Floristic survey of the Gulkana National Wild and Scenic River

Report prepared for:

The Bureau of
Land Management –
Glennallen Field Office

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The Alaska Natural
Heritage Program,
University of Alaska Anchorage

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Introduction

In 2008 Alaska Natural Heritage Program (AKNHP) conducted rare plant and non-native plant surveys along the Gulkana National Wild and Scenic River. The Gulkana River is a popular recreation destination in south central Alaska, and BLM is entrusted with the management of the natural biological communities and recreational activities of the river corridor. The objective of the rare plant survey was to assess the occurrence of rare plant populations along the river, both at sites of heavy human impact such as campsites and in natural communities within the river corridor.

The Gulkana River flows through the foothills of the Alaska Range. The Middle Fork of the river originates in the Tangle Lakes area and joins the Main Stem south of Paxson Lake. The Main Stem is joined by the West Fork south of the Canyon Rapids, and flows south into the Copper River. Most of the river is a Class I - II float, with small stretches of Class III - IV.

The river flows through boreal forest, featuring stands of white spruce and black spruce muskeg, as well as small stands of balsam poplar. The river margin consists mostly of a narrow mosaic of low willow scrubs and wet herbaceous meadows. Bedrock is exposed in the rapids area; sand and gravel bars are frequent downriver of the rapids. Elevations range from 3,000 feet at Dickie Lake, 2,552 ft at Paxson Lake, and 1,894 ft at the Sourdough Campground.

The area's average annual precipitation, measured in Glennallen, is 12 inches of rain and 44 inches of snow. July is commonly the wettest month. During the summer, temperatures range from 35° F to 70° F with occasional highs in the 80s. January temperatures average from -22° to -2° F, but winter temperatures can drop to -50° F.

The rare plant and non-native plant surveys were performed concurrently from 16-19 August 2008. Results of the non-native plant survey have been described separately (Cortés-Burns *et al*. 2010). This report presents the results of the Rare Plant survey performed by Helen Cortés-Burns, Mike Duffy, and Bill Macfarlane. Mike Duffy was specifically hired for this project because of his strong background conducting floristic surveys in Alaska, and his extensive knowledge of Alaska's rare plant species. The survey area consisted of the Main Stem of the river, encompassing approximately 45.5 river miles from Paxson Lake to the Sourdough Creek Campground take-out ramp.

Previous studies

A summary of the collecting history in the area extending from Black Rapids to Paxson is provided in Carlson's (2007) Tangle Lakes Rare Plant Inventory report; however, no rare or sensitive plant species were recorded within the Tangle Lakes Archaeological District during the 2007 survey itself.

In addition, the USDA-Natural Resources Conservation Service prepared a soil survey for the Gulkana River corridor (Clark & Kautz 1999). Three plants reported for that survey (*Cypripedium montanum* G4 S1[1], *Galium kamtschaticum* G5 S2, and *Melica subulata* G5 S1) are considered rare in Alaska. Those reports, however, were not documented by voucher specimens or photographs and, as far as we know, these species are restricted to coastal areas in southern and southeastern Alaska and it is highly unlikely for them to occur along the Gulkana River. Regardless, special attention was given to habitats that might contain those species.

Target species included plant taxa on the BLM sensitive species list, those currently being tracked by AKNHP, and those previously reported or documented from the area. To develop this species list, we downloaded collection data for target species both from ARCTOS (The University of Alaska Fairbanks herbarium database) and from BIOTICS (a database that specifically tracks rare plant and animal species and is maintained by AKNHP) and plotted their distribution (Fig. 1). Based on the data downloaded, there are no documented findings of rare vascular plants in the survey area prior to 2008. The survey also looked for notable range extensions of more common plant species.

Methods

The survey was conducted using a raft. We adapted the guidelines established in the Reconnaissance Method, [summarized in Carlson (2007)], which has been widely used in Alaska for other rare plant surveys in the state (Carlson *et al.* 2003; Carlson *et al.* 2004a, b; Carlson 2007) and is described in Carlson (2007). This targeted, judgment-based approach is an efficient way to locate populations of species of special concern based on known habitat preferences and patterns of distribution.

To maximize our chances of finding and recording any rare plant populations along the area, AKNHP developed a list of species of conservation concern that are likely to occur along the Gulkana NWSR by researching (1) BIOTICS, the rare species database that is administered by AKNHP, (2) ARCTOS (University of Alaska Fairbanks Herbarium

[1] "G" denotes the global rank for a species, while "S" denotes the statewide rank. Smaller rank values indicate a greater conservation concern than greater values (for instance, a G3 or S3 species is more common or less threatened than a species ranked G1 or S1). See Appendix 2 for a description of each of the rank categories used by NatureServe and the Heritage Programs across North and South America.

collections' database), (3) previous vegetation surveys that have been conducted in the area (Clark and Kautz 1999).

The resulting list of species and associated habitats was then adjusted following discussions with Alaska botanists Rob Lipkin, who co-authored the Alaska Rare Plant Field Guide (Lipkin and Murray 1997) and managed the rare plant information in BIOTICS through 2008, and Mike Duffy, who has conducted floristic surveys across the state, including the 2005 survey along the Delta NWSR (Clark 2005), and has recorded over 25 collections of rare or imperiled vascular plant species within a 200 km radius of the survey area (BIOTICS 2010).

Stops were made at as many official and unofficial campsites as possible, as well as at any habitats observed from the river that looked suitable for rare plant species. Special attention was given to habitats similar to those known to support previously recorded species (see next section for a list of species that were considered likely to occur in the area).

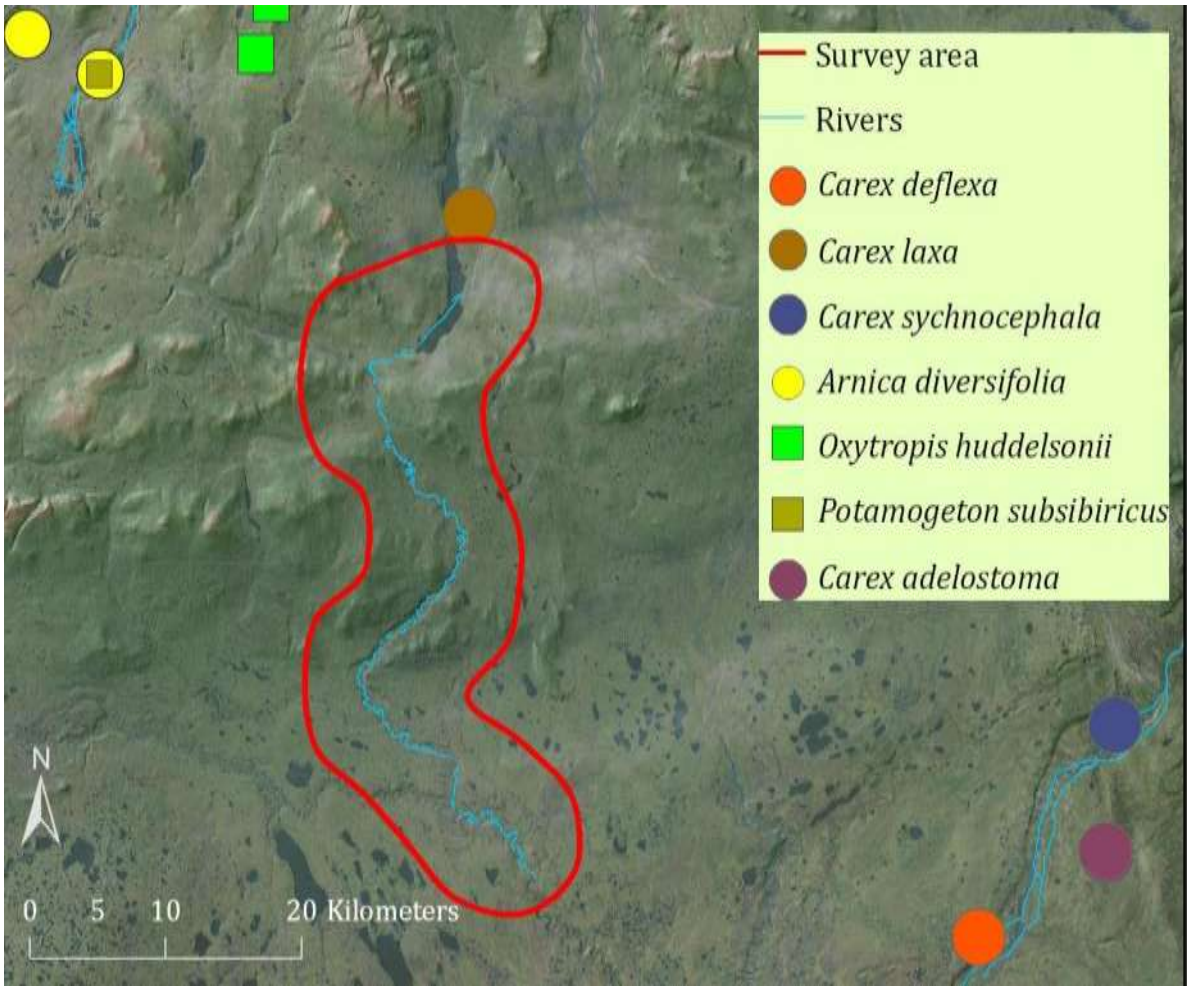

Figure 1. Distribution of rare vascular plants recorded prior to 2008 in the vicinity of the survey area.

At each stop a general survey was made, inventorying the area of the campsite and a margin of the natural community in which it was located. In the case of sites without human impact but considered suitable for rare plant species, we examined the full extent of the suitable habitat. At each site GPS coordinates and photographs were taken. Notes were made on the landscape, vegetation communities, natural and human-derived disturbance (if any), and dominant plant species observed. Each species of plant was identified to determine if notable species were present. When a rare plant was encountered, the site was described in more detail with soil/substrate, associated plant species and number of plants. Specimens were collected when population size permitted, according to the protocol set forth by Murray and Parker (1990) and Parker and Murray (1992).

Rare plant species previously documented in the vicinity of Gulkana NWSR

Using available sources AKNHP identified a list of species of conservation concern that are known to occur within 200 km of the Gulkana NWSR corridor, and could possibly occur inside it (Appendix 1). Many of the species on that list are known from higher elevations and not expected due to lack of appropriate habitat (e.g. *Aphragmus eschscholtzianus*, *Draba ruaxes*). On the other hand, some typically alpine species such as the pink poppy (*Papaver alboroseum,* G3G4 S3), can also be found in naturally disturbed areas such as river bars (though they are not common in the study area).

The species we considered most likely to encounter were those that might occur in wetlands and aquatic habitats associated with the river system (*Carex laxa* and *Potamogeton subsibiricus*, and possibly *Carex adelostoma*), and riparian scrub and herbaceous meadows (*Viola selkirkii*). Other habitats especially suitable for rare plants included seeps, alluvial forests and scrubs, black spruce muskegs, rocky outcrops and bluffs.

Results

Two botanists surveyed habitats along approximately 45.5 river miles of the Gulkana NWSR corridor. One plant observed during the survey is on the AKNHP tracking list. None of the plants observed are on the BLM sensitive species list.

A total of 8 survey stops were made during the survey (Fig. 2). Typical forests stops were dominated by white spruce with an understory of willow species, sparse herbs and feathermoss. Muskegs were open black spruce forests or woodlands, with a dwarf ericaceous scrub understory, moderate to sparse herb cover and a thick moss layer of *Sphagnum* spp. and feathermosses. Willow scrubs had a rich herbaceous component, as did poplar forests.)

Over 70 vascular plant taxa were recorded in the temporary plots erected, and a total of 16 plant collections were made (both sets of data are included in Appendix 3). Most of the collections represent non-native species documented for the non-native plant survey. Almost all of the collections represent species common in Alaska with widespread distributions.

Only one rare plant was discovered during the survey, mudwort (*Limosella aquatica*). It was found at four sites downstream of the rapids. At the West Fork Confluence campsite a somewhat large population of mudwort (*Limosella aquatica*) was observed in the muddy margin of the Gulkana River (see Appendix I for a brief description of this species and photographs of the populations found along the Gulkana River). The population consisted of 33 plants; all were growing in less than 20 cm of water, in muddy silt overlaying sand on the banks of the river. The plants were covered in a filamentous alga. Other plants growing with the mudwort included vernal water starwort (*Callitriche palustris*), threadleaf water crowfoot (*Ranunculus trichophyllus*) and water miner's lettuce (*Montia chamissoi*).

Additional populations were encountered downstream at Ole Island, Allen Bar and Jaeger Bar. Each of these consisted of only a few individuals. The three Ole Island plants grew in similar habitat, with mare's tail (*Hippuris vulgaris)* and fleshy starwort (*Stellaria crassifolia*). At Allen Bar, only two plants were found, growing with threadleaf water crowfoot (*Ranunculus trichophyllus*), Gmelin's buttercup (*Ranunculus gmelinii*), arctic rush (*Juncus arcticus*) and common spikerush (*Eleocharis palustris* s.s.). A single mudwort plant was found growing at Yaeger Bar in similar habitat.

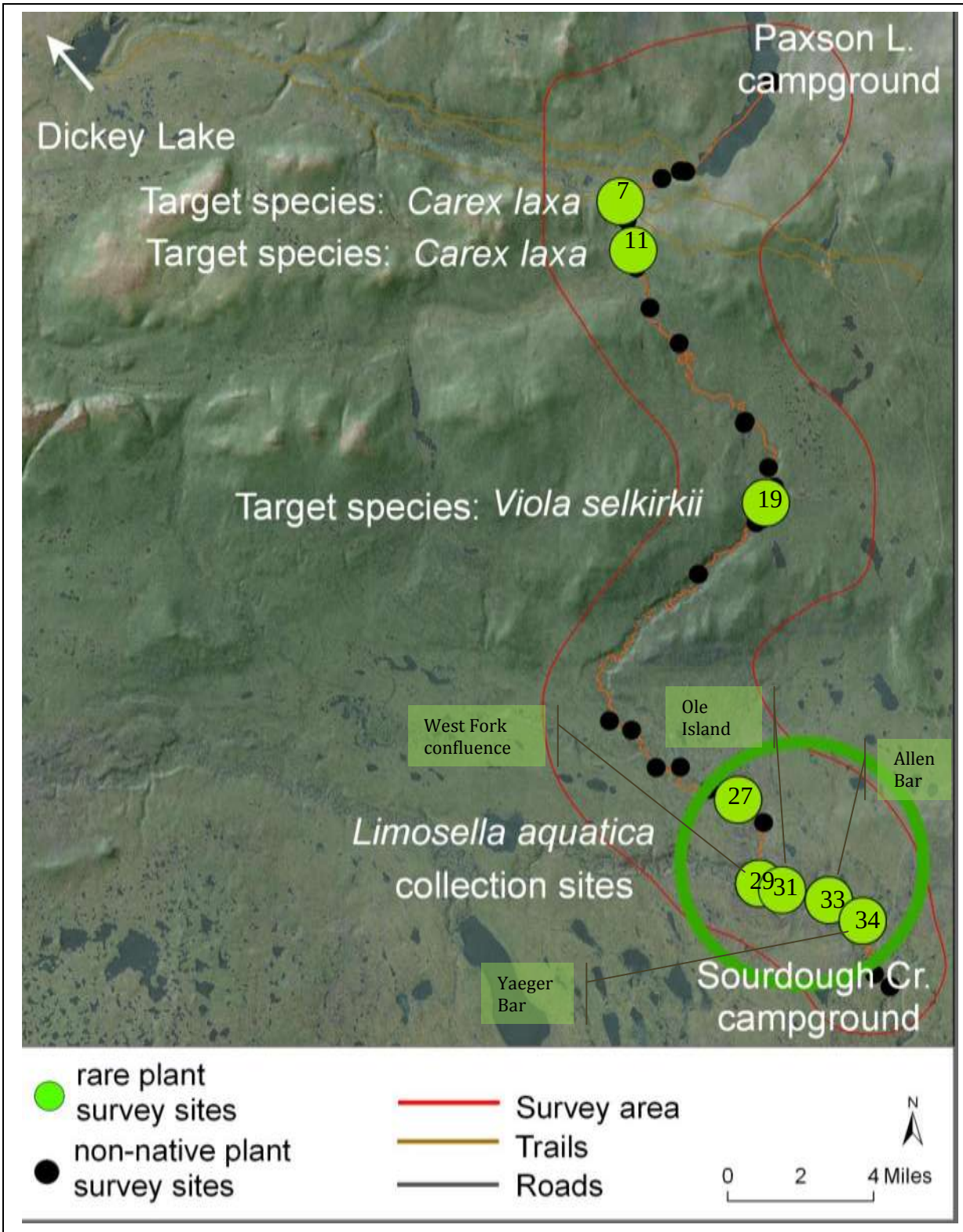

Figure 2. Light green circles indicate **s**ites that were surveyed specifically for rare plants (waypoint number included within)**.**

Discussion

Previous studies and collections in the Wild and Scenic River corridor indicated the possibility that several rare species might be encountered during the survey, including *Carex laxa, Potamogeton subsibiricus* and *Viola selkirkii.* No populations of those plants were encountered, and no plants on the BLM sensitive species list were observed. The three rare plants reported in the Gulkana River area soil survey were also not observed.

The only species found, mudwort, had not been previously collected from the area. Its current AKNHP ranking is G5 S3 (AKNHP 2008). Mudwort is an uncommon species with a scattered but widespread distribution in Alaska. While not previously known from the river corridor area, it is not an unexpected find. Because of its small size and cryptic habit, it is most likely much more prevalent than extant collections would indicate. It is to be expected in other appropriate habitat within the river corridor.

Conclusion

AKNHP surveyed the Gulkana Wild and Scenic River Corridor from Paxson Lake to the Sourdough Creek Campground pullout. Approximately 45 miles of the river corridor were surveyed and eight data stops were made. One rare plant was observed at four locations. Mudwort is an uncommon plant, probably more an overlooked than a truly rare plant species. It is new to the area but within its normal range and was found in appropriate habitat. Previously reported rare plant species were not observed.

Acknowledgements

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Appendix 1. Rare plants that have been collected within 200 km of the Gulkana NWSR.

Aphragmus eschscholtzianus

This small, white-flowered mustard is endemic to Alaska and Yukon, primarily in the Aleutian and Alaska Ranges. It is known from approximately 40 sites and typically populations are not large. In Alaska it is principally found on moist to wet alpine screes and cliffs saturated with snow melt and along streams in the alpine, typically on limestone (Fig. 3). Although it is not common anywhere in the state, this species has been found at an increasing number of scattered sites in alpine areas within its range. This species is the only North American representative of the genus, whose other six species are found in the Himalayas and Siberia. Carolyn Parker of the University of Alaska Museum collected this species from Rainbow Ridge in a snowmelt area along the Richardson Highway to the north of Gulkana NWSR.

Figure 3. *Aphragmus eschscholtzianus* and typical steep limestone scree slope habitat. (Aniakchak Caldera).

Rank: G3 S3

Range: Tracking mountain ranges from the Aleutians to western Yukon.

Local distribution: Known from Rainbow Mountain (vic. Delta River).

Habitat: Limited to wet areas of tundra and heath such as areas of slow water flowage, wet scree/boulders, slopes, seepy areas in subalpine meadows, solifluction slopes, and ridgetops, sparsely vegetated loose scree slopes, mesic snowbed tundra.

Likely in survey area? It is <u>unlikely</u> that this species will be found within the survey area.

Figure 4. Known occurrences of *Aphragmus eschscholtzianus* in Alaska.

Arnica diversifolia

Rank: G5 S1

Range: Pacific Northwest, disjunct to Alaska. In Alaska, recorded from Kodiak, the Kenai Peninsula, the Alaska Range, the Chugach Mountains, and Coast Mountains in Southeast (vic. Juneau ice field).

Local distribution: Vic. Upper Tangle Lakes (ridge north of Tangle Lakes, and mile 25 Denali Highway).

Habitat: Subalpine, lower drainage meadows, alpine, gravelly tundra, fine eroding mudstone gravels and bedrock on exposed alpine saddle, alpine tundra, snow patched on acidic bedrock lush herbaceous vegetation, mesic moist places.

Likely in survey area? It is <u>unlikely</u> to be found along the Gulkana NWSR corridor.

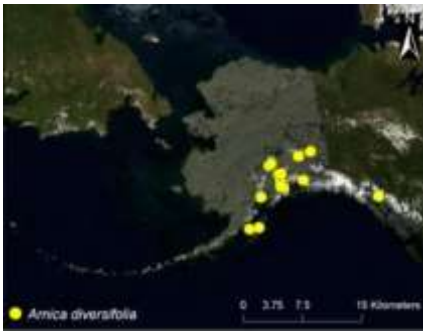

Figure 5. Known occurrences of ***Arnica diversifolia*** in Alaska.

Arnica mollis

There is only a single collection of this yellow-flowered composite in the study area, which is a collection of H. T. Shacklette from 1967 near the Maclaren Glacier, north of the Gulkana NWSR (see Hultén 1968). This species of *Arnica* is quite common in the Rocky Mountains to the south. Mountain meadows south of the Alaska Range spine and adjacent to the upper Delta River may provide suitable habitat for this plant.

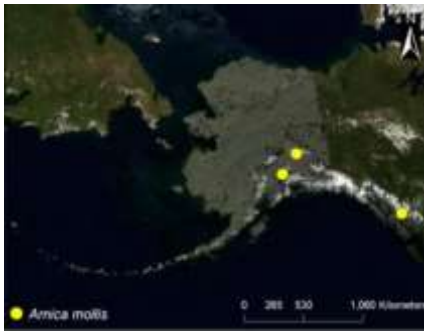

Figure 6. Known occurrences of ***Arnica mollis*** in Alaska.

Rank:	G5 S1
Range:	Rocky Mountain states; disjunct to Alaska and eastern Canada. Recorded in Southeast Alaska (Stikine River), from Hatcher Pass, and from the MacLaren Glacier (vic. Delta River).
Local distribution:	Historic collection noted in Hultén (1967) from the MacLaren Glacier.
Habitat:	Moist meadows and conifer forests, (gravelly sites along) stream banks, late snow-melt areas, montane to subalpine; 1000–4000 m; low forb meadow on terminal moraine.
Likely in survey area?	It is <u>unlikely</u> to be found along the Gulkana NWSR corridor.

Carex adelostoma

Rank:	G4 S1
Range:	Recorded from river basins in the Wrangell Mountains and from the Alaska Range.
Local distribution:	Three collections from the Copper River Basin are the nearest known occurrences of *C. adelostoma* to the study area (Gulkana River, in particular).
Habitat:	Common in subarctic lowland sedge wet meadow, wet meadow fens, wet marshy places on low granite, granite hills and rich woods, low tundra and lakeshores.
Likely in survey area?	Given its habitat preferences, it is <u>possible</u> that this species may occur within the survey area.

Figure 7. Known occurrences of *Carex adelostoma* in Alaska

Carex deflexa

Rank: G5 S1S2

Range: Greenland; Alberta, B.C., Man., N.B., N.F., Labr., N.W.T., N.S., Ont., Que., Sask., Yuk.; Alaska, Conn., Maine, Mass., Mich., N.H., N.Y., Vt., WVa., Wisc. Within Alaska, this species has been found in interior Alaska, mainly in eastern interior Alaska.

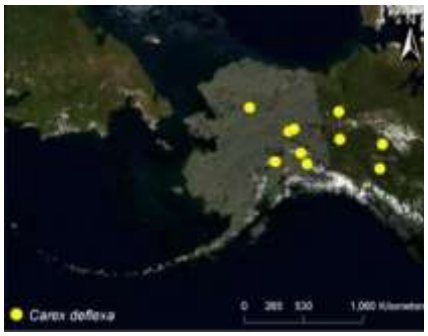

Figure 8. Known occurrences of ***Carex deflexa*** in Alaska.

Local distribution: One collection made by the Upper Delta River.

Habitat: Disturbed sites (disturbed gravel, sand and gravel borrow pit, disturbed roadside and adjacent cleared area); open white spruce/poplar river bar terrace; moist to dry, open or shaded, mixed and coniferous woodlands (subalpine-scrub gravelly fan terraces with poplar/Sitka alder woodland, white spruce/soapberry-willow woodland); scattered dry herb meadows adjacent to hot springs; talus slopes, ridges, rock outcrops, burns, clearings, snowbeds.

Likely in survey area? Given its habitat preferences, it is <u>possible</u> that this species may occur within the survey area.

Carex laxa

This sedge is globally common, but it is known from only a handful of sites in Alaska. This species looks quite similar to *C. limosa, C. magellanica*, *C. pluriflora*, and *C. rariflora*, but differs in having a long, tubiform sheath of the upper bract. There is a report of this species for the area between Mile 172-174 along the Richardson Highway in the vicinity of Paxson Lake.

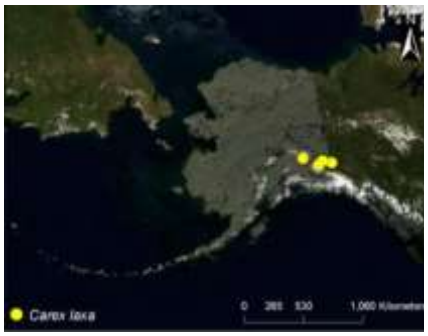

Figure 9. Known occurrences of ***Carex laxa*** in Alaska.

Rank:	G5? S1S2
Range:	Greenland; Alberta, B.C., Man., N.B., N.F., Labr., N.W.T., N.S., Ont., Que., Sask., Yuk.; Alaska, Conn., Maine, Mass., Mich., N.H., N.Y., Vt., WVa., Wisc. Within Alaska, only known from eastern Alaska.
Local distribution:	One record from vic. Paxson Lake, by the Richardson Highway
Habitat:	pond edges and marshes, in wet graminoid or graminoid herbaceous meadows (for instance, surrounded by black spruce woodland, 25-50% cover of standing water)
Likely in survey area?	It is possible for this species to show up in wet habitats adjacent to woodlands along the Gulkana NWSR.

Carex sychnocephala

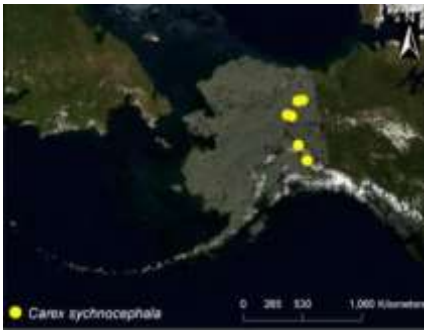

Figure 10. Known occurrences of ***Carex sychnocephala*** in Alaska.

Rank:	G4 S1
Range:	Greenland; Alberta, B.C., Man., N.B., N.F., Labr., N.W.T., N.S., Ont., Que., Sask., Yuk.; Alaska, Conn., Maine, Mass., Mich., N.H., N.Y., Vt., WVa., Wisc. Within Alaska, it is only known from eastern Alaska.
Local distribution:	Copper River Basin and north side of the Alaska Range.
Habitat:	Growing in wet sites, in rocky crevices on ridgetop screes and outcrops, on outcrops above floodplains, on limestone cliffs, stream banks (in moist sites under dense alder or spruce brush), rocky seepage areas.
Likely in survey area?	It is possible that this species occurs within the survey area.

Cryptogramma stelleri

Rank:	G5 S2S3
Range:	Greenland; Alberta, B.C., Man., N.B., N.F., Labr., N.W.T., N.S., Ont., Que., Sask., Yuk.; Alaska, Conn., Maine, Mass., Mich., N.H., N.Y., Vt., WVa., Wisc. Within Alaska, extends from the Seward Peninsula, across the Brooks Range, in the Yukon-Tanana uplands, the Alaska Range, and in western Alaska, one record from the Ahklun Mountains.
Local distribution:	Southside of the Alaska Range (Coffee River).
Habitat:	Growing in moist to wet sites in rocky crevices on shaded outcrops above floodplain, along wet stream banks and in river terrace forests, especially under dense alder and spruce rush along the shores, in seepage areas on unstable scree and fellfields on ridgetops and slopes, on wet sites on limestone cliffs.
Likely in survey area?	It is <u>possible</u> that this species occurs within the survey area.

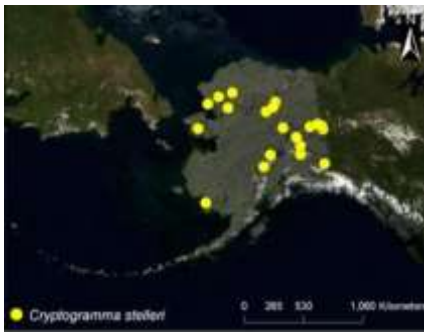

Figure 11. Known occurrences of ***Cryptogramma stelleri*** in Alaska.

Draba ruaxes

The distribution of *Draba ruaxes* is concentrated along the Alaska Range to the Wrangell Mountains, extending into the Yukon, with a number of outlying collections in the Tanana Uplands, the Chugach Mountains, and on the Seward Peninsula. S. Galen Smith collected this species along Rainbow Mountain in 1953 and 1955 and it is possible that it could be found in mountainous sites in the area.

Figure 12. Known occurrences of ***Draba ruaxes*** in Alaska.

Rank:	G3 S3
Range:	Greenland; Alberta, B.C., Man., N.B., N.F., Labr., N.W.T., N.S., Ont., Que., Sask., Yuk.; Alaska, Conn., Maine, Mass., Mich., N.H., N.Y., Vt., WVa., Wisc. In Alaska, it is mainly restricted to the Alaska Range and to Seward Peninsula, with one collection from the Brooks Range.
Local distribution:	One collection from Rainbow Mountain (vic. Delta River).
Habitat:	In sparsely vegetated sites on ridgetops, scree, outcrops, and talus slopes, on rocky, gravelly dwarf scrub on exposed ridge crests; scattered in loose, sparsely vegetated limestone rubble and scree; in sparsely vegetated moraines and growing on fine volcanic ash/scree ridge.
Likely in survey area?	Given that the Gulkana NWSR (unlike Tangle Lakes and the Delta River) runs mostly through boreal forests, it is unlikely that this species will be found within the survey area.

Limosella aquatica

Rank: G5 S3

Range: This species is widespread throughout the Northern Hemisphere, and is considered secure on a global scale. It is considered vulnerable (S2) in the Yukon Territory and Ontario (Canada), rare in Alaska, British Columbia, and Alberta (S3), and either secure or unranked by most other Canadian provinces and Lower 48 states. This species is probably more abundant than the number of Alaska collections indicates, and is probably overlooked in many floristic surveys. In Alaska it is a habitat specialist, and generally occurs on lakeshores, ponds, and riverbanks. There are collections of this species from sites close to the Gulf of Alaska, Bristol Bay, and the Kuskokwim River Delta. Recent collections have been made on the Kobuk River. There are two additional records from the lower reaches of the Kantishna River in Denali National Park and Preserve. Although there are other collections of this species in Alaska, they do not have any geographic or locality data associated with them. Therefore, the Gulkana NWSR populations detected in 2008 represent new occurrences for this species in the state.

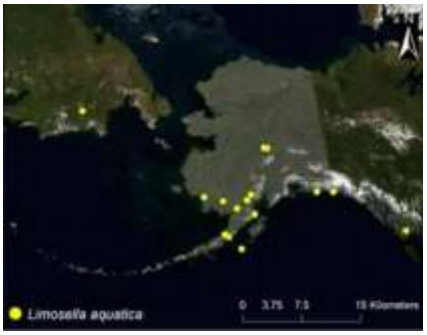

Figure 13. Known occurrences of ***Limosella aquatica*** in Alaska.

Local distribution: The closest known occurrences for this species prior to the 2008 survey were from Denali and from areas around the Gulf of Alaska.

Habitat:	Wet mud shores of watercourses; in wet mud, sand, and loamy soils in floodplains, in halophytic wet sedge meadows, in silty pond edges and in moist mud at the bottom of ponds.
Likely in survey area?	This species was recorded at four sites along the Gulkana NWSR in 2008.

Figure 14. Habitat where *Limosella aquatica* was recorded in along the Gulkana River.

Figure 15. *Limosella aquatica* collected at the West Fork Confluence.

Lupinus kuschei

Rank:	G3 S2
Range:	Greenland; Alberta, B.C., Man., N.B., N.F., Labr., N.W.T., N.S., Ont., Que., Sask., Yuk.; Alaska, Conn., Maine, Mass., Mich., N.H., N.Y., Vt., WVa., Wisc. Within Alaska, this species has been recorded from the Kobuk River valley (in western Alaska) and from the Alaska and Wrangell ranges in eastern Alaska.
Local distribution:	Sandford dunes (Copper River Basin).
Habitat:	Forming large clumps and tussocks in moving sand and cobbles and silt, in sand dunes, open floodplain deposits, in beaches by lakes, on river terraces; one record collected in a dry roadside field.
Likely in survey area?	It is unlikely that this species will be found along the Gulkana NWSR corridor

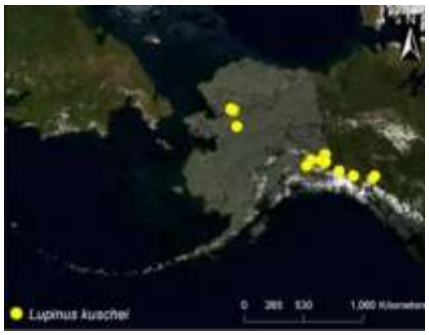

Figure 16. Known occurrences of ***Lupinus kuschei*** in Alaska.

Oxytropis huddelsonii

Rank:	G3 S2S3
Range:	Greenland; Alberta, B.C., Man., N.B., N.F., Labr., N.W.T., N.S., Ont., Que., Sask., Yuk.; Alaska, Conn., Maine, Mass., Mich., N.H., N.Y., Vt., WVa., Wisc. In Alaska, known from eastern interior Alaska (Yukon Tanana uplands, Alaska Range, Wrangell Mountains).
Local distribution:	Recorded by Gulkana Glacier, along the Denali Highway near Tangle Lakes, and from Rainbow Mountain.
Habitat:	In alpine, gravelly high tundra; on scree, rocky slopes, and outcrops near ridges, on gravel creek beds.
Likely in survey area?	It is unlikely that this species will be found along the Gulkana NWSR corridor.

Figure 17. Known occurrences of ***Oxytropis huddelsonii*** in Alaska.

Papaver alboroseum

This is a striking light orange-pink poppy that ranges from Kamtschatka through the Aleutian and Alaska Ranges. It is found primarily on eroding alpine screes especially near glaciers. However, large populations of this poppy have also been found along roadsides in the Kenai Peninsula. Carolyn Parker collected this species along a rocky stream bed and a south-facing dirt bank on Rainbow Ridge.

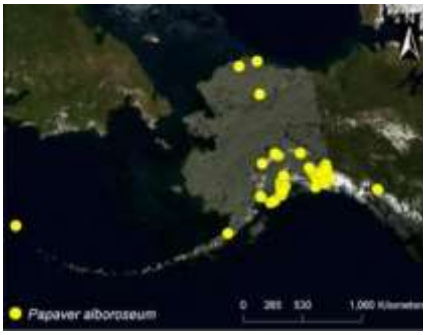

Figure 18. Known occurrences of ***Papaver alboroseum*** in Alaska.

Rank:	G3G4 S3
Range:	Aleutians to the Alaska Range, with populations along the Kenai Peninsula, and also recorded from the Arctic Coastal Plain.
Local distribution:	Rainbow ridge.
Habitat:	Sandy gravelly soil, alpine scree slopes, outwash plain, on rocky, gravelly, streambeds, in sandy, gravelly soils, along roadsides.
Likely in survey area?	Although the only collection made in the region was by the lower reaches of the National Wild and Scenic portion of the Delta River, it is possible that this relatively uncommon poppy could be found along the Gulkana NWSR corridor.

Potamogeton subsibiricus

This rare pondweed was collected from Tangle Lakes in 0.6 m water from a stony bottom in mid August of 1953 by S. Galen Smith. This species is known mostly from Alaska and adjacent Yukon, but a few sites are also from Siberia and from Hudson Bay, Canada. It is moderately rare in the state, with about 15 known sites. This species has a combination of traits that distinguishes it from other *Potamogeton* species: it lacks floating leaves, the submerged leaves are linear, 1.5-2 mm wide, and 9-17 nerved, it has stipules free from the leaf, and it has a nearly round stem.

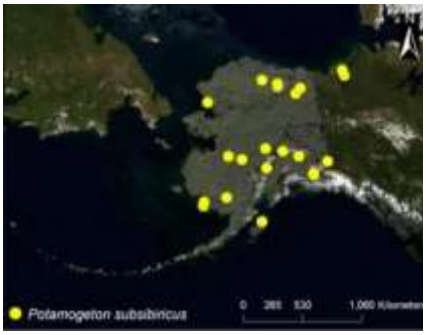

Figure 19. Known occurrences of ***Potamogeton subsibiricus*** in Alaska.

Rank: G3 S3

Range: To the north, recorded from the Brooks Range Foothills, and to the south, recorded from various sites spanning across south-central to eastern Alaska.

Local distribution: Recorded from Tangle Lakes.

Habitat: Shallow water of ponds and lakes; in shallow, stagnant pool in muskeg, submerged in beaver ponds, filled-in ponds in wet sedge herbaceous meadows, small lakes and muskeg ponds with organic muddy bottoms, in drainage ditches.

Likely in survey area? It is <u>possible</u> that *Potamogeton subsibiricus* could be found in sections of Paxson Lake or shallow ponds of water downriver of the lake.

Stellaria alaskana

Rank: G3 S3

Range: Alaska (Wrangell Mountains, Brooks and Alaska Ranges) and Yukon.

Local distribution: Collected vic. Gulkana Glacier, the Hoodoos, Rainbow Mountain and Gunnison Creek (area around the Delta River, Alaska Range).

Habitat: Steep, sparsely vegetated unstable alpine screes from 2000-5500 ft elevation, on both calcareous and non-calcareous sites.

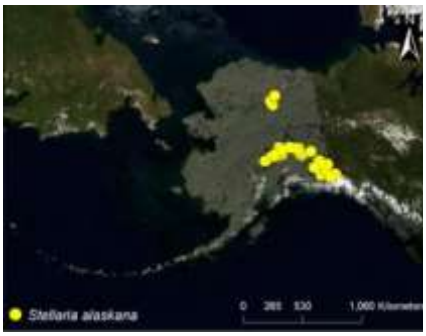

Figure 20. Known occurrences of ***Stellaria alaskana*** in Alaska.

Likely in survey area? It is <u>unlikely</u> that this species will be found along the Gulkana NWSR corridor.

Viola selkirkii

This violet has populations scattered throughout the northern hemisphere, but it seems to be moderately rare in the state, with about 20 known locations from Juneau to Denali and the Tikchik Lakes.

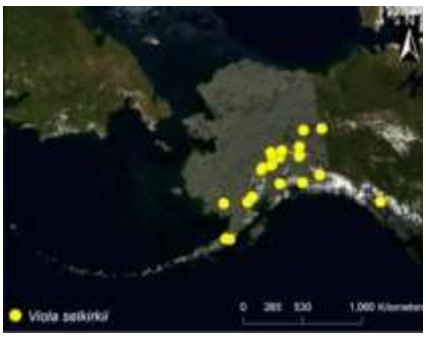

Figure 21. Known occurrences of ***Viola selkirkii*** in Alaska.

Two collections of the violet were made along the upper Delta River in mid June of 1999 in willow scrub habitats. One collection is from just below the confluence with Wildhorse Creek and the other is at the Rainy Creek-Delta River confluence.

Rank:	G5? S3
Range:	Alaska (south-central, eastern interior, and southeast) east to N.Fld, south to New Mexico
Local distribution:	Upper Delta River.
Habitat:	Growing in alder-sparse spruce stands, under alders, in old poplar forest on river terrace, in willow scrub-white spruce woodland, along meadow edges by alder scrub; moist woods and alder thickets.
Likely in survey area?	Although both collections made in the vicinity of the Gulkana River are northeast of the Delta National Wild and Scenic River, it is possible that *Viola selkirkii* could be found along the Gulkana NWSR corridor.

References

Hultén, E. 1967. Comments on the flora of Alaska. Arkiv Bot. 2(7):1-47. Almqvist and Wiksell, Stockholm, Sweden.

Hultén, E. 1968. Flora of Alaska and Neighboring Territories; A manual of the vascular plants. Stanford University Press, Stanford, California, 1008 pp.

Appendix 2. Definitions of ranks used by NatureServe and AKNHP.

Species Global Rankings	
G1:	Critically imperiled globally.
G2:	Imperiled globally.
G3:	Rare or uncommon globally.
G4:	Apparently secure globally, but cause for long-term concern.
G5:	Demonstrably secure globally.
G?:	Unranked.
G#G#:	Global rank of species uncertain, best described as a range between the two ranks.
G#Q:	Taxonomically questionable.
G#T#:	Global rank of species and global rank of the described variety or subspecies of the species.
GNR:	Unranked--Global rank not yet assessed.
GU:	Unrankable.
GH:	Historical Occurrence.
GX:	Extinct.
HYB:	Hybrid.

Species State Rankings	
S1:	Critically imperiled in state.
S2:	Imperiled in state.
S3:	Rare or uncommon in state.
S4:	Apparently secure in state, but with cause for long-term concern.
S5:	Demonstrably secure in state.
S#S#	State rank of species uncertain, best described as a range between the two ranks.
S?:	Unranked.
SU	Unrankable.
SA:	Accidental
SR:	Reported from the state, but not yet verified.
SRF:	Reported falsely.
SP:	Potential to occur in the state
SE:	Exotic--Some, or all, populations are introduced within state.
HYP:	Hybrid.
SSYN:	Synonym.

Qualifiers:	
B:	Breeding status.
N:	Non-breeding status.
?:	Inexact.
Q:	Questionable taxonomy.

Appendix 3.

List of voucher specimens collected in 2008 along the Gulkana NWSR.

Origin	Scientific name	Accession #	Collection Date	Locality	Latitude	Longitude	Elev.
Non-native	*Alopecurus pratensis*	1164	08/16/2008	Meier's Roadhouse campsite	62.845630	-145.670030	763
Non-native	*Brassica napus*	1177	08/19/2008	Sourdough Creek Campground, boat ramp	62.526560	-145.524550	577
Non-native	*Capsella bursa-pastoris*	1171	08/16/2008	another campsite by French Meadow	62.847120	-145.669890	754
Non-native	*Crepis tectorum*	1173	08/19/2008	Sourdough Creek Campground, boat ramp	62.526560	-145.524550	577
Non-native	*Matricaria discoidea*	1172	08/16/2008	another campsite by French Meadow	62.847120	-145.669890	754
Non-native	*Poa annua*	1162	08/16/2008	another campsite by French Meadow	62.847120	-145.669890	754
Non-native	*Poa annua*	1331	08/17/2008	Caribou Island campsite, silty pebbly beach	62.788700	-145.635120	751
Non-native	*Poa pratensis* ssp. *pratensis*	1163	08/16/2008	TaK' ATS' NA' Cove campsite	62.856100	-145.615110	792
Non-native	*Poa pratensis* ssp. *pratensis*	1330	08/16/2008	Willow Run campground	62.854120	-145.631840	785
Non-native	*Polygonum aviculare*	1161	08/19/2008	Sourdough Creek Campground, boat ramp	62.526560	-145.524550	577
Non-native	*Stellaria media*	1160	08/16/2008	Meier's Roadhouse campsite	62.845630	-145.670030	763
Native	*Calamagrostis lapponica*	1170	08/16/2008	TaK' ATS' NA' Cove campsite	62.856100	-145.615110	792
Native	*Cardamine oligosperma* var. *kamtschatica*	1174	08/16/2008	Campsite by French Meadow	62.847120	-145.669890	754
Native	*Elymus alaskanus* ssp. *alaskanus*	1159	08/16/2008	Dawson's cabin campsite	62.839350	-145.666490	748
Native	*Limosella aquatica*	1176	08/19/2008	West Fork Confluence campsite, recently flooded bar	62.573540	-145.624930	593
Native	*Rumex salicifolius* var. *salicilifolius*	1175	08/19/2008	West Fork Confluence campsite, recently flooded bar	62.573540	-145.624930	593

List of all vascular plants observed.

Plants recorded along the Gulkana NWSR (scientific name only)
Achillea millefolium
Aconitum delphinifolium
Alnus incana ssp. *tenuifolia*
Alnus viridis ssp. *crispa*
Alopecurus pratensis
Anemone richardsonii
Arctophila fulva
Betula glandulosa
Betula nana x *papyrifera*
Betula papyrifera
Brassica napus
Bromus inermis ssp. *inermis*
Calamagrostis canadensis
Calamagrostis lapponica
Calamagrostis stricta ssp. *inexpansa*
Callitriche cf. *verna*
Capsella bursa-pastoris
Cardamine oligosperma var. *kamtschatica*
Carex aurea
Cerastium glomeratum
Chamerion angustifolium
Chenopodium album
Chrysosplenium tetrandum
Claytonia chamissoi = Montia chamissoi
Crepis tectorum
Cypripedium passerinum
Elymus alaskanus ssp. *alaskanus*
Elymus trachycaulus ssp. *trachycaulus*
Empetrum nigrum
Epilobium latifolium
Equisetum arvense
Equisetum pratense
Erysimum cheiranthoides
Gentianella propinqua
Geum macrophyllum
Hierochloe odorata
Hordeum jubatum
Lepidium densiflorum
Limosella aquatica
Matricaria discoidea
Melilotus alba
Phleum alpinum
Picea glauca

Plants recorded along the Gulkana NWSR (scientific name only)
Picea mariana
Plantago major
Poa alpina
Poa annua
Poa compressa
Poa leptocoma
Poa pratensis ssp. *alpigena*
Poa pratensis ssp. *pratensis*
Polemonium acutiflorum
Polygonum aviculare
Populus balsamifera
Populus tremuloides
Potentilla fruticosa = Dasiphora floribunda
Potentilla palustris = Comarum palustre
Rorippa islandica
Rubus arcticus
Rumex arcticus
Rumex sibiricus
Salix alaxensis
Salix barclayi
Salix commutata
Salix glauca
Salix myrtillifolia
Salix pulchra
Sanguisorba canadensis
Senecio congestus
Stellaria crassifolia
Stellaria media
Swertia perennis
Taraxacum officinale ssp. *officinale*
Trifolium hybridum
Trifolium repens
Tripleurospermum perforata
Trisetum spicatum
Vaccinium uliginosum

= rare plant

= non-native plant