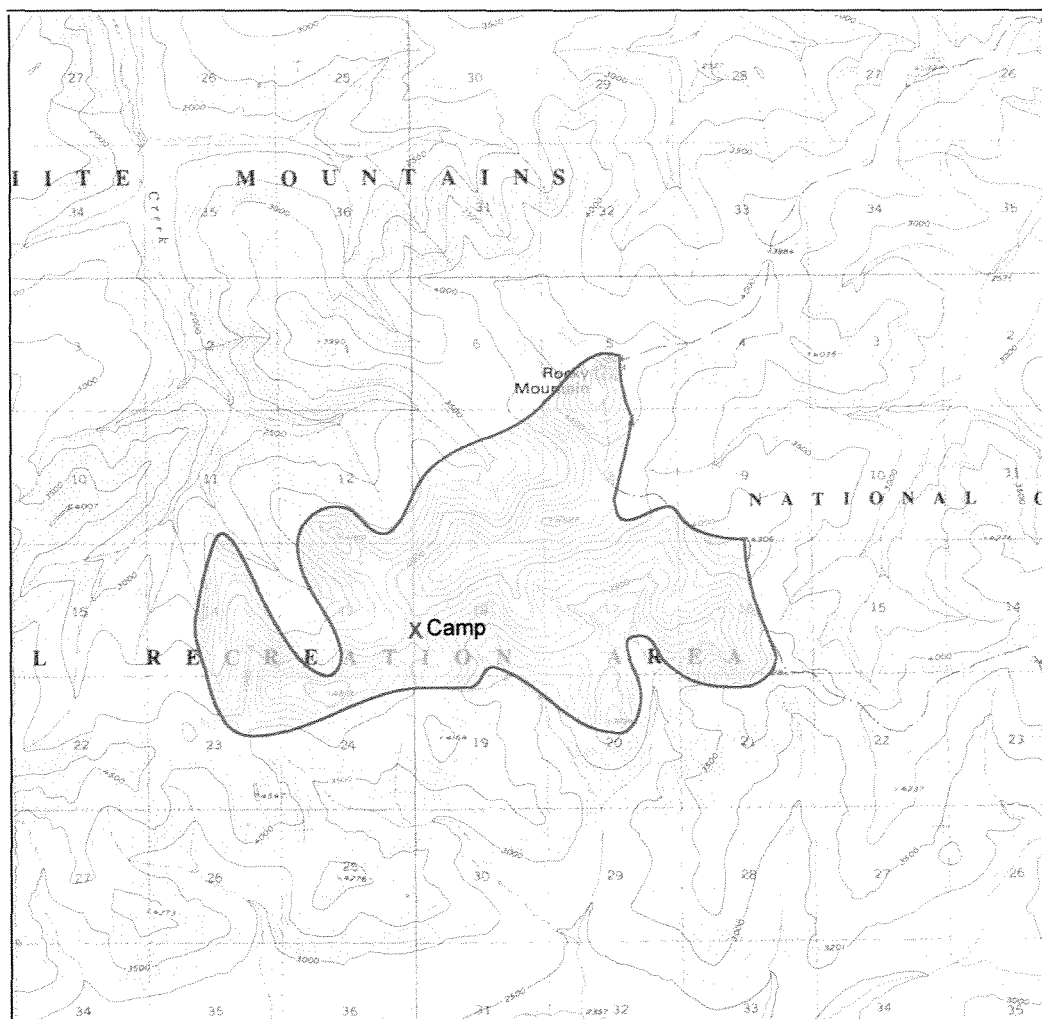


FIGURE A-2. Survey area in the Lime Peak (Rocky Mountain) vicinity. USGS Circle (C-6) Quadrangle. Mascot Creek is in upper left. Faint dashed line at center right is boundary between White Mountains National Recreation Area and Steese National Conservation Area.

Mount Schwatka vicinity

Participants:

- Jim Herriges, BLM, Northern Field Office, Fairbanks
- Carolyn Parker, University of Alaska Museum Herbarium, Fairbanks
- David Murray, University of Alaska Museum Herbarium, Fairbanks
- Robert Lipkin, Alaska Natural Heritage Program, University of Alaska Anchorage
- Michael Emers, USFWS, Arctic National Wildlife Refuge, Fairbanks

Dates: 14-19 June 1994

Location: Mount Schwatka lies in the northwestern corner of the Y-T Uplands north of Victoria Creek (USGS Livengood (D-1) 65°53'N, 147°15'W). It sits directly on the border between the White Mountains National Recreation Area (WMNRA) and the Yukon Flats National Wildlife Refuge managed by the U. S. Fish and Wildlife Service, Fairbanks (USFWS). Portions of both areas were visited (Figure A-4).

Geology: The rounded upper slopes and flat summit of Mount Schwatka are composed of dark-colored Devonian and Silurian volcanics and basalts. The massive gray-white limestone hogback trending northwest from a saddle north of the summit has weathered to a series of rugged headwalls and scree on its southwest-facing side, and a more gently sloping and stable block slope on its northeast facing side (Dover 1994). The contrasting bedrock, weathering and vegetation cover displayed by these two adjacent landscape features is striking (Figure A-3).

Previous collections: No previous collections are known from this area. However, as a historical note, Lieutenant Frederick Schwatka, for whom Mount Schwatka was named, made a small collection of vascular plants from along the Yukon River to the north while on a U. S. Army reconnaissance trip in 1883 (Hultén 1940).

Vegetation: This locality offered an excellent opportunity to compare the vegetation and floras of adjacent contrasting bedrock surfaces. The unstable southwest-facing limestone scree slope north of Mount Schwatka supported scattered alpine herbs, and vegetation cover was 1% to 5%. No taxa were clearly dominant, however *Potentilla uniflora*, *Saxifraga tricuspidata* and *Torularia humilis* were among the more abundant species. The more stable northeast-facing limestone block slope displayed poorly developed sorted stripes with patches of dryas

dwarf scrub dominated by *Dryas octopetala* and several fruticose lichen species. Vegetation cover on this slope was 30% to 50%. The lower, more stable slopes on both sides of the hogback had a continuous cover of dryas tundra, dominated by *Dryas octopetala*, *Festuca altaica* and *Salix arctica*. This vegetation became increasingly mesic and rich in forbes downslope into the upper reaches of drainages.

In contrast, basalt bedrock slopes below the summit of Mount Schwatka supported a dryas sedge tundra on the north-facing side and a dryas tundra rich in forbs and grasses on the south-facing side. Vegetation cover here was 60% to 100%. Dominant taxa on the north-facing side were *Dryas alaskensis* (lower slope), *Dryas octopetala* (upper slope), *Carex microchaeta* and *Salix arctica*. On the south-facing slope *Dryas octopetala*, *Festuca brachyphylla*, *Hierochloe alpina*, and *Lupinus arcticus* were common. The summit area supported a dryas lichen tundra dominated by *Dryas octopetala*.

A small patch of limestone within the basalt on the east-facing side of Mount Schwatka supported scattered alpine herbs including several taxa not otherwise found on this slope, but observed on the adjacent limestone hogback, including *Saxifraga oppositifolia*, *Silene acaulis* and *Carex petricosa*.

The low saddle spanning the contact zone between the basalt and the limestone hogback supported vaccinium tundra on the drier sites and tussock tundra on the lowest, wettest zone.

Floristics: The Mount Schwatka area was rich in Beringian endemics and rare taxa. Thirty-two Beringian endemics and four species ranked S3 or higher by AKNHP were found. Most of these taxa were collected on the limestone substrate and were among the alpine herb vegetation growing on the southwest-facing scree slope. Included were *Campanula aurita*, an East Beringian endemic ranked S3, and *Festuca lenensis*, an Asian subarctic steppe taxon ranked S2S3 (Figure 9). Other Beringian endemics found on this slope included *Oxytropis arcticus*, *O. borealis*, *Torularia humilis* and *Erigeron hyperboreus*: all taxa displaying a generally arctic distribution and rarely found in interior Alaska. Collections of the East Beringian endemic *Eritrichium splendens* from this slope had uncharacteristically large blossoms and compact foliage for this taxon, suggesting that a reconsideration of the taxonomic treatment or description of this species is needed. In addition, several circumpolar taxa strongly associated with calcareous substrates were common here, including *Lesquerella arctica*, *Carex glacialis* and *Phlox alaskensis*.

The role of Dall sheep activity in contributing to floristic richness and lush growth on this slope was apparent. There was evidence of heavy use by sheep: a

network of well-defined trails and bedding perches, droppings, hair, and signs of browsing. Vegetation patches associated with perches supported very lush vegetation, rooted several centimeters in dung, in strong contrast to the adjacent sparse alpine herb cover. Taxa found on these perches included those more typical of lower elevations or mesic sites such as *Adoxa moschatellina*, *Bromopsis pumpelliana* ssp. *arctica*, and *Descurainia sophioides*, as well as species normally expected on scree but displaying uncharacteristically robust growth here. Sheep activity contributes nutrients and organics that improve soil conditions, effect compensatory growth, and disperse propagules to the site.

Douglasia arctica, an East Beringian endemic ranked S2S3, was found on both limestone scree and on basalt, where it was growing in dryas tundra. This species is known only from the Y-T Uplands and arctic Yukon, Canada.

The primarily arctic-Asian grass *Trisetum sibiricum* ssp. *litorale*, ranked S2, was found in a small, disturbed

microsite under willows along a stream draining southwest from Mount Schwatka. This species is widespread in arctic Russia but rare in western and arctic Alaska. Gjærevoll (1958) reported it growing on moist gelifluction terraces near Lime Peak. Our collection is the second record for the Y-T Uplands.

Conclusions: The proximity of very different bedrock types and the concentrated Dall sheep activity appear to be significant factors contributing to the contrasting vegetation cover and enriched floristic diversity at this locality. Calcareous substrates often support azonal vegetation as well as endemic, disjunct, or rare taxa. The limestone hogback, though sparsely vegetated, supported the majority of the endemic and sensitive taxa found here. The adjacent basalt substrate supported a relatively continuous dryas-dominated vegetation cover, but lacked the species richness and the presence of sensitive taxa seen on the limestone.



FIGURE A-3. Mount Schwatka vicinity. South-facing headwalls and scree of the limestone hogback are in the left foreground. Sheep trails and patches of vegetation are conspicuous on this slope. Lower, north-facing basalt slopes of Mount Schwatka are in the right background. Photo by Carolyn Parker.

Species Collected or Observed in Alpine and Subalpine Habitats in Vicinity of Mount Schwatka

<i>Aconitum delphinifolium</i>	<i>Cnidium cnidiifolium</i>	<i>Lesquerella arctica</i>	<i>Rumex acetosa</i>
<i>Adoxa moschatellina</i>	<i>Corydalis pauciflora</i>	<i>Linnaea borealis</i>	<i>Salix alaxensis</i>
<i>Alnus viridis</i> ssp. <i>crispa</i>	<i>Cystopteris fragilis</i>	<i>Lloydia serotina</i>	<i>Salix arctica</i>
<i>Anemone drummondii</i>	<i>Delphinium glaucum</i>	<i>Lupinus arcticus</i>	<i>Salix glauca</i>
<i>Anemone narcissiflora</i>	<i>Descurainia sophioides</i>	<i>Luzula confusa</i>	<i>Salix hastata</i>
<i>Anemone parviflora</i>	<i>Diapensia lapponica</i>	<i>Luzula kjellmaniana</i>	<i>Salix lanata</i> ssp. <i>richardsonii</i>
<i>Anemone richardsonii</i>	<i>Dodecatheon frigidum</i>	<i>Lycopodium annotinum</i>	<i>Salix phlebophylla</i>
<i>Androsace chamaejasme</i>	<i>Douglasia arctica</i>	<i>Mertensia paniculata</i>	<i>Salix planifolia</i> ssp. <i>pulchra</i>
<i>Antennaria friesiana</i>	<i>Draba cana</i>	<i>Minuartia arctica</i>	<i>Salix polaris</i>
<i>Arctagrostis latifolia</i>	<i>Draba fladnizensis</i>	<i>Minuartia rossii</i>	<i>Salix reticulata</i>
<i>Arctostaphylos uva-ursi</i>	<i>Draba palanderiana</i>	<i>Minuartia rubella</i>	<i>Saussurea angustifolia</i>
<i>Arctous alpina</i>	<i>Dryopteris fragrans</i>	<i>Moehringia lateriflora</i>	<i>Saxifraga bronchialis</i>
<i>Arctous rubra</i>	<i>Dryas alaskensis</i>	<i>Myosotis alpestris</i>	<i>Saxifraga cernua</i>
<i>Arnica griscomii</i> ssp. <i>frigida</i>	<i>Dryas integrifolia</i>	<i>Orthilia secunda</i>	<i>Saxifraga hieracifolia</i>
<i>Artemisia arctica</i>	<i>Dryas octopetala</i>	<i>Oxyria digyna</i>	<i>Saxifraga hirculus</i>
<i>Artemisia borealis</i>	<i>Dryas sylvatica</i>	<i>Oxytropis arctica</i>	<i>Saxifraga nelsoniana</i>
<i>Artemisia furcata</i>	<i>Empetrum hermaphroditum</i>	<i>Oxytropis borealis</i>	<i>Saxifraga oppositifolia</i>
<i>Artemisia tilesii</i>	<i>Elymus alaskanus</i> ssp. <i>hyperarcticus</i>	<i>Oxytropis bryophila</i>	<i>Saxifraga reflexa</i>
<i>Astragalus aboriginum</i>	<i>Epilobium latifolium</i>	<i>Oxytropis deflexa</i>	<i>Saxifraga tricuspidata</i>
<i>Astragalus umbellatus</i>	<i>Equisetum arvense</i>	<i>Oxytropis maydelliana</i>	<i>Selaginella sibirica</i>
<i>Betula glandulosa</i>	<i>Equisetum scirpoidea</i>	<i>Oxytropis scammaniana</i>	<i>Senecio atropurpureus</i> ssp. <i>frigidus</i>
<i>Bistorta plumosa</i>	<i>Equisetum variegatum</i>	<i>Papaver macounii</i>	<i>Senecio lindstroemii</i>
<i>Bistorta vivipara</i>	<i>Eriogon hyperboreus</i>	<i>Papaver radicatum</i>	<i>Senecio lugens</i>
<i>Bromopsis pumPELLIANA</i> ssp. <i>arctica</i>	<i>Eriophorum angustifolium</i>	<i>Parnassia kotzebuei</i>	<i>Senecio ogotorukensis</i>
<i>Bupleurum triradiatum</i>	<i>Eriophorum brachyantherum</i>	<i>Parrya nudicaulis</i>	<i>Senecio resedifolius</i>
<i>Calamagrostis purpurascens</i>	<i>Eriophorum vaginatum</i>	<i>Pedicularis capitata</i>	<i>Senecio tundricola</i>
<i>Campanula aurita</i>	<i>Eritrichium splendens</i>	<i>Pedicularis interior</i>	<i>Silene acaulis</i>
<i>Cardamine purpurea</i>	<i>Eutrema edwardsii</i>	<i>Pedicularis labradorica</i>	<i>Solidago multiradiata</i>
<i>Cassiope tetragona</i>	<i>Festuca altaica</i>	<i>Pedicularis lanata</i>	<i>Stellaria longipes</i>
<i>Castilleja hyperborea</i>	<i>Festuca baffinensis</i>	<i>Pedicularis langsdoeffii</i>	<i>Synthyris borealis</i>
<i>Carex bigelowii</i>	<i>Festuca brachyphylla</i>	<i>Pedicularis oederi</i>	<i>Taraxacum ceratophorum</i>
<i>Carex capillaris</i>	<i>Festuca lenensis</i>	<i>Pentaphylloides floribunda</i>	<i>Taraxacum kamtschaticum</i>
<i>Carex concinna</i>	<i>Festuca rubra</i>	<i>Petasites frigidus</i>	<i>Taraxacum phymatocarpum</i>
<i>Carex glacialis</i>	<i>Gastrolychnis affinis</i>	<i>Phlox alaskensis</i>	<i>Thalictrum alpinum</i>
<i>Carex membranacea</i>	<i>Gastrolychnis apetala</i>	<i>Pinguicula vulgaris</i>	<i>Tofieldia coccinea</i>
<i>Carex microchaeta</i>	<i>Geocaulon lividum</i>	<i>Platanthera obtusata</i>	<i>Tofieldia pusilla</i>
<i>Carex misandra</i>	<i>Hedysarum alpinum</i>	<i>Poa glauca</i>	<i>Torularia humilis</i> ssp. <i>arctica</i>
<i>Carex nardina</i>	<i>Hedysarum mackenzii</i>	<i>Poa pseudoabbreviata</i>	<i>Trisetum sibiricum</i> ssp. <i>litorale</i>
<i>Carex obtusata</i>	<i>Hierochloa alpina</i>	<i>Polemonium acutiflorum</i>	<i>Trisetum spicatum</i>
<i>Carex petricosa</i>	<i>Huperzia selago</i>	<i>Polemonium boreale</i>	<i>Vaccinium uliginosum</i>
<i>Carex podocarpa</i>	<i>Juniperus communis</i>	<i>Potentilla uniflora</i>	<i>Vaccinium vitis-idaea</i>
<i>Carex rupestris</i>	<i>Kobresia sibirica</i>	<i>Pyrola grandiflora</i>	<i>Valeriana capitata</i>
<i>Carex scirpoidea</i>	<i>Lagotis glauca</i>	<i>Ranunculus nivalis</i>	<i>Woodsia glabella</i>
<i>Carex vaginata</i>	<i>Ledum palustre</i> ssp. <i>decumbens</i>	<i>Rhododendron lapponicum</i>	
<i>Cerastium beeringianum</i>		<i>Rhodiola integrifolia</i>	
		<i>Rosa acicularis</i>	

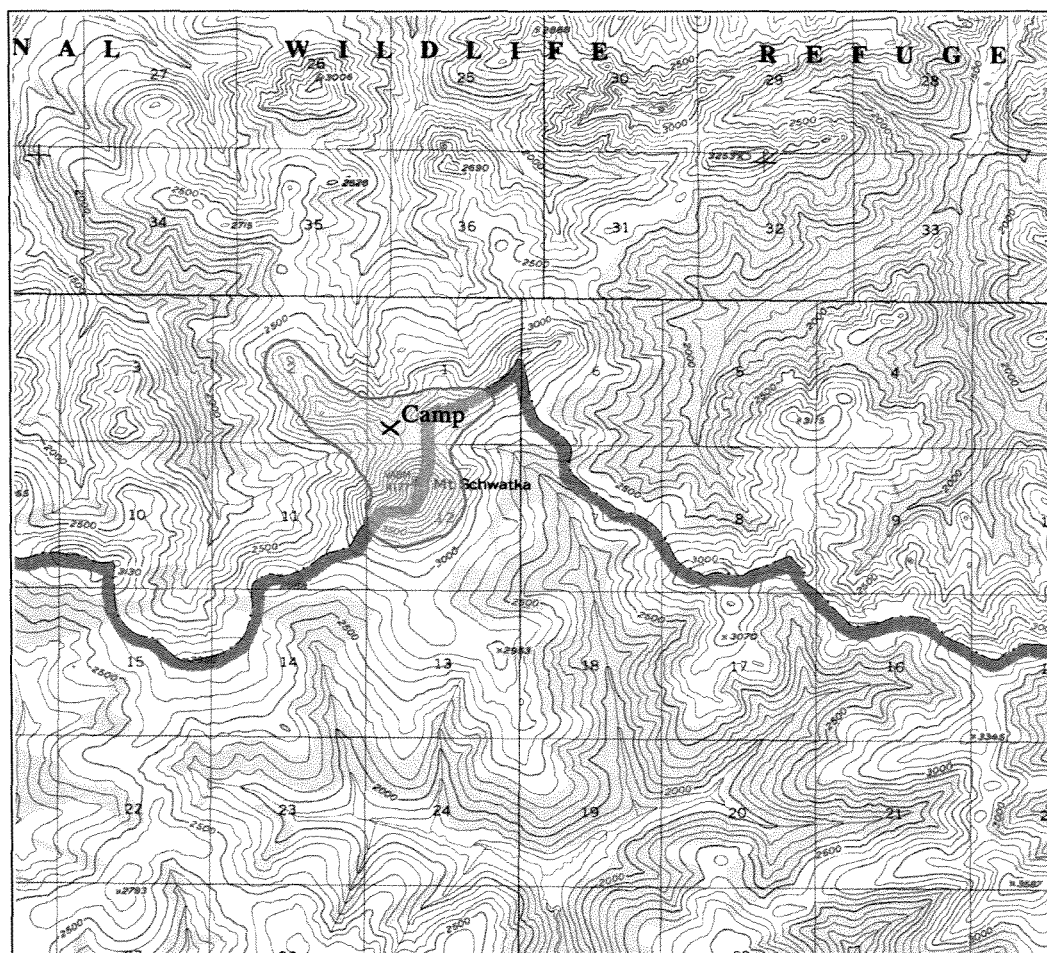


FIGURE A-4. Survey area and base camp in Mount Schwatka vicinity. USGS Livengood (D1) Quadrangle. Red line is the boundary between the Yukon Flats National Wildlife Refuge and the White Mountains National Recreation Area.

White Mountains, VABM Fossil vicinity

Participants:

- Jim Herriges, BLM, Northern Field Office, Fairbanks
- Carolyn Parker, University of Alaska Museum Herbarium, Fairbanks
- David F. Murray, University of Alaska Museum Herbarium, Fairbanks
- Barbara M. Murray, University of Alaska Museum Herbarium, Fairbanks

Dates: 12-14 June 1995. D.F. Murray and B.M. Murray visited the site for a few hours on 12 June 1995.

Location: The area surveyed was the vicinity of VABM Fossil in the northern portion of the White Mountains proper, ca. 8 km NE of Windy Gap (USGS Livengood Quadrangle (C1) 65°37'N, 147°22'W) (Figure A-6). The White Mountains consist of a distinct and rugged limestone hogback trending northeast-southwest in the central Beaver Creek drainage. The site is within the White Mountains National Recreational Area (WMNRA). Although the term 'White Mountains' is often used to refer to all the uplands in the vicinity of the WMNRA, we use it here to refer only to this northeast-southwest ridge.

A brief stop was made at one site within Serpentine Slide Research Natural Area (RNA) (USGS Livengood Quadrangle (C-2) 65°42'N, 147°36'W) and a few collections were made.

Geology: Devonian-Silurian Tolovana Limestone is the primary local bedrock (Chapman *et al.* 1971, Dover 1994). This light-colored, massive microcrystalline rock produces a spectacular alpine landscape of hogback ridges and large, isolated outcrops. The Fossil Creek Volcanics abruptly contact the limestone along both the northwest and southeast margins of the area, offering a contrasting substrate for vegetation comparison (Figure A-5). The area remained unglaciated throughout the Pleistocene with the exception of the north side of the highest peaks, where there exists limited evidence for localized glaciation during the early Pleistocene (F. Weber, pers. comm.).

Several mid- to high-elevation serpentine (noncalcareous) bedrock and scree exposures are found within the Serpentine Slide Research Natural Area. These sites have been described by Juday (1992).

Previous collections: Olav Gjærevoll visited the Fossil Creek lowlands and the southwestern alpine region of the White Mountains south of Fossil Creek in 1959. His collections are held at Trondheim, Norway (TRH), and his floristic findings for all of Alaska, including this area,

have been published (Gjærevoll 1958, 1963 and 1967). David Murray made small collections, held at ALA, in association with a site documentation effort for Limestone Jags RNA 10 km SSW of this survey site (Juday 1989) and a study of Serpentine Slide RNA (Juday 1992).

Vegetation: Dryas tundra was the dominate vegetation on the driest, more stable limestone slopes. *Dryas octopetala*, *Salix arctica*, and *S. reticulata* were the most abundant taxa. Other frequently encountered species included *Lupinus arcticus*, *Minuartia arctica*, *Pedicularis lanata*, *Eritrichium aretioides*, and *Oxytropis scammaniana*. Steeper, unstable limestone scree supported an alpine herb vegetation including the scattered occurrence of *Potentilla uniflora*, several *Draba* spp., *Saxifraga oppositifolia*, *Silene acaulis*, and *Salix rotundifolia*. Poorly-developed vegetation stripes were common in areas of intermediate stability.

Vaccinium tundra dominated on the stable, dry volcanic slopes. *Vaccinium uliginosum*, *Vaccinium vitis-idaea*, *Ledum palustre* ssp. *decumbens*, and *Cassiope tetragona* were common to abundant. Volcanic slopes and contact zones with more moisture supported a dryas-sedge tundra which graded to a mesic grass-herb meadow tundra with scattered patches of willow and alder in more protected mesic areas at lower elevations. *Dryas alaskensis* was abundant in the dryas-sedge tundra. A rich diversity of forbs including *Polemonium acutiflorum*, *Petasites frigidus*, *Mertensia paniculata*, and *Dodecatheon frigidum* were found in the meadow tundra.

A very diverse assemblage of scattered alpine herbs was found on a large, east-facing contact zone between the limestone and Fossil Creek volcanics. The contact zone was well-weathered, had a large component of fines mixed with larger fragments, and was moist from ground seepage. Although no taxa were dominant, several were found only at this site including *Cardamine bellidifolia*, *Saxifraga nivalis*, *S. flagellaris*, *S. cernua* and *Torularia humilis*. This exposed site was highly disturbed by frost heave and slope processes, but the abundance of fines and moisture possibly contributed to its floristic richness.

The vegetation at Serpentine Slide RNA has been described by Juday (1992).

Floristics: The White Mountains area supported several East Beringian endemics and sensitive species being tracked by the AKNHP.

Poa porsildii was collected from a steep mesic grass-herbaceous meadow tundra in a southwest-facing gully directly below and southeast of VABM Fossil. This gully is situated on a volcanic-limestone contact zone at an elevation of ca. 1000 m. (Figure A-5). Although *P. porsildii* was searched for in similar habitats at this locality, this was the only population found.

Draba ruaxes (Figure 7) and *Douglasia arctica* (Figure 6), both East Beringian endemics ranked S2S3, were growing in alpine herb and dryas tundra vegetation, respectively. *Cystopteris montana*, ranked S3, was collected from a moist creek bank. Additional Beringian endemics documented for the area and ranked S3S4 are *Anemone multiceps*, *Erigeron hyperboreus*, *Oxytropis scammaniana*, and *Synthyris borealis*.

The collections of *Saxifraga caespitosa*, a circumpolar arctic-alpine species, and *Draba ruaxes* represent new records for the Y-T Uplands and a range connection between the Brooks Range and the Alaska Range.

Conclusions: Contrasting bedrock, a diversity of substrates and exposures, and the soil enrichment

associated with concentrated use by sheep have all contributed to the species richness at this site.

The collection of *Poa porsildii* is significant for our documentation of this taxon, which appears to be rare at the western edge of its range. Now known to be frequent to common in mesic, herbaceous habitats such as snowmelt meadows and gelifluction slopes in the South Fork Birch Creek valley (this report), more effort should be made to locate it throughout the Uplands region. The two new records for the Yukon-Tanana Uplands, *Saxifraga caespitosa* and *Draba ruaxes*, underscore the value of surveying many sites within the region of interest. Neither taxa was found elsewhere during this survey, and neither has been documented from the Eagle Summit area, where intensive collecting has occurred.



FIGURE A-5. White Mountains, vicinity of VABM Fossil. Tolovana Limestone (left and upper center of photo) and Fossil Creek Volcanics contact zone in a tributary of Fossil Creek. *Poa porsildii* was collected near the base of the mesic meadow tundra slope on the right. Photo by Carolyn Parker.

Species Collected or Observed in Alpine and Subalpine Habitats in Vicinity of White Mountains

Acomastylis rossii	Epilobium angustifolium	Poa arctica
Aconitum delphinifolium	Epilobium latifolium	Poa porsildii
Andromeda polifolia	Equisetum arvense	Podistera macounii
Androsace chamaejasme	Equisetum scirpoides	Polemonium acutiflorum
Anemone parviflora	Equisetum variegatum	Potentilla biflora
Anemone multiceps	Erigeron humilis	Potentilla uniflora
Anemone narcissiflora	Erigeron hyperboreus	Pyrola grandiflora
Anemone richardsonii	Erigeron purpuratus	Ranunculus nivalis
Antennaria friesiana	Eriophorum callitrix	Rhododendron lapponicum
Arctous rubra	Eritrichium aretioides	Rhodiola integrifolia
Arnica griscomii ssp. frigida	Eutrema edwardsii	Rumex acetosa
Artemisia arctica	Festuca altaica	Salix alaxensis
Artemisia furcata	Festuca brachyphylla	Salix arctica
Astragalus aboriginum	Festuca vivipara	Salix brachyphylla ssp. niphoclada
Astragalus umbellatus	Gastrolychnis apetala	Salix planifolia ssp. pulchra
Betula glandulosa	Gentiana glauca	Salix reticulata
Bistorta plumosa	Gentiana prostrata	Salix rotundifolia
Bistorta vivipara	Gentianella propinqua	Saxifraga bronchialis
Boykinia richardsonii	Gymnocarpium dryopteris	Saxifraga caespitosa
Bupleurum triradiatum	Hedysarum alpinum	Saxifraga cernua
Calamagrostis purpurascens	Hedysarum mackenzii	Saxifraga flagellaris
Campanula uniflora	Hierochloa alpina	Saxifraga hieracifolia
Cardamine bellidifolia	Huperzia selago	Saxifraga hirculus
Cardamine purpurea	Lagotis glauca	Saxifraga nelsoniana
Carex capillaris	Ledum palustre	Saxifraga nivalis
Carex glacialis	ssp. decumbens	Saxifraga oppositifolia
Carex nardina	Lloydia serotina	Saxifraga reflexa
Carex petricosa	Lupinus arcticus	Saxifraga rivularis
Carex podocarpa	Luzula wahlenbergii	Saxifraga spicata
Carex scirpoidea	Lycopodium annotinum	Saxifraga tricuspidata
Cassiope tetragona	Mertensia paniculata	Selaginella sibirica
Castilleja hyperborea	Minuartia arctica	Senecio atropurpureus
Cerastium beeringianum	Minuartia elegans	Senecio kjellmanii
Chrysanthemum integrifolium	Minuartia rossii	Senecio lugens
Claytonia tuberosa	Myosotis alpestris	Senecio resedifolius
Corydalis pauciflora	Novosieversia glacialis	Silene acaulis
Cystopteris fragilis	Oxyria digyna	Solidago multiradiata
Cystopteris montana	Oxytropis bryophila	Stellaria edwardsii
Delphinium glaucum	Oxytropis maydelliana	Stellaria laeta
Diapensia lapponica	Oxytropis scammaniana	Synthyris borealis
Dodecatheon frigidum	Oxytropis viscida	Taraxacum ceratophorum
Douglasia arctica	Papaver lapponicum	Thalictrum alpinum
Draba fladnizensis	Papaver macounii	Tofieldia coccinea
Draba glabella	Parrya nudicaulis	Torularia humilis
Draba lactea	Pedicularis capitata	Trisetum spicatum
Draba lonchocarpa	Pedicularis lanata	Vaccinium uliginosum
Draba longipes	Pedicularis langsдорffii	Vaccinium vitis-idaea
Draba ruaxes	Pedicularis oederi	Valeriana capitata
Dryas alaskensis	Pedicularis verticillata	Viola biflora
Dryas integrifolia	Pentaphylloides floribunda	Woodsia glabella
Dryas octopetala	Petasites frigidus	Zygadenus elegans
Empetrum hermaphroditum	Phlox alaxensis	

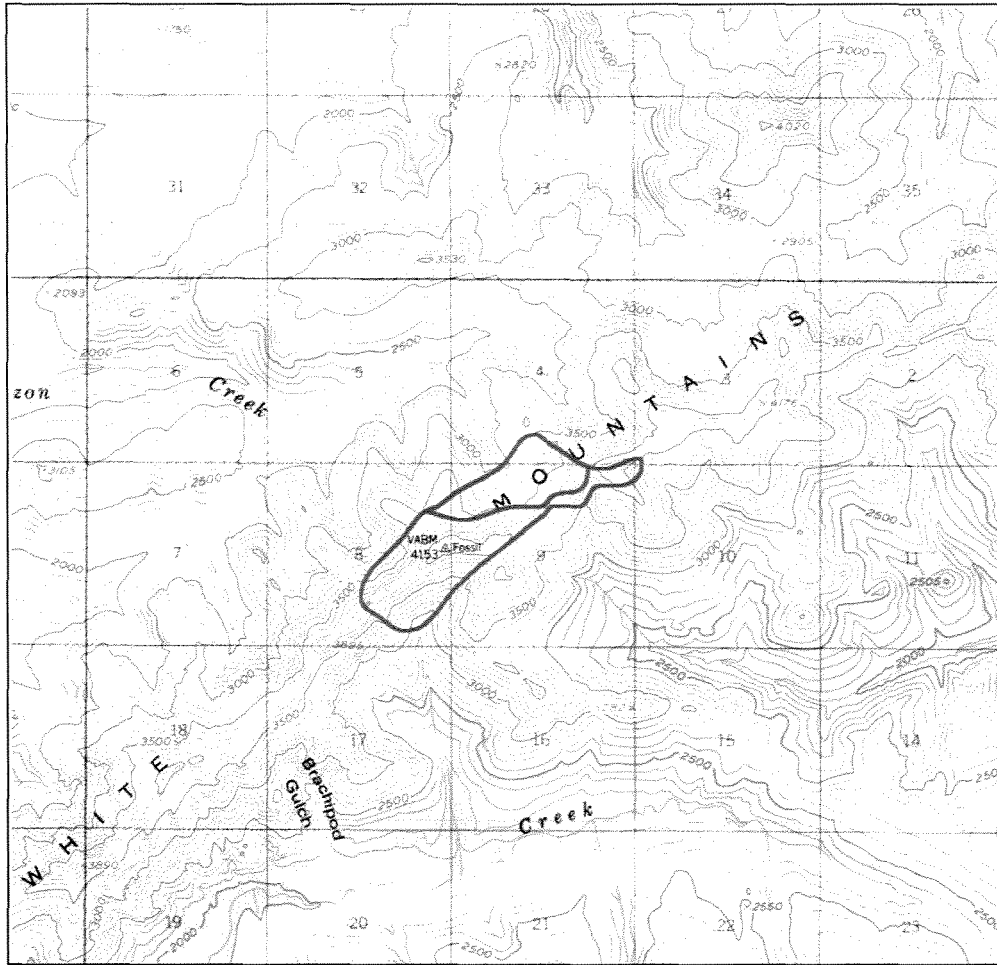


FIGURE A-6. Survey routes in the White Mountains, vicinity of VABM Fossil. USGS Livengood (C-1) Quadrangle. The drainage toward the southwest is Fossil Creek. The limestone-volcanic contact zone, referred to in the text, is in the northeast corner of the survey area.

Victoria Mountain vicinity, SW flanking ridge

Participants:

- Jim Herriges, BLM, Northern Field Office, Fairbanks
- Carolyn Parker, University of Alaska Museum Herbarium, Fairbanks
- David F. Murray, University of Alaska Museum Herbarium, Fairbanks
- Barbara M. Murray, University of Alaska Museum Herbarium, Fairbanks

Dates: 12 June and 15-16 June 1995. All participants made a brief visit on 12 June 1995. Herriges and Parker made a traverse on 15 June and spent an additional day at the east end of this area on 16 June 1995.

Location: The area visited is a portion of an east-west trending alpine ridge contiguous with Victoria Mountain (USGS Livengood Quadrangle (D-1) 65°47'N, 147°06.13'W). The ridge is 12 km west of Victoria Mountain and two km north of the confluence of Willow and Beaver creeks (Figure A-8). This area is within the White Mountains National Recreation Area.

Geology: Silurian-Precambrian dolomite is the primary bedrock along this ridge. This exposure is interbedded with chert, shales, siltstones, and basaltic greenstone (Chapman *et al.* 1971, Weber *et al.* 1992). These diverse rock types have created a variety of landscape features along this ridge line, including shallowly sloped fellfields, prominent outcrops of resistant rock, and taluses and block slopes that display various degrees of weathering and stability (Figure A-7). The south-facing slope of the ridge is generally steeper and more fragmented by outcrops and talus deposits than the north-facing slope.

Previous collections: There are no known collections from this site. Collections from the White Mountains, Mount Schwatka, and Lime Peak, all within 25 km, are included or referenced in this report.

Vegetation: Areas of dolomite and other calcareous bedrock supported a dryas tundra on the more stable sites and an alpine herb vegetation on the unstable rubble slopes. *Dryas octopetala* was the dominate species in both vegetation types; other taxa common in both types included *Silene acaulis*, *Draba palanderiana*, *Salix arctica*, *S. rotundifolia*, *Phlox alaskensis* and *Oxytropis bryophila*. Greenstone outcrops and slopes supported vaccinium tundra that graded to mesic shrub birch-ericaceous shrub in more protected and moist areas below the ridge top. *Vaccinium vitis-idaea*, *Vaccinium uliginosum*, *Cassiope tetragona*, and *Betula glandulosa* were common. White spruce woodland ascended to just below the ridge top on the south-facing side in the moister draws. On the north-facing slopes, open tall alder-willow scrub having a herbaceous understory was found just above treeline. Boundaries between vegetation classes were poorly defined along this ridge, possibly due in part to the variety of mixed bedrock types and to the disturbance caused by weathering and slope processes.

Floristics: Although species richness was enhanced by the diverse substrate and vegetation types found along this ridge, each of the seven taxa noted below and tracked by the AKNHP was collected from open vegetation growing on limestone and displayed scattered to infrequent abundance. *Douglasia arctica* (Figure 6), endemic to East Beringia, and *Festuca lenensis*, (Figure 9) a subarctic-Asian steppe species, are both ranked S2S3. East Beringian endemics *Erigeron hyperboreus*, *Eritrichium splendens*, and *Oxytropis scammaniana* are ranked S3S4. *Anemone multiceps*, a western North American alpine species, and *Artemisia furcata*, a Beringian endemic, are also ranked S3S4.

Conclusions: The concentration of infrequently found and endemic species on the south-facing, barren and geomorphologically-active limestone portions of this ridge was striking but falls within a pattern detected during this, and similar, floristic surveys. It underscores the merit of focusing on sites that are geologically and geomorphologically distinct and that support open, azonal vegetation when searching for rare and sensitive species.

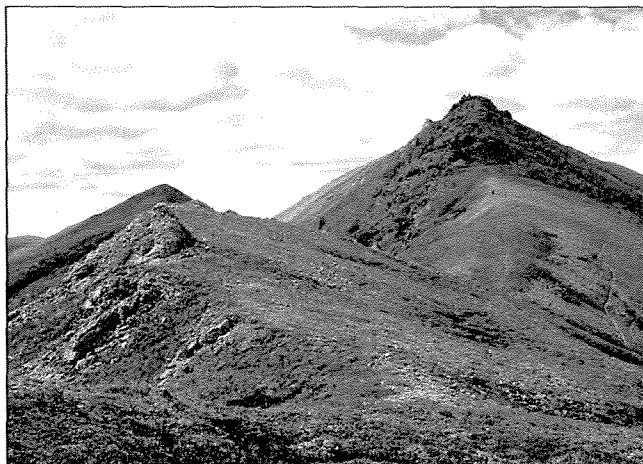


FIGURE A-7. Victoria Mountain vicinity, SW flanking ridge, with view looking to the west. The darker outcrop in the distant right of the photo is basalt. Lighter rocks in foreground are limestone and associated calcareous bedrock types. North-facing slopes are to right. Game trails are visible in the dryas tundra leading up to the basalt outcrop. *Photo by Carolyn Parker.*

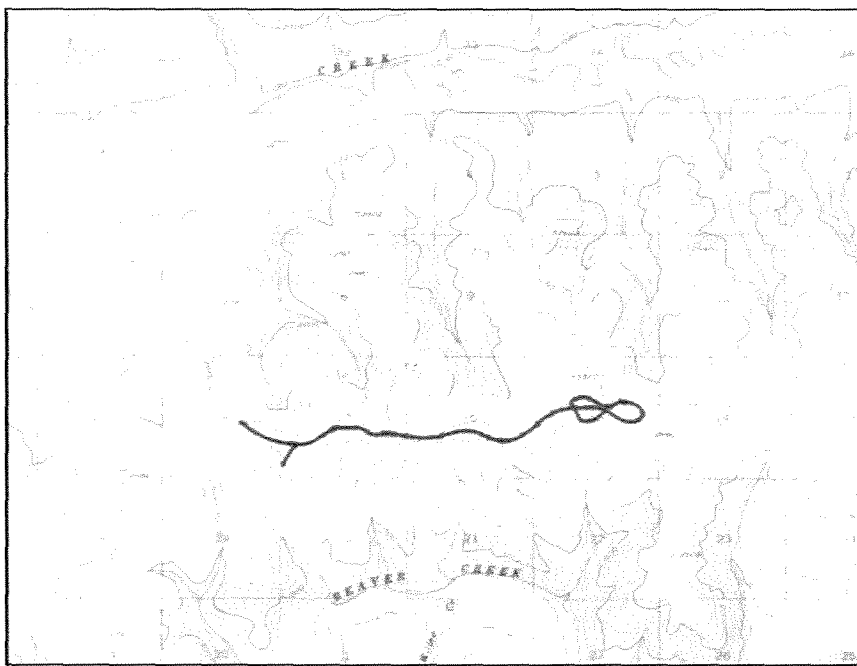


FIGURE A-8. Survey route along ridge southwest of Victoria Mountain. USGS Livengood (D-1) Quadrangle. Victoria Mountain is 10 km to the east. Tributaries on north side of the ridge drain to Victoria Creek, and Beaver Creek drains to the south at bottom of figure.

Species Collected or Observed in Alpine and Subalpine Habitats in Vicinity of Victoria Mountain

Acomastylis rossii	Epilobium angustifolium	Poa porsildii
Aconitum delphinifolium	Epilobium latifolium	Podistera macounii
Andromeda polifolia	Equisetum arvense	Polemonium acutiflorum
Androsace chamaejasme	Equisetum scirpoides	Potentilla biflora
Anemone parviflora	Equisetum variegatum	Potentilla uniflora
Anemone multiceps	Erigeron humilis	Pyrola grandiflora
Anemone narcissiflora	Erigeron hyperboreus	Ranunculus nivalis
Anemone richardsonii	Erigeron purpuratus	Rhododendron lapponicum
Antennaria friesiana	Eriophorum callitrix	Rhodiola integrifolia
Arctous rubra	Eritrichium aretioides	Rumex acetosa
Arnica grischomii ssp. frigida	Eutrema edwardsii	Salix alaxensis
Artemisia arctica	Festuca altaica	Salix arctica
Artemisia furcata	Festuca brachyphylla	Salix brachyphylla ssp. niphoclada
Astragalus aboriginum	Festuca 'vivipara'	Salix planifolia ssp. pulchra
Astragalus umbellatus	Gastrolychnis apetala	Salix reticulata
Betula glandulosa	Gentiana glauca	Salix rotundifolia
Bistorta plumosa	Gentiana prostrata	Saxifraga bronchialis
Bistorta vivipara	Gentianella propinqua	Saxifraga caespitosa
Boykinia richardsonii	Gymnocarpium dryopteris	Saxifraga cernua
Bupleurum triradiatum	Hedysarum alpinum	Saxifraga flagellaris
Calamagrostis purpurascens	Hedysarum mackenzii	Saxifraga hieracifolia
Campanula uniflora	Hierochloa alpina	Saxifraga hirculus
Cardamine bellidifolia	Huperzia selago	Saxifraga nelsoniana
Cardamine purpurea	Lagotis glauca	Saxifraga nivalis
Carex capillaris	Ledum palustre ssp. decumbens	Saxifraga oppositifolia
Carex glacialis	Lloydia serotina	Saxifraga reflexa
Carex nardina	Lupinus arcticus	Saxifraga rivularis
Carex petricosa	Luzula wahlenbergii	Saxifraga spicata
Carex podocarpa	Lycopodium annotinum	Saxifraga tricuspidata
Carex scirpoidea	Mertensia paniculata	Selaginella sibirica
Cassiope tetragona	Minuartia arctica	Senecio atropurpureus
Castilleja hyperborea	Minuartia elegans	Senecio kjellmanii
Cerastium beeringianum	Minuartia rossii	Senecio lugens
Chrysanthemum integrifolium	Myosotis alpestris	Senecio resedifolius
Claytonia tuberosa	Novosieversia glacialis	Silene acaulis
Corydalis pauciflora	Oxyria digyna	Solidago multiradiata
Cystopteris fragilis	Oxytropis bryophila	Stellaria edwardsii
Cystopteris montana	Oxytropis maydelliana	Stellaria laeta
Delphinium glaucum	Oxytropis scammaniana	Synthyris borealis
Diapensia lapponica	Oxytropis viscida	Taraxacum ceratophorum
Dodecatheon frigidum	Papaver lapponicum	Thalictrum alpinum
Douglasia arctica	Papaver macounii	Tofieldia coccinea
Draba fladnizensis	Parrya nudicaulis	Torularia humilis
Draba glabella	Pedicularis capitata	Trisetum spicatum
Draba lactea	Pedicularis lanata	Vaccinium uliginosum
Draba lonchocarpa	Pedicularis langsdoeffii	Vaccinium vitis-idaea
Draba longipes	Pedicularis oederi	Valeriana capitata
Draba ruaxes	Pedicularis verticillata	Viola biflora
Dryas alaskensis	Pentaphylloides floribunda	Woodsia glabella
Dryas integrifolia	Petasites frigidus	
Dryas octopetala	Phlox alaxensis	
Empetrum hermaphroditum	Poa arctica	

East and West Crazy Mountains

Participants:

- Jim Herriges, BLM, Northern Field Office, Fairbanks
- John Cook, BLM, Northern Field Office, Fairbanks
- Alan Batten, University of Alaska Museum Herbarium, Fairbanks
- Carolyn Parker, University of Alaska Museum Herbarium, Fairbanks

Dates: 17 - 23 June 1995.

Location: The Crazy Mountains are isolated, low northern outliers of the Y-T Uplands. The Preacher Creek valley separates them into two isolated uplands: the West Crazy Mountains and the East Crazy Mountains. The highest elevations in the West Crazy Mountains are slightly over 1070 m (3500 ft). The area covered most intensively in this survey was VABM Wolf, and the ridges leading toward the east, west and south (Figure A-11). Brief stops were also made at outcrops to the west and south, and a steep south-facing bluff above Preacher Creek (Figure A-12) were also made. All sites are located on USGS Circle (D-4 and D-5) Quadrangles. The outcrop west of VABM Wolf was visited briefly by Carolyn Parker on 17 June. All other sites were visited by Herriges, Batten and Cook.

The highest elevation in the East Crazy Mountains is VABM Crazy at 1136 m (3725 ft). The area surveyed included a short visit to VABM Rock and vicinity (USGS Circle (C-3), 65°44'N, 145°11'W) on 20 June by Herriges, Batten and Cook; the area around VABM Craz (USGS Circle (C-3), 65°42'N, 145°05'W) was surveyed from 20 - 22 June by Herriges and Batten (Figure A-10).

Geology: The Crazy Mountains is the only site in this survey north of the Tintina Fault Zone. This is a major east-west trending fault system that extends through the Y-T Uplands and separates rocks of vastly different composition, age and history.

In the West Crazy Mountains, bedrock in the vicinity of VABM Wolf consisted of Paleozoic chert pebble conglomerate. Scattered, small outcroppings of slightly metamorphosed limestone occur, and two of these outcroppings were visited. Bedrock underlying the Preacher Creek bluff site is mapped as Paleozoic chert, conglomerate, and limestone (Foster *et al.* 1983). In the East Crazy Mountains, VABM Rock is composed of highly resistant Mesozoic volcanic intrusive rocks of the Circle Volcanics group. The bedrock of VABM Craz and vicinity consists of argillite, grit, and quartzite (Foster *et al.* 1983). Metamorphosed limestone (marble) outcroppings are exposed in scattered localities

throughout the area and are a conspicuous element within the otherwise weathered, rounded landscape (Figure A-9).

Previous Collections: None known.

Vegetation: Dryas tundra was characteristic of windswept ridges and well-drained alpine slopes on acidic substrates in the Crazy Mountains. The soil was thin and rocky, and vegetation cover ranged from sparse to nearly continuous. Vegetation classes included dryas-sedge tundra on calcareous sites, outcrop and scree vegetation on steeper or rockier sites, and low shrub tundra on more sheltered sites. *Dryas octopetala* was commonly the dominant plant, but *D. integrifolia* was present and occasionally the dominant or codominant species. A wide variety of species were associated with *Dryas*. Some of the most common included *Anemone narcissiflora*, *Arctous rubra*, *Carex microchaeta*, *Festuca altaica*, *Hierochloa alpina*, *Oxytropis maydelliana*, *Pedicularis lanata*, and *Salix phlebophylla*.

Dryas-sedge tundra, a sedge-rich variant of dryas tundra, commonly occurred on calcareous slopes. On strongly calcareous substrates the usual dominant was *Dryas alaskensis*, though on outcrops and very thin dry soils it was often *D. integrifolia*. More weakly calcareous slopes were often codominated by both *D. integrifolia* and *D. octopetala*. Common sedges codominant with *Dryas* in this vegetation were *Carex capillaris*, *C. rupestris*, *C. scirpoidea* and *C. supina* ssp. *spaniocarpa*. Other common species included *Androsace chamaejasme*, *Astragalus umbellatus*, *Cypripedium passerinum*, *Potentilla uniflora*, *Rhododendron lapponicum*, *Salix reticulata*, *Senecio resedifolius* and *Tofieldia pusilla*.

Though vegetation on screes and outcrops was sparse, species diversity was often high on these sites. Common species on acidic rocks included *Aconitum delphinifolium*, *Arnica griscomii* ssp. *frigida*, *Mimuartia arctica*, *Saxifraga reflexa*, and *S. tricuspidata*. Limestone outcrops and screes commonly supported *Anemone drummondii*, *Bupleurum triradiatum*, *Calamagrostis purpurascens*, *Campanula aurita*, *Cystopteris fragilis*, *Lloydia serotina*, and *Potentilla hookeriana*.

Sheltered slopes with deeper soils supported low shrub tundra. These sites ranged from mesic to wet, depending on slope, aspect and drainage. Common dominant shrubs included *Betula glandulosa*, *B. nana*, *Salix glauca*, and *S. planifolia* ssp. *pulchra*, all growing 20-50 cm tall. Other common species included *Carex bigelowii*, *Empetrum hermaphroditum*, *Festuca altaica*, *Ledum palustre* ssp. *decumbens*, *Pedicularis labradorica*, and *Vaccinium vitis-idaea*. Feather mosses and foliose and fruticose lichens were common. *Eriophorum vaginatum* was present at one poorly drained site.

Open alder thickets were found on poorly drained north slopes at lower, subalpine elevations. These open stands were dominated by combinations of *Alnus vividus* ssp. *crispa*, *Betula glandulosa*, *Salix glauca* and *S. planifolia* ssp. *pulchra*, all growing 0.5-1.5 m tall. Dominant understory species on the wet hummocky substrate included *Carex bigelowii*, *Empetrum hermaphroditum* and *Cassiope tetragona*. Other common species were *Calamagrostis canadensis*, *Eriophorum vaginatum*, feather mosses, *Ledum palustre* ssp. *decumbens*, *Rubus chamaemorus*, *Sphagnum* spp., and *Vaccinium vitis-idaea*.

A steep south slope above a meander of Preacher Creek supported an island of subarctic steppe vegetation. *Calamagrostis purpurascens*, *Erigeron caespitosus*, and *Pulsatilla patens* dominated this site. Other species present were *Androsace septentrionalis*, *Artemisia frigida*, *Carex supina*, *Dryopteris fragrans*, *Pentstemon gormanii*, *Poa glauca*, *Potentilla hookeriana*, *P. pensylvanica*, *Saxifraga reflexa*, *Selaginella sibirica*, *Silene repens* and *Solidago multiradiata*.

Floristics: *Campanula aurita*, listed S3, was found on ledges and crevices in calcareous outcrops in the East Crazy Mountains. This and a collection from Mount Schwatka (this survey) are the only records of this species from the western Y-T Uplands.

Douglasia gormanii, an East Beringian endemic listed S2S3, grew on screes and windswept ridge crests in the vicinity of VABM Wolf in the West Crazy Mountains. This species is also documented for the Y-T Uplands at ALA by specimens from Eagle Summit and off the Elliott Highway.

The following taxa are not listed by AKNHP, but their occurrence in the Y-T Uplands merits floristic comment.

Artemisia frigida was present on a subarctic steppe bluff above Preacher Creek. This is a small northward range extension within the Y-T Uplands for this species, which characteristically grows on steep, dry, south-facing slopes and outcrops. Other localities in the western Y-T uplands documented at ALA include Manley Hot Springs and the Central-Circle area.

Erigeron caespitosus was one of the dominant plants on the Preacher Creek steppe bluff. This specimen, along

with a collection from near Central, documents a northward range extension within the Y-T Uplands. *Penstemon gormanii* was also common on the steppe bluff. This collection marks a minor range extension to the northwest within the Y-T Uplands for this East Beringian endemic. It has also been collected at Circle Hot Springs, the Steese Highway near Lower Birch Creek, and Crooked Creek near Central (ALA).

Potentilla pensylvanica occurred at the Preacher Creek steppe bluff. This is a substantial northwestward range extension within the Y-T Uplands relative to Hultén (1968). The species was also collected from Puzzle Gulch (South Fork Birch Creek) and Big Windy Hot Springs (this report).

Carex rupestris was found on dry, calcareous slopes and outcrop crevices. This circumpolar species is fairly common in interior mountain ranges throughout the state, but only one collection is noted between the Yukon and Tanana rivers in Hultén (1968). This survey documented the species on calcareous substrates at both Mount Schwatka and South Fork Birch Creek.

Oxytropis splendens was growing in crevices on a limestone outcrop. Although Hultén (1968) does not indicate this species as occurring in the Y-T Uplands, ALA collections document it from the Taylor Highway, middle Yukon River valley, and Delta Junction area. Our collection had yellow flowers with bluish keels; however, both blue-flowered and yellow-flowered specimens have been assigned to this species.

Conclusions: The East and West Crazy Mountains are lower in elevation than most of the other sites visited during this survey, and even the highest summits are not far above treeline. A true alpine flora was not found; however, the numerous marble outcroppings, which were more abundant in the West Crazy Mountains, did support several alpine and calciphilous species, significantly enriching the local flora.

The bluff above Preacher Creek supported a subarctic steppe element that included *Artemisia frigida*, *Erigeron caespitosus*, *Pulsatilla patens* and *Penstemon gormanii*, all species that were not encountered elsewhere in the survey.

Species Collected or Observed in Alpine and Subalpine Habitats in the of East and West Crazy Mountains

Androsace chamaejasme	Minuartia arctica
Anemone drummondii	Minuartia rubella
Anemone narcissiflora	Myosotis alpestris
Anemone parviflora	Oxyria digyna
Anemone richardsonii	Oxytropis borealis
Arctous rubra	Oxytropis bryophila
Arnica griscomii ssp. frigida	Oxytropis campestris
Artemisia arctica	Oxytropis scammaniana
Artemisia furcata	Papaver lapponicum
Artemisia tilesii	Parrya nudicaulis
Astragalus aboriginum	Pedicularis capitata
Astragalus umbellatus	Pedicularis oederi
Betula glandulosa	Phlox alaskensis
Bupleurum triradiatum	Platanthera obtusata
Carex bigelowii	Poa arctica
Carex misandra	Polemonium acutiflorum
Carex nardina	Polemonium boreale
Cassiope tetragona	Potentilla uniflora
Castilleja caudata	Rubus chamaemorus
Corallorrhiza trifida	Salix arctica
Cystopteris fragilis	Salix brachycarpa ssp. niphoclada
Delphinium glaucum	Salix reticulata
Douglasia arctica	Salix rotundifolia
Draba cana	Saxifraga hirculus
Draba fladnizensis	Saxifraga oppositifolia
Draba glabella	Saxifraga reflexa
Draba palanderiana	Saxifraga tricuspidata
Dryas alaxensis	Senecio tundricola
Dryas octopetala	Shepherdia canadensis
Dryopteris fragrans	Silene acaulis
Empetrum hermaphroditum	Solidago multiradiata
Epilobium latifolium	Spiraea stevenii
Equisetum arvense	Taraxacum ceratophorum
Erigeron hyperboreus	Tofieldia coccinea
Eritrichium aretioides	Torularia humilis
Eritrichium splendens	Vaccinium uliginosum
Festuca altaica	Vaccinium vitis-idaea
Festuca lenensis	Valeriana capitata
Gastrolychnis ostenfeldii	Viola biflora
Lesquerella arctica	Woodsia glabella
Loiseleuria procumbens	Zygadenus elegans
Lupinus arcticus	
Mertensia paniculata var. alaskana	



FIGURE A-9. Ridgetop and marble outcrop in the West Crazy Mountains. Treeline reaches to just below the ridgetops throughout most of the East and West Crazy Mountains. Scattered marble outcrops and barren, rounded summits characterize the subalpine landscape. Photo by Alan Batten.

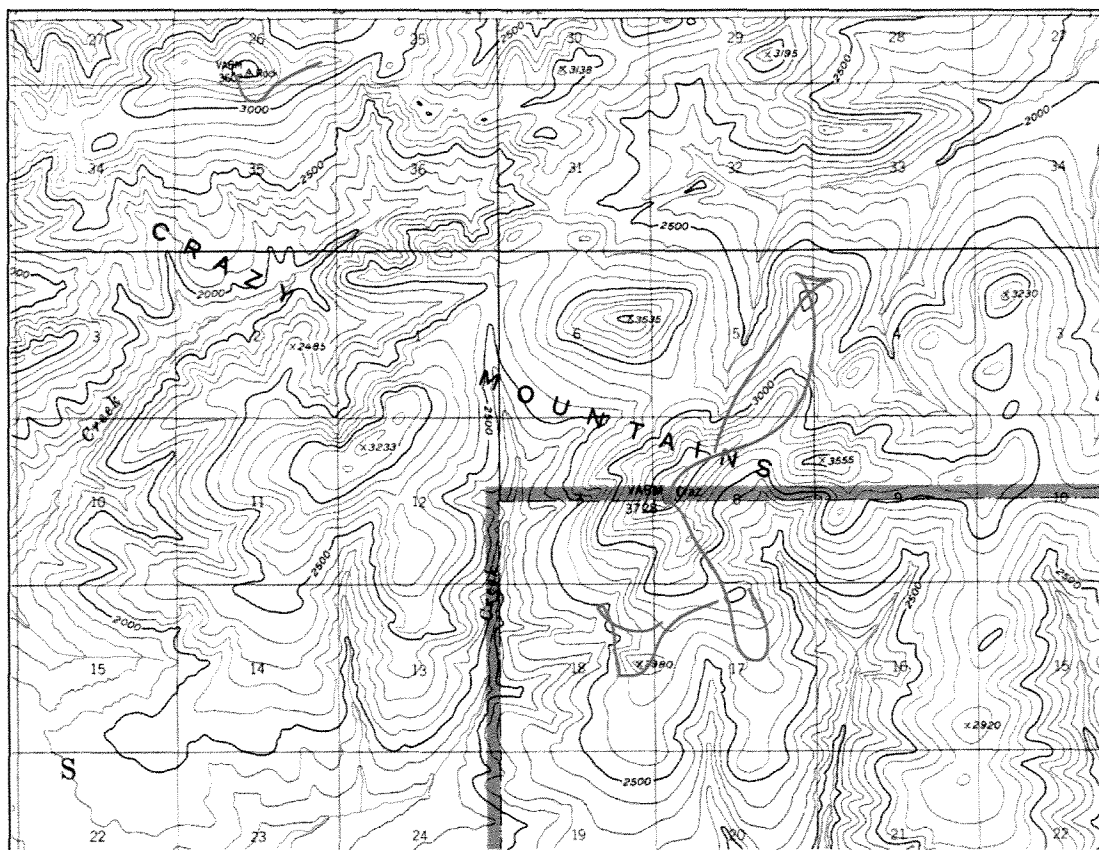


FIGURE A-10. Survey routes in the East Crazy Mountains. USGS Circle (C-3). The survey focused on the vicinity of VABM Craz and VABM Rock.

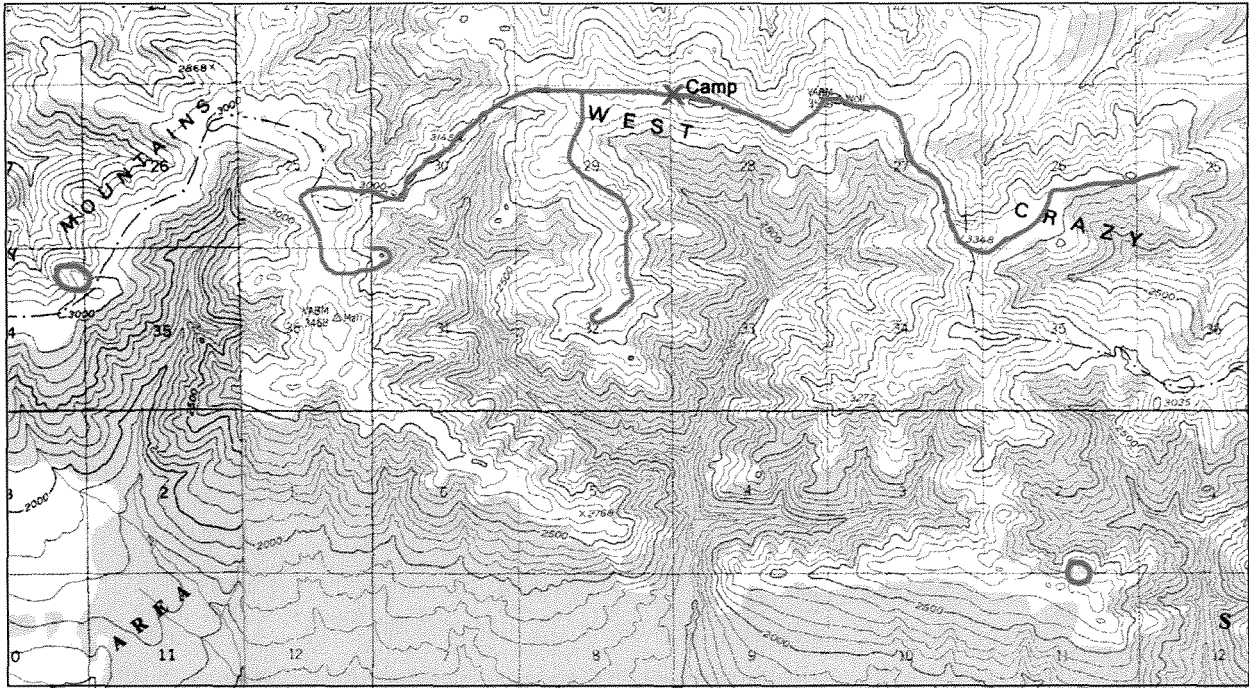


FIGURE A-11. Survey routes and two isolated survey sites in the West Crazy Mountains. USGS Circle (D-5). Base Camp is 1 mile west of VABM Wolf.

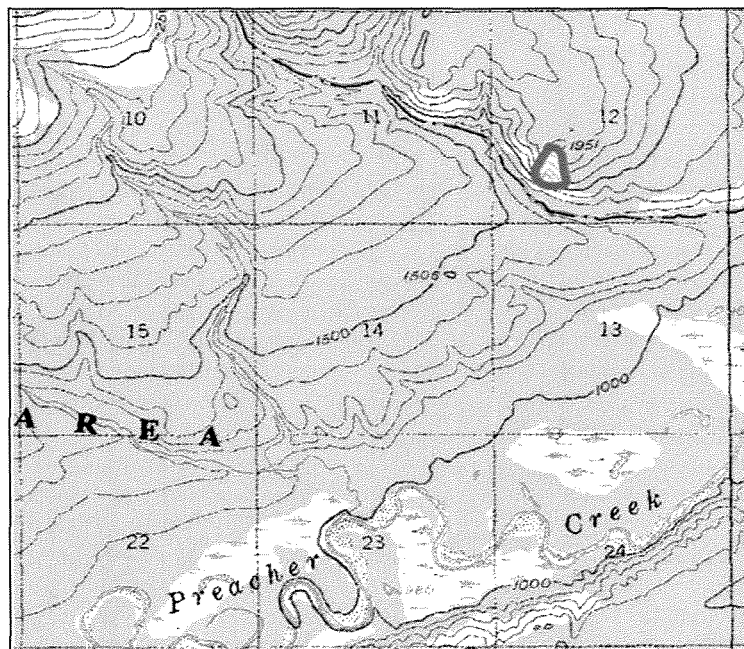


FIGURE A-12. Additional survey area on bluff near Preacher Creek in the West Crazy Mountains. USGS Circle (D-4).

South Fork Birch Creek

Participants:

- Jim Herriges, BLM, Northern Field Office, Fairbanks
- Carolyn Parker, University of Alaska Museum Herbarium, Fairbanks
- Alan Batten, University of Alaska Museum Herbarium, Fairbanks

Dates: 2-11 July 1996

Locations: The South Fork Birch Creek valley and its tributaries drain the eastern portion of the southwest corner of the Steese National Conservation Area (SNCA). Three base camp sites were selected for their potential floristic diversity based on aerial photographs and geologic maps. The 3 sites were as follows:

1. Ridges above the headwaters of Caribou Creek (USGS Circle Quadrangle (A-1) 65°07'N, 144°03'W). A west to east ridge top traverse from 144°15'N to 144°03'W was made 2 July. Two additional days (3-4 July) were spent within 4 km of base camp (Figures A-13 and A-16).
2. Ridges above the headwaters of the Yukon Fork of the South Fork (USGS Charley River Quadrangle (A-6) 65°09'N, 143°42'W). A ridge top traverse was made 5 July from the alpine ridges above the headwaters of Alder Creek (E of Peak 5580, 65°12'N, 143°48'W) to base camp. Two additional days (6-7 July) were spent on ridges and saddles north and southwest of this base camp (Figures A-14 and A-16).
3. Ridges between Puzzle Gulch and Big Windy Creek (USGS Circle Quadrangle (A-1 and A-2) 65°11'N, 144°31'W). Ridges and outcrops within 4 km of base camp were visited 8-11 July (Figures A-15 and A-17).

Geology: Paleozoic pelitic schist is the country rock throughout this area. Interbedded marbles, and volcanic and granitic intrusions, along with their associated contact zone rocks, are common (Foster *et al.* 1983, F. Weber, pers. comm.). These weather-resistant rock units have produced conspicuous outcrops and tors that are scattered across an otherwise rolling, upland landscape. Numerous marble and volcanic outcrops are exposed along the ridgetops of the Caribou Creek and Yukon Fork headwaters. Highly metamorphized contact zone rock has created vertical cliffs, spires, and rubble slopes, essentially a badlands topography, on two ridges west of Puzzle Gulch (F. Weber, pers. comm.). There are small alpine glacial cirques on the north facing side of the highest ridgeline on the north side of the Yukon Fork headwaters (Pewe *et al.* 1967), and some of this area may

have experienced local glaciation during the early Pleistocene (F. Weber, pers. comm.).

Previous collections: None known.

Vegetation: The most prevalent alpine vegetation on the ridgetops graded from dryas-dwarf shrub tundra in drier areas to dryas-sedge dwarf shrub tundra on more mesic sites. *Dryas octopetala* was dominant on the drier sites, while *D. alaxensis* and *D. integrifolia* appeared, respectively, as soil moisture increased in swales and on lower slopes. Moist snow flushes and gelifluction slopes supported a mixed herb meadow including *Festuca altaica*, *Poa arctica*, *Carex podocarpa*, *Artemisia arctica*, and *Dryas alaxensis*. Widely scattered shrub *Salix* ssp. appear with increased moisture availability and decreased exposure on lower slopes. Alpine herbs grew on rock outcrops, rubble slopes, and similar unstable and rock-dominated sites.

Floristics: The East Beringian endemic *Poa porsildii*, ranked S2, (see White Mountains section, this report) was found in the area of each base camp growing in moist, herbaceous habitats such as north facing snowflush meadows, the lower margins and tops of gelifluction lobes, and moist depressions within dryas-sedge dwarf shrub tundra. Species abundance was scattered to common at all sites. Male plants were in full flower, while most female plants were past full flowering at the time of our visit. Taxa consistently associated with *Poa porsildii* included *Festuca altaica*, *Poa arctica*, *Carex podocarpa*, *Salix reticulata*, *S. arctica*, *Dryas alaskensis*, and mosses. In contrast to its rare occurrence in the White Mountains to the west, *Poa porsildii* appeared to be widespread and well-established here.

Phlox hoodii, ranked S1S2, (Figure 3) was found growing on a dry, south facing outcrop within white spruce forest at the very head of Yukon Fork South Fork Creek approximately 3 km SW of the second base camp. Only one of the several large outcrops exposed on this forested slope was visited. It supported several species characteristic of dry graminoid vegetation, including *Calamagrostis purpurascens*, *Elytrigia spicata*, *Oxytropis campestris*, *Carex petricosa*, *Saxifraga tricuspidata*, as well as the East Beringian endemic *Mimuartia yukonensis*, which is ranked S3 by AKNHP.

Mimuartia biflora was found growing on moist soil in an east-facing draw 1.5 km east of the base camp above Caribou Creek. This rare circumpolar species is ranked S2, and the collection represents a 125 km northeast range extension within the Y-T Uplands.

Oxytropis huddlesonii, (Figure 10) an East Beringian endemic ranked S2S3, was found growing in dryas tundra at the base of a ridge top marble tor in the Yukon Fork

South Fork headwaters. This collection is the first for the Y-T Uplands west of the Boundary-Jack Wade area. The circumpolar fern *Cystopteris montana*, ranked S3, was found growing along the moist, herbaceous margin of a gelifluction lobe in the same area.

Several populations of *Montia bostockii*, ranked S3, (Figure 11) were located in the area of each base camp. Previously unknown from the central Y-T Uplands, this narrowly restricted East Beringian endemic is known from the Wrangell-St. Elias Mountains, one site in the central Brooks Range, and from a site near Boundary. At all sites where it was found during this survey, plants were rooted in open patches of moist to wet moss in heath-hummock or herbaceous heath tundra on gentle slopes and swales. *Claytonia tuberosa* was also found in identical habitats, but the two taxa were seldom growing in close proximity. Species commonly associated with *Montia bostockii* include *Eriophorum angustifolium*, *Carex podocarpa*, *Salix polaris*, *S. arctica*, *S. reticulata*, *Dryas alaskensis*, and *Poa porsildii*. Heath tussocks, when part of the habitat, were dominated by *Ledum palustre* ssp. *decumbens*, *Vaccinium vitis-idaea*, and *V. uliginosum*. Population size ranged from several to over two hundred individual plants and the taxon appeared to be well-established.

Additional East Beringian endemics found in this area and ranked S3S4 were *Anemone drummondii*, *Erigeron hyperboreus*, *Oxytropis scammaniana*, *Salix chamissonis*, and *Synthyris borealis*. Taxa having the same ranking, but a broader range of distribution include *Draba fladnizensis*, *Oxytropis mertensiana*, and *Woodsia ilvensis*.

Our collections of *Carex marina*, *Draba nemorosa*, and *Erigeron grandiflorus* represent first records for these taxa in the Y-T Uplands. Eastward range extensions within the uplands of approximately 130 km were documented for *Salix chamissonis*, *Carex chordorrhiza*,

and *Novosieversia glacialis*. A westward range extension of 175 km was recorded for *Ranunculus pedatifidus*.

The large rock outcrops near Puzzle Gulch showed evidence of intense use by Dall sheep and the sheltered sites adjacent to these outcrops supported the lush, herbaceous, species-rich vegetation that is characteristic of areas highly used by sheep. Taxa found here that were not found elsewhere during the survey of this region included *Draba nemorosa*, *Viola biflora*, *Botrychium lunaria*, *Kobresia myosuroides*, *Erigeron grandiflorus*, and *Ranunculus pedatifidus*.

Conclusions: This area, which was botanically unknown prior to our survey, is now documented as supporting several well established populations of two rare taxa. *Poa porsildii*, considered very rare and only previously known within the Y-T Uplands from the Lime Peak, the White Mountains area, and Eagle Summit, was found frequently, and often in abundance, in this area. It has also recently been recorded as well-established in the Ogilvie Mountains in eastern interior Alaska (Parker 1997, Cook *et al.* 1993) and Yukon Territory, Canada (Cody 1994). *Montia bostockii*, not previously known from the central uplands, was also found frequently and populations generally consisted of several to over 200 plants. This is currently the only area within Alaska where both of these taxa are known to be in such relative abundance.

A total of 15 taxa being tracked by the Alaska Natural Heritage Program and listed S1 to S3S4 were documented from this area. Although rock dominated habitats (tors, outcrops, screes) and areas highly used by sheep were very diverse floristically, no single habitat type supported a majority of the sensitive species recorded. The 5 new records for the Yukon-Tanana Uplands, and the 9 range extensions of greater than 100 km, add significantly to our knowledge of the flora of this region.

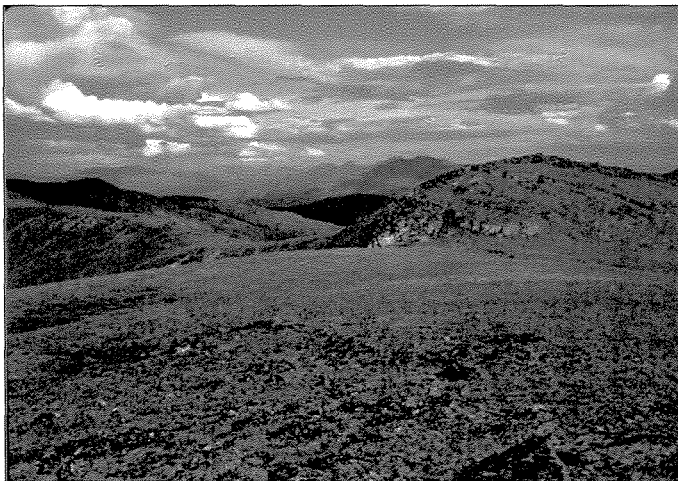


FIGURE A-13. Ridges between Caribou Creek and Salcha River valley. *Dryas*-dwarf shrub tundra covers the dry ridge tops. Marbleized outcrops in background support scattered alpine herbs. Photo by Carolyn Parker.

Species Collected or Observed in Alpine and Subalpine Habitats in the Vicinity of South Fork Birch Creek

Acomastylis rossii	Carex podocarpa	Gastrolychnis apetala
Aconitum delphinifolium	Carex rupestris	Gentiana algida
Adoxa moschatellina	Carex scirpoidea	Gentiana prostrata
Alnus viridis ssp. crispa	Carex vaginata	Gentianella propinqua
Andromeda polifolia	Cassiope tetragona	Geocaulon lividum
Androsace chamaejasme	Castilleja elegans	Hedysarum alpinum
Androsace septentrionalis	Castilleja hyperborea	Hierochloa alpina
Anemone drummondii	Cerastium beeringianum	Huperzia selago
Anemone narcissiflora	Chrysosplenium tetrandrum	Juncus biglumis
Anemone parviflora	Claytonia sarmentosa	Juncus triglumis
Anemone richardsonii	Claytonia tuberosa	Juniperus communis
Antennaria friesiana	Corallorrhiza trifida	Kobresia myosuroides
Antennaria monocephala	Corydalis pauciflora	Kobresia sibirica
Arctagrostis latifolia	Crepis nana	Kobresia simpliciuscula
Arctostaphylos uva-ursi	Cystopteris fragilis	Lagotis glauca
Arctous alpina	Cystopteris montana	Ledum palustre ssp. decumbens
Arctous rubra	Delphinium glaucum	Linnaea borealis
Arnica griscomii ssp. frigida	Descurainia sophioides	Lloydia serotina
Arnica lessingii	Diapensia lapponica	Loiseleuria procumbens
Artemisia alaskana	Dodecatheon frigidum	Lupinus arcticus
Artemisia arctica	Draba alpina	Luzula arcuata
Artemisia borealis	Draba cana	Luzula confusa
Artemisia tilesii	Draba fladnizensis	Luzula multiflora
Astragalus aboriginum	Draba longipes	Luzula parviflora
Astragalus alpinus	Draba nemorosa	Luzula wahlenbergii
Astragalus umbellatus	Draba palanderiana	Lycopodium alpinum
Betula glandulosa	Dryas alaskensis	Lycopodium annotinum
Betula hybrids	Dryas integrifolia	Lycopodium clavatum
Betula nana	Dryas octopetala	Lycopodium complanatum
Bistorta plumosa	Dryopteris fragrans	Mertensia paniculata
Bistorta vivipara	Elymus trachycaulus	Minuartia arctica
Boschniakia rossica	Elytrigia spicata	Minuartia biflora
Botrychium lunaria	Empetrum hermaphroditum	Minuartia macrocarpa
Boykinia richardsonii	Epilobium angustifolium	Minuartia rossii
Bromopsis pumpelliana ssp. arctica	Epilobium latifolium	Minuartia rubella
Bupleurum triradiatum	Equisetum arvense	Minuartia yukonensis
Calamagrostis purpurascens	Equisetum pratense	Moehringia lateriflora
Campanula lasiocarpa	Equisetum scirpoides	Montia bostockii
Campanula uniflora	Equisetum variegatum	Myosotis alpestris
Cardamine bellidifolia	Erigeron grandiflorus	Novosieversia glacialis
Cardamine purpurea	Erigeron humilis	Oxyria digyna
Carex aquatilis	Erigeron hyperboreus	Oxytropis borealis
Carex atrofusca	Eriophorum angustifolium	Oxytropis bryophila
Carex bigelowii	Eriophorum callitrix	Oxytropis campestris
Carex capillaris	Eriophorum scheuchzeri	Oxytropis huddelsonii
Carex chordorrhiza	Eriophorum vaginatum	Oxytropis maydelliana
Carex lachenalii	Eritrichium aretioides	Oxytropis mertensiana
Carex marina	Eutrema edwardsii	Oxytropis scammaniana
Carex membranacea	Festuca altaica	Papaver macounii
Carex microchaeta	Festuca brachyphylla	Parnassia kotzebuei
Carex misandra	Festuca rubra	Parrya nudicaulis
Carex petricosa	Gastrolychnis affinis	Pedicularis albolabiata

Pedicularis capitata
Pedicularis interior
Pedicularis labradorica
Pedicularis lanata
Pedicularis langsдорffii
Pedicularis oederi
Pentaphylloides floribunda
Petasites frigidus
Petasites nivalis
Phlox hoodii
Pinguicula villosa
Poa arctica
Poa glauca
Poa paucispicula
Poa porsildii
Podistera macounii
Polemonium acutiflorum
Polemonium pulcherrimum
Polygonum alaskanum
Potentilla biflora
Potentilla elegans
Potentilla hookeriana
Potentilla cf. nivea
Potentilla pensylvanica
Potentilla uniflora
Primula eximia
Pyrola grandiflora
Pyrola minor
Ranunculus eschscholtzii
Ranunculus nivalis
Ranunculus pedatifidus ssp. affinis
Ranunculus pygmaeus
Rhodiola integrifolia
Rhododendron lapponicum
Rosa acicularis
Rubus chamaemorus
Rumex arcticus
Salix alaxensis
Salix arbusculoides
Salix arctica
Salix chamissonis
Salix glauca
Salix lanata ssp. richardsonii
Salix phlebophylla

Salix planifolia ssp. pulchra
Salix polaris
Salix reticulata
Salix rotundifolia
Saussurea angustifolia
Saxifraga bronchialis
Saxifraga calycina
Saxifraga cernua
Saxifraga flagellaris
Saxifraga hieracifolia
Saxifraga hirculus
Saxifraga nelsoniana
Saxifraga oppositifolia
Saxifraga reflexa
Saxifraga tricuspidata
Selaginella sibirica
Senecio atropurpureus
Senecio kjellmanii
Senecio lugens
Senecio ogotorukensis
Senecio resedifolius
Senecio tundricola
Senecio yukonensis
Shepherdia canadensis
Sibbaldia procumbens
Silene acaulis
Silene repens
Silene williamsii
Solidago multiradiata
Spiraea stevenii
Stellaria edwardsii
Stellaria longipes
Synthyris borealis
Taraxacum alaskanum
Taraxacum ceratophorum
Thalictrum alpinum
Tofieldia coccinea
Tofieldia pusilla
Torularia humilis
Trisetum spicatum
Vaccinium uliginosum
Vaccinium vitis-idaea
Valeriana capitata
Viola biflora

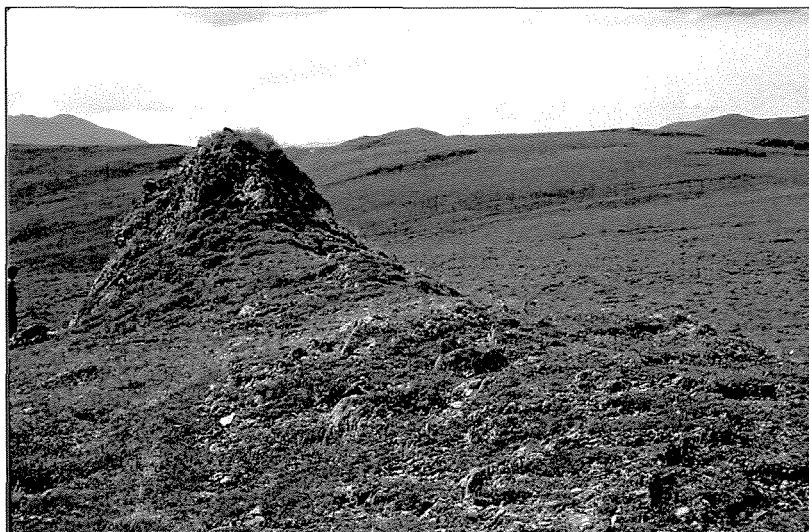


FIGURE A-14. Ridge above headwaters of the Yukon Fork South Fork Birch Creek. The primary vegetation is dryas-sedge dwarf shrub tundra. The dry area immediately around and on marble outcrop in foreground is dryas-dwarf shrub and alpine herbs. *Photo by Alan Batten.*



FIGURE A-15. Puzzle Gulch site within the South Fork Birch Creek study area. *Photo by Carolyn Parker.*

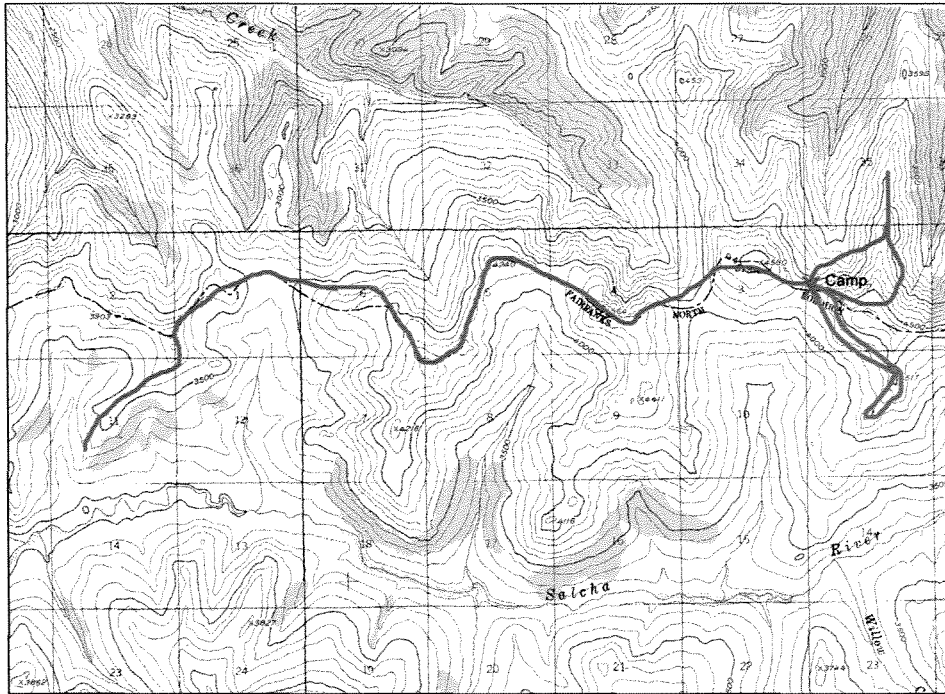


FIGURE A-16. Survey routes and base camp at the headwaters of Caribou Creek, a tributary of South Fork Birch Creek. USGS Circle (A-1). The east-west trending ridge system is the divide between Salcha River to the south and Birch Creek.

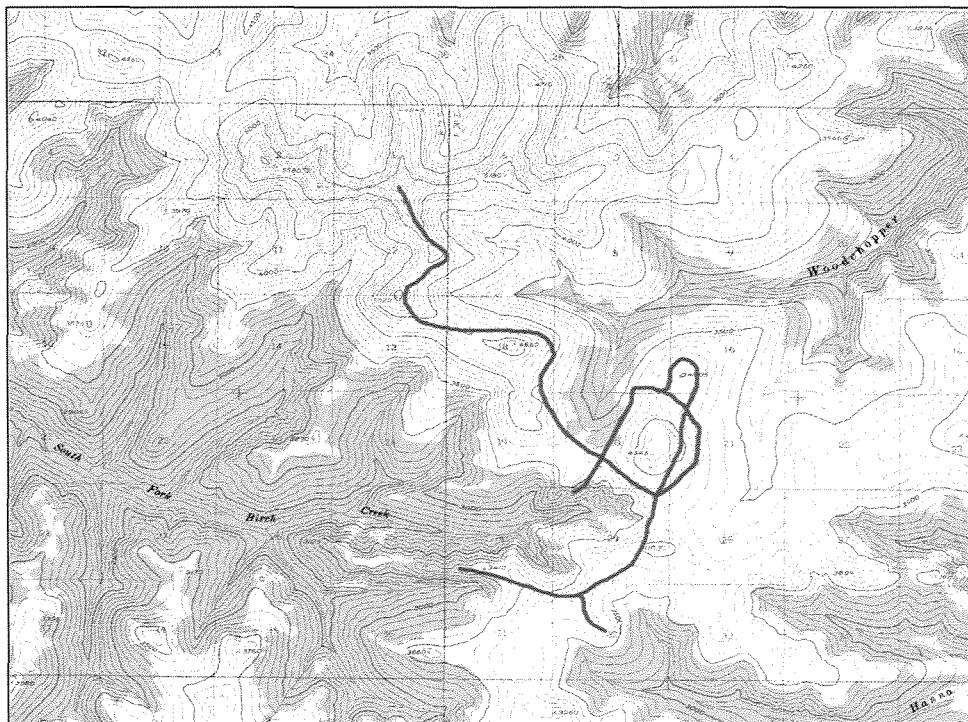


FIGURE A-17. Survey routes at the headwaters of Yukon Fork South Fork Birch Creek. USGS Charley River (A-6) Quadrangle. Woodchopper Creek headwaters are at upper right.

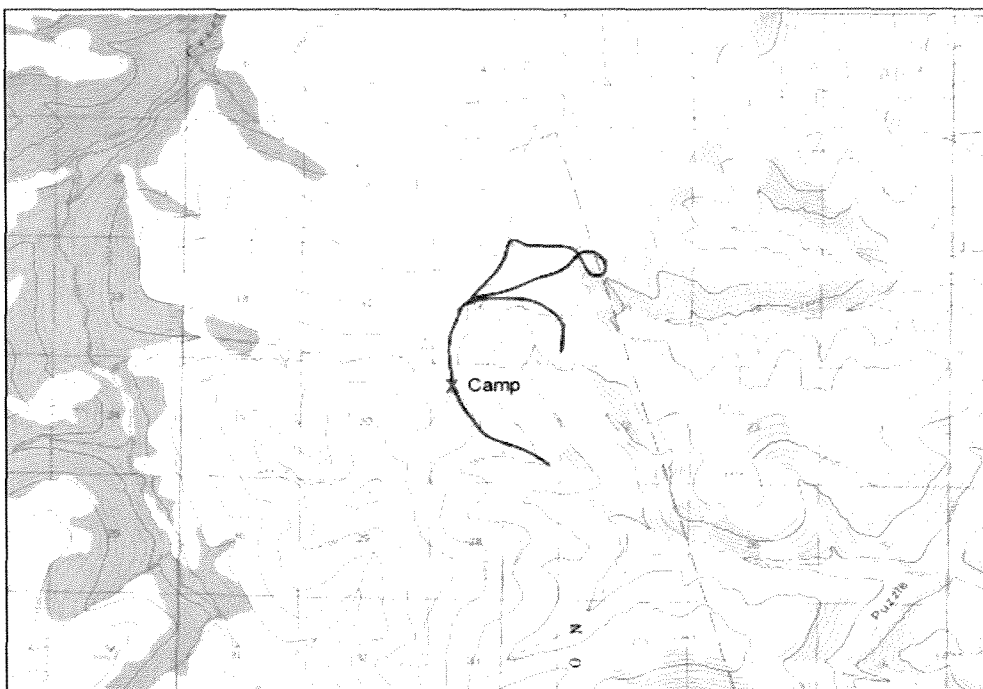


FIGURE A-18. Survey routes in the Puzzle Gulch area. USGS Circle (A-1 and A-2) Quadrangle. The main stem of Big Windy Creek is in the upper left with Puzzle Gulch in the lower right. Base camp is 5.5. km south of Big Windy Hot Springs.

Big Windy Hot Springs Research Natural Area

Participants:

- Jim Herriges, BLM, Northern Field Office, Fairbanks
- Carolyn Parker, University of Alaska Museum Herbarium, Fairbanks
- Glenn P. Juday, Forest Sciences, University of Alaska, Fairbanks
- Susan Willsrud, Natural Resource Management, University of Alaska, Fairbanks

Dates: 12-14 July 1996

Location: Big Windy Hot Springs (USGS Circle Quadrangle (A-1 and A-2): 65°13.653'N, 144°30.14'W) is located on Big Windy Creek, a tributary of South Fork Birch Creek 29 km south of Circle Hot Springs (Figure A-20). The springs are within Big Windy Hot Springs Research Natural Area (RNA), a 160-acre reserve established in 1986, and within the Steese National Conservation Area (SNCA). This survey focused on the area immediately adjacent to the springs, which are potentially affected by the year-round flow of ground and surface water.

Geology and Hydrology: Waters of Big Windy Hot Springs flow along both banks of a small stream cutting through the steep-walled valley of Big Windy Creek (Figure A-19). The hot springs originates at the northwest margin of a Tertiary-aged granitic pluton that intrudes into the pelitic schist and quartzite country rock (Foster *et al.* 1983). Low levels of diffuse flow of both hot and cold water emerge from the granitic headwalls and among the boulders lining the creek, as well as from the base of the granite headwall on the north bank. Small travertine deposits are found on many rock surfaces and on the more level portions of the northwest bank of the creek. The occurrence of mineral deposits on rock and ground surfaces not currently washed by water, and the observations of one participant who had visited this site previously, suggest flow has been reduced significantly since 1982 (Juday, pers. comm.).

Previous collections: Glenn Juday made collections during reconnaissance visits in 1982 and 1987 (Juday 1985, 1998). His collections are included in the species list below and are held at ALA.

Vegetation: The local vegetation was closed white spruce-paper birch forest. On the north bank in the vicinity of the springs, the vegetation graded from open mixed white spruce-paper birch with a shrub understory

dominated by *Swida stolonifera*, *Rosa acicularis* and *Alnus viridis* ssp. *crispa* to an open meadow dominated by *Phalaris arundinacea*, *Equisetum arvense*, *Eleocharis palustris* and other herbs. Flowing and ponded water (both cool ground water and hot springs) and travertine deposits were found scattered throughout the meadow and forest margin. The granite headwall above the springs supported small patches of *Populus tremuloides* and *P. balsamifera* along with some floristic elements of dry graminoid vegetation. The few seeps on the south bank of the creek lay mostly within the lush understory of a closed white spruce-paper birch forest. One small pond and a sparsely vegetated seepage slope on the south bank of Big Windy Creek formed a forest gap that was highly disturbed by concentrated moose and Dall sheep activity.

Floristics: Although only one sensitive taxa was found, the small area adjacent to the hot springs supported several floristic anomalies. *Phalaris arundinacea*, Reed Canary grass, ranked S3 by the AKNHP, dominated the meadow and is ca. 800 km disjunct from its temperate-southern boreal contiguous range of distribution. It has also been found at Kanuti Hot Springs (66°21'N, 150°51'W; ALA collections) and has been observed at Tolovana Hot Springs (65°16'N, 148°52'W; C. Parker, pers. obser.), two similarly disjunct hot springs sites in interior Alaska. Other taxa found here and common to moist, herbaceous sites that have widely fragmented distributions in interior Alaska include *Ranunculus cymbalaria*, *Puccinellia borealis*, and *Circaea alpina*. The very limited area at the top edge of the granite headwall supported several steppe vegetation elements including *Poa glauca*, *Calamagrostis purpurascens*, *Artemisia alaskana*, *Arabis divaricarpa*, *Potentilla pensylvanica* and *Halimolobos mollis*. This headwall area showed evidence of frequent use by Dall sheep as a bedding site. The patches of *Thelypteris phegopteris*, the northern beech fern, and the scattered occurrence of *Viola renifolia* in the moist, shady forest understory on the south bank of the creek represent moderate northward range extensions of ca. 200 km for both taxa. A previous record for the occurrence of *Athyrium filix-femina* (Juday 1985) was not confirmed.

Conclusions: Within a very small area of approximately one hectare (2 acres), Big Windy Hot Springs supports several vascular plant taxa that display widely fragmented distributions, are widely disjunct from their contiguous range, or represent steppe and meadow vegetation types. Evidence for frequent use as a mineral lick by Dall sheep and moose includes trails, hair, fresh tracks and bedding sites. A group of 17 ewes and lambs descended from the alpine ridge to the southeast, but retreated when they detected our presence at the springs. Small mammal

trapping in the meadow and forest margin yielded eight specimens of the water shrew (*Sorex palustris*), representing a northern record for this species (Cook *et al.* 1997).

Although the immediate area of the hot springs is small, it is currently a focal point for wildlife activity in the region. Big Windy Hot Springs offers an impressive testimony to the potential dispersal and establishment

ability of plants and small mammals, and possibly to their persistence as relict elements of an earlier time. Future management decisions need to consider the enriched species diversity and concentrated animal activity level at this highly restricted site, which would be quickly and adversely impacted by any increase in disturbance above the current level of very rare visitation.



FIGURE A-19. Big Windy Hot Springs. View looking southwest up Big Windy Creek. *Phalaris arundinacea* meadow and granitic boulders are in foreground. Photo by Carolyn Parker.

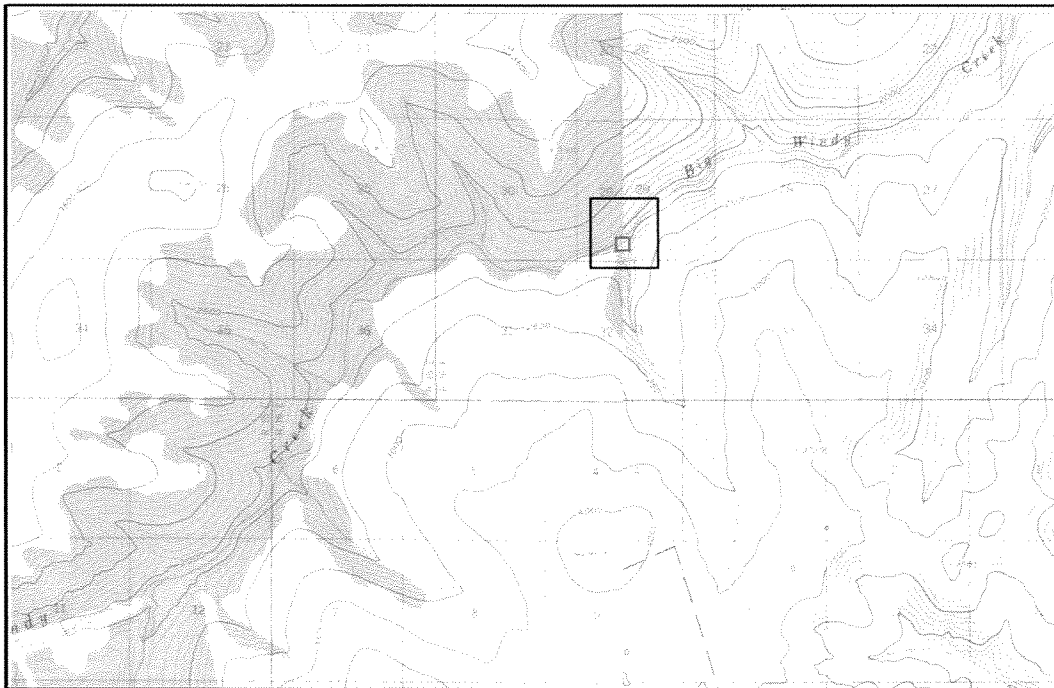


FIGURE A-20. Boundary of Big Windy Hot Springs Research Natural Area and the smaller survey area within it. USGS Circle (A-1 & A-2) Quadrangle. Circle Hot Springs is 29 km northward. The springs are adjacent to both banks of Big Windy Creek immediately downstream from the small, unnamed northwest-flowing tributary. Survey was restricted to the area immediately adjacent to the springs.

Species Collected or Observed in Alpine and Subalpine Habitats in Vicinity of Big Windy Hot Springs

Achillea sibirica	Huperzia selago
Aconitum delphinifolium	Juncus bufonius
Actaea rubra	Juncus castaneus
Adoxa moschatellina	Juniperus communis
Agrostis mertensii	Lycopodium annotinum
Agrostis scabra	Mertensia paniculata
Alnus viridis ssp. crispa	Minuartia rubella
Arabis divaricarpa	Moehringia lateriflora
Arabis hirsuta	Parnassia kotzebuei
Artemisia alaskana	Parnassia palustris
Artemisia tilesii	Phalaris arundinacea
Aster sibiricus	Poa alpigena
Betula papyrifera	Poa glauca
Bistorta vivipara	Poa pratensis
Bromopsis pumpelliana ssp. arctica	Polygonum alaskanum
Calamagrostis canadensis	Populus balsamifera
Calamagrostis lapponica	Populus tremuloides
Calamagrostis purpurascens	Potentilla pensylvanica
Carex capillaris	Puccinellia borealis
Carex media	Puccinellia interior
Chenopodium album	Pyrola asarifolia
Chrysosplenium tetrandrum	Ranunculus cymbalaria
Circaea alpina	Ranunculus hyperboreus
Cornus canadensis	Rhodiola integrifolia
Cystopteris fragilis	Ribes lacustre
Delphinium glaucum	Ribes triste
Dryopteris expansa	Rosa acicularis
Dryopteris fragrans	Rubus idaeus
Eleocharis palustris	Salix alaxensis
Elymus macrourus	Salix bebbiana
Elymus trachycaulus	Saxifraga nelsoniana
Elymus trachycaulus ssp. major	Saxifraga tricuspidata
Elymus trachycaulus ssp. novae-angliae	Senecio pauciflorus
Elymus trachycaulus ssp. violaceus	Shepherdia canadensis
Epilobium ciliatum ssp. adenocaulon	Solidago multiradiata
Epilobium angustifolium	Stellaria calycantha
Epilobium ciliatum ssp. glandulosum	Swida stolonifera
Epilobium hornemannii	Taraxacum ceratophorum
Equisetum arvense	Thelypteris phegopteris
Erigeron acris	Trientalis europaea
Erysimum cheiranthoides	Trisetum spicatum
Galium boreale	Vaccinium uliginosum
Gentianella propinqua	Viburnum edule
Gymnocarpium dryopteris	Viola biflora
Halimolobus mollis	Viola renifolia
Hedysarum alpinum	Wilhelmsia physodes
Hierochloa odorata	

Mount Prindle vicinity

Participants:

- Jim Herriges, BLM Northern Field Office, Fairbanks
- Alan Batten, University of Alaska Museum Herbarium, Fairbanks
- Vicki DeGuenther, BLM Northern Field Office, Fairbanks

Dates: 12-14 July 1994

Location: Mount Prindle is one of the highest peaks in the Yukon-Tanana Uplands at 1611 m (5286 ft) elevation. It is 25 km southeast of Lime Peak and connected to it by a high ridge (Figure A-22). Access to the area is via a gravel road into Nome Creek from the Steese Highway and from there, on foot. The Mount Prindle summit area (USGS Circle (B-5) Quadrangle 65°27'N, 146°28'W) and the headwaters of Champion Creek (USGS Circle (B-6) Quadrangle 65°26'50"N, 146°31'W) were visited on 13 July. The headwaters area of Nome Creek (Circle (B-6) 65°25'N, 146°33'20"W) downstream to the tailings and the BLM reclamation (Circle (B-6) 65°22'N, 146°35'30"W) were traversed on 14 July.

Geology: Bedrock geology is similar to that of the Lime Peak area, consisting mostly of quartzite and quartzitic schists surrounding intrusive igneous rocks. The granite intrusives are very resistant to erosion and form many of the high peaks and ridges (Foster *et al.* 1983). Mount Prindle is the only area surveyed that experienced well-developed alpine glaciation during the Quaternary (Figure A-21). This glaciation was locally confined to a few cirques and the valleys flanking the summit. The Nome and Champion creek valleys were essentially unglaciated below 900 m (2950 ft) (Pewe *et al.* 1967).

Previous Collections: David Murray collected in the vicinity of the summit of Mt. Prindle in 1982 while on a BLM-sponsored trip (Juday 1988). Additional small collections from Champion, Sourdough, Nome, and Hope

creeks have been made over the years by G. Halliday, V. Johnson, D. F. Murray, G. Smith, J. N. Trent, and R. W. Weeden and are held at ALA .

Vegetation: The vegetation was similar to that described for Lime Peak in this report. Primary vegetation types included alpine herb-heath tundra, *Salix planifolia*-*Betula glandulosa* shrub thickets, wet sedge meadows, and sparsely vegetated screes.

Floristics: *Draba densifolia* , listed S1, (Figure 2) was collected on windswept screes of decomposed granite. This species is locally abundant in the western Y-T Uplands on barren windswept ridges having a substrates of sandy, decomposed granite, but it was less common on Mount Prindle than on Lime Peak, the other documented locality in this survey.

Mimuartia biflora, listed S2, was found at the base of a large tor on a south-facing slope. The only additional collections for the Y-T Uplands are just south of Mt. Prindle in the headwaters of Sourdough Creek (Halliday, ALA) and South Fork Birch Creek (this report). *Ranunculus glacialis* var. *camissonis*, listed S2, (Figure 5) was collected in a wet basin surrounded by *Carex bigelowii* mounds in the upper Champion Creek drainage. This Beringian endemic is fairly common on parts of the Seward Peninsula, but otherwise is absent from North America except for outliers in the western Brooks Range and Y-T uplands. Additional specimens held at ALA are also from the Champion Creek-Little Champion Creek area and from near Lime Peak (this report).

Conclusions: The area surrounding Mount Prindle has been visited by botanists more frequently than any other site investigated during this survey. However, a systematic collection from the area still remains to be made. The uniformly acidic rock may detract from the diversity of the flora. However, the presence of *Ranunculus glacialis* var. *camissonis* in alpine wetlands is remarkable.

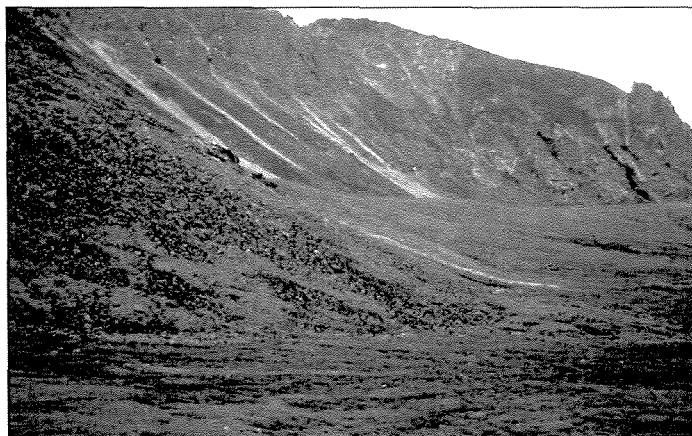


FIGURE A-21. Headwaters of Champion Creek near the summit of Mt. Prindle. Active taluses are characteristic of this locally glaciated landscape. *Ranunculus glacialis* var. *chamissonis* was found growing in a wet sedge meadow similar to that shown in the foreground. Photo by Alan Batten.

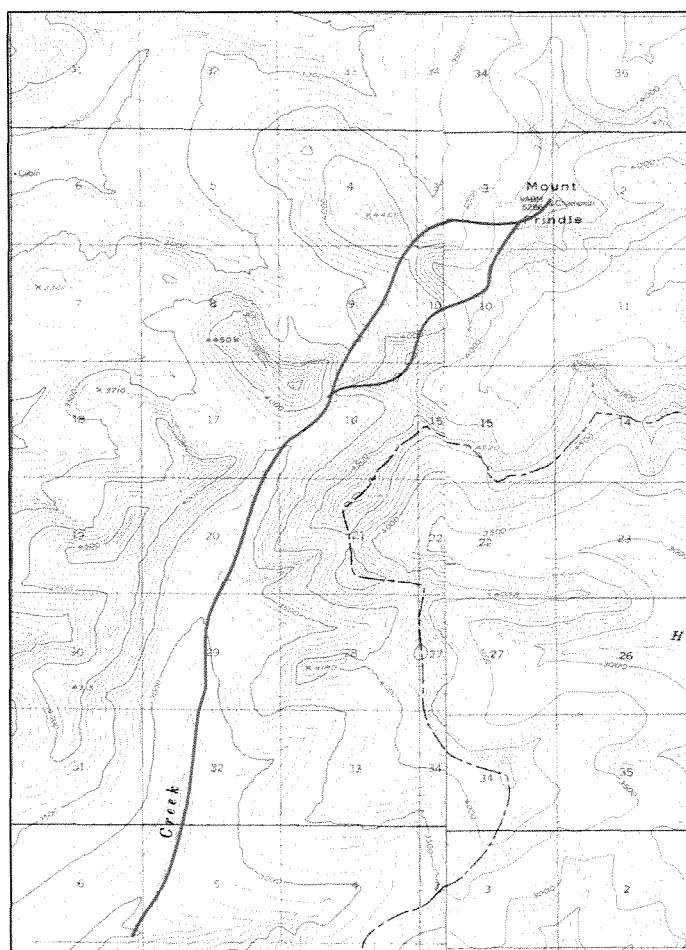


FIGURE A-22. Mount Prindle and vicinity. USGS Circle (B-5 & B-6) Quadrangle. Indicated by solid line, the areas surveyed included ridges northwest of the summit, and headwaters of Nome and Champion Creeks.

Species Collected or Observed in Alpine and Subalpine Habitats in the Vicinity of Mt. Prindle

Aconitum delphinifolium	Lycopodium alpinum
Alnus viridis ssp. crispa	Lycopodium clavatum
Andromeda polifolia	Mertensia paniculata
Anemone narcissiflora	Minuartia arctica
Anemone richardsonii	Minuartia biflora
Angelica cf. lucida	Minuartia macrocarpa
Antennaria friesiana	Oxytropis nigrescens
Arctous alpina	Oxytropis scammaniana
Arnica griscomii ssp. frigida	Parrya nudicaulis
Arnica lessingii	Pedicularis albolabiata
Artemisia arctica	Pedicularis capitata
Betula glandulosa	Pedicularis labradorica
Bistorta plumosa	Pedicularis lanata
Bistorta vivipara	Pedicularis oederi
Calamagrostis lapponica	Pedicularis verticillata
Campanula lasiocarpa	Petasites frigidus
Cardamine bellidifolia	Picea mariana
Cardamine pratensis	Poa arctica
ssp. angustifolia	Podistera macounii
Carex aquatilis	Polemonium acutiflorum
Carex bigelowii	Polygonum alaskanum
Carex eleusinoides	Potentilla elegans
Carex lachenalii	Pentaphylloides floribunda
Carex membranacea	Pyrola grandiflora
Carex microchaeta	Pyrola minor
Carex podocarpa	Ranunculus glacialis
Carex rotundata	var. camissonis
Cassiope tetragona	Rhodiola integrifolia
Castilleja hyperborea	Rubus arcticus
Claytonia sarmentosa	Rubus chamaemorus
Cornus canadensis	Salix rotundifolia
Diapensia lapponica	Salix chamissonis
Dodecatheon frigidum	Salix planifolia ssp. pulchra
Draba densifolia	Salix reticulata
Dryas alaskensis	Saxifraga hieracifolia
Dryas octopetala	Saxifraga nelsoniana
Empetrum nigrum	Senecio lugens
Epilobium angustifolium	Senecio kjellmanii
Equisetum arvense	Senecio yukonensis
Equisetum silvaticum	Sibbaldia procumbens
Eriophorum angustifolium	Solidago multiradiata
Eriophorum vaginatum	Spiraea stevenii
Festuca altaica	Stellaria spp.
Gentiana algida	Synthyris borealis
Gentiana glauca	Tofieldia pusilla
Hierochloa alpina	Vaccinium uliginosum
Huperzia selago	Vaccinium vitis-idaea
Lagotis glauca	Valeriana capitata
Ledum palustre ssp. decumbens	Veronica wormskjoldii
Loiseleuria procumbens	Viola epipsila
Luzula confusa	
Luzula parviflora	

APPENDIX B:

CROSS-REFERENCED LIST OF PLANT SPECIES NAMES

The following is an alphabetical list of the scientific names of vascular plants found during this survey for which ALA Nomenclature (this report) differs from that found in Hultén (1968).

NAME USED IN THIS REPORT	SYNONYM USED IN HULTÉN	FAMILY NAME
<i>Acomastylis rossii</i>	<i>Geum rossii</i>	Rosaceae (Rose Family)
<i>Alnus viridis</i> ssp. <i>crispa</i>	<i>Alnus crispa</i>	Betulaceae (Birch Family)
<i>Arctous alpina</i>	<i>Arctostaphylos alpina</i>	Ericaceae (Heath Family)
<i>Arctous rubra</i>	<i>Arctostaphylos rubra</i>	Ericaceae (Heath Family)
<i>Arnica griseomii</i> ssp. <i>frigida</i>	<i>Arnica frigida</i>	Asteraceae (Sunflower Family)
<i>Bistorta vivipara</i>	<i>Polygonum vivipara</i>	Polygonaceae (Buckwheat Family)
<i>Bistorta plumosa</i>	<i>Polygonum bistorta</i>	Polygonaceae (Buckwheat Family)
<i>Bromopsis pumpelliana</i> ssp. <i>arctica</i>	<i>Bromus pumpellianus</i> var. <i>arcticus</i>	Poaceae (Grass Family)
<i>Carex marina</i>	<i>Carex amblyorhyncha</i>	Cyperaceae (Sedge Family)
<i>Carex petricosa</i>	<i>Carex franklinii</i>	Cyperaceae (Sedge Family)
<i>Draba cana</i>	<i>Draba lanceolata</i>	Brassicaceae (Mustard Family)
<i>Draba glabella</i>	<i>Draba hirta</i>	Brassicaceae (Mustard Family)
<i>Draba longipes</i>	<i>Draba juvenilis</i>	Brassicaceae (Mustard Family)
<i>Draba palanderiana</i>	<i>Draba caesia</i>	Brassicaceae (Mustard Family)
<i>Draba ruaxes</i>	<i>Draba exalata</i> var. <i>ruaxes</i>	Brassicaceae (Mustard Family)
<i>Dryas alaskensis</i>	<i>Dryas octopetala</i> ssp. <i>alaskensis</i>	Rosaceae (Rose Family)
<i>Dryas sylvatica</i>	<i>Dryas integrifolia</i> ssp. <i>sylvatica</i>	Rosaceae (Rose Family)
<i>Dryopteris expansa</i>	<i>Dryopteris dilatata</i>	Aspleniaceae (Shield Fern Family)
<i>Elymus alaskanus</i>	<i>Agropyron boreale</i>	Poaceae (Grass Family)
<i>Elymus alaskanus</i> ssp. <i>hyperarcticus</i>	<i>Agropyron boreale</i> ssp. <i>hyperarcticum</i>	Poaceae (Grass Family)
<i>Elymus macrourus</i>	<i>Agropyron macrourum</i>	Poaceae (Grass Family)
<i>Elymus trachycaulus</i>	<i>Agropyron violaceum</i>	Poaceae (Grass Family)
<i>Elymus trachycaulus</i> ssp. <i>major</i>	<i>Agropyron pauciflorum</i> ssp. <i>major</i>	Poaceae (Grass Family)
<i>Elymus trachycaulus</i> ssp. <i>novae-angliae</i>	<i>Agropyron pauciflorum</i> ssp. <i>novae-angliae</i>	Poaceae (Grass Family)
<i>Elymus trachycaulus</i> ssp. <i>violaceum</i>	<i>Agropyron violaceum</i> ssp. <i>violaceum</i>	Poaceae (Grass Family)
<i>Elytrigia spicata</i>	<i>Agropyron spicatum</i>	Poaceae (Grass Family)
<i>Empetrum hermaphroditum</i>	<i>Empetrum nigrum</i> ssp. <i>hermaphroditum</i>	Empetraceae (Crowberry Family)
<i>Epilobium ciliatum</i> ssp. <i>adenocaulon</i>	<i>Epilobium adenocaulon</i>	Onagraceae (Evening Primrose Family)
<i>Epilobium ciliatum</i> ssp. <i>glandulosum</i>	<i>Epilobium glandulosum</i>	Onagraceae (Evening Primrose Family)
<i>Festuca lenensis</i>	<i>F. ovina</i> ssp. <i>alaskana</i> (in part)	Poaceae (Grass Family)
<i>Gastrolychnis affinis</i>	<i>Melandrium affine</i>	Caryophyllaceae (Pink Family)
<i>Gastrolychnis apetal</i>	<i>Melandrium apetalum</i>	Caryophyllaceae (Pink Family)

NAME USED IN THIS REPORT	SYNONYM USED IN HULTÉN	FAMILY NAME
<i>Gastrolychnis ostenfeldii</i>	<i>Melandrium taimyrense</i>	Caryophyllaceae (Pink Family)
<i>Gentianella propinqua</i>	<i>Gentiana propinqua</i>	Gentianaceae (Gentian Family)
<i>Huperzia selago</i>	<i>Lycopodium selago</i>	Lycopodiaceae (Clubmoss Family)
<i>Ledum groenlandicum</i>	<i>Ledum palustre</i> ssp. <i>groenlandicum</i>	Ericaceae (Heath Family)
<i>Luzula kjellmaniana</i>	<i>Luzula tundricola</i>	Juncaceae (Rush Family)
<i>Montia bostockii</i>	<i>Claytonia bostockii</i>	Portulacaceae (Purslane Family)
<i>Novosieversia glacialis</i>	<i>Geum glaciale</i>	Rosaceae (Rose Family)
<i>Orthilia secunda</i> ssp. <i>obtusata</i>	<i>Pyrola secunda</i>	Pyrolaceae (Wintergreen Family)
<i>Oxytropis bryophila</i>	<i>Oxytropis nigrescens</i>	Fabaceae (Pea Family)
<i>Pedicularis albolabiata</i>	<i>Pedicularis sudetica</i> . ssp. <i>albolabiata</i>	Scrophulariaceae (Figwort Family)
<i>Pedicularis interior</i>	<i>Pedicularis sudetica</i> . ssp. <i>interior</i> , <i>P. sudetica</i> ssp. <i>interioides</i>	Scrophulariaceae (Figwort Family)
<i>Pedicularis lanata</i>	<i>Pedicularis kanei</i>	Scrophulariaceae (Figwort Family)
<i>Pentaphylloides floribunda</i>	<i>Potentilla fruticosa</i> .	Rosaceae (Rose Family)
<i>Petasites nivalis</i>	<i>Petasites hyperboreus</i> .	Asteraceae (Sunflower Family)
<i>Phlox alaskensis</i>	<i>Phlox sibirica</i> ssp. <i>sibirica</i>	Poaceae (Grass Family)
<i>Poa porsildii</i>	<i>Poa vaseyochloa</i>	Poaceae (Grass Family)
<i>Podistera macounii</i>	<i>Ligusticum mutellinoides</i>	Apiaceae (Parsley Family)
<i>Primula eximia</i>	<i>Primula tschuktschorum</i> var. <i>arctica</i>	Primulaceae (Primrose Family)
<i>Rhodiola integrifolia</i>	<i>Sedum rosea</i>	Crassulaceae (Stonecrop Family)
<i>Salix planifolia</i> ssp. <i>pulchra</i>	<i>Salix pulchra</i>	Salicaceae (Willow Family)
<i>Salix pseudomonticola</i>	<i>Salix padophylla</i>	Salicaceae (Willow Family)
<i>Saxifraga calycina</i>	<i>Saxifraga davurica</i> ssp. <i>grandipetala</i>	Saxifragaceae (Saxifrage Family)
<i>Saxifraga nelsoniana</i>	<i>Saxifraga punctata</i> ssp. <i>nelsoniana</i>	Saxifragaceae (Saxifrage Family)
<i>Senecio kjellmanii</i>	<i>Senecio atropurpureus</i> ssp. <i>tomentosus</i>	Asteraceae (Sunflower Family)
<i>Senecio ogotorukensis</i>	<i>Senecio conterminus</i> (in part)	Asteraceae (Sunflower Family)
<i>Senecio tundricola</i>	<i>Senecio fuscatus</i>	Asteraceae (Sunflower Family)
<i>Silene williamsii</i>	<i>Silene menziesii</i> ssp. <i>williamsii</i>	Caryophyllaceae (Pink Family)
<i>Spiraea stevenii</i>	<i>Spiraea beauverdiana</i>	Rosaceae (Rose Family)
<i>Swida stolonifera</i>	<i>Cornus stolonifera</i>	Cornaceae (Dogwood Family)
<i>Torularia humilis</i> ssp. <i>richardsonii</i>	<i>Braya humilis</i> ssp. <i>richardsonii</i>	Brassicaceae (Mustard Family)

APPENDIX C:

VASCULAR PLANT SPECIES LIST

Listed are taxa collected during an inventory of twelve localities in the Yukon-Tanana Uplands sponsored by the Bureau of Land Management, Northern Field Office, Fairbanks with assistance from the University of Alaska Fairbanks Museum Herbarium (ALA). Nomenclature follows that is used at ALA. Synonyms are offered where this nomenclature differs from that used in Eric Hultén's *Flora of Alaska and Neighboring Territories* (1968). Specimens are curated at ALA. Collection numbers are those of C.L. Parker et al. (4000-6000's), A.R. Batten et al. (preceded by 94- or 95-), Glen Juday (s.n.), or D.F. Murray (12000's). Site observations (plant was noted in the field, but not collected) are indicated where a locality is listed, but an associated collection number is lacking for a species.

Adoxaceae (Moschatel Family)

ADOXA MOSCHATELLINA L

Moschatel

- Mt. Schwatka, limestone ridge, herbaceous entrance to cave, rare, 5000.
- South Fork Birch Creek.
- Big Windy Hot Springs, moist fern understory, scattered, 6632.

Apiaceae (Parsley Family)

ANGELICA LUCIDA L.

Wild Celery

Northeastern edge of range for this predominantly coastal species.

- Lime Peak, understory of willow thicket along stream, rare, 4861.
- Mount Prindle vicinity, in thickets in lower valley, rare.

BUPLEURUM TRIRADIATUM J. Adam

Thoroughwax

- Mt. Schwatka, limestone rock outcrops and scree, scattered, 4883, 4948, 5057.
- Serpentine Slide, barren knoll, 12073
- White Mountains, VABM Fossil, dry tundra.
- Victoria Mountain ridge, dryas fellfield.
- East Crazy Mountains, rocky soil, scree, outcrops, common.
- West Crazy Mountains, dry tundra and scree, common, 5723, 95-237.
- South Fork Birch Creek, rock outcrops, rare, 6509.

CNIDIUM CNIDIIFOLIUM (Turz.) Schischkin

Hemlock Parsley

Beringian endemic.

- Mt. Schwatka, limestone scree, uncommon, 4965.

PODISTERA MACOUNII (J. Coulter & Rose) Mathias & Constance

= *Ligusticum mutellinoides* (Crantz) Willa

- Lime Peak, mesic herbaceous patches at base of tors, frequent, 4721.
- Mt. Prindle vicinity, alpine tundra.
- White Mountains, VABM Fossil, moist fines, 5637.
- South Fork Birch Creek, herbaceous heath, 6418.

Aspleniaceae (Shield Fern Family)

CYSTOPTERIS FRAGILIS (L.) Bernh.

Fragile Fern

- Lime Peak, granite outcrops, scattered, 4776, 5492.
- Mt. Schwatka, limestone crevices, rare, 4911.
- White Mountains, VABM Fossil, limestone scree.
- Victoria Mountain ridge, outcrops, 5699.
- East Crazy Mountains, limestone crevices and rocky slopes.
- West Crazy Mountains, outcrop crevices, 95-231.
- South Fork Birch Creek, moist rock outcrops, rare to scattered, 6404, 6435, 6556.
- Big Windy Hot Springs, wet seepage area on granite, rare, 6637.

CYSTOPTERIS MONTANA (Lam.) Bernh.

Northern circumpolar. Ranked S3 by ANHP.

- White Mountains, VABM Fossil, moist, mossy creek bank, rare, 5693.
- South Fork Birch Creek, moist front of gelifluction lobe, rare, 6515.

DRYOPTERIS EXPANSA (C. Presl) Fraser-Jenkins & Jermy

Shield Fern

= *D. dilatata* (Hoffm.) A. Gray

- Big Windy Hot Springs, forest understory, local patches, Juday s.n.

DRYOPTERIS FRAGRANS (L.) Schott

Fragrant Fern

- Lime Peak, granitic tors, scattered, 4775, 4845.
- Mt. Schwatka, volcanic rock depression in moist tundra, 5013.
- Victoria Mountain ridge, volcanic outcrop, 12051.
- East Crazy Mountains, among acidic boulders.
- West Crazy Mountains, blocky talus and outcrop crevices, 95-269A.
- South Fork Birch Creek, outcrops, 6442
- Big Windy Hot Springs, Juday s.n.

GYMNOCARPIUM DRYOPTERIS (L.) Newman

Oak Fern

- Lime Peak, shrub heath at base of tors, rare, 4875.
- White Mountains, VABM Fossil.
- Big Windy Hot Springs, shady forest understory, rare, 6628.

WOODSIA GLABELLA R. Br.

Smooth Woodsia

- Mt. Schwatka, limestone and volcanic outcrop crevices, rare, 4913, 5051.
- White Mountains, VABM Fossil, limestone scree.
- Victoria Mountain ridge, limestone outcrops and scree, rare, 5700.

- South Fork Birch Creek, rock outcrops and scree, rare, 6405, 6555.

WOODSIA ILVENSIS (L.) R. Br.

Rusty Woodsia

- Minor northeastward range extension.
- Lime Peak, granitic outcrop crevices, scattered, 4777. South Fork Birch Creek.

Asteraceae (Sunflower Family)

ACHILLEA SIBIRICA Ledeb.

Northern Yarrow

- Big Windy Hot Springs, moist canary grass meadow, scattered, 6612.

ANTENNARIA FRIESIANA (Trautv.) Ekman

Pussy Toes

- Lime Peak, grus fellfield and dryas heath, scattered to frequent, 4726, 4783, 4864.
- Mt. Schwatka, dry rocky barrens and rocky heath, 4993, 5029.
- Serpentine Slide, barren knoll, 12079
- White Mountains, VABM Fossil, rocky limestone heath, scattered, 5670.
- East Crazy Mountains, dry rocky tundra.
- West Crazy Mountains, dry rocky exposed tundra, 95-206.
- South Fork Birch Creek, dry fellfield, scattered, 6398.

ANTENNARIA MONOCEPHALA DC.

- Lime Peak, herbaceous patches at base of granitic tors, scattered, 4842.
- South Fork Birch Creek.

ARNICA GRISCOMII Fern. ssp. FRIGIDA (C. Meyer ex Iljin) S. J. Wolf

Frigid Arnica

= *A. frigida* C. Meyer

Beringian endemic.

- Lime Peak, dry rocky heath, scattered, 4837.
- Mt. Schwatka, herbaceous heath on limestone, scattered, 4970.
- Mt. Prindle vicinity, mesic tundra, 94-113.
- White Mountains, VABM Fossil.
- Victoria Mountain ridge, heath on limestone, 5716.
- East Crazy Mountains, dry to mesic alpine tundra, common.
- West Crazy Mountains, dry tundra and scree, 95-234.
- South Fork Birch Creek, moist heath, 6452.

ARNICA LESSINGII E. Greene

Lessing's Arnica

Beringian endemic.

- Mt. Prindle vicinity, mesic tundra, 94-120.
- South Fork Birch Creek, moist, herbaceous heath, 6453.

ARTEMISIA ALASKANA Rydb

Alaska Wormwood

East Beringian endemic.

- South Fork Birch Creek, cliff ledges and scree, rare, 6566.
- Big Windy Hot Springs, crevices and ledges of granitic rock face, rare, 6599.

ARTEMISIA ARCTICA Less.

Arctic Wormwood

- Lime Peak, gelifluction lobes and shrub heath, common, 4870, 94-151.
- Mt. Schwatka, moist tundra on volcanic slope, frequent, 5019.
- Mt. Prindle vicinity, sheltered meadows and mesic tundra.
- White Mountains, VABM Fossil.
- Victoria Mountain ridge.
- East Crazy Mountains, mesic alpine tundra, common.
- West Crazy Mountains, rocky alpine tundra.
- South Fork Birch Creek.

ARTEMISIA BOREALIS Pallas

Wormwood

- Lime Peak, dry rocky knoll and heath, rare, 4863.
- Mt. Schwatka, limestone heath, scattered, 4929.
- South Fork Birch Creek, rock outcrops, rare, 6495, 6561.

ARTEMISIA FRIGIDA Willd.

- West Crazy Mountains, Preacher Creek, steppe bluff, 95-264.

ARTEMISIA FURCATA M. Bieb.

Beringian endemic.

- Serpentine Slide, barren knoll, 12076
- Mt. Schwatka, limestone scree, rare, 4953.
- White Mountains, VABM Fossil, limestone heath, 5656.
- Victoria Mountain ridge, heath-rock rubble slope.

ARTEMISIA TILESII Ledeb.

Common Wormwood

- Victoria Mountain ridge, herbaceous vegetation near treeline.
- South Fork Birch Creek.
- Big Windy Hot Springs, moist to wet canary grass meadow, scattered, Juday s.n.

ASTER SIBIRICUS L.

Siberian Aster

- Big Windy Hot Springs, moist meadow, scattered.

CHRYSANTHEMUM INTEGRIFOLIUM Richardson

Southern edge of arctic North American range, rare in interior Alaska.

- White Mountains, VABM Fossil, limestone rubble, rare, 5689A.

CREPIS NANA Richardson

Alpine Hawk's Beard

- South Fork Birch Creek.

ERIGERON ACRIS L.

- Big Windy Hot Springs, moist to wet canary grass meadow, scattered, 6618.

ERIGERON CAESPITOSUS Nutt.

- West Crazy Mountains, Preacher Creek, steppe bluff, abundant, 94-261.

ERIGERON GRANDIFLORUS Hook.

East Beringian endemic, new to Yukon-Tanana Uplands.

- East Crazy Mountains, crevices of limestone outcrop, 95-287.
- South Fork Birch Creek, dry herbaceous slope, rare, 6537.

ERIGERON HUMILIS Graham

Mountain Fleabane

- White Mountains, VABM Fossil, limestone rubble slope, rare, 5624.
- South Fork Birch Creek, moist herbaceous heath slopes, uncommon, 6426, 6575.

ERIGERON HYPERBOREUS E. Greene

East Beringian endemic.

- Mt. Schwatka, limestone outcrops and scree, rare, 4880.
- White Mountains, VABM Fossil, moist fines on limestone, 5625.
- Victoria Mountain ridge, limestone outcrop, sheep perch, rare, 5706, 12053.
- South Fork Birch Creek, rocky dryas fellfield, rare, 6538.

ERIGERON PURPURATUS E. Greene

East Beringian endemic.

- White Mountains, VABM Fossil, dryas heath, scattered.

HIERACIUM TRISTE Willd.

Hawkweed

Beringian endemic, northward range extension for this predominantly coastal taxon.

- Lime Peak, opening in shrub thicket, 94-163.

PETASITES FRIGIDUS (L.) Franchet

Coltsfoot

- Lime Peak, wet snowmelt meadows, scattered, 4792, 4805.
- Mt. Schwatka, moist shrub herbaceous heath, scattered.
- Mt. Prindle vicinity, thickets, shrub tundra, and wet tundra.
- White Mountains, VABM Fossil, dryas heath on limestone.
- East Crazy Mountains, moist hummocky tundra, openings in alder - shrub birch.
- West Crazy Mountains, moist to wet fens and thickets.
- South Fork Birch Creek, snowmelt meadow, scattered, 6469.

PETASITES NIVALIS E. Greene

= *P. hyperboreus* Rydb.

- South Fork Birch Creek, moist tundra.

SAUSSUREA ANGUSTIFOLIA (Willd.) DC.

Beringian endemic.

- Lime Peak, snowmelt meadow, 94-130.
- Mt. Schwatka, dry, rocky, limestone dryas heath, rare, 5061.
- East Crazy Mountains, moist tundra, thickets, and forest openings.
- West Crazy Mountains, mesic tundra, common.
- South Fork Birch Creek.

SENECIO ATROPURPUREUS (Ledeb.) B. Fedtsch. ssp. FRIGIDUS (Richardson) Hultén

Beringian endemic.

- Lime Peak, snowmelt meadows, scattered to frequent, 4808, 94-132.
- Mt. Schwatka, moist herbaceous moss meadows and dry tundra, scattered, 5006, 5023.
- White Mountains, VABM Fossil, moist heath, 5671.
- East Crazy Mountains, moist tundra and openings in forests and thickets, 95-219.

- West Crazy Mountains, fens, shrub tundra, dry dryas tundra, common.
- South Fork Birch Creek.

SENECIO KJELLMANII A. Pors.

= *S. atropurpureus* (Ledeb.) Fedtsch. ssp. *tomentosus* (Kjellm.) Hultén

Beringian endemic.

- Lime Peak, snowmelt meadows and herbaceous slopes, scattered to frequent, 4730, 4809.
- White Mountains, VABM Fossil, moist, mossy draw, 5677.
- Mt. Prindle vicinity, moist tundra.
- South Fork Birch Creek, wet herbaceous heath slope, 6386.

SENECIO LUGENS Richardson

- Mt. Schwatka, S-facing herbaceous heath slope, scattered, 4984.
- White Mountains, VABM Fossil, moist herbaceous draw.
- Mt. Prindle vicinity, shrub tundra and subalpine meadows, 94-117.
- East Crazy Mountains, mesic alpine slopes and openings in forest and thickets, 95-284, 95-320.
- West Crazy Mountains, warm sites near treeline and openings in thickets, 95-219.
- South Fork Birch Creek, snowmelt meadow, scattered, 6444.

SENECIO OGOTORUKENSIS Packer

= *S. conterminus* Greenm. in part

East Beringian endemic.

- Mt. Schwatka, rocky limestone heath, scattered to rare, 4981, 5058.
- South Fork Birch Creek, dry outcrops and meadows, rare, 6496, 6533.

SENECIO PAUCIFLORUS Pursh

- Big Windy Hot Springs, wet canary grass meadow, rare, 6620.

SENECIO RESEDIFOLIUS Less.

Dwarf Arctic Butterweed

- Mt. Schwatka, low shrub meadow, rare, 5036.
- White Mountains, VABM Fossil, limestone heath, rare, 5658.
- East Crazy Mountains, mesic tundra and outcrop ledges and crevices, 95-288.
- West Crazy Mountains, dry rocky tundra, 95-223, 95-235.
- South Fork Birch Creek, wet to moist herbaceous heath, 6384, 6424.

SENECIO TUNDRICOLA Tolm.

= *S. fuscatus* (Jord. & Fourr.) Hayek

- Lime Peak, herbaceous heath, tussocks, rare, 4749, 4789, 4874.
- Mt. Schwatka, herbaceous heath, rare, 4943, 5011.
- Victoria Mountain ridge, 12055.
- South Fork Birch Creek, mesic herbaceous heath, 6385.

SENECIO YUKONENSIS A. Pors.

East Beringian endemic.

- Mt. Prindle vicinity, mesic to dry tundra, 94-104.
- South Fork Birch Creek, moist hummocky heath tundra, rare, 6367.

SOLIDAGO MULTIRADIATA Aiton

Goldenrod

- Lime Peak, herbaceous slope, scattered, 4827.
- Mt. Schwatka, moist herbaceous heath, scattered, 4972, 5073.
- Mt. Prindle vicinity, shrub tundra, thickets, and subalpine meadows.

- White Mountains, VABM Fossil.
- Victoria Mountain ridge, limestone heath, 5715.
- East Crazy Mountains, steep rocky south slope.
- West Crazy Mountains, Preacher Creek, steppe bluff, 95-258.
- South Fork Birch Creek.
- Big Windy Hot Springs, moist canary grass meadow, scattered, Juday s.n.

TARAXACUM ALASKANUM Rydb.

Alaska Dandelion

Beringian endemic.

- South Fork Birch Creek, moist herbaceous draw, rare, 6577.

TARAXACUM CERATOPHORUM (Ledeb.) DC.

- Lime Peak, herbaceous patches at base of granite tors, scattered, 4780, 4852.
- Mt. Schwatka, limestone outcrops and moist herbaceous heath, rare, 4901, 4930, 5020.
- White Mountains, VABM Fossil, herbaceous sheep perch, rare, 5678.
- Victoria Mountain ridge, limestone scree, 5705.
- East Crazy Mountains, limestone outcrop crevices.
- West Crazy Mountains, limestone outcrops, 95-275.
- South Fork Birch Creek, herbaceous patches on outcrops, scattered, 6554, 6581.

TARAXACUM cf. KAMTSCHATICUM Dahlst.

Beringian endemic.

- Mt. Schwatka, limestone outcrops and scree, rare, 4900.

TARAXACUM PHYMATOCARPUM Vahl

- Mt. Schwatka, moist tundra meadow, rare, 5015.

Betulaceae (Birch Family)

ALNUS VIRIDIS Villar ssp. CRISPA (Aiton) A. Loeve & D. Loeve

Green Alder

= *A. crispa* (Aiton) Pursh

- Lime Peak, shrub thicket, abundant, 4848.
- Mt. Schwatka, moist shrub heath meadow, 5052.
- Mt. Prindle vicinity, along creeks and sheltered sites.
- East Crazy Mountains, mossy hummocky north lower slopes.
- West Crazy Mountains, moist north slopes.
- South Fork Birch Creek, draws, lower slopes near treeline.
- Big Windy Hot Springs, along stream and forest understory.

BETULA GLANDULOSA Michaux

Shrub Birch

- Lime Peak, lower slopes and draws.
- Mt. Schwatka, moist shrub heath meadow, 5053.
- Mt. Prindle vicinity, lower slopes, common.
- White Mountains, VABM Fossil.
- Victoria Mountain ridge, mesic shrub tundra.
- East Crazy Mountains, forest openings and lower alpine slopes.
- West Crazy Mountains, sheltered slopes, forming thickets.
- South Fork Birch Creek, lower slopes.

BETULA hybrids

Probably B. papyrifera X B. glandulosa.

- East Crazy Mountains, lower slopes and at treeline, common.
- South Fork Birch Creek, lower slopes.

BETULA NANA L.

Dwarf Birch

- Lime Peak, rocky herbaceous heath, rare, 4765.
- East Crazy Mountains, boggy and exposed sites.
- West Crazy Mountains, ridge crests, patches of thickets.
- South Fork Birch Creek.

Boraginaceae (Borage Family)

ERITRICHIMUM ARETIOIDES (Cham.) DC.

Dwarf Forget-Me-Not

Beringian endemic.

- White Mountains, VABM Fossil, rocky limestone heath, scattered, 5608.
- Victoria Mountain ridge, limestone scree.
- South Fork Birch Creek, mesic herbaceous heath, 6395.

ERITRICHIMUM SPLENDENS Kearney

Splendid Forget-Me-Not

East Beringian endemic, unusually large-blossomed populations observed.

- Mt. Schwatka, limestone scree and outcrops, scattered, 4907.
- Victoria Mountain ridge, limestone scree, rare, 12067.

MERTENSIA PANICULATA (Aiton) G. Don

Bluebells

- Mt. Schwatka, moist shrub heath herbaceous meadow, 5044.
- Mt. Prindle vicinity, subalpine meadows.
- White Mountains, VABM Fossil, moist herbaceous draw.
- Victoria Mountain ridge.
- West Crazy Mountains, alder and willow thickets.
- South Fork Birch Creek, snowmelt meadows and dry sheep meadows, frequent, 6445, 6534.
- Big Windy Hot Springs, margin of canary grass meadow and forest understory.

MYOSOTIS ALPESTRIS F.W. Schmidt

Forget-Me-Not

- Mt. Schwatka, S-facing limestone herbaceous slope, scattered, 4885, 4986.
- White Mountains, VABM Fossil, limestone heath, 5628.
- Victoria Mountain ridge, 12063.
- South Fork Birch Creek, moist herbaceous heath slope and meadows, scattered, 6481.

Brassicaceae (Mustard Family)

ARABIS DIVARICARPA Nelson

- Big Windy Hot Springs, granitic rock ledges, rare, 6597.

ARABIS HIRSUTA (L.) Scop. ssp. PYCNOCARPA (M. Hopkins) Hultén

New to Yukon-Tanana Uplands.

- West Crazy Mountains, Preacher Creek, steppe bluff, under aspen, 95-263.
- Big Windy Hot Springs, granitic rock ledges, rare, 6616.

BRAYA BARTLETTIANA Jordal

East Beringian endemic, new to Yukon-Tanana Uplands.

- White Mountains, VABM Fossil, limestone rubble slope, 5669.

CARDAMINE BELLIDIFOLIA L.

- Lime Peak, mesic herbaceous patches, scattered, 4746.
- Mt. Prindle vicinity, moist rocky slopes.
- White Mountains, VABM Fossil, moist fines of well-weathered scree, rare, 5636.
- South Fork Birch Creek, moist rock outcrop overhang, rare, 6434.

CARDAMINE PURPUREA Cham. & Schldl.

Purple Bittercress

East Beringian endemic.

- Lime Peak, moist snowmelt meadow, scattered, 4728.
- Mt. Schwatka, herbaceous heath on limestone, scattered, 4957.
- White Mountains, VABM Fossil.
- South Fork Birch Creek.

CARDAMINE PRATENSIS L. ssp. ANGUSTIFOLIA (Hook.) O.E. Schulz

Cuckoo Flower

- Mt. Prindle vicinity, sheltered subalpine meadows, 94-118.

DESCURAINIA SOPHIOIDES (Fischer) O. Schulz

Tansy Mustard

- Mt. Schwatka, mouth of limestone cave, sheep perch, rare, 4968.
- South Fork Birch Creek, lush herbaceous sheep perch, rare, 6547.

DRABA ALPINA L.

- South Fork Birch Creek, wet moss in hummocks and herbaceous heath, rare, 6389, 6475.

DRABA CANA Rydb.

= D. lanceolata Royle

- Mt. Schwatka, limestone scree, herbaceous sheep perch, rare, 4928.
- Victoria Mountain ridge, rare, 12072A.
- East Crazy Mountains, disturbed dry soils, 95-292.
- South Fork Birch Creek, rock outcrops, rare to scattered, 6510, 6541.

DRABA DENSIFOLIA Nutt.

Known from only a few localities in interior Alaska and from the Rocky Mountains, taxonomic relationship with D. paysonii remains unclear. Ranked SI by ANHP.

- Lime Peak, mesic to dry fellfield, scattered to frequent, 4719, 4768, 4858.
- Mt. Prindle vicinity, granitic screes, 94-109.

DRABA FLADNIZENSIS Wulfen

- Lime Peak, heath and herbaceous patches near tors, scattered to rare, 4739, 4847, 4872, 4873.
- Mt. Schwatka, frost boil on rocky summit, rare, 5033
- White Mountains, VABM Fossil, moist fine scree, rare, 5638.
- Victoria Mountain ridge.

- East Crazy Mountains, mossy site on steep rocky slope, 95-281.
- South Fork Birch Creek, herbaceous patch on outcrop, rare, 6413.

DRABA GLABELLA Pursh

= D. hirta L. sensu Hultén

- Lime Peak, herbaceous patch at base of tor and sheep perch, scattered, 4778, 4830.
- White Mountains, VABM Fossil, herbaceous sheep perch, rare, 5685.
- Victoria Mountain ridge, 12070.
- West Crazy Mountains, limestone outcrops, 5722, 95-276.

DRABA LACTEA J. Adams

- Serpentine Slide, barren knoll, 12082.

DRABA LONGIPES Raup

= D. juvenilis Kom.

- White Mountains, VABM Fossil, herbaceous heath, rare to scattered, 5683.
- South Fork Birch Creek, moist to wet herbaceous heath and seepages, frequent, 6415, 6466, 6564, 6585.

DRABA NEMOROSA L.

Northern edge of range.

- South Fork Birch Creek, herbaceous sheep perch, rare, 6532.

DRABA NIVALIS Lilj.

- West Crazy Mountains, screes and outcrop, 95-232.

DRABA PALANDERIANA Kjellman

= D. caesia Adams

Beringian endemic.

- Mt. Schwatka, limestone scree and outcrops, scattered, 4905, 4960.
- Victoria Mountain ridge, 12072B.
- White Mountains, VABM Fossil, limestone heath and scree, rare, 5666.
- South Fork Birch Creek, dry fellfield and moist heath, rare to scattered, 6408, 6451, 6540, 6552.

DRABA RUAXES Payson & H. St. John

= D. exalata Ekman var. ruaxes (Payson & St. John) Hitch. sensu Hultén

Northward range extension, new to Yukon-Tanana Uplands.

Ranked S2S3 by ANHP.

- White Mountains, VABM Fossil, limestone rubble, rare, 5689, 5692.

ERYSIMUM CHEIRANTHOIDES L.

Wormseed Mustard

- Big Windy Hot Springs, moist canary grass meadow, rare, 6598.

EUTREMA EDWARDSII R. Br.

- Lime Peak, mesic meadows, rare, 5500.
- Mt. Schwatka, snowmelt meadow, rare, 5089.
- White Mountains, VABM Fossil, moist mossy draw, rare, 5675.
- East Crazy Mountains, moist moss, uncommon.
- West Crazy Mountains, wet moss in shrubby tundra, rare, 95-243.
- South Fork Birch Creek, wet mossy graminoid meadow, rare, 6422.

HALIMOLOBUS MOLLIS (Hook.) Rollins

- Big Windy Hot Springs, dry granitic rock faces and sheep perch, rare, 6593.

LESQUERELLA ARCTICA (Wormsk.) S. Watson**Bladderpod**

- Mt. Schwatka, limestone outcrops and scree, scattered, 4886, 4950.
- Victoria Mountain ridge, limestone scree, rare, 12059.

PARRYA NUDICAULIS (L.) Regel**Parry's Wallflower**

- Lime Peak, moist herbaceous draw, common, 4751.
- Mt. Schwatka, herbaceous heath on limestone, scattered, 4891.
- White Mountains, VABM Fossil, moist herbaceous heath.
- Mt. Prindle vicinity, moist tundra.
- Victoria Mountain ridge, 12052.
- East Crazy Mountains, moist tundra and openings in thickets, common.
- West Crazy Mountains, mesic tundra.
- South Fork Birch Creek.

TORULARIA HUMILIS (C. Meyer) O. Schulz ssp.**RICHARDSONII [comb. not yet made]****= *Braya humilis* (C. Meyer) Robins. ssp. *richardsonii* (Rydb.) Hultén**

- Mt. Schwatka, limestone screes, scattered to common, 4892.
- Victoria Mountain ridge, screes, 12069.
- South Fork Birch Creek, dry fellfield, rare, 6396.

Campanulaceae (Harebell Family)**CAMPANULA AURITA E. Greene*****East Beringian endemic. Ranked S3 by ANHP.***

- Mt. Schwatka, limestone outcrops and scree, rare, 4912.
- East Crazy Mountains, calcareous outcrops, ledges and crevices, 95-293.

CAMPANULA LASIOCARPA Cham.**Mountain Harebell**

- Lime Peak, snowmelt meadow, 94-134.
- Mt. Prindle vicinity, dry alpine tundra.
- East Crazy Mountains, alpine scree, 95-324.
- South Fork Birch Creek, rocky fellfield, rare, 6476.

CAMPANULA UNIFLORA L.**One-flowered Harebell**

- White Mountains, VABM Fossil, moist fines in limestone, rare, 5626.
- East Crazy Mountains, dry tundra, scattered, 95-280.
- West Crazy Mountains, dry tundra and limestone outcrops, 95-227.
- South Fork Birch Creek, dry rocky ridgetop, rare, 6369.

Caprifoliaceae (Honeysuckle Family)**LINNAEA BOREALIS L.****Twinflower**

- Lime Peak, shrub heath slope, rare to scattered.
- Mt. Schwatka, moist understory of shrub heath, rare, 5084.
- South Fork Birch Creek, mesic heath, lower slopes.

VIBURNUM EDULE (Michaux) Raf.**Highbush Cranberry**

- Big Windy Hot Springs, margin of canary grass meadow.

Caryophyllaceae (Pink Family)**ARENARIA CHAMISSONIS Maguire*****Beringian endemic, second record for Yukon-Tanana Uplands.***

- Lime Peak, barren ridgetop scree, rare, 4810.

CERASTIUM BEERINGIANUM Cham. & Schldl.**Mouse-ear Chickweed**

- Lime Peak, herbaceous slope, sheep perches, scattered, 4834.
- Mt. Schwatka, limestone outcrops and scree, scattered to common, 4914, 4998.
- White Mountains, VABM Fossil, limestone heath, 5664.
- South Fork Birch Creek, moist herbaceous heath tundra, 6373.

GASTROLYCHNIS AFFINIS (Vahl) Tolm. & Kozhanch.**Arctic Lychnis****= *Melandrium affine* J. Vahl**

- Mt. Schwatka, moist tundra meadow, rare, 5009.
- East Crazy Mountains, rocky slopes and outcrop crevices, 95-282, 95-290.
- South Fork Birch Creek, moist herbaceous sheep perch and dry herbaceous slope, 6430, 6553, 6582.

GASTROLYCHNIS APETALA (L.) Tolm. & Kozhanch.**Nodding Lychnis****= *Melandrium apetalum* (L.) Fenzl**

- Mt. Schwatka, moist herbaceous meadow, rare, 5007, 5010.
- White Mountains, VABM Fossil, moist, mossy draw, 5676.
- South Fork Birch Creek, wet herbaceous heath tussocks, scattered, 6425.

GASTROLYCHNIS OSTENFELDII (A. Pors.) D. Murray**= *Melandrium taimyrense* Tolm.**

- Victoria Mountain ridge, sheep perch on limestone ridge, rare, 5714.

MINUARTIA ARCTICA (Steven) Asch. & Graebner**Arctic Sandwort*****Beringian endemic.***

- Lime Peak, snowbeds, fellfield, dryas and herbaceous heaths, common, 4716, 4769, 4844, 94-133.
- Mt. Schwatka, limestone outcrops and screes, common, 4889, 5035.
- Serpentine Slide, barren knoll, 12080.
- Mt. Prindle vicinity, dry alpine tundra and screes.
- White Mountains, VABM Fossil, limestone rubble, 5662.
- Victoria Mountain ridge, limestone scree, 5703.
- East Crazy Mountains, screes and thin rocky soils.
- West Crazy Mountains, dry tundra, screes and outcrops, 95-201.
- South Fork Birch Creek, rock outcrops, frequent, 6583.

MINUARTIA BIFLORA (L.) Schinz & Thell***Second and third records for Yukon-Tanana Uplands. Ranked S2 by ANHP.***

- Mt. Prindle vicinity, sheep perches, 94-106.

- South Fork Birch Creek, moist bare soil, rare, 6472.

MINUARTIA ELEGANS (Cham. & Schldl.) Schischkin

- Serpentine Slide, barren knoll, 12081
- East Crazy Mountains, moist soil of frost scar, 95-312.

MINUARTIA MACROCARPA (Pursh) Ostenf.

Beringian endemic.

- Lime Peak, moist sheltered sites among outcrops, rare, 4771, 5498.
- Mt. Prindle vicinity, outcrops and dry tundra, 94-108.
- South Fork Birch Creek, mesic sites on outcrops, rare, 6441.

MINUARTIA ROSSII (R. Br.) Graebner

- Mt. Schwatka, limestone scree, rare, 4915, 5003.
- White Mountains, VABM Fossil, limestone rubble, 5691.
- South Fork Birch Creek, moist mossy tussock tundra and bare soil, rare, 6369, 6459, 6463.

MINUARTIA RUBELLA (Wahlenb.) Graebner

- Mt. Schwatka, limestone outcrops and scree, and moist tundra meadow, rare, 4915, 5002, 5014.
- Victoria Mountain ridge.
- South Fork Birch Creek, outcrops, rare, 6551.
- Big Windy Hot Springs, moist soil patches among boulders, rare, 6611.

MINUARTIA YUKONENSIS Hultén

East Beringian endemic. Ranked S3 by ANHP.

- South Fork Birch Creek, rock outcrops, rare to scattered, 6503.

MOEHRINGIA LATERIFLORA (L.) Fenzl

Grove Sandwort

- Mt. Schwatka, moist heath shrub tundra, rare, 5050.
- West Crazy Mountains, base of south-facing outcrop, rare, 95-228.
- South Fork Birch Creek, moist herbaceous meadow at base of outcrop, 6549.
- Big Windy Hot Springs.

SILENE ACAULIS L.

Moss Campion

- Lime Peak, snowmelt area, 94-131.
- Mt. Schwatka, limestone heath, rare to scattered, 4931.
- White Mountains, VABM Fossil, limestone screes and fellfields, common.
- Victoria Mountain ridge.
- East Crazy Mountains, mesic tundra, especially calcareous substrates.
- West Crazy Mountains, fens, limestone outcrops, 95-249.
- South Fork Birch Creek.

SILENE REPENS Patrin

Tall Campion

- East Crazy Mountains, steep rocky south slope.
- West Crazy Mountains, Preacher Creek, steppe bluff, 95-259.
- South Fork Birch Creek, dry herbaceous meadow, rare, 6536.

SILENE WILLIAMSHII Britton

= *S. menziesii* Hook. ssp. *williamsii* (Britton) Hultén

East Beringian endemic.

- South Fork Birch Creek, outcrops and screes, rare, 6567.

STELLARIA CALYCANTHA (Ledeb.) Bong.

- Big Windy Hot Springs, wet disturbed soil of wildlife lick, rare, 6633A.

STELLARIA EDWARDSII R. Br.

- White Mountains, VABM Fossil, herbaceous heath, rare, 5684B.
- West Crazy Mountains, shrub tundra, dry tundra, 95-208.
- South Fork Birch Creek, moist tussock tundra, rare, 6502.

STELLARIA LAETA Richardson

- Lime Peak, dryas heath and herbaceous sheep perches, 4786, 4833, 4809.
- White Mountains, VABM Fossil, herbaceous heath, rare, 5684A.

STELLARIA LONGIPES Goldie

- Mt. Schwatka, limestone scree and heath, 4975.
- East Crazy Mountains, tundra.
- South Fork Birch Creek, herbaceous heath, under willows, outcrops, 6399, 6446, 6520, 6542.

WILHELMSIA PHYSODES (Fischer) McNeil

- Big Windy Hot Springs, wet disturbed soil of wildlife lick, rare, 6633.

Chenopodiaceae (Pigweed Family)

CHENOPODIUM ALBUM L.

Pigweed

- Big Windy Hot Springs, moist canary grass meadow, among rocks, rare, 6596, 6648.

Cornaceae (Dogwood Family)

CORNUS CANADENSIS L.

Dwarf Dogwood

- Mt. Prindle vicinity, low shrub tundra in lower valleys.
- Big Windy Hot Springs, margin of canary grass meadow and forest understory.

SWIDA STOLONIFERA (Michaux) Rydb.

American Dogwood

= *Cornus stolonifera* Michaux

- Big Windy Hot Springs, canary grass meadow and forest margin, scattered, 6617.

Crassulaceae (Stonecrop Family)

RHODIOLA INTEGRIFOLIA Raf.

Roseroot

= *Sedum rosea* (L.) Scop.

- Lime Peak, base of granitic tors, rare, 4715.
- Mt. Schwatka, among volcanic rocks, 5017.

- Mt. Prindle vicinity, moist tundra, subalpine meadows, moist seepages.
- White Mountains, VABM Fossil, heath tundra near limestone tors, rare, 5654.
- South Fork Birch Creek.
- Big Windy Hot Springs, granitic outcrops.

Cupressaceae (Cypress Family)

JUNIPERUS COMMUNIS L.

Mountain Juniper

- Mt. Schwatka, rocky heath herbaceous slope, rare, 4990.
- East Crazy Mountains, dry lower slopes.
- South Fork Birch Creek.
- Big Windy Hot Springs, dry open aspen understory.

Cyperaceae (Sedge Family)

CAREX AQUATILIS Wahlenb.

- Mt. Prindle vicinity, wet tundra.
- South Fork Birch Creek, wet tussock tundra.

CAREX ATROFUSCA Schk.

- South Fork Birch Creek.

CAREX BIGELOWII Torrey

- Lime Peak, wet meadows and streamside, common, 4794.
- Mt. Schwatka, moist shrub heath meadow, 5047.
- Mt. Prindle vicinity, moist to wet hummocky tundra, common.
- Victoria Mountain ridge, limestone slopes and moist mossy heath, 5709, 5720.
- East Crazy Mountains, mesic to wet sites, forming hummocks.
- West Crazy Mountains, moist to mesic tundra, abundant.
- South Fork Birch Creek.

CAREX CAPILLARIS L.

- Lime Peak, ephemeral pools, 95-136.
- Mt. Schwatka, dry lichen heath on limestone, 4936.
- White Mountains, VABM Fossil, moist herbaceous heath, 5690.
- East Crazy Mountains, sedge vegetation on calcareous soils, common, 95-307.
- South Fork Birch Creek, wet to mesic herbaceous heath and dry meadows, 6416, 6488, 6569.
- Big Windy Hot Springs, wet disturbed soil of wildlife lick, 6638.

CAREX CHORDORRHIZA Ehrh.

Minor southeastward range extension.

- South Fork Birch Creek, small pools in herbaceous heath tussocks, rare, 6508.

CAREX CONCINNA R. Br.

- Mt. Schwatka, limestone tors at treeline, rare, 5063.
- East Crazy Mountains, open white spruce forest.

CAREX ELEUSINOIDES Turcz.

- Mt. Prindle vicinity, disturbed floodplain gravels, 94-123.

CAREX GLACIALIS Mackenzie

- Mt. Schwatka, limestone outcrops and scree, rare, 4895.
- White Mountains, VABM Fossil, limestone scree, rare, 5681.

CAREX LACHENALII Schkuhr.

- Lime Peak, snowmelt meadows, gelifluction lobes, streamside sand, 4829, 94-128, 94-153.
- Mt. Prindle vicinity, moist sheltered slopes and subalpine meadows, 94-115.
- South Fork Birch Creek, herbaceous heath, sedge meadows, 6462, 6516, 6586.

CAREX MARINA Dewey

= *C. amblyorhyncha* Krecz.

New to Yukon-Tanana Uplands.

- South Fork Birch Creek, wet tussock tundra, wet herbaceous heath, rare, 6375, 6504.

CAREX MEDIA R. Br.

- Big Windy Hot Springs, moist sandy soil along stream, rare, 6643.

CAREX MEMBRANACEA Hook.

- Lime Peak, gelifluction lobe, 94-154.
- Mt. Schwatka, moist shrub herbaceous heath meadow, 5041.
- Mt. Prindle vicinity, wet meadows.
- West Crazy Mountains, moist fens, 95-218.
- South Fork Birch Creek, sedge fen, 6523.

CAREX MICROCHAETA Holm

- Lime Peak, herbaceous heath, common, 4759, 5496.
- Mt. Schwatka, mesic to dry tundra.
- Mt. Prindle vicinity, mesic alpine slopes, abundant, 94-103.
- East Crazy Mountains, alpine slopes.
- West Crazy Mountains, mesic tundra, common.
- South Fork Birch Creek.

CAREX MISANDRA R. Br.

- Lime Peak, ephemeral pools, 94-127.
- Mt. Schwatka, mesic tundra.
- Victoria Mountain ridge, limestone fellfield, 5708.
- South Fork Birch Creek, moist to wet herbaceous heath and dryas heath, 6370, 6423, 6486.

CAREX NARDINA Fries

- Mt. Schwatka, limestone outcrops and scree, scattered, 4887, 4922.
- White Mountains, VABM Fossil, limestone scree and herbaceous sheep perch, 5622, 5679.
- Victoria Mountain ridge, dry limestone scree, 5702.

CAREX OBTUSATA Lilj.

- Mt. Schwatka, limestone outcrops and scree and on sheep perch, rare, 4897, 4921, 4961, 5069.

CAREX PETRICOSA Dewey

= *C. franklinii* Boott

- Mt. Schwatka, limestone scree and dryas sedge meadows, 4923, 5023, 5067.

- White Mountains, VABM Fossil, limestone ridge sheep perch, 5650.
- South Fork Birch Creek, rock outcrops and ledges, rare to scattered, 6484.

CAREX PODOCARPA R. Br.

- Lime Peak, snowbed meadow and sandy gravel along stream, 4836, 94-127.
- Mt. Schwatka, moist shrub herbaceous heath meadow, 5045.
- Mt. Prindle vicinity, mesic alpine slopes, 94-114.
- White Mountains, VABM Fossil, moist herbaceous draw, 5688.
- East Crazy Mountains, mesic sites at treeline.
- West Crazy Mountains, moist openings in alder and willow thickets, 95-220.
- South Fork Birch Creek, moist gelifluction lobe front, 6432.

CAREX ROTUNDATA Wahlenb.

- Mt. Prindle vicinity, wet basins in upper drainage, 94-110.

CAREX RUPESTRIS All.

- Mt. Schwatka, outcrops and dry rocky dryas heath, scattered, 5037, 5056.
- South Fork Birch Creek, rock outcrops and dry dryas tundra, 6483, 6518.
- East Crazy Mountains, dry calcareous slopes and outcrops, 95-308.

CAREX SCIRPOIDEA Michaux

- Lime Peak, snowmelt meadow and dry, dryas slope, scattered, 4850, 94-156.
- Mt. Schwatka, limestone outcrops and scree, rare, 4902.
- White Mountains, VABM Fossil.
- East Crazy Mountains, mesic to dry tundra slopes.
- West Crazy Mountains, mesic to dry tundra, common, 95-271.
- South Fork Birch Creek, moist herbaceous heath, 6420.

CAREX SUPINA Willd. ssp. SPANIOCARPA (Steud.) Hultén

- East Crazy Mountains, sedge vegetation on calcareous slopes, 95-309, 95-318.
- West Crazy Mountains, Preacher Creek, steppe bluff, 95-268.

CAREX VAGINATA Tausch

- Mt. Schwatka, margin of forest and limestone tors, rare, 5062.
- South Fork Birch Creek, moist herbaceous heath tussock tundra, 6411, 6439.

CAREX WILLIAMSII Britton

- Lime Peak, snowmelt meadow, 94-157.

ELEOCHARIS PALUSTRIS (L.) Roemer & Schultes

- Big Windy Hot Springs, moist canary grass meadow, frequent, Juday s.n.

ERIOPHORUM ANGUSTIFOLIUM Honck

Tall Cottongrass

- Lime Peak, ephemeral pools and snowmelt meadows, 4817, 5495, 94-139.

- Mt. Schwatka, moist moss heath depressions and meadows, rare, 4963, 5039.
- Mt. Prindle vicinity, wet meadows.
- West Crazy Mountains, alpine fens.
- South Fork Birch Creek, wet fen below gelifluction lobe, 6563.

ERIOPHORUM BRACHYANTHERUM Trautv.

- Mt. Schwatka, moist shrub herbaceous heath meadow, 5054.

ERIOPHORUM CALLITRIX Cham.

- Lime Peak, ephemeral pools, wet meadows, scattered, 4782, 4865, 94-138.
- White Mountains, VABM Fossil, moist mossy draw, 5672.
- South Fork Birch Creek, sedge fen, 6524.

ERIOPHORUM SCHEUCHZERI Hoppe

- South Fork Birch Creek, wet tussock tundra, 6499.

ERIOPHORUM VAGINATUM L.

Tufted Cottongrass

- Lime Peak, wet meadow adjacent to stream, 5494.
- Mt. Schwatka, moist shrub herbaceous heath meadow, 5040.
- Mt. Prindle vicinity, wet basins, scattered.
- East Crazy Mountains, forming tussocks on poorly drained slopes.
- South Fork Birch Creek, wet tussock tundra.

KOBRESIA MYOSUROIDES (Villars) Fiori & Paol.

- South Fork Birch Creek, dry lush herbaceous slope, 6543.

KOBRESIA SIBIRICA Turcz.

- Mt. Schwatka, outcrops and scree, dry lichen dryas heath, rare, 4890, 4935.
- South Fork Birch Creek, moist herbaceous heath and dryas tundra, 6458, 6482.

KOBRESIA SIMPLICIUSCULA (Wahlenb.) Mackenzie

- South Fork Birch Creek, moist herbaceous heath and dry lush meadows, 6487, 6517, 6544, 6570.

Diapensiaceae (Diapensia Family)

DIAPENSIA LAPPONICA L.

Lapland Diapensia

Beringian endemic.

- Lime Peak, herbaceous heath fellfield, common, 4745.
- Mt. Schwatka, moist heath among rocks, rare, 5083.
- Mt. Prindle vicinity, dry, exposed alpine tundra, common.
- White Mountains, VABM Fossil, moist fines in mineral contact zone, 5646.
- East Crazy Mountains, rocky alpine tundra.
- West Crazy Mountains, dry rocky tundra.
- South Fork Birch Creek.

Elaeagnaceae (Oleaster Family)

SHEPHERDIA CANADENSIS (L.) Nutt.**Soapberry**

- Victoria Mountain ridge, dry lower slopes.
- South Fork Birch Creek.
- Big Windy Hot Springs, among rocks at hot springs margin, 6604.

Empetraceae (Crowberry Family)**EMPETRUM HERMAPHRODITUM (Lange) Hagerup****Crowberry****=*E. nigrum* L. ssp. *hermaphroditum* (Lange) Bocher**

- Lime Peak, dry to mesic tundra, common.
- Mt. Schwatka, moist heath among rocks, rare, 5085.
- Mt. Prindle vicinity, shrub heath tundra in lower valley.
- White Mountains, VABM Fossil, mesic tundra.
- Victoria Mountain ridge.
- East Crazy Mountains, dry tundra, common.
- West Crazy Mountains, heath tundra, abundant.
- South Fork Birch Creek.

Equisetaceae (Horsetail Family)**EQUISETUM ARVENSE L.**

- Lime Peak, snowmelt meadows, scattered, 4811.
- Mt. Schwatka, moist shrub herbaceous heath meadow, 5042.
- Mt. Prindle vicinity, thickets, meadows, shrub tundra.
- White Mountains, VABM Fossil, moist draw.
- Victoria Mountain ridge.
- West Crazy Mountains, mesic tundra and fens.
- South Fork Birch Creek.
- Big Windy Hot Springs, moist to wet canary grass meadow, Juday s.n.

EQUISETUM PRATENSE Ehrh.

- South Fork Birch Creek.

EQUISETUM SCIRPOIDES Michaux

- Mt. Schwatka, moist mossy heath depressions, rare, 5068.
- White Mountains, VABM Fossil, dry tundra.
- East Crazy Mountains, calcareous slopes at treeline, 95-306.
- West Crazy Mountains, open forests and thickets near treeline.
- South Fork Birch Creek.

EQUISETUM SILVATICUM L.

- Lime Peak, willow-dwarf birch thicket understory, scattered, 4862.
- Mt. Prindle vicinity, thickets and meadows.

EQUISETUM VARIEGATUM Schleicher

- Mt. Schwatka, mossy snowmelt meadow, rare, 5080.
- White Mountains, VABM Fossil, dry tundra.
- South Fork Birch Creek.

Ericaceae (Heath Family)**ANDROMEDA POLIFOLIA L****Bog Rosemary**

- Lime Peak, wet hummock meadows and *Sphagnum* heath, scattered, 4795, 4816.
- Mt. Prindle vicinity, wet basins.
- White Mountains, VABM Fossil, moist depressions.
- East Crazy Mountains, sedge tundra on calcareous slopes, rare.
- South Fork Birch Creek.

ARCTOSTAPHYLOS UVA-URSI (L.) Sprengel**Kinnikinnick**

- Mt. Schwatka, dry understory at treeline, common, 5065.
- East Crazy Mountains, dry south slopes, near open white spruce.
- West Crazy Mountains, Preacher Creek, in aspen at edge of steppe site, 95-265.
- South Fork Birch Creek, dry lower slopes.

ARCTOUS ALPINA (L.) Niedenzu**Alpine Bearberry****= *Arctostaphylos alpina* (L.) Sprengel**

- Lime Peak, herbaceous heath, scattered to common, 4764.
- Mt. Schwatka, heath tundra on volcanic rock.
- Mt. Prindle vicinity, mesic to dry alpine tundra.
- East Crazy Mountains, thin rocky soils in alpine tundra.
- West Crazy Mountains, dry exposed and moist hummocky tundra.
- South Fork Birch Creek.

ARCTOUS RUBRA (Rehder & E. Wilson) Nakai**Red Bearberry****= *Arctostaphylos rubra* (Rehder & E. Wilson) Fern**

- Mt. Schwatka, moist shrub herbaceous heath meadow, 5077.
- Victoria Mountain ridge.
- White Mountains, VABM Fossil, moist herbaceous draw.
- East Crazy Mountains, mesic calcareous sites, openings in forests and thickets.
- West Crazy Mountains, moist fens and sheltered thickets.
- South Fork Birch Creek.

CASSIOPE TETRAGONA (L.) D. Don**Mountain Heather**

- Lime Peak, herbaceous heath, abundant, 4823.
- Mt. Schwatka, rocky dryas heath, 4997.
- Mt. Prindle vicinity, mesic tundra, common.
- White Mountains, VABM Fossil.
- Victoria Mountain ridge.
- East Crazy Mountains, moist alpine tundra.
- West Crazy Mountains, heath tundra, north slopes, sheltered sites, abundant.
- South Fork Birch Creek, mesic snowmelt meadows and heath.

LEDUM GROENLANDICUM Oeder**Labrador Tea****= *L. palustre* L. ssp. *groenlandicum* (Oeder) Hultén**

- Lime Peak, open shrub willow thicket, scattered, 4869.
- East Crazy Mountains, open spruce forest.
- West Crazy Mountains, thickets and forests.

LEDUM PALUSTRE L. ssp. DECUMBENS (Aiton) Hultén
Narrow-leaf Labrador Tea

- Lime Peak, herbaceous heath, common, 4774, 4813.
- Mt. Schwatka, moist heath among rocks, common, 5091.
- Mt. Prindle vicinity, shrub tundra and mesic alpine slopes.
- White Mountains, VABM Fossil.
- East Crazy Mountains, heath tundra, common.
- West Crazy Mountains, heath tundra, abundant.
- South Fork Birch Creek, mesic to dry tundra.

LOISELEURIA PROCUMBENS (L.) Desv.

Alpine Azalea

- Lime Peak, herbaceous heath, abundant, 4755.
- Mt. Prindle vicinity, dry exposed alpine tundra, common.
- Victoria Mountain ridge.
- South Fork Birch Creek, dry tundra.

OXYCOCCUS MICROCARPUS Turcz. ex Rupr.

Bog Cranberry

- East Crazy Mountains, in *Sphagnum* bog in shrub birch thicket below treeline.

RHODODENDRON LAPPONICUM (L.) Wahlenb.

Lapland Rosebay

- Lime Peak, herbaceous heath, scattered, 4750.
- Mt. Schwatka, heath slope, rare to scattered, 4973.
- White Mountains, VABM Fossil, limestone scree and heath, scattered.
- East Crazy Mountains, mesic calcareous slopes.
- West Crazy Mountains, mesic to dry tundra, especially on limestone.
- South Fork Birch Creek, dry tundra.

VACCINIUM ULIGINOSUM L.

Blueberry

- Lime Peak, herbaceous heath, common to abundant, 4762.
- Mt. Schwatka, moist heath among rocks, common, 5087.
- Mt. Prindle vicinity, shrub tundra, mesic alpine tundra.
- White Mountains, VABM Fossil, heath.
- Victoria Mountain ridge.
- East Crazy Mountains, mesic heath, openings in forest and thickets, common.
- West Crazy Mountains, shrub tundra and openings in thickets.
- South Fork Birch Creek.
- Big Windy Hot Springs, forest understory and margin.

VACCINIUM VITIS-IDEA L.

Lowbush Cranberry

- Mt. Schwatka, dry understory at treeline below limestone, common, 5060.
- White Mountains, VABM Fossil, dry to mesic heath.
- Mt. Prindle vicinity, lowland shrub tundra and alpine ridges, common.
- Victoria Mountain ridge.
- East Crazy Mountains, mesic heath, openings in forest and thickets, common.
- West Crazy Mountains, shrub tundra.
- South Fork Birch Creek.
- Big Windy Hot Springs, forest understory.

Fabaceae (Pea Family)

ASTRAGALUS ABORIGINUM Richardson

- Mt. Schwatka, limestone outcrops, scree and heath, scattered, 4884, 4983.
- White Mountains, VABM Fossil, dry dryas fellfield on limestone, scattered.
- Victoria Mountain ridge, dry limestone heath, scattered, 5713, 12056.
- East Crazy Mountains, dry calcareous slopes.
- West Crazy Mountains, dry rocky tundra and scree, 95-229.
- South Fork Birch Creek, dry calcareous heath and outcrops at treeline, 6374, 6500.

ASTRAGALUS ALPINUS L.

Alpine Milk Vetch

- South Fork Birch Creek, moist herbaceous draw, 6576.

ASTRAGALUS UMBELLATUS Bunge

Hairy Arctic Milk Vetch

Beringian endemic.

- Lime Peak, mesic herbaceous heath, scattered, 4801.
- Mt. Schwatka, herbaceous mossy meadow, scattered, 5008.
- White Mountains, VABM Fossil, mesic heath.
- Victoria Mountain ridge, 12065.
- East Crazy Mountains, mesic tundra.
- West Crazy Mountains, moist to mesic tundra, especially in sheltered sites, 95-212.
- South Fork Birch Creek, mesic heath, scattered.

HEDYSARUM ALPINUM L.

Eskimo Potato

- Mt. Schwatka, herbaceous heath slope, scattered, 4954.
- White Mountains, VABM Fossil, limestone heath around tors, 5647.
- East Crazy Mountains, mesic tundra and forest openings, common.
- West Crazy Mountains, tundra at base of limestone outcrops.
- South Fork Birch Creek, dry lower slopes.
- Big Windy Hot Springs, stream and forest margins.

HEDYSARUM MACKENZII Richardson

Wild Sweet Pea

- Mt. Schwatka, limestone outcrops and scree, scattered, 4898.
- White Mountains, VABM Fossil, limestone heath around tors, 5648.

LUPINUS ARCTICUS S. Watson

Lupine

- Lime Peak, dryas heath, scattered, 4840.
- Mt. Schwatka, dry rocky dryas heath, common, 4996.
- White Mountains, VABM Fossil, rocky limestone low heath, common, 5614.
- Victoria Mountain ridge, dry to mesic tundra, scattered.
- East Crazy Mountains, mesic slopes and forest openings, common.
- West Crazy Mountains, scree, outcrops, dry tundra, and openings in thickets.
- South Fork Birch Creek, mesic to moist tundra and moist gelifluction lobes.

OXYTROPIS ARCTICA R. Br.

Beringian endemic, rarely found south of the Brooks Range.

- Mt. Schwatka, heath on rocky limestone slope, scattered, 4909.

OXYTROPIS BOREALIS DC.

Beringian endemic.

- Mt. Schwatka, limestone outcrops and scree, 4893.
- Victoria Mountain ridge, dry tundra ridgetops, 12066.
- East Crazy Mountains, mesic to dry calcareous slopes, 95-299.
- South Fork Birch Creek, dry tundra fellfield, scattered, 6372.

OXYTROPIS BRYOPHILA (E. Greene) Yurtsev

Blackish Oxytrope

= *O. nigrescens* (Pallas) Fischer

Beringian endemic.

- Lime Peak, herbaceous heath, commo, 4766.
- Mt. Schwatka, limestone outcrops and scree, rocky heath, scattered, 4949, 4962.
- Mt. Prindle vicinity, scree and exposed dry tundra.
- White Mountains, VABM Fossil, dry lichen-dryas tundra, scattered.
- Victoria Mountain ridge, dry ridgetops.
- West Crazy Mountains, dry rocky tundra, common, 95-239.
- South Fork Birch Creek.

OXYTROPIS CAMPESTRIS (L.) DC. s. lat.

Northern Oxytrope

includes *O. campestris* (L.) DC. ssp. *gracilis* (Nelson) Hultén;
O. variens (Rydb.) Schumann

- White Mountains, VABM Fossil, dry limestone scree, scattered.
- Victoria Mountain ridge, dry limestone scree, 5695.
- South Fork Birch Creek, rock outcrops at treeline, scattered, 6497.
- West Crazy Mountains, dryas-lichen fellfield, 5721.

OXYTROPIS DEFLEXA (Pallas) DC.

Pendant Pod Oxytrope

- Mt. Schatka, limestone scree, rare, 4947.

OXYTROPIS HUDDERSONII A. Pors.

East Beringian endemic. Ranked S2S3 by ANHP.

- South Fork Birch Creek, rock outcrops above heath ridge, scattered, 6511.

OXYTROPIS MAYDELLIANA Trautv.

Maydell's Oxytrope

- Mt. Schwatka, limestone dryas heath, scattered, 4910.
- White Mountains, VABM Fossil, limestone heath, scattered, 5629.
- East Crazy Mountains, mesic tundra.
- West Crazy Mountains, dry tundra, common, 95-204, 95-246.
- South Fork Birch Creek, mesic to moist tundra, scattered.

OXYTROPIS MERTENSIANA Turcz.

Merten's Oxytrope

Beringian endemic.

- South Fork Birch Creek, wet graminoid tundra, scattered to rare, 6383.

OXYTROPIS SCAMMANIANA Hultén

Scamman's Oxytrope

East Beringian endemic, first described from Eagle Summit.

- Lime Peak, heath and scree, scattered, 4790, 4859, 5502.
- Mt. Schwatka, rocky heath and rock summits, scattered, 4908, 5021.
- Mt. Prindle vicinity, dry alpine tundra.
- White Mountains, VABM Fossil, rocky limestone low heath, 5615.
- South Fork Birch Creek, mesic herbaceous heath tundra, scattered, 6382.

OXYTROPIS SPLENDENS Douglas

Westward range extension.

- East Crazy Mountains, limestone outcrop crevices, 95-301.

OXYTROPIS VISCIDA Nutt.

Sticky Oxytrope

- White Mountains, VABM Fossil, limestone heath, scattered to rare, 5665.

Fumariaceae (Earth Smoke Family)

CORYDALIS PAUCIFLORA (Stephan) Pers.

Few-flowered Corydalis

- Lime Peak, herbaceous patch at base of granitic tors, rare, 4779, 4803.
- Mt. Schwatka, wet snowmelt moss heath patch, rare, 5090.
- White Mountains, VABM Fossil.
- West Crazy Mountains, moist, mossy sheltered sites, 95-211.
- South Fork Birch Creek.

Gentianaceae (Gentian Family)

GENTIANA ALGIDA Pallas

Whitish Gentian

- Lime Peak, gelifluction lobe, rare, 94-150.
- Mt. Prindle vicinity, mesic alpine tundra.
- South Fork Birch Creek.

GENTIANA GLAUCA Pallas

Glaucus Gentian

- Lime Peak, herbaceous heath at base of tors, scattered to rare, 4770, 4871.
- Mt. Prindle vicinity, alpine tundra.
- White Mountains, VABM Fossil.

GENTIANA PROSTRATA Haenke

Moss Gentian

- White Mountains, VABM Fossil, bare moist soil in fellfield and heath, rare.
- East Crazy Mountains, mesic tundra.
- South Fork Birch Creek, small bare soil patches, rare, 6467.

GENTIANELLA PROPINQUA (Richardson) J.M. Gillett

Four-parted Gentian

= *Gentiana propinqua* Richardson

- White Mountains, VABM Fossil, small bare soil patches, rare, 5616.

- South Fork Birch Creek, bare patches among rocks at tree line, rare, 6514.
- Big Windy Hot Springs, Juday s.n.

Grossulariaceae (Gooseberry Family)

RIBES LACUSTRE (Pers.) Poiret

Bristly Black Current

- Big Windy Hot Springs, forest understory, rare, 6647.

RIBES TRISTE Pallas

Northern Red Current

- Lime Peak, among granitic tors, rare, 4785.
- Big Windy Hot Springs, forest understory, scattered, Juday s.n.

Juncaceae (Rush Family)

JUNCUS BIGLUMIS L.

- Lime Peak, ephemeral pools, 94-142.
- South Fork Birch Creek, bare soil.

JUNCUS BUFONIUS L.

- Big Windy Hot Springs, alkaline terraces at springs, 6595.

JUNCUS CASTANEUS Smith

- Lime Peak, gelifluction lobes, 94-155.
- West Crazy Mountains, in fens, rare.
- Big Windy Hot Springs, wet disturbed soil at wildlife lick, 6630.

JUNCUS TRIGLUMIS L.

- Lime Peak, ephemeral pools, 94-143.
- South Fork Birch Creek.

LUZULA ARCTICA Blytt

- Lime Peak, snowmelt meadow, 94-159.

LUZULA ARCUATA (Wahlenb.) Sw. ssp.

UNALASCHCENSIS (Buchenau) Hultén

- Lime Peak, herbaceous streamside, 4831.
- South Fork Birch Creek, moist herbaceous gully and dryas heath, 6465, 6519, 6588.

LUZULA CONFUSA Lindeb.

- Lime Peak, moist herbaceous patches and scree among tors, frequent, 4725, 4733, 4826, 4841, 94-164.
- Mt. Schwatka, dry, rocky dryas heath, 4991, 5027.
- Mt. Prindle vicinity, mesic to dry alpine tundra and screes.
- East Crazy Mountains, rocky slopes and frost scars, 95-311.
- West Crazy Mountains, rocky slope, dry tundra, frost scars, 95-207, 95-254.
- South Fork Birch Creek, moist frost scars and herbaceous heath, 6473, 6507.

LUZULA KJELLMANIANA Miyabe & Kudo

= *L. tundricola* Gorodk.

Beringian endemic.

- Lime Peak, moist herbaceous patches at base of tors, scattered, 4723.
- Mt. Schwatka, herbaceous sheep perch, 4942.

LUZULA MULTIFLORA (Retz.) Lej.

- Lime Peak, herbaceous heath scree slope, 4819.
- East Crazy Mountains, thin dry soil on calcareous slope, 95-316.
- West Crazy Mountains, dry tundra, 95-225, 95-247.
- South Fork Birch Creek, herbaceous patches in outcrops, 6419.

LUZULA PARVIFLORA (Ehrh.) Desv.

- Mt. Prindle vicinity, meadow and shrub tundra and screes.
- South Fork Birch Creek, herbaceous understory of willow thicket, common, 6522.

LUZULA WAHLENBERGII Rupr.

- Lime Peak, ephemeral pools, 94-141.
- White Mountains, VABM Fossil, moist fines of mineral contact zone, rare, 5644.
- South Fork Birch Creek, moist grassy patch within heath tundra, 6492.

Lentibulariaceae (Bladderwort Family)

PINGUICULA VILLOSA L.

- South Fork Birch Creek.
- East Crazy Mountains, boggy Sphagnum sites in open thickets below treeline, 95-313.

PINGUICULA VULGARIS L.

Butterwort

- Mt. Schwatka, S-facing heath on limestone, rare, 4985.
- West Crazy Mountains, sedge-dryas tundra near limestone outcrop, rare, 5725.

Liliaceae (Lily Family)

LLOYDIA SEROTINA (L.) Reichb.

Alp Lily

- Lime Peak, moist herbaceous patches at base of tor, scattered, 4724.
- Mt. Schwatka, limestone outcrops and scree, scattered, 4906.
- White Mountains, VABM Fossil, dry tundra.
- East Crazy Mountains, gravelly soils and calcareous outcrop crevices, 95-298.
- South Fork Birch Creek, dry rocky tundra.

TOFIELDIA COCCINEA Richardson

False Asphodel

- Lime Peak, SE-facing grus and heath slopes, scattered to rare, 4734, 4866.
- Mt. Schwatka, dryas heath on limestone, scattered, 4938.
- White Mountains, VABM Fossil, dry and mesic sites in limestone fellfield.
- Victoria Mountain ridge, dryas fellfield.
- East Crazy Mountains, calcareous tundra, rare, 95-322, 95-296B.
- West Crazy Mountains, dry tundra, 95-210.

- South Fork Birch Creek, mesic heath slope, scattered, 6402.

TOFIELDIA PUSILLA (Michaux) Pers.

- Mt. Schwatka, dryas heath, scattered, 4937.
- Mt. Prindle vicinity, shrub tundra, scattered.
- East Crazy Mountains, mesic calcareous tundra and openings in thickets, common, 95-296A.
- West Crazy Mountains, dry tundra.
- South Fork Birch Creek, mesic heath slope, scattered, 6403.

ZYGADENUS ELEGANS Pursh

Death Camas

- Mt. Schwatka, moist herbaceous heath and meadows, 4988, 5051.
- White Mountains, VABM Fossil.
- Victoria Mountain ridge, dry dryas tundra.
- East Crazy Mountains, mesic tundra and forest openings.
- West Crazy Mountains, dry gravelly ridges, limestone, 95-250.
- South Fork Birch Creek.

Lycopodiaceae (Clubmoss Family)

HUPERZIA SELAGO (L.) C. Martius

Fir Clubmoss

= *Lycopodium selago* L.

- Lime Peak, herbaceous heath, scattered, 4763.
- Mt. Schwatka, mossy, wet snowmelt patch, rare, 5081.
- Mt. Prindle vicinity, alpine tundra.
- White Mountains, VABM Fossil.
- East Crazy Mountains, mossy rocky north slopes, common.
- West Crazy Mountains, rocky north slopes, in moss and snowbeds, 95-236.
- South Fork Birch Creek.
- Big Windy Hot Springs, Juday s.n.

LYCOPODIUM ALPINUM L.

- Lime Peak, herbaceous heath, scattered to frequent, 4737.
- Mt. Prindle vicinity, mesic alpine slopes.
- West Crazy Mountains, mossy tundra, 95-240.
- South Fork Birch Creek, moist herbaceous heath, 6464.

LYCOPODIUM ANNOTINUM L.

Stiff Clubmoss

- Lime Peak, willow thicket, scattered, 4791.
- Mt. Schwatka, snowmelt patches and moist mossy heath, rare to scattered, 5071, 5082.
- South Fork Birch Creek, herbaceous patches on rock outcrops, 6421.
- Big Windy Hot Springs, Juday s.n.

LYCOPODIUM CLAVATUM L.

- Lime Peak, herbaceous heath, rare to scattered, 4735.
- Mt. Prindle vicinity, shrub and mesic alpine tundra.
- West Crazy Mountains, mossy tundra, north slopes and depressions, 95-241.
- South Fork Birch Creek, herbaceous patches on rock outcrops, 6417.

LYCOPODIUM COMPLANATUM L.

- South Fork Birch Creek, forest understory.

Onagraceae (Evening Primrose Family)

CIRCAEA ALPINA L.

Enchanter's Night Shade

- Big Windy Hot Springs, moist shady sites among granitic boulders, rare, 6607.

EPILOBIUM ANGUSTIFOLIUM L.

Tall Fireweed

- Lime Peak, lower slopes, mesic to moist herbaceous heath.
- Mt. Prindle vicinity, subalpine meadows and shrub tundra.
- West Crazy Mountains, base of rock outcrop.
- South Fork Birch Creek.
- Big Windy Hot Springs, margin of wet to moist canary grass meadow.

EPILOBIUM CILIATUM Raf. ssp. ADENOCaulon (Hausskn.) Hoch & Raven

= *E. adenocaulon* Haussk.

- Big Windy Hot Springs, wet canary grass meadow, scattered, 6591.

EPILOBIUM CILIATUM Raf. ssp. GLANDULOSUM (Lehm.) Hoch & Raven

= *E. glandulosum* Lehm.

Northward range extension for this coastal taxon.

- Big Windy Hot Springs, wet disturbed soil below wildlife lick, rare, 6631.

EPILOBIUM HORNEmannii Reichb.

- Big Windy Hot Springs, Juday s.n.

EPILOBIUM LATIFOLIUM L.

Dwarf Fireweed

- Lime Peak, moist streamside.
- Mt. Schwatka, herbaceous heath on limestone, scattered, 4977.
- White Mountains, VABM Fossil, acidic rock scree and moist sites.
- Victoria Mountain ridge, moist draw.
- East Crazy Mountains, dry alpine tundra.
- West Crazy Mountains, scree and rocky slopes.
- South Fork Birch Creek.

Ophioglossaceae (Adder's Tongue Family)

BOTRYCHIUM LUNARIA (L.) Sw.

Moonwort

- South Fork Birch Creek, herbaceous slopes below outcrops, sheep perch, rare, 6560.

Orchidaceae (Orchid Family)

CORALLORRHIZA TRIFIDA Chatel.

Coral Root

- Victoria Mountain ridge, wet mossy heath, rare, 5719.
- West Crazy Mountains, north slope heath-dwarf willow tundra, 95-226.
- South Fork Birch Creek, moist herbaceous heath, rare, 6449.

CYPRIPEDIUM PASSERINUM Richardson

Lady Slipper

- East Crazy Mountains, dry calcareous slopes, 95-314.

PLATANThERA OBTUSATA (Pursh) Lindley

- Mt. Schwatka, moist shrub heath and herbaceous heath meadow, rare, 4982, 5076.
- Victoria Mountain ridge, moist shrub heath.
- East Crazy Mountains, calcareous mesic tundra, 95-303.
- West Crazy Mountains, moist mossy fens and sheltered north slopes, 95-217, 95-221.

Orobanchaceae (Broomrape Family)

BOSCHNIAKIA ROSSICA (Cham. & Schldl.) R. Fedtsch.

Broomrape

- West Crazy Mountains, alder thickets.
- South Fork Birch Creek, alder thickets.

Papaveraceae (Poppy Family)

PAPAVER LAPPONICUM (Tolm.) Nordh.

- White Mountains, VABM Fossil, limestone scree, rare, 5680.
- Victoria Mountain ridge, limestone scree, 5704.

PAPAVER MACOUNII E. Greene

- Lime Peak, heath, scattered to rare, 4800.
- Mt. Schwatka, volcanic heath and dryas mats, 4899.
- White Mountains, VABM Fossil, dryas tundra on limestone, scattered.
- East Crazy Mountains, limestone crevices and openings in alder.
- West Crazy Mountains, mesic tundra and openings in thickets, 95-213.
- South Fork Birch Creek, moist herbaceous heath tundra, scattered to rare, 6377, 6455.

PAPAVER RADICATUM Rottb.

- Mt. Schwatka, volcanic heath slope, 5032.

Poaceae (Grass Family)

AGROSTIS MERTENSII Trin.

- Big Windy Hot Springs, moist soil along stream, rare, 6642.

AGROSTIS SCABRA Willd.

- Big Windy Hot Springs, cold seepage area at base of cliff, 6622.

ARCTAGROSTIS LATIFOLIA (R. Br.) Griseb.

Polar Grass

- Lime Peak, wet sites below gelifluction lobes, 94-147.
- Mt. Schwatka, moist streamside.
- East Crazy Mountains, dry rocky saddle, 95-325.
- South Fork Birch Creek.

BROMOPSIS PUMPELLIANA (Scribner) Holub ssp.

ARCTICA (Shear) A. Loeve & D. Loeve

= *Bromus pumpeIIianus* Scribner var. *arcticus* (Shear) Pors.

Beringian endemic.

- Mt. Schwatka, herbaceous sheep perch and cave entrance, rare, 5005.
- South Fork Birch Creek, herbaceous heath patch on small outcrop, 6505.
- Big Windy Hot Springs, white spruce understory, rare, 6614.

CALAMAGROSTIS CANADENSIS (Michaux) P. Beauv.

- Lime Peak, sheep perches among tors.
- Mt. Prindle vicinity, thickets and subalpine meadows.
- East Crazy Mountains, boggy thickets.
- West Crazy Mountains, among open spruce and willows at treeline, scattered.
- Big Windy Hot Springs, forest understory and disturbed soil of lick, 6639.

CALAMAGROSTIS LAPPONICA (Wahlenb.) Hartman

- Mt. Prindle vicinity, dry alpine sites, 94-105.
- Big Windy Hot Springs, Juday s.n.

CALAMAGROSTIS PURPURASCENS R. Br.

- Mt. Schwatka, herbaceous sheep perch, 4978.
- White Mountains, VABM Fossil, sheep perch on limestone, 5652.
- East Crazy Mountains, dry slopes and rock crevices, especially on calcareous sites.
- West Crazy Mountains, dry tundra, a dominant on steppe bluff, 95-238, 95-266.
- South Fork Birch Creek, fellfield, 6400.
- Big Windy Hot Springs, sheep perch on granitic outcrop, rare to scattered, 6646.

DESCHAMPSIA CESPITOSA (L.) P. Beauv.

- Lime Peak, ephemeral pools, 94-140.

ELYMUS ALASKANUS (Scribner & Merr.) A. Loeve

= *Agropyron boreale* (Turcz.) Drobov

- East Crazy Mountains, limestone outcrop crevices, 95-300.
- West Crazy Mountains, limestone outcrop, 95-278.

ELYMUS ALASKANUS (Scribner & Merr.) A. Loeve

ssp. *HYPERARCTICUS* (Polunin) A. Loeve & D. Loeve

= *Agropyron boreale* (Turcz.) Drobov ssp. *hyperarcticum* (Polunin) Mederis

- Mt. Schwatka, herbaceous sheep perch, 4926.

ELYMUS MACROURUS (Turcz.) Tzvelev

= *Agropyron macrourum* (Turcz.) Drobov.

Beringian endemic.

- Big Windy Hot Springs, wet disturbed soil of wildlife lick, rare, 6635.

ELYMUS TRACHYCAULUS (Link) Gould ex Shinnars s. *lat.*

= *Agropyron violaceum* (Hornem.) Lange s. *lat.*

- South Fork Birch Creek, exposed rock outcrops on heath slope.
- Big Windy Hot Springs, open aspen patch on schist outcrop, Juday s.n.

ELYMUS TRACHYCAULUS (Link) Gould ex Shinnery ssp. MAJOR (Vasey) Tzvelev

= ***Agropyron pauciflorum* (Schwein.) Hitchc. ssp. major (Vasey) Mederis**

- Big Windy Hot Springs, moist herbaceous sites at base of granite wall, 6592, 6608.

ELYMUS TRACHYCAULUS (Link) Gould ex Shinnery

ssp. NOVAE-ANGLIAE (Scribner) Tzvelev

= ***Agropyron pauciflorum* (Schwein.) Hitchc. ssp. novae-angliae (Scribn.) Melderis**

- Big Windy Hot Springs, sheep perch on granitic outcrops, rare, 6615.

ELYMUS TRACHYCAULUS (Link) Gould ex Shinnery

ssp. VIOLACEUS (Hornem.) A. Loeve & D. Loeve

= ***Agropyron violaceum* (Hornem.) Lange ssp. violaceum**

- Big Windy Hot Springs, aspen understory on schist outcrop, rare, 6644.

ELYTRIGIA SPICATA (Pursh) D.R. Dewey

= ***Agropyron spicatum* (Pursh) Scribner & Smith**

- South Fork Birch Creek, rock outcrops within forest, rare, 6485.

FESTUCA ALTAICA Trin.

- Lime Peak, herbaceous heath, common, 4731.
- Mt. Schwatka, moist shrub heath meadow, 5048.
- Mt. Prindle vicinity, meadows and mesic tundra, common.
- White Mountains, VABM Fossil, heath, frequent, 5633.
- Victoria Mountain ridge, moist draw.
- East Crazy Mountains, mesic alpine tundra and forest openings, common.
- West Crazy Mountains, mesic to dry tundra, forest openings, common to abundant.
- South Fork Birch Creek, mesic herbaceous heath and moist meadows.

FESTUCA BAFFINENSIS Polunin

- Mt. Schwatka, limestone outcrops and scree, 4958.

FESTUCA BRACHYPHYLLA Schultes & Schultes F.

- Lime Peak, ephemeral pools, scree, sheep perches, scattered, 4742, 4838, 4838, 94-145.
- Mt. Schwatka, rocky frost boil summit, 5025.
- White Mountains, VABM Fossil, moist fines of mineral contact zone, 5643.
- South Fork Birch Creek, base of outcrops in dry fellfield, 6539.

FESTUCA LENENSIS Drobov

= ***F. ovina* L. ssp. *alaskana* Holmen in part**

Beringian endemic widespread in East Asia and recently recognized in the North American flora. Ranked S2S3 by ANHP.

- Mt. Schwatka, limestone outcrops and scree, scattered, 4916, 4945.
- Victoria Mountain ridge, disturbed sheep area on limestone, 5698, 12062.

FESTUCA RUBRA L.

- Mt. Schwatka, moist shrub heath meadow and herbaceous sheep perches, 4927, 5055.
- South Fork Birch Creek, moist herbaceous sites near outcrops, 6589.

FESTUCA VIVIPARA (L.) Smith

- White Mountains, VABM Fossil, heath at base of limestone tors, 5661.

HIEROCHLOE ALPINA (Sw.) Roemer & Schultes

Alpine Holy Grass

- Lime Peak, herbaceous heath, common, 4743.
- Mt. Schwatka, rocky frost boils, 5026.
- Mt. Prindle vicinity, dry alpine tundra, common.
- White Mountains, VABM Fossil.
- East Crazy Mountains, dry tundra and rocky forest openings.
- West Crazy Mountains, dry tundra, abundant.
- South Fork Birch Creek.

HIEROCHLOE ODORATA (L.) P. Beauv.

Vanilla Grass

- Big Windy Hot Springs, forest - canary grass meadow margin, rare, 6603.

POA ABBREVIATA R. Br.

- Lime Peak, herbaceous heath patch at base of tors, rare, 4878.

PHALARIS ARUNDINACEA L.

Reed Canary Grass

Minor range extension within Alaska where it is known from several very disjunct localities in the interior. Ranked S3 by ANHP.

- Big Windy Hot Springs, wet seepage meadow at hot springs, abundant, 6612.

POA ALPIGENA (Fries) Lindman

- Big Windy Hot Springs, Juday s.n.

POA ARCTICA R. Br.

- Lime Peak, snowmelt meadows, herbaceous sheep perches, frequent, 4832, 5490, 94-129.
- White Mountains, VABM Fossil, moist mossy draw, sheep perches, common, 5645, 5649, 5674.
- East Crazy Mountains, alpine tundra.
- West Crazy Mountains, dry tundra.
- South Fork Birch Creek, dry rocky fellfield and herbaceous heath, frequent, 6371, 6528.

POA GLAUCA M. Vahl

- Mt. Schwatka, limestone screes, sheep perches, frost boils, scattered, 4917, 4966, 4999, 5024.
- East Crazy Mountains, dry gravelly soils.
- West Crazy Mountains, dry tundra, screes, and outcrops, 95-248, 95-267, 95-272.
- South Fork Birch Creek, fellfield and rock outcrops, 6401, 6506.
- Big Windy Hot Springs, ledges on granitic rock wall, 6601.

POA PAUCISPICULA Scribner & Merr.

Beringian endemic.

- Lime Peak, gelifluction lobes and snowmelt meadows, 94-152, 94-158.
- South Fork Birch Creek, moist herbaceous draw, 6578.

POA PORSILDII Gjaerevoll

= *Poa vaseyochloa* Scribner *sensu* Hultén

East Beringian endemic, narrowly restricted to eastern interior Alaska and central Yukon Territory, Canada. Ranked S2 by ANHP.

- White Mountains, VABM Fossil, moist herbaceous heath gully, rare, 5634.
- South Fork Birch Creek, moist herbaceous heath and mossy hummocks, scattered, 6378, 6436, 6454, 6493, 6562.

POA PRATENSIS L.

- Big Windy Hot Springs, wet disturbed soil of wildlife lick, rare, 6634.

POA PSEUDOABBREVIATA Rosch.

Beringian endemic.

- Mt. Schwatka, limestone ridge, 5078.

PUCCINELLIA BOREALIS Swallen

Beringian endemic.

- Big Windy Hot Springs, wet alkaline terraces, rare, 6594.

PUCCINELLIA INTERIOR T. Sorensen

East Beringian endemic.

- Big Windy Hot Springs, wet alkaline terraces, rare, 6605.

TRisetum sIBIRICUM Rupr. ssp. **LITORALE** (Rupr.) Rosch.

Circumpolar, having few known localities in northern Alaska. Ranked S2 by ANHP.

- Mt. Schwatka, moist shrub herbaceous heath along stream, rare, 5079.

TRisetum SPICATUM (L.) K. Richter

- Lime Peak, moist meadows below gelifluction lobes, 94-146.
- Mt. Schwatka, herbaceous sheep perch on limestone, 4940.
- White Mountains, VABM Fossil, sheep perch on limestone, 5653.
- West Crazy Mountains, dry rocky tundra and scree.
- South Fork Birch Creek, herbaceous streamside, 6587.
- Big Windy Hot Springs, moist soil along stream, 6641.

Polemoniaceae (Phlox Family)

PHLOX ALASKENSIS Jordal

= *P. sibirica* L. ssp. *sibirica*

Beringian endemic and minor range extension, new to Yukon-Tanana Uplands.

- Mt. Schwatka, rocky limestone herbaceous heath, scattered, 4946.
- White Mountains, VABM Fossil, low limestone heath, rare, 5627.
- Victoria Mountain ridge, dry exposed ridges, 12054.

PHLOX HOODII Richardson

Minor westward range extension within Yukon-Tanana Uplands.

Ranked S1S2 by ANHP.

- South Fork Birch Creek, rock outcrops on white spruce slope, rare, 6505A.

POLEMONIUM ACUTIFLORUM Willd.

Jacob's Ladder

- Lime Peak, moist herbaceous and snowmelt meadows, scattered, 4797, 4804.
- Mt. Schwatka, herbaceous sheep perch, 4955.
- Mt. Prindle vicinity, moist tundra and subalpine meadows.
- White Mountains, VABM Fossil, heath shrub tundra, 5623.
- Victoria Mountain ridge, mesic herbaceous heath near treeline.
- South Fork Birch Creek.

POLEMONIUM BOREALE J. Adams

Northern Jacob's Ladder

Beringian endemic.

- Mt. Schwatka, herbaceous sheep perch, rare, 4959.
- White Mountains, VABM Fossil, moist lichen moss heath.
- East Crazy Mountains, limestone outcrops, ledges and crevices, 95-285.

POLEMONIUM PULCHERRIMUM Hook.

Pretty Jacob's Ladder

- South Fork Birch Creek, herbaceous site under outcrop, rare, 6397.

Polygonaceae (Buckwheat Family)

BISTORTA PLUMOSA (Small) E. Greene

Pink Bistort

= *Polygonum bistorta* L.

- Lime Peak, herbaceous heath, scattered, 4820.
- Mt. Schwatka, moist shrub herbaceous heath meadow, 5074.
- Mt. Prindle vicinity, moist alpine tundra.
- White Mountains, VABM Fossil, dryas heath around tors.
- East Crazy Mountains, moist tundra and openings in boggy thickets.
- West Crazy Mountains, moist tundra, common.
- South Fork Birch Creek.

BISTORTA VIVIPARA (L.) Gray

Alpine Bistort

= *Polygonum vivipara* L.

- Lime Peak, mesic to moist heath and meadows, scattered.
- Mt. Schwatka, limestone scree and dryas mats, 4941.
- Mt. Prindle vicinity, alpine tundra.
- White Mountains, VABM Fossil, seepage area in limestone.
- East Crazy Mountains, mesic calcareous slopes and forest openings, 95-286.
- West Crazy Mountains, moist to dry tundra, common.
- South Fork Birch Creek.
- Big Windy Hot Springs, wet disturbed soil of wildlife lick.

OXYRIA DIGYNA (L.) Hill

Mountain Sorrel

- Lime Peak, herbaceous sheep perch, scattered to rare, 4825.
- Mt. Schwatka, herbaceous heath at base of limestone scree, scattered.

- White Mountains, VABM Fossil, moist disturbed sites in heath, 5631.
- Victoria Mountain ridge, mesic heath near treeline.
- West Crazy Mountains, moist fens on sheltered slope, 95-216.
- South Fork Birch Creek, moist herbaceous draw, 6479.

POLYGONUM ALASKANUM (Small) W. Wight
Wild Rhubarb

East Beringian endemic.

- Mt. Prindle vicinity, shrub tundra, thicket margins in lower valley.
- East Crazy Mountains, moist mossy soils, treeline to alpine.
- South Fork Birch Creek.
- Big Windy Hot Springs, canary grass - forest margin, infrequent, Juday s.n.

RUMEX ACETOSA L. ssp. ALPESTRIS (Scop.) Loeve
Sheep Sorrel

Rare in eastern interior Alaska.

- Mt. Schwatka, moist tundra meadow, 5012.
- Serpentine Slide, barren knoll, 12077
- White Mountains, VABM Fossil, moist, mossy draw, scattered to rare, 5673.

RUMEX ARCTICUS Trautv.
Arctic Dock

Beringian endemic.

- South Fork Birch Creek, moist graminoid meadow, rare, 6530.

Portulacaceae (Purslane Family)

CLAYTONIA SARMENTOSA C. Meyer
Spring Beauty

Beringian endemic.

- Lime Peak, moist graminoid meadow, rare, 4856.
- Mt. Prindle vicinity, seepages on slopes, 94-101.

CLAYTONIA TUBEROSA Pallas
Beringian endemic.

- Serpentine Slide, barren knoll, 12078.
- South Fork Birch Creek, wet mossy seepage area in heath, rare to scattered, 6428.

MONTIA BOSTOCKII (A. Pors.) Welsh
= *Claytonia bostockii* A. Pors.
Narrowly restricted East Beringian endemic, range extension within Yukon-Tanana Uplands. Ranked S3 by ANHP.

- South Fork Birch Creek, wet mossy sites in herbaceous heath tundra, scattered, 6406, 6433, 6501.

Primulaceae (Primrose Family)

ANDROSACE CHAMAEJASME Host
Rock Jasmine

- Lime Peak, grus slope and wet snowmelt patches, rare, 4772, 5491.
- Mt. Schwatka, dryas mat on limestone, scattered, 4903.
- White Mountains, VABM Fossil, dry dryas lichen fellfield.
- Victoria Mountain ridge, dry tundra and screes.
- East Crazy Mountains, sedge and dryas tundra on calcareous slopes, common, 95-297.

- South Fork Birch Creek.

ANDROSACE SEPTENTRIONALIS L.

- West Crazy Mountains, Preacher Creek, bare soil on steppe bluff, 95-270.
- South Fork Birch Creek, lush sheep perch on top of outcrops, 6550.

DODECATHEON FRIGIDUM Cham. & Schldl.
Shooting Star

Beringian endemic.

- Lime Peak, moist front of gelifluction lobe, 4727, 4806.
- Mt. Schwatka, moist shrub heath meadow along stream, 5038.
- Mt. Prindle vicinity, mesic alpine slopes and subalpine meadows.
- White Mountains, VABM Fossil, heath tundra, 5630.
- South Fork Birch Creek, moist herbaceous fronts of gelifluction lobes.

DOUGLASIA ARCTICA Hook.
Narrowly restricted East Beringian endemic. Ranked S2S3 by ANHP.

- Mt. Schwatka, moist tundra meadow on volcanic rock, rare, 4894, 4995, 5018.
- White Mountains, VABM Fossil, low heath on limestone-volcanic contact, rare, 5620.
- Victoria Mountain ridge, acidic rock screes, scattered to rare, 12068.

DOUGLASIA GORMANII Constance
East Beringian endemic. Ranked S2S3 by ANHP.

- West Crazy Mountains, screes and exposed ridge crests, 95-224, 95-233.

PRIMULA EXIMIA E. Greene
= *P. tschuktschorum* Kjellman var. *arctica* (Koidz.) Fern.
Beringian endemic, second locality for Yukon-Tanana Uplands.

- South Fork Birch Creek, moist, lush snowmelt patch, rare, 6443.

TRIENTALIS EUROPAEA L.
Starflower

- Big Windy Hot Springs, fern understory, rare, 6640.

Pyrolaceae (Wintergreen Family)

ORTHILIA SECUNDA (L.) House ssp. OBTUSATA (Turcz.) Bocher
One-sided Wintergreen

- = *Pyrola secunda* L.**
- Lime Peak, snowmelt area, rare, 4855C.
 - Mt. Schwatka, herbaceous heath at base of limestone scree, scattered.
 - West Crazy Mountains, moist tundra on sheltered slopes, uncommon.

PYROLA ASARIFOLIA Michaux
Pink Pyrola

- Lime Peak, herbaceous heath, rare, 4855B.
- Big Windy Hot Springs, forest understory, rare, 6629.

PYROLA GRANDIFLORA RADIUS**Large-flowered Wintergreen**

- Lime Peak, snowmelt patches, rare, 4855C, 5501.
- Mt. Schwatka, herbaceous heath and wet snowmelt patches, 4976, 5086.
- Mt. Prindle vicinity, thickets and shrub tundra.
- White Mountains, VABM Fossil, heath on volcanic boulders.
- East Crazy Mountains, birch thickets and openings in white spruce forest.
- West Crazy Mountains, mesic soil and in moss in shrub tundra and thickets.
- South Fork Birch Creek, moist herbaceous heath, rare, 6381.

PYROLA MINOR L.**Small-flowered Wintergreen***Northern edge of range.*

- Mt. Prindle vicinity, subalpine meadows, moist tundra, 94-121.
- South Fork Birch Creek, open low heath in snowmelt patch, rare, 6529.

Ranunculaceae (Buttercup Family)**ACONITUM DELPHINIFOLIUM DC.****Monkshood**

- Lime Peak, gelifluction lobe, 94-148.
- Mt. Schwatka, herbaceous heath at base of limestone scree.
- Mt. Prindle vicinity, subalpine meadows.
- White Mountains, VABM Fossil, seepage area on limestone.
- East Crazy Mountains, rocky south slopes, 95-279.
- West Crazy Mountains, dry tundra, scattered.
- South Fork Birch Creek, moist herbaceous patch among rocks, 6431.
- Big Windy Hot Springs, wet canary grass meadow, scattered, 6619.

ACTAEA RUBRA (Aiton) Willd.**Baneberry**

- Big Windy Hot Springs, forest understory, rare, 6627.

ANEMONE DRUMMONDII S. Watson**Blue Anemone**

- Lime Peak, barren grus, rare, 4857.
- Mt. Schwatka, herbaceous sheep perch, rare, 4896.
- White Mountains, VABM Fossil, among volcanic boulders, rare, 5609.
- Victoria Mountain ridge, limestone scree, 5701, 12064.
- East Crazy Mountains, limestone outcrop ledges and crevices, 95-291.
- South Fork Birch Creek, dry fellfield and lush herbaceous slope, 6376, 6535.

ANEMONE NARCISSIFLORA L.**Narcissus-flowered Anemone**

- Lime Peak, moist herbaceous patches among tors and grus slopes, common, 4720, 4732.
- Mt. Schwatka, rocky, volcanic heath slope, 5031.
- Mt. Prindle vicinity, mesic to dry tundra, common.
- White Mountains, VABM Fossil, rocky, low heath, common, 5611.
- Victoria Mountain ridge, moist draw.
- East Crazy Mountains, rocky alpine tundra.

- West Crazy Mountains, moist hummocks to dry, exposed screes, common.
- South Fork Birch Creek, moist herbaceous gelifluction lobe front, common.

ANEMONE PARVIFLORA Michaux**Windflower**

- Lime Peak, moist snowmelt meadow, frequent, 4799.
- Mt. Schwatka, rocky, limestone heath, 4964.
- Mt. Prindle vicinity, subalpine meadows, 94-119.
- White Mountains, VABM Fossil, moist herbaceous draw.
- Victoria Mountain ridge, moist draw.
- East Crazy Mountains, mesic alpine tundra.
- West Crazy Mountains, moist sheltered sites, scattered.
- South Fork Birch Creek.

ANEMONE RICHARDSONII Hook.**Yellow Anemone**

- Lime Peak, moist front of gelifluction lobe, scattered to rare, 4802.
- Mt. Schwatka, moist herbaceous shrub heath meadow, 5043.
- Mt. Prindle vicinity, thickets and subalpine meadows.
- White Mountains, VABM Fossil, moist herbaceous heath draw, rare, 5635.
- Victoria Mountain ridge, herbaceous heath near treeline.
- West Crazy Mountains, moist fens and thickets.
- South Fork Birch Creek, moist draw, 6480.

DELPHINIUM GLAUCUM S. Watson**Larkspur**

- Mt. Schwatka, herbaceous heath at base of limestone scree, scattered to rare.
- White Mountains, VABM Fossil, sheltered sites among limestone boulders.
- Victoria Mountain ridge, herbaceous heath near treeline.
- South Fork Birch Creek, sheltered herbaceous patches among rocks, rare, 6546.
- Big Windy Hot Springs, aspen stand at top of headwall, rare, 6645.

PULSATILLA PATENS (L.) Miller**Pasque Flower**

- West Crazy Mountains, Preacher Creek, steppe bluff, 95-256.

RANUNCULUS CYMBALARIA Pursh

- Big Windy Hot Springs, wet alkaline terraces, scattered, 6606.

RANUNCULUS ESCHSCHOLTZII Schlechter**Mountain Buttercup**

- South Fork Birch Creek, wet tussocks, scattered to rare, 6388.

RANUNCULUS GLACIALIS L. ssp. CAMISSONIS (Schlechter) Hultén

Beringian endemic, known from only a few highly disjunct localities in Alaska.. Ranked S2 by ANHP.

- Lime Peak, snowmelt patch, rare, 5497.
- Mt. Prindle vicinity, wet sedge basins, 94-112.

RANUNCULUS HYPERBOREUS Rottb.**Creeping Buttercup**

- Big Windy Hot Springs, cold seepage area at base of granite face, rare, 6623.

RANUNCULUS NIVALIS L.**Snow Buttercup**

- Lime Peak, moist snowmelt meadows and moist herbaceous sites, frequent, 4729, 4758, 4843.
- Mt. Schwatka, seepage area on volcanic slope, 5033.
- White Mountains, VABM Fossil, moist moss, 5641.
- South Fork Birch Creek, moist herbaceous heath and snowmelt patches, 6387, 6447, 6521.

RANUNCULUS PEDATIFIDUS Smith ssp. AFFINIS (R. Br.) Hultén

- South Fork Birch Creek, herbaceous sheep perch on rock outcrop, 6580.

RANUNCULUS PYGMAEUS Wahlenb.

- South Fork Birch Creek, in moss on rock face and moist herbaceous sites, 6457, 6590.

RANUNCULUS SULPHUREUS Sol.

- Lime Peak, snowmelt meadow, scattered, 4787.

THALICTRUM ALPINUM L.**Alpine Meadow Rue**

- Mt. Schwatka, limestone outcrops and scree, 4888.
- South Fork Birch Creek.

Rosaceae (Rose Family)**ACOMASTYLIS ROSSII (R. Br.) E. Greene****Ross's Avens****= *Geum rossii* (R.Br.) Ser*****Beringian endemic.***

- Lime Peak, moist herbaceous heath meadow, rare, 4736.
- White Mountains, VABM Fossil, moist fines in mineral contact zone, rare, 5642.
- South Fork Birch Creek, mesic heath, 6393.

DRYAS ALASKENSIS A. Pors.**Alaska Avens****= *D. octopetala* L. ssp. *alaskensis* (A. Pors.) Hultén*****East Beringian endemic.***

- Lime Peak, moist snowmelt patches and herbaceous heath, common to abundant, 4798, 4815.
- Mt. Schwatka, rocky limestone heath, 4969A.
- Mt. Prindle vicinity, moist sheltered alpine tundra.
- White Mountains, VABM Fossil, moist shady base of limestone tors.
- Victoria Mountain ridge, moist draw.
- East Crazy Mountains, weakly calcareous slopes at treeline.
- West Crazy Mountains, open thickets, fens and limestone outcrops, 95-273.
- South Fork Birch Creek, herbaceous heath, 6471.

DRYAS INTEGRIFOLIA M. Vahl ssp. INTEGRIFOLIA

- Mt. Schwatka, rocky limestone heath, 4969B.
- White Mountains, VABM Fossil.
- East Crazy Mountains, dry tundra, especially on limestone slopes and outcrops, 95-302.
- West Crazy Mountains, dry tundra on ridge crests, scattered.
- South Fork Birch Creek, wet mossy seepage within heath, 6438.

DRYAS OCTOPETALA L.**Eight-petalled Avens**

- Lime Peak, fellfield, common to abundant, 4717.
- Mt. Schwatka, dry rocky dryas heath, common to abundant, 4992.
- Mt. Prindle vicinity, dry exposed alpine tundra.
- White Mountains, VABM Fossil, low heath on limestone, abundant, 5619.
- Victoria Mountain ridge, dry dryas-lichen tundra, common to abundant.
- East Crazy Mountains, dry tundra.
- West Crazy Mountains, dry tundra on ridge crests and exposed slopes, common.
- South Fork Birch Creek, dry dryas tundra, common to abundant.

DRYAS SYLVATICA (Hultén) A. Pors.**= *D. integrifolia* M. Vahl ssp. *sylvatica* (Hultén) Hultén**

- Mt. Schwatka, treeline below limestone tors, scattered, 5064.

NOVOSIEVERSIA GLACIALIS (J. Adams) F. Bolle**= *Geum glaciale* J. Adams*****Beringian endemic, minor southward range extension.***

- White Mountains, VABM Fossil, rocky limestone low heath, rare, 5612.
- South Fork Birch Creek, moist heath, rare, 6379.

PENTAPHYLLOIDES FLORIBUNDA (Pursh) A. Loeve**Tundra Rose****= *Potentilla fruticosa* L.**

- Mt. Schwatka, herbaceous heath, scattered, 4989.
- White Mountains, VABM Fossil, limestone scree and heath.
- Mt. Prindle vicinity, shrub tundra in lower valley.
- East Crazy Mountains, lower slopes and openings in spruce forest, common.
- South Fork Birch Creek.

POTENTILLA BIFLORA Willd. ex Schldl.

- White Mountains, VABM Fossil, heath at base of limestone tors, rare, 5667.
- South Fork Birch Creek, dry fellfield, 6407.

POTENTILLA ELEGANS Cham. & Schldl.***Beringian endemic.***

- Lime Peak, grus and seepage areas at base of tors, rare, 4824.
- Mt. Prindle vicinity, outcrop crevices.
- South Fork Birch Creek, moist rock ledges, 6437.

POTENTILLA HOOKERIANA Lehm.

- East Crazy Mountains, limestone outcrops ledges and crevices.
- West Crazy Mountains, Preacher Creek, steppe bluff, 95-262.

- South Fork Birch Creek, rock outcrops on heath ridges, rare to infrequent, 6494.

POTENTILLA HYPARCTICA Malte

- Lime Peak, mesic herbaceous sites and sheep perches, scattered to rare, 4744, 4828, 5493.

POTENTILLA NIVEA L.

- Lime Peak, summit of small rock tors, rare, 4854.
- West Crazy Mountains, limestone outcrops, ledges and crevices in limestone, 5724, 95-274.
- South Fork Birch Creek, scree in heavy sheep use area, rare, 6579.

POTENTILLA PENNSYLVANICA L.

- West Crazy Mountains, Preacher Creek, steppe bluff.
- South Fork Birch Creek, lush herbaceous sheep perches, rare, 6548.
- Big Windy Hot Springs, sheep perches on granitic outcrop, rare, 6613.

POTENTILLA UNIFLORA Ledeb.

Single-flowered Cinquefoil

- Lime Peak, moist herbaceous heath, scattered, 4722, 4756.
- Mt. Schwatka, limestone outcrops and scree, 4918, 4919, 4920.
- White Mountains, VABM Fossil, limestone scree and volcanic boulders, 5660, 5686.
- Victoria Mountain ridge, limestone scree and disturbed sheep areas, 5696, 5697, 5710, 5717.
- East Crazy Mountains, rocky soils, screes, ledges, and crevices in outcrops.
- South Fork Birch Creek, rock outcrops, scattered, 6410, 6440, 6491, 6558, 6559, 6571, 6572, 6573.

ROSA ACICULARIS Lindley

Wild Rose

- Mt. Schwatka, moist herbaceous shrub heath meadow, 5049.
- East Crazy Mountains, south slopes, rare.
- West Crazy Mountains, near treeline and on steppe bluff, scattered.
- South Fork Birch Creek, drier lower slopes near treeline and base of outcrops.
- Big Windy Hot Springs, canary grass meadow margin, forest understory.

RUBUS ARCTICUS L.

Nagoon Berry

- Mt. Prindle vicinity, shrub tundra in lower valley.

RUBUS CHAMAEMORUS L.

Cloudberry

- Victoria Mountain ridge, moist sites near treeline.
- Mt. Prindle vicinity, shrub tundra.
- East Crazy Mountains, boggy, *Sphagnum* openings in birch and alder thickets.
- West Crazy Mountains, moist tundra and openings in thickets.
- South Fork Birch Creek.

RUBUS IDAEUS L.

Raspberry

- Big Windy Hot Springs, moist to wet canary grass meadow, scattered to rare.

SIBBALDIA PROCUMBENS L.

- Lime Peak, gravelly disturbed soil, rare, 94-160.
- Mt. Prindle vicinity, mesic to dry tundra, 94-107.
- South Fork Birch Creek, disturbed soil in snowmelt patch, rare, 6531.

SPIRAEA STEVENII (C. Schneider) Rydb.

Alaska Spiraea

= *S. beauverdiana* C. Schneider

- Lime Peak, lower slopes near treeline.
- Victoria Mountain ridge, moist heath sites near treeline.
- Mt. Prindle vicinity, sheltered slopes in lower valley, scattered.
- West Crazy Mountains, sheltered slopes near treeline.
- South Fork Birch Creek.

Rubiaceae (Bedstraw Family)

GALIUM BOREALE L.

Northern Bedstraw

- Big Windy Hot Springs, dry aspen understory on granitic outcrop, common.

Salicaceae (Willow Family)

SALIX ALAXENSIS (Andersson) Cov.

Felt-leaf Willow

- Lime Peak, thickets along small stream, abundant, 4822.
- Mt. Schwatka, moist herbaceous shrub heath meadow, 5046.
- White Mountains, VABM Fossil, heath on lower slopes and moist gullies.
- South Fork Birch Creek.
- Big Windy Hot Springs, streamside, common.

SALIX ARBUSCULOIDES Andersson

Littletree Willow

- South Fork Birch Creek, at treeline.

SALIX ARCTICA Pallas

Arctic Dwarf Willow

- Mt. Schwatka, rocky limestone heath, 4971.
- White Mountains, VABM Fossil, dry dryas-lichen tundra on limestone.
- Victoria Mountain ridge, dry dryas fellfield and heath.
- East Crazy Mountains, alpine tundra, openings in forest near treeline, 95-283, 95-319.
- West Crazy Mountains, shrub tundra, 95-245.
- South Fork Birch Creek, mesic to moist heath and snowmelt meadows.

SALIX BEBBIANA Sarg.

Bebb Willow

- Big Windy Hot Springs, streamside and in aspen, common.

SALIX BRACHYCARPA Nutt. ssp. NIPHOCALADA (Rydb.)**Argus**

- Lime Peak, ridges and slope, 4761.
- White Mountains, VABM Fossil, limestone rubble, rare.
- Serpentine Slide, barren knoll, 12075
- Victoria Mountain ridge, lower limestone slopes, 5712.
- West Crazy Mountains, shrub tundra on sheltered slopes and ridges, 95-209.

SALIX CHAMISSONIS Andersson**Chamisso Willow***Beringian endemic.*

- Lime Peak, herbaceous heath and snowmelt meadows, scattered to frequent, 4773, 4757, 4793, 4807, 4849, 5504.
- Mt. Prindle vicinity, moist to wet tundra, common.
- South Fork Birch Creek, herbaceous heath and moist gelifluction lobes, 6470, 6526.

SALIX GLAUCA L.**Grayleaf Willow**

- Mt. Schwatka, shrub heath on limestone, 4924.
- East Crazy Mountains, sheltered sites on tundra and openings in forest.
- West Crazy Mountains, tundra, scattered.
- South Fork Birch Creek, rock outcrops at treeline, 6525.

SALIX HASTATA L.

- Mt. Schwatka, shrub heath on limestone, 4979.

SALIX LANATA L. ssp. RICHARDSONII (Hook.) A.**Skvortsov****Richardson's Willow**

- Mt. Schwatka, moist draw.
- West Crazy Mountains, wet sheltered draws, forming thickets, 95-255.
- South Fork Birch Creek, herbaceous heath, 6474.

SALIX PHLEBOPHYLLA Andersson*Beringian endemic.*

- Lime Peak, herbaceous heath and dry snowmelt patches, 4760, 4784, 4821.
- Mt. Schwatka, dry rocky dryas heath, common, 4994, 5030.
- East Crazy Mountains, rocky exposed tundra.
- West Crazy Mountains, moist mossy hummocks and dry dryas tundra, 95-252, 95-253.
- South Fork Birch Creek, dry rocky tundra.

SALIX PLANIFOLIA Pursh ssp. PULCHRA (Cham.)**Argus****Diamond-leaf Willow****= *S. pulchra* Cham.**

- Lime Peak, herbaceous heath, common to abundant, 4740.
- Mt. Schwatka, moist shrub herbaceous heath meadow, 5072.
- Mt. Prindle vicinity, shrub tundra and thickets, common.
- White Mountains, VABM Fossil, heath on lower slope and moist gullies.
- East Crazy Mountains, moist tundra and forest openings.
- West Crazy Mountains, moist sheltered draws and tundra slopes, 95-244.

- South Fork Birch Creek, moist heath and lower slopes.

SALIX POLARIS Wahlenb.

- Lime Peak, herbaceous heath and snowmelt patches, 4754, 4814, 94-135.
- Mt. Schwatka, wet snowmelt patch, 5088.
- South Fork Birch Creek, mossy heath and wet seepage areas, 6429, 6450, 6568.

SALIX PSEUDOMONTICOLA C.R. Ball**= *S. padophylla* Rydb.**

- East Crazy Mountains, openings and understory of forest near treeline, 95-305.

SALIX RETICULATA L.**Net-veined Willow**

- Lime Peak, moist snowmelt patch, scattered to frequent, 4868.
- Mt. Schwatka, limestone heath, 4956.
- Mt. Prindle vicinity, mesic alpine tundra.
- White Mountains, VABM Fossil, dry dryas-lichen tundra and moist herbaceous.
- Victoria Mountain ridge, dry dryas fellfield, heath, and moist draw.
- East Crazy Mountains, mesic tundra, forest and thicket openings.
- West Crazy Mountains, fens and dry tundra, abundant.
- South Fork Birch Creek.

SALIX ROTUNDIFOLIA Trautv.**Least Willow**

- Mt. Prindle vicinity, mesic to dry alpine tundra and scree.
- White Mountains, VABM Fossil, limestone rubble and moist sites, scattered, 5668.
- Victoria Mountain ridge, dry dryas fellfield.
- South Fork Birch Creek.

Santalaceae (Sandalwood Family)**GEOCAULON LIVIDUM (Richardson) Fern.****Pumpkin Berry**

- Mt. Schwatka, treeline as base of limestone tors, scattered, 5066.
- East Crazy Mountains, forests and forest openings near treeline.
- South Fork Birch Creek.

Saxifragaceae (Saxifrage Family)**BOYKINIA RICHARDSONII (Hook.) A. Gray****Bearflower***East Beringian endemic.*

- White Mountains, VABM Fossil, mesic sites at base of tors, rare.
- South Fork Birch Creek, mesic to moist heath, scattered.

CHRYSOSPLENIUM TETRANDRUM (N. Lund) T.C.E.**Fries****Northern Water Carpet**

- South Fork Birch Creek, wet streamside, rare, 6584.
- Big Windy Hot Springs, wet mossy seepage among rocks, 6625.

PARNASSIA KOTZEBUEI Cham. & Schldl.

Small Grass-of-Parnassus

- Mt. Schwatka, limestone heath, 4932.
- South Fork Birch Creek, moist herbaceous draw, 6574.
- Big Windy Hot Springs, wet canary grass meadow.

PARNASSIA PALUSTRIS L.

Grass-of Parnassus

- Big Windy Hot Springs, wet canary grass meadow.

SAXIFRAGA BRONCHIALIS L.

Yellow Spotted Saxifrage

- Lime Peak, rocky fellfield, scattered to rare.
- Mt. Schwatka, herbaceous heath at base of limestone scree, scattered to rare.
- White Mountains, VABM Fossil, moist fines of mineral contact zone, rare.
- West Crazy Mountains, with dryas on exposed site, rare.
- South Fork Birch Creek.

SAXIFRAGA CAESPITOSA L.

Tufted Saxifrage

Minor range extension, new to Yukon-Tanana Uplands.

- White Mountains, VABM Fossil, limestone tor, rare, 5682.

SAXIFRAGA CALYCINA Sternb.

= *S. davurica* Willd. ssp. *grandipetala* (Engler & Irmsch.) Hultén

Beringian endemic.

- Lime Peak, ephemeral pools, 94-144.
- South Fork Birch Creek, mesic heath and moist open draw, rare, 6390, 6478.

SAXIFRAGA CERNUA L.

Bulblet Saxifrage

- Lime Peak, herbaceous patches at base of tors, rare, 4846.
- Mt. Schwatka, limestone rock crevices, rare, 4939.
- White Mountains, VABM Fossil, moist fines of mineral contact zone, rare.
- South Fork Birch Creek, moist grassy site among rocks, 6427.

SAXIFRAGA FLAGELLARIS Willd.

Spider Plant

- White Mountains, VABM Fossil, moist fines of mineral contact zone, rare, 5640.
- South Fork Birch Creek, moist herbaceous heath, 6456.

SAXIFRAGA FOLIOLOSA R. Br.

Grained Saxifrage

- Lime Peak, disturbed gravelly sites and near tors, rare, 5499, 94-162.

SAXIFRAGA HIERACIFOLIA Waldst. & Kit.

Stiff-stemmed Saxifrage

- Lime Peak, snowmelt patch, 94-125.
- Mt. Schwatka, moist heath, scattered, 4944.
- Mt. Prindle vicinity, moist shrub tundra and thickets in lower valley.

- White Mountains, VABM Fossil, moist herbaceous draw, scattered to rare, 5632.
- South Fork Birch Creek, snowmelt meadows.

SAXIFRAGA HIRCULUS L.

Bog Saxifrage

- Mt. Schwatka, herbaceous heath at base of limestone scree, rare.
- White Mountains, VABM Fossil, moist fines of mineral contact zone, rare.
- Victoria Mountain ridge, moist heath near treeline.
- South Fork Birch Creek.

SAXIFRAGA NELSONIANA D. Don

Brook Saxifrage

= *S. punctata* L. ssp. *nelsoniana* (D. Don) Hultén

Beringian endemic.

- Lime Peak, snowmelt patches and moist shrub thicket, scattered to frequent, 4853, 4867, 94-126.
- Mt. Schwatka, herbaceous moss meadow, scattered, 5005.
- Mt. Prindle vicinity, moist depression, gullies, seepages.
- White Mountains, VABM Fossil, moist herbaceous draw, scattered to rare.
- East Crazy Mountains, moist tundra and openings in birch and alder thickets.
- West Crazy Mountains, shrub tundra and moist openings in thickets, 95-202.
- South Fork Birch Creek, mossy rock face, rare, 6460.
- Big Windy Hot Springs, Juday s.n.

SAXIFRAGA NIVALIS L.

Snow Saxifrage

- White Mountains, VABM Fossil, moist fines of mineral contact zone, rare, 5639.

SAXIFRAGA OPPOSITIFOLIA L.

Purple Mountain Saxifrage

- Mt. Schwatka, limestone outcrops and scree, scattered, 4904.
- White Mountains, VABM Fossil, moist limestone scree, scattered to common, 5621.
- Victoria Mountain ridge, screes and dry dryas tundra, scattered.
- East Crazy Mountains, rock outcrops and scree.
- South Fork Birch Creek, wet mossy seepage area, rare, 6412.

SAXIFRAGA REFLEXA Hook.

East Beringian endemic.

- Lime Peak, herbaceous heath, rare, 4753, 4818.
- Mt. Schwatka, limestone outcrops and scree, scattered, 4882.
- White Mountains, VABM Fossil, base of limestone tors, rare, 5663.
- Victoria Mountain ridge, 12071.
- East Crazy Mountains, rocky tundra and outcrops.
- West Crazy Mountains, dry tundra, outcrops and steppe bluff, 95-242.
- South Fork Birch Creek, rock outcrops on heath ridge, 6512.

SAXIFRAGA RIVULARIS L.

- Lime Peak, wet rock crevices and stream banks, rare, 4767, 4835.
- White Mountains, VABM Fossil, moist fines of mineral contact zone, rare.

SAXIFRAGA SPICATA D. Don**Spiked Saxifrage**

East Beringian endemic.

- White Mountains, VABM Fossil, moist mossy draw under willow, rare, 5694.

SAXIFRAGA TRICUSPIDATA Rottb.**Three-toothed Saxifrage**

- Lime Peak, tops of granitic tors, scattered, 4851.
- Mt. Schwatka, limestone outcrops and scree, common, 4881.
- White Mountains, VABM Fossil.
- Victoria Mountain ridge, dry heath and scree, scattered.
- East Crazy Mountains, dry rocky slopes and outcrops.
- West Crazy Mountains, dry rocky tundra, screes, outcrops.
- South Fork Birch Creek, rock outcrops at treeline, rare, 6490.
- Big Windy Hot Springs, margin of moist canary grass meadow.

Scrophulariaceae (Figwort Family)**CASTILLEJA CAUDATA (Pennell) Rebrist.****Yellow Paintbrush**

Beringian endemic.

- Victoria Mountain ridge, moist herbaceous heath draw, 5711.
- West Crazy Mountains, dry rocky dryas tundra, 95-251.

CASTILLEJA ELEGANS Malte**Elegant Paintbrush**

Beringian endemic.

- South Fork Birch Creek, dryas lichen tundra, rare, 6380, 6513.

CASTILLEJA HYPERBOREA Pennell**Paintbrush**

East Beringian endemic.

- Lime Peak, herbaceous heath, scattered, 4752.
- Mt. Schwatka, herbaceous heath, scattered, 4987.
- Mt. Prindle vicinity, mesic alpine tundra.
- White Mountains, VABM Fossil, limestone heath, 5655.
- East Crazy Mountains, alpine tundra.
- South Fork Birch Creek, mesic herbaceous heath, 6392.

LAGOTIS GLAUCA P. Gaertner**Weasel Snout**

Beringian endemic.

- Lime Peak, wet meadows and moist grus near gelifluction lobe, rare to scattered, 4812, 4860.
- Mt. Schwatka, herbaceous moss meadow, scattered, 5004.
- Serpentine Slide, barren knoll, 12074
- Mt. Prindle vicinity, moist tundra and seepages.
- White Mountains, VABM Fossil.
- South Fork Birch Creek.

PEDICULARIS ALBOLABIATA (Hultén) Kozhanch.

= *P. sudetica* Willd. ssp. *albolabiata* Hultén

Disjunct in the uplands from a predominantly arctic distribution.

- Mt. Prindle vicinity, wet basins, 94-111.

PEDICULARIS CAPITATA J. Adams**Capitate Lousewort**

- Lime Peak, herbaceous heath, scattered, 4738.
- Mt. Schwatka, limestone heath, 4973.
- Mt. Prindle vicinity, alpine tundra, common.
- White Mountains, VABM Fossil.
- Victoria Mountain ridge, 12057.
- East Crazy Mountains, mesic tundra, common.
- West Crazy Mountains, mesic to dry tundra, scattered.
- South Fork Birch Creek.

PEDICULARIS INTERIOR (Hultén) Molau & D.F. Murray

= *P. sudetica* Willd. ssp. *interior* Hultén, *P. sudetica* Willd. ssp. *interioides* Hultén

- Mt. Schwatka, herbaceous heath on limestone, 4933.
- Mt. Prindle vicinity, moist tundra.
- East Crazy Mountains, moist soil in forest opening at treeline, 95-317.
- South Fork Birch Creek, moist herbaceous heath, 6448.

PEDICULARIS LABRADORICA Wirs.

- Lime Peak, hummocky heath, rare, 4781.
- Mt. Schwatka, treeline below limestone tors, scattered, 5059.
- Mt. Prindle vicinity, shrub tundra in lower valley.
- East Crazy Mountains, moist tundra, forest openings, alder thickets, common.
- West Crazy Mountains, fens to screes, several types of habitats, 95-230.
- South Fork Birch Creek.

PEDICULARIS LANATA Cham. & Schldl.**Wooley Lousewort**

= *P. kanei* Durand

- Lime Peak, herbaceous heath, scattered to frequent, 4747.
- Mt. Schwatka, limestone heath.
- Mt. Prindle vicinity, alpine tundra and granite screes.
- White Mountains, VABM Fossil, limestone heath, 5657.
- East Crazy Mountains, dry alpine tundra, common.
- West Crazy Mountains, dry rocky exposed sites and low shrub birch tundra.
- South Fork Birch Creek.

PEDICULARIS LANGSDORFFII Fischer ex Steven

- Lime Peak, herbaceous heath, scattered to frequent, 4748.
- Mt. Schwatka, herbaceous heath, 4934.
- White Mountains, VABM Fossil.
- East Crazy Mountains, moist tundra and forest openings at tree line.
- West Crazy Mountains, mesic tundra and fens, 95-203, 95-214.
- South Fork Birch Creek.

PEDICULARIS OEDERI M. Vahl

- Lime Peak, herbaceous heath, scattered, 4741.
- Mt. Schwatka, limestone heath, 4952.
- Mt. Prindle vicinity, moist tundra.
- White Mountains, VABM Fossil, low heath on limestone-volcanic contact, 5613.
- Victoria Mountain ridge, 12058.
- South Fork Birch Creek, mesic herbaceous heath, scattered, 6391.

PEDICULARIS VERTICILLATA L.**Verticillate Lousewort**

- Lime Peak, gelifluction lobe, 94-149.
- Mt. Prindle vicinity, subalpine meadows in lower valley.
- White Mountains, VABM Fossil.

PENTSTEMON GORMANII E. Greene

East Beringian endemic, minor range extension within Yukon-Tanana Uplands.

- West Crazy Mountains, Preacher Creek, steppe bluff, 95-257.

SYNTHYRIS BOREALIS Pennell**Northern Synthyris**

East Beringian endemic.

- Lime Peak, moist grus fellfield, 4718.
- Mt. Schwatka, heath stripes on limestone scree, scattered.
- Mt. Prindle vicinity, dry exposed tundra, scattered.
- White Mountains, VABM Fossil, low heath and moist herbaceous, rare, 5610.
- South Fork Birch Creek, dry rocky fellfield and rocky heath, rare, 6394, 6461.

VERONICA WORMSKJOLDII Roemer & Schultes**Speedwell**

- Lime Peak, well-vegetated site on ridge, 94-161.
- Mt. Prindle vicinity, subalpine meadows.

Selaginellaceae (Spikemoss Family)

SELAGINELLA SIBIRICA (Milde) Hieron.

- Lime Peak, rock crevices, rare, 4788.
- Mt. Schwatka, volcanic rocks, 5028.
- White Mountains, VABM Fossil.
- East Crazy Mountains, large rocks on south summit.
- West Crazy Mountains, gravelly tundra, outcrops, steppe, 95-269B.
- South Fork Birch Creek, moist heath on rock outcrops, 6468.

Thelypteridaceae (Marsh Fern Family)

THELYPTERIS PHEGopteris (L.) Slosson

Northward range extension, new to Yukon-Tanana Uplands.

- Big Windy Hot Springs, moist, shady forest understory, growing in several clumps, 6626.

Valerianaceae (Valerian Family)

VALERIANA CAPITATA Pallas**Capitate Valerian**

- Lime Peak, moist herbaceous meadow at gelifluction lobe front.
- Mt. Schwatka, herbaceous heath, 4980.
- Mt. Prindle vicinity, moist tundra.
- White Mountains, VABM Fossil, dryas heath on limestone.
- Victoria Mountain ridge, moist shrub heath near treeline.
- West Crazy Mountains, sheltered fens and moist openings in thickets.
- South Fork Birch Creek.

Violaceae (Violet Family)

VIOLA BIFLORA L.**Small Yellow Violet**

- White Mountains, VABM Fossil, moist herbaceous heath, 5687.
- Victoria Mountain ridge, screes, 12061.
- South Fork Birch Creek, moist crevices in rock outcrops, 6565.
- Big Windy Hot Springs, shady bank along stream, rare, 6624.

VIOLA EPIPSILA Ledeb.

- Lime Peak, herbaceous sheep perches and moist, herbaceous streamside, 4839, 5503.
- Mt. Prindle vicinity, moist meadow on stream terrace, 94-122.

VIOLA RENIFOLIA A. Gray

Minor northward range extension.

- Big Windy Hot Springs, under ferns in forest understory, rare, 6636.

APPENDIX D:

EXPLANATION OF GLOBAL AND STATE RANKINGS

The following description of global and state rankings is taken directly from the Introduction chapter in the Alaska Rare Plant Field Guide (Lipkin and Murray 1997).

GLOBAL RANK (Global ranks are based on the world-wide status of a taxon and are assigned by The Nature Conservancy and an international network of Natural Heritage Programs and Conservation Data Centers.)

G1: Critically imperiled globally because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction. (Critically endangered throughout its range.)

G2: Imperiled globally because of rarity (6 to 20 occurrences) or because of other factors demonstrably making it very vulnerable to extinction throughout its range. (Endangered throughout its range.)

G3: Either very rare and local throughout its range or found locally (even abundantly at some of its location) in a restricted range (21 to 100 occurrences). (Threatened throughout its range.)

G4: Widespread and apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.

G5: Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

T#: Global rank of the described subspecies or variety.

G#G#: Global rank of species uncertain, best described as a range between the two ranks.

G#Q: Indicates some uncertainty about taxonomic status that might affect global rank.

STATE RANK (State ranks are based on the status of the taxon within a particular state or province. The state ranks for taxa presented in this guide (Lipkin and Murray 1997) often differ from the ranks for the same taxa in other states or provinces.)

S1: Critically imperiled in state because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction. (Critically endangered throughout in state.)

S2: Imperiled in state because of rarity (6-20 occurrences), or because of other factors making it very vulnerable to extirpation from the state.

S3: Rare or uncommon in the state (21-100 occurrences).

S#S#: State rank of species uncertain, best described as a range between the two ranks.