

Plant Collection Report
Fairbanks, Alaska Region

July 24-30, 2011

Prepared by Danny L. Barney and Patricia Holloway



Introduction

This report covers a plant collection trip conducted by Dr. Danny L. Barney and Dr. Patricia Holloway during July 24-July 30, 2011 in the region around Fairbanks, Alaska. During the trip, we were guided by our proposal that had been approved and partially funded by the U.S. Department of Agriculture – Agricultural Research Service National Genetic Resources Laboratory. The proposal is included as Appendix A.

Principal investigators included:

Dr. Danny L. Barney, Curator and Horticulturist, U.S. Department of Agriculture – Agricultural Research Service Arctic and Subarctic Plant Gene Bank

Dr. Patricia Holloway, Professor and Director of the Georgeson Botanic Gardens, University of Alaska Fairbanks

Other participants in the trip served as guides and included:

Dr. Charles Knight, Northern Region Manager, Alaska Department of Natural Resources Division of Agriculture

Larry 'Papa' Meunier, Nursery owner and professional horticulturist, North Pole, Alaska

Tina Buxbaum-Carr, Graduate student, University of Alaska, Fairbanks



Figure 1. The collection party included, from left to right, Danny Barney, Patricia Holloway, Charles Knight, Papa Meunier, and Tina and Finnegan Buxbaum-Carr.

The focus of our trip was to collect small fruits native to interior Alaska. *Vaccinium uliginosum* was of particular interest, as we were specifically looking for horticulturally superior germplasm to serve as a source of cultivar development material for domestication and cultivation efforts. Species that were collected included:

- *Empetrum nigrum* L. (black crowberry)
- *Ribes hudsonianum* Richardson (Northern black currant)
- *Rubus arcticus* L. (nagoon berry, arctic blackberry)
- *Rubus chamaemorus* L. (cloudberry)
- *Rubus strigosus* Michx. (red raspberry)
- *Vaccinium uliginosum* L. (Alaska blueberry, alpine bilberry, bog bilberry)

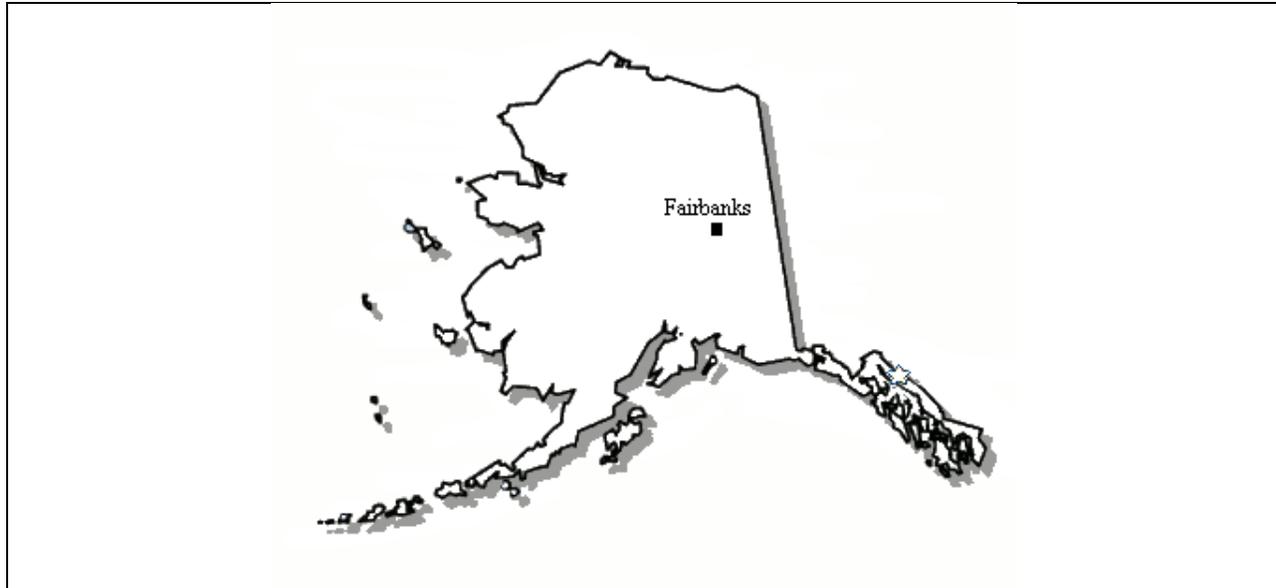


Figure 2. The collection area was north of the Tanana River in the Fairbanks region of Alaska, USA. A more detailed map appears in Appendix B.

Collection Authorizations and Permits

Prior to beginning the collecting trip, we obtained written authorization or permits for plant collections on Alaska State lands, Alaska State Parks, U.S. Bureau of Land Management lands, and Alyeska Pipeline easements. These are shown in Appendix D. Verbal authorization to collect on Alaska DOT easements was also obtained.

Abbreviations key

Accessions are designated in this report using two methods. "DBPH" numbers refer to those assigned in the field at the time of collection. Designators representing accessions entered into the USDA-ARS National Plant Germplasm System following return from the collection trip include CRUB (*Rubus*), CVAC (*Vaccinium*), PEMP (*Empetrum*), and PRIB (*Ribes*). Both designations are shown in the accession collections summary in Appendix C.

Trip Log

Sunday, July 24, 2011

Danny Barney departed Palmer Alaska and drove to Fairbanks.

Monday, July 25, 2011

Danny Barney, Patricia Holloway, Charles Knight, and Papa Meunier met at the University of Alaska Georgeson Botanic Gardens to plan the details of the trip. We decided to focus on areas north and southeast of Fairbanks lying north of the Tanana River and within 132 km of Fairbanks. The collection sites are shown in Appendix B.

Site 1. N 64.8756°, W 148.0680°, elevation 845 m

We departed Fairbanks on Sheep Creek Road west-northwest to St. Patrick Road, and then to Ester Dome Road. We followed Ester Dome Road to the antenna array at the crest of the ridge. The ridge had clustered stands of *Alnus*, *Betula*, *Picea*, and *Salix*, with scattered trees on the slopes.

Vaccinium uliginosum was abundant on the site, ranging from prostrate plants 0-15 cm high to erect phenotypes 20-30 m high. Berry size was average for the species and most berries were borne singly, rather than in clusters. We collected fruit samples from a prostrate (DBPH 1, CVAC 1968) and erect (DBPH 2, CVAC 1969) clone, and an herbarium sample for DBPH 2.

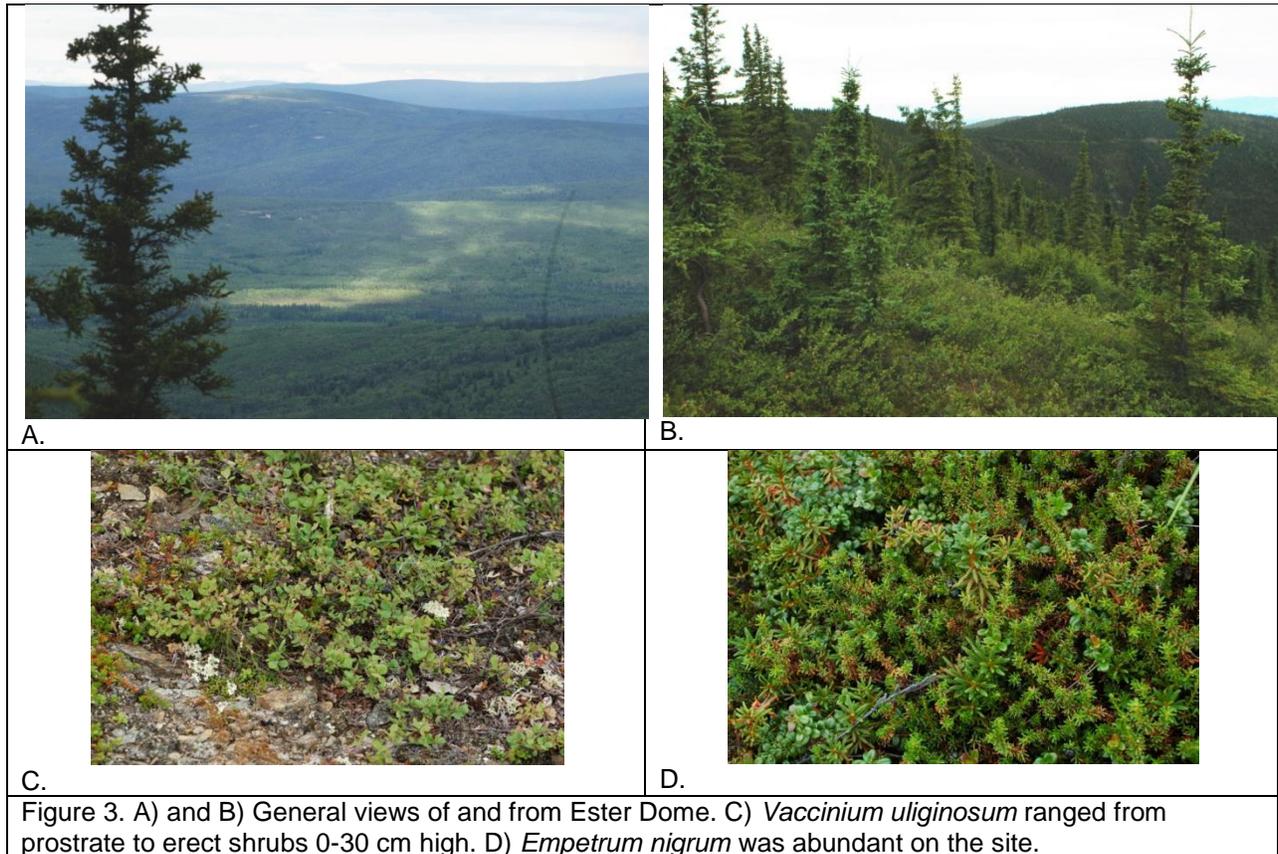


Figure 3. A) and B) General views of and from Ester Dome. C) *Vaccinium uliginosum* ranged from prostrate to erect shrubs 0-30 cm high. D) *Empetrum nigrum* was abundant on the site.

Empetrum nigrum was very abundant on the site, particularly under the edges of tree stand canopies and on the moss-covered slopes. Berry size was small to average for the species and we collected a fruit and herbarium sample (DBPH 3, PEMP 10).

Vaccinium vitis-idaea subsp. *minus* was abundant and relatively productive on the site but the fruit was not yet ripe enough to harvest for seed. We estimated that the fruit would ripen in late August or early September.

Site 2. N 64.9522°, W 148.2574°, elevation 695 m

We returned to Sheep Creek Road, heading north and west to Murphy Dome Road, and then west to Old Murphy Dome Road. We followed the Old Murphy Dome Road northeast to a wide pipeline easement.

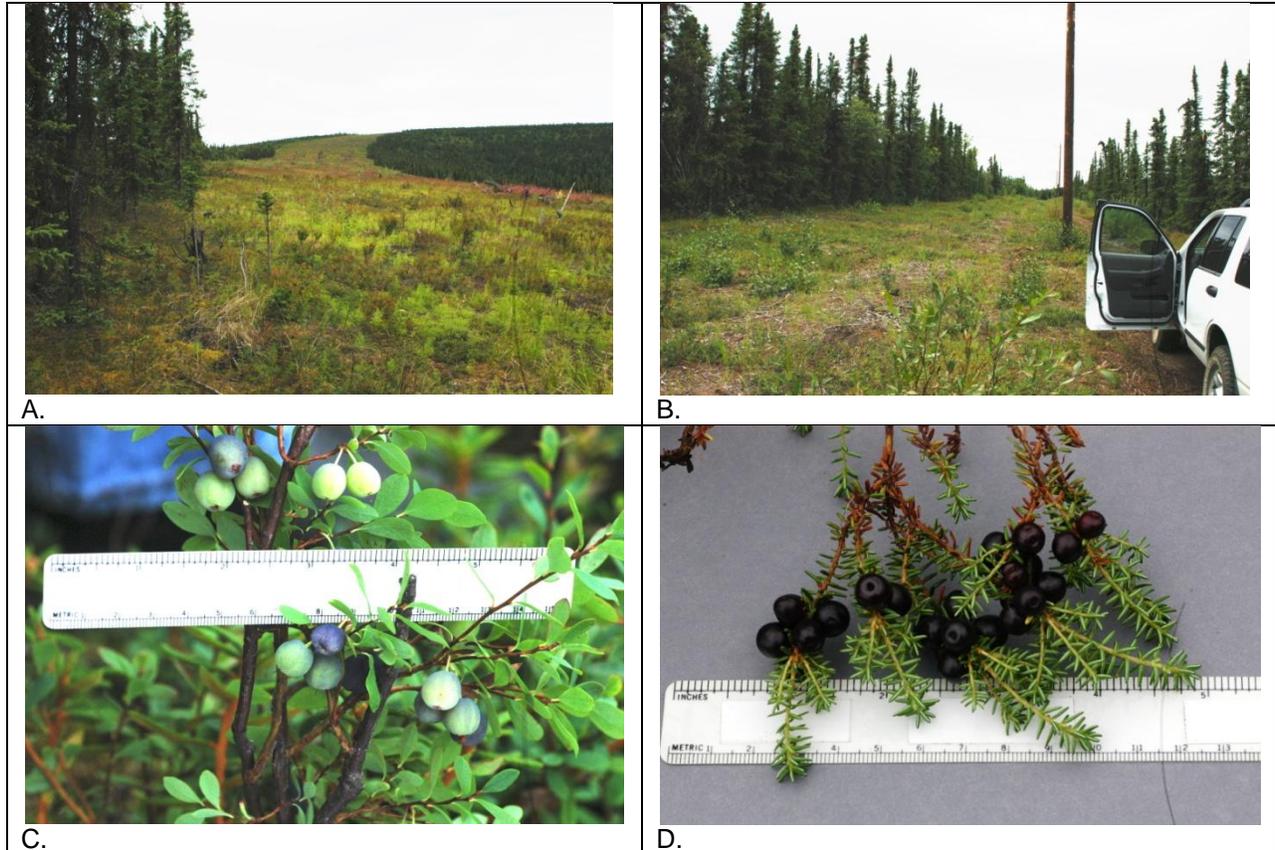


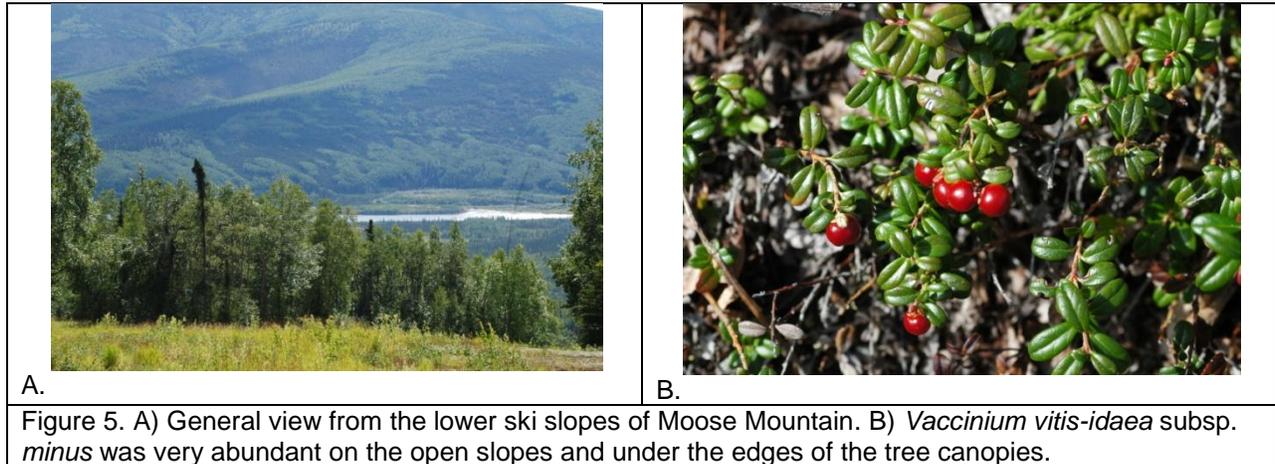
Figure 4. Views of A) pipeline easement and B) access road. C) *Vaccinium uliginosum* was abundant. Select plants exhibited large fruits and relatively large numbers of fruit per cluster. Photo of DBPH 5 (CVAC 1971). D) *Empetrum nigrum* was abundant and productive. Berry size ranged from average to above average. Photo of DBPH 6 (PEMP 11).

Vaccinium uliginosum was abundant and generally productive in the easement and along an adjacent access road. Across the site, fruit size was variable. We collected fruit and herbarium samples from one high-yielding colony (DBPH 4, CVAC 1970) and fruit from a second high-yielding colony (DBPH 5, CVAC 1971). In both cases, fruit size was above average and the fruit was generally borne in clusters. We also collected 2 plants from these colonies (DBPH 37, CVAC 1989 and DBPH 38, CVAC 1990). Plant height was approximately 20 cm and the site appeared to have been mown within approximately the past year. Dr. Knight reported that he had previously collected plants from these colonies that bore up to 8 berries per cluster. This is an excellent site for *V. uliginosum* germplasm intended for cultivar development.

Empetrum nigrum was abundant in the area. We collected fruit from a high-yielding, large-fruited colony (DBPH 6, PEMP 11) and from throughout the area (DBPH 7, PEMP 12). We also collected a clonal sample (DBPH 39, not assigned a PEMP number). This site represented one of the best two *Empetrum nigrum* sites visited during our week-long collection trip.

Site 3. N 64.9431°, W 147.9593°, elevation 675 m.

We returned eastbound on Murphy Dome Road, turning north on Moose Mountain Road, and following it north to a gate across the road leading to a downhill ski area. We walked into the site. Except for roads and ski trails, the site was generally covered with a moderate to dense canopy of *Alnus*, *Betula*, *Picea*, and *Salix*.



Vaccinium uliginosum was scattered across the summit of the ski area. The plants were nearly prostrate, seldom rising more than 10-15 cm. The crop was light and berry size small, with berries mostly being borne singly. We collected one fruit and herbarium sample (DBPH 8, CVAC 1972).

Empetrum nigrum, *Rubus strigosus*, and *Vaccinium vitis-idaea* subsp. *minus* were scattered alongside and under the canopy along the road leading uphill to the ski area. We collected an *Empetrum nigrum* (DBPH 9, PEMP 13) sample along about 1 km of road. We also collected fruit and herbarium samples from *Rubus strigosus* (DBPH 10, CRUB 2629) from a small colony at the head of one of the ski trails.

Vaccinium vitis-idaea subsp. *minus* was abundant throughout the site and carpeted the ski runs in some areas. Berries were abundant and of average size, but none were ripe enough to harvest for seed. This is an excellent site for *Vaccinium vitis-idaea* subsp. *minus*.

We returned to the Georgeson Botanic Gardens and placed the fruit and herbarium samples inside a walk-in cooler for storage during the one-week trip. During the day, the samples had been stored inside an ice chest with a block of ice.

Tuesday July 26, 2011.

Danny Barney, Patricia Holloway and Charles Knight departed Georgeson Botanic Gardens enroute North Pole, Alaska via the Richardson Highway (Alaska 2).

Site 4. N 64.7739°, W 147.2478°, elevation 260 m

We travelled to a nursery owned by Papa Meunier. There we examined approximately 100 *Vaccinium uliginosum* plants that had been transplanted from the wild, primarily from locations within about 40 miles of Fairbanks. The exact locations of the collection sites were not available. The plants were grown as garden-cultivated plants and appeared generally healthy and vigorous. Most of the plants were about 30 cm tall. Most of the fruit had been harvested but several plants still bore heavy crops of large fruit. We collected fruit from 4 high-yielding, large-fruited plants (DBPH 11, DBPH 12, DBPH 13, and DBPH 14 – CVAC 1973, CVAC 1974, CVAC 1975, and CVAC 1976, respectively). Pat Holloway also collected cuttings from these and other plants to attempt rooting the clones at the Georgeson Botanic Gardens. During seed removal and cleaning, *Vaccinium uliginosum* sample DBPH 11 (CVAC 1973) appeared to be particularly rich in water-soluble pigments.

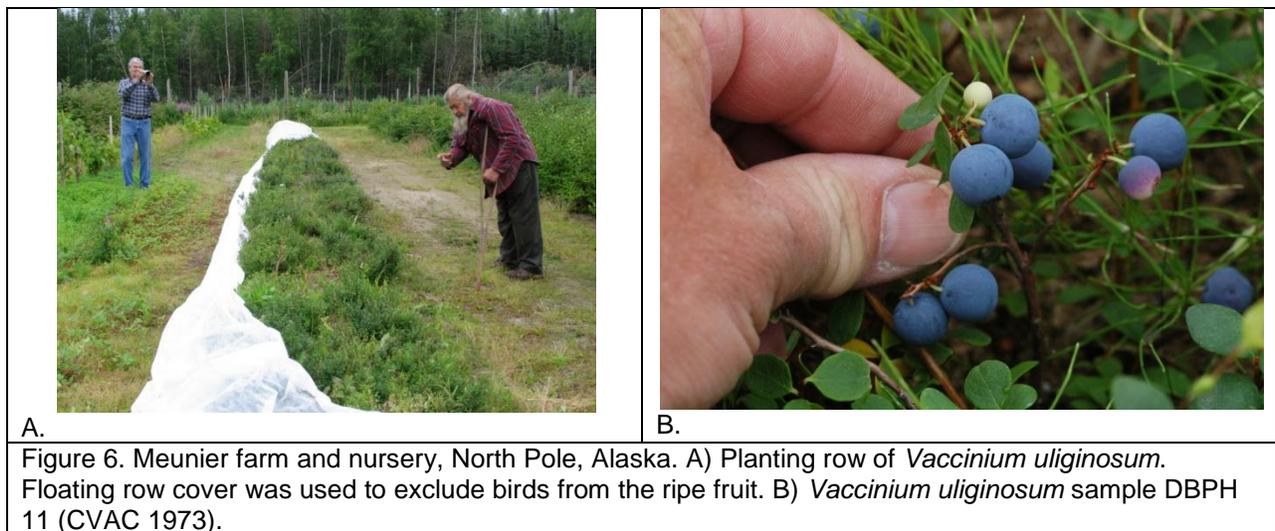


Figure 6. Meunier farm and nursery, North Pole, Alaska. A) Planting row of *Vaccinium uliginosum*. Floating row cover was used to exclude birds from the ripe fruit. B) *Vaccinium uliginosum* sample DBPH 11 (CVAC 1973).

Site 5. N 64.5598°, W 146.9389°, elevation 400 m

We continued south and east on Alaska Highway 2 to Johnson Road and followed it northeast to Woodcutting Road. This is a dirt track leading into an Alaska Department of Natural Resources property, known locally as Sulliwood. The site is heavily wooded with *Betula*, with some *Alnus*, *Picea*, and *Salix*. Approximately 1.1 miles along the track and about 50 m west-southwest from the track, we found a partial clearing. The point on Woodcutting road nearest the clearing was N 64.5603°, W 146.9389°.

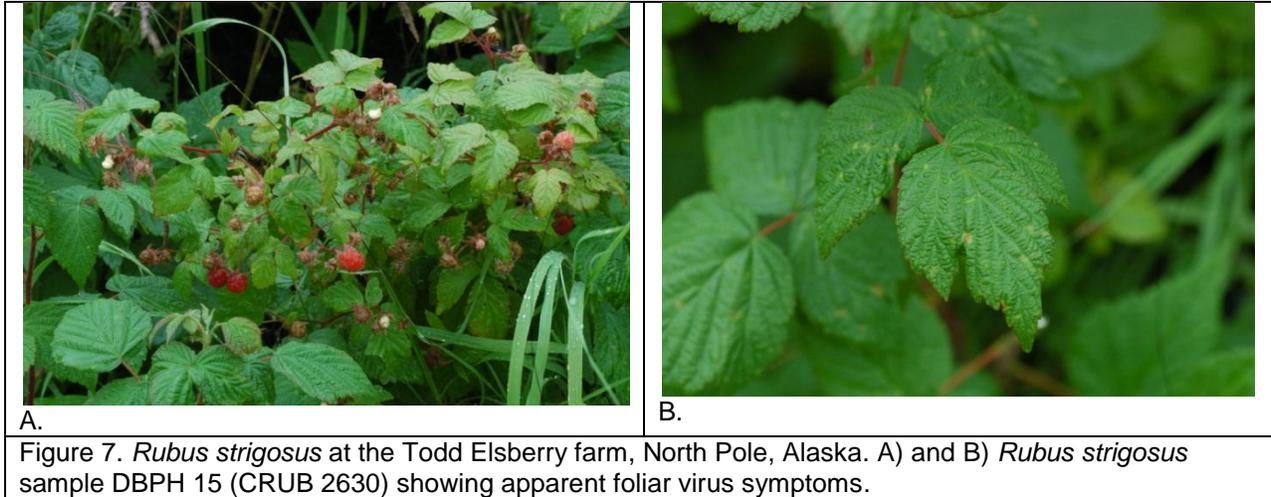
Vaccinium vitis-idaea subsp. *minus* was very abundant in the clearing, largely carpeting the ground. The species was often found growing on or alongside rotting stumps and fallen trees. Fruit was abundant but not ripe enough to harvest for seed. Dr. Knight offered to make a collection during the fall of 2011 and send the seeds to the Arctic and Subarctic Plant Gene Bank. This is an excellent site for collecting *Vaccinium vitis-idaea* subsp. *minus*.

Empetrum nigrum was also present and typical for the species. We did not collect a sample.

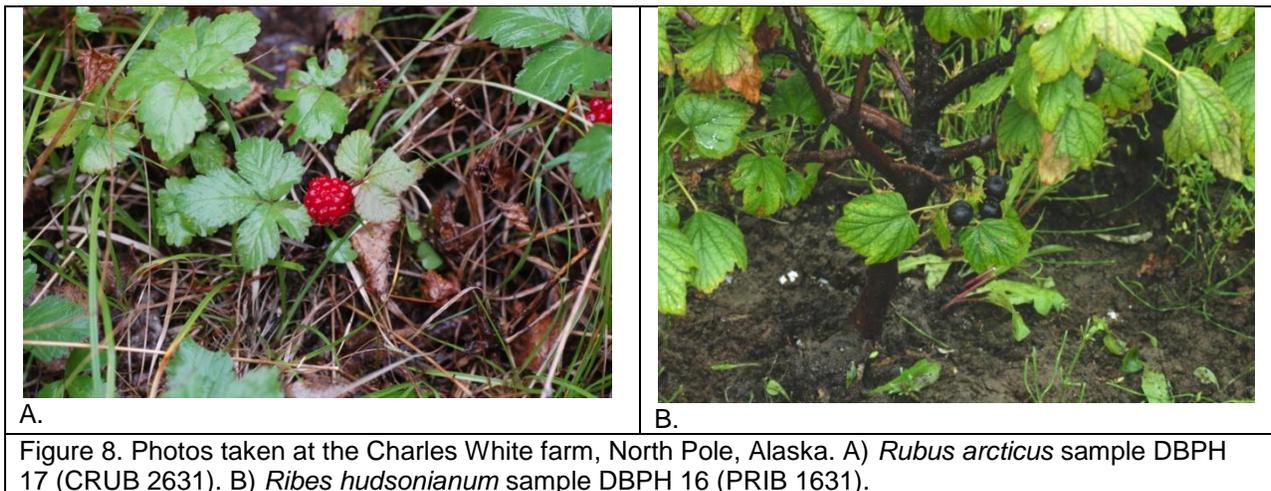
Site 6. N 64.6355°, W 147.1242°, elevation 275 m

We returned on Alaska Highway 2 north to Eielson Farm Road, turning west off of the highway and following the road west and then south to the Todd Elsberry farm. The farm had been cleared but was not being actively managed for agriculture and was largely overgrown with native vegetation.

Rubus strigosus was abundant on berms created from soil, rocks, and logs during land clearing. We collected a fruit and herbarium sample (DBPH 15, CRUB 2630) from a colony exhibiting what appeared to be foliar virus symptoms. The berries were small and crumbly. ARS virologist Dr. Nancy Robertson stationed at the ASPGB in Palmer had previously sampled *Rubus strigosus* on this site.

**Site 7. N 64.6321°, W 147.1071°, elevation 275 m**

We continued southeast on farm roads to the Charles Knight farm adjacent to the Todd Elsberry farm.

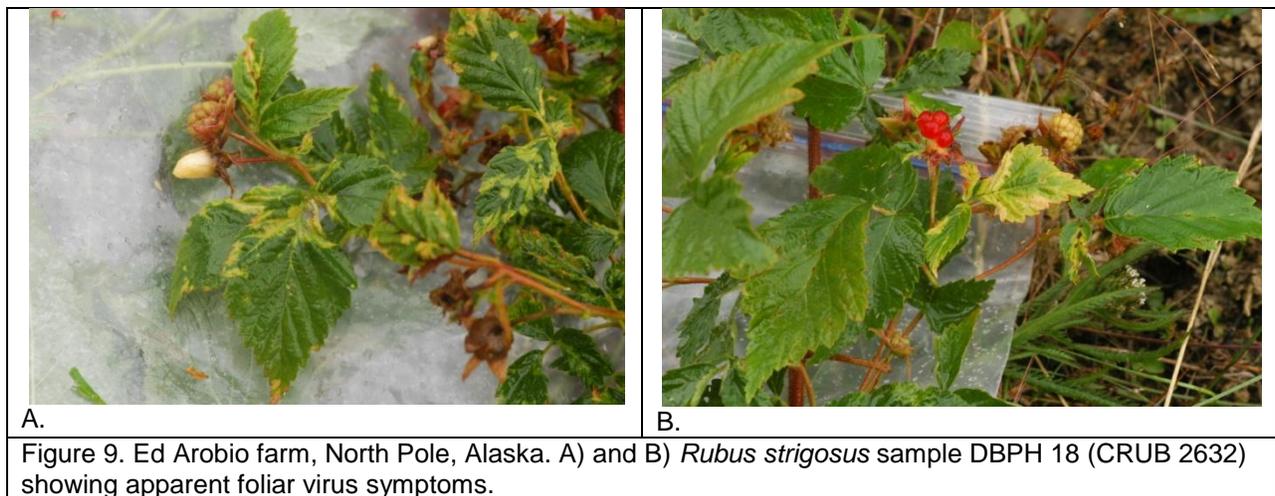


We collected fruit and an herbarium sample (DBPH 16, PRIB 1631) from a single *Ribes hudsonianum* bush growing in cultivation on the farm. Dr. Knight explained that the plant had been propagated from a cutting taken from a plant in his yard at Fairbanks. That plant had been propagated from a wild plant growing on the property of his neighbor in Fairbanks. The *R. hudsonianum* plant appeared generally healthy and vigorous with a light crop of fruit. The leaves were rather yellowish with darker green veins.

Rubus arcticus was relatively abundant along the farm road leading from the Elsberry farm, with some fruit present. We collected fruit and herbarium samples (DBPH 17, CRUB 2631).

Site 8. N 64.6148°, W 147.1060°, elevation 285 m

We continued south on farm roads to the Ed Arobio farm adjacent to the Knight farm. The land had been cleared of trees and was being cultivated for farm crops. On a berm formed during land clearing, we found abundant *Vaccinium vitis-idaea* subsp. *minus*, but no ripe fruit. We also found abundant *Viburnum edule* bearing average crops of fruit.



Rubus strigosus was abundant on the berms and we collected fruit and herbarium samples (DBPH 18, CRUB 2632) from a colony that appeared to exhibit foliar virus symptoms. According to Dr. Knight, Dr. Nancy Robertson of the ASPGB previously collected foliar samples from that colony. Our purpose in collecting samples from the virus-infected plants was to determine to what degree the virus might be transmitted via seed.

We returned to Fairbanks and placed the samples inside a walk-in cooler.

Wednesday August 27, 2011

We departed Fairbanks north along the Elliott Highway (Alaska Highway 2). Our party consisted of Danny Barney, Patricia Holloway, Charles Knight, and Papa Meunier.

Site 9. N 65.1500°, W 147.8592°, elevation 274 m

We stopped at a pullout at the east side of the highway and the south end of a bridge across Washington Creek. We walked north along a trail on the east bank of the creek. The ground rose steeply from the east side of the creek, leaving a 10-30 meter-wide strip of bog, hummocks, and standing water with a light canopy of trees.

Vaccinium uliginosum was abundant and productive on the lower edge of the slope. The plants were taller than average for the Fairbanks region with heights typically about 70-100 cm. Fruit size appeared average to somewhat above average for the Fairbanks region. We collected an herbarium sample from the trailhead and fruit from along 0.5 km of the trail on the east side of the creek (DBPH 19, CVAC 1977). During seed removal and cleaning, *Vaccinium uliginosum* sample DBPH 19 (CVAC 1977) appeared to be particularly rich in water-soluble pigments.

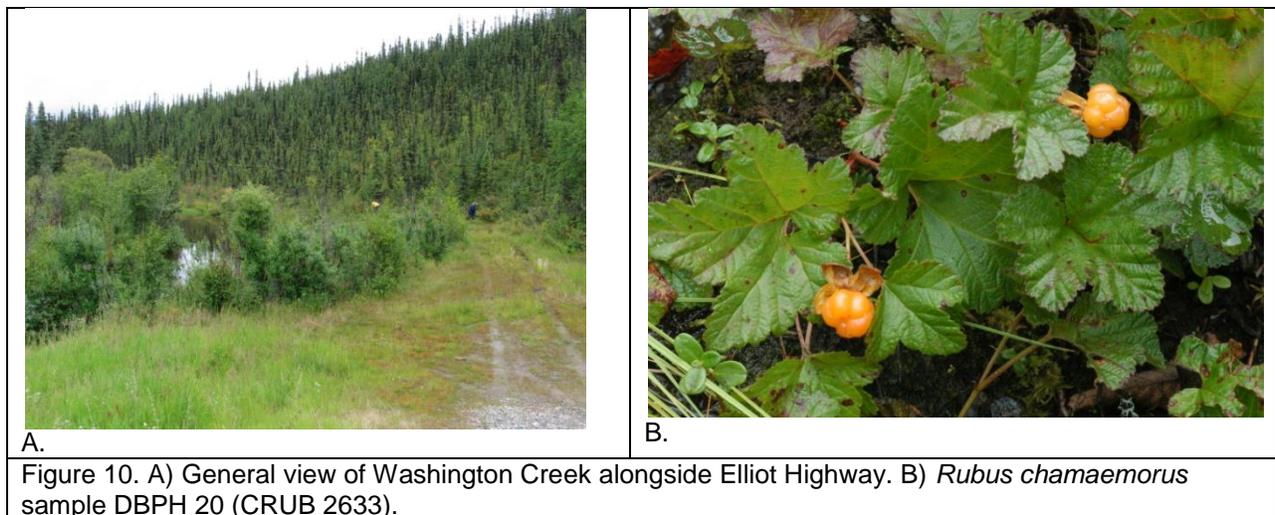


Figure 10. A) General view of Washington Creek alongside Elliot Highway. B) *Rubus chamaemorus* sample DBPH 20 (CRUB 2633).

Rubus chamaemorus was abundant on the site, although few fruits were present. We collected fruit and herbarium samples (DBPH 20, CRUB 2633).

Empetrum nigrum, *Vaccinium vitis-idaea* subsp. *minus*, and *Fragaria* (probably *F. virginiana*) were scattered along the trail, but few or no fruit were present and we did not collect samples for the NPGS.

Site 10. N 65.1631°, W 147.9349°, elevation 381 m

We continued north along the Elliott Highway to approximately mile post 22 and turned northeast onto a fire road built for a burn about 25-30 years ago. The site had regrown into a moderate to dense stand of *Alnus*, *Betula*, and *Picea*. We parked about 100 m from the highway and walked northeast along the fire road. Samples collected at Site 1 were harvested along approximately 0.5 km of the fire road.

Vaccinium uliginosum was abundant along the road and under the canopy. Production was sporadic with a generally light crop and some highly productive patches. We collected a fruit sample from

along the road (DBPA 21, CVAC 1978). During seed removal and cleaning, *Vaccinium uliginosum* sample DBPH 21 appeared to be particularly rich in water-soluble pigments.

We continued northeast along the fire road for approximately 100 m and collected fruit and herbarium samples from a large-fruited, highly productive *Vaccinium uliginosum* colony (DBPH 22, CVAC 1979).

Approximately 30 m down slope (east) of that colony we collected *V. uliginosum* fruit samples from a colony with very large fruits (DBPH 23, CVAC 1980) and a colony with unusually sweet and flavorful berries (DBPH 24, CVAC 1981). During seed removal and cleaning, *Vaccinium uliginosum* sample DBPH 23 (CVAC 1980) appeared to be particularly rich in water-soluble pigments.

We returned to Fairbanks and placed the samples into a walk-in cooler.



Thursday August 28, 2011

We departed Fairbanks and traveled northeast along the Steese Highway (Alaska Highway 6). Our party consisted of Danny Barney, Patricia Holloway, Charles Knight, and Papa Meunier.

Site 11. N 65.2925°, W 146.4700°, elevation 448 m

We collected from a site that had burned approximately 20 years ago. The canopy was predominantly *Alnus*, *Betula*, and *Picea* with few tall trees remaining, other than burned spruce snags.

Vaccinium uliginosum was abundant with a light crop of average to somewhat above average-sized fruit. We collected fruit and herbarium samples (DBPH 25, CVAC 1982). We also collected a clonal plant sample (DBPH 40, CVAC 1991). During seed removal and cleaning, *Vaccinium uliginosum* sample DBPH 25 (CVAC 1982) appeared to be particularly rich in water-soluble pigments.

Rubus Chamaemorus was abundant and productive on hummocks of moss that appeared to have escaped the fire. We collected fruit and herbarium samples (DBPH 26, CRUB 2634).

Vaccinium vitis-idaea subsp. *minus* was scattered across the site, but the crop was light and none of the fruits were ripe.



A.



B.



C.

Figure 12. Steese Highway, Site 11. A) General view. B) *Vaccinium uliginosum* sample DBPH 25 (CVAC 1982). C) *Rubus chamaemorus* sample DBPH 26 (CRUB 2634).

Site 12. N 65.3708°, W 146.0610°, elevation 682 m

We continued northeast along the Steese Highway. Upslope of the highway (northwest) was a forest comprised mostly of *Picea* with some *Alnus*, *Betula*, and *Salix*.

Vaccinium uliginosum was relatively abundant and moderately productive with berries average in size and borne mostly as single fruits. The plants averaged about 20-30 cm high. We collected fruit and herbarium samples (DBPH 27, CVAC 1983).

Empetrum nigrum was abundant across the site and productive under the canopy upslope of the highway. Fruit size appeared well above average for the Fairbanks region. This was the best *E. nigrum* site visited during the week-long collection trip, with Site 2 also being quite good. We collected fruit and herbarium samples (DBPH 28, PEMP 14).

Vaccinium vitis-idaea subsp. *minus* was present on the site, but no ripe fruits were present.

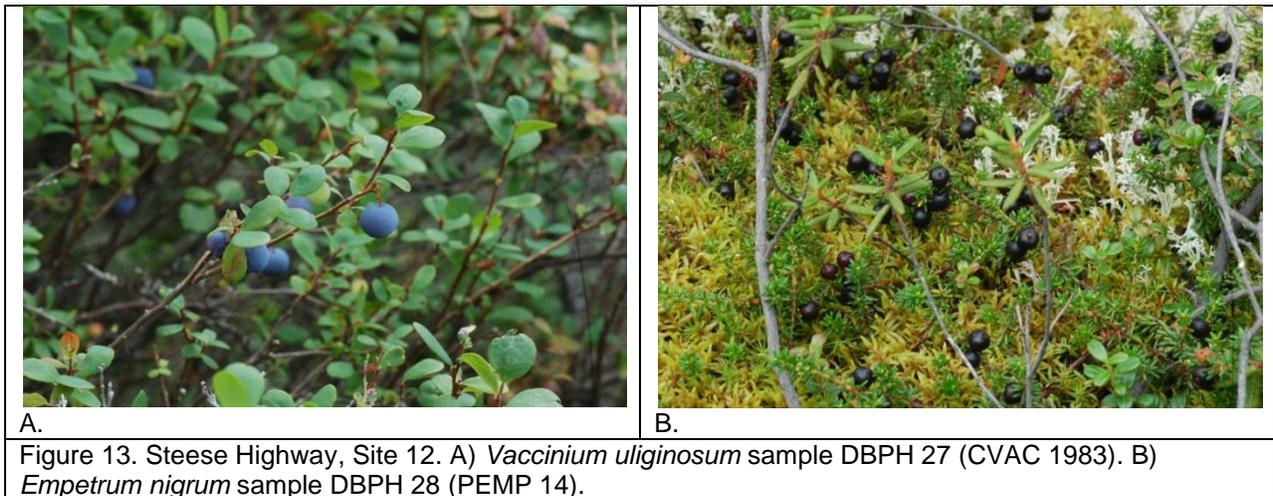
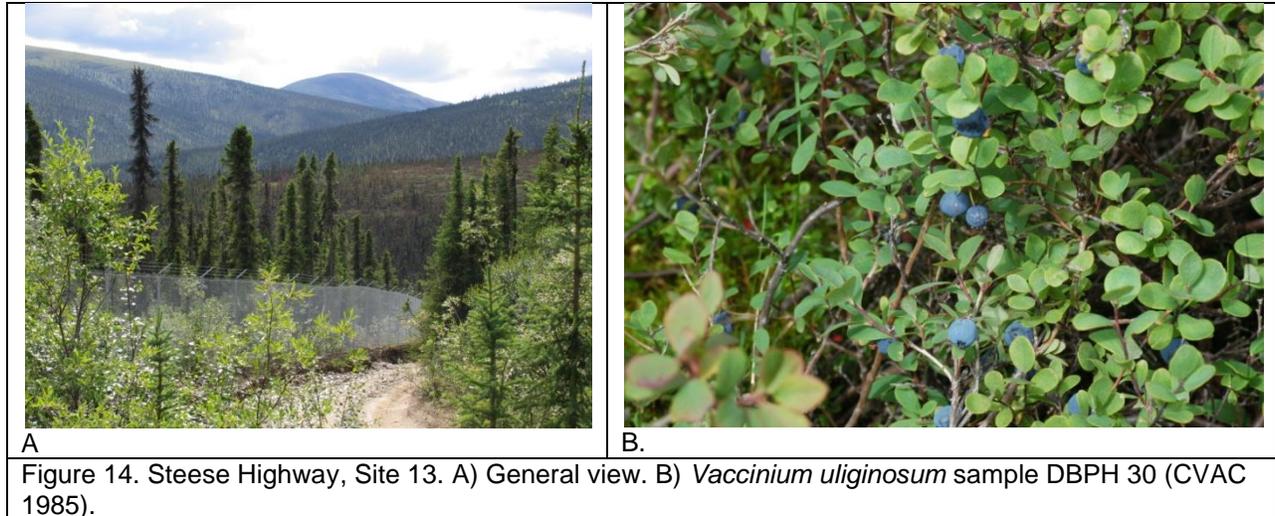


Figure 13. Steese Highway, Site 12. A) *Vaccinium uliginosum* sample DBPH 27 (CVAC 1983). B) *Empetrum nigrum* sample DBPH 28 (PEMP 14).

Site 13. N 65.3641°, W 146.0890°, elevation 678 m

We backtracked along the Steese Highway about 2 km to a site occupied with an Alaska Department of Transportation facility. The facility was contained within a chain link fence and surrounded by a washed-out perimeter road along the west side. There was a clearing 30-50 m wide between the fence and the adjoining forest, which was comprised mostly of *Picea*, with some *Alnus* and *Betula*.

Vaccinium uliginosum was abundant and productive on the site outside of the DOT facility fence. Midway along the perimeter road west of the fence we collected fruit from a dark-fruited phenotype (DBPH 29, CVAC 1984). Outside of the northwest corner of the fence we collected fruit and herbarium samples from a high-yielding colony with above average numbers of fruits per cluster (DBPH 30, CVAC 1985). During seed removal and cleaning, *Vaccinium uliginosum* sample DBPH 30 (CVAC 1985) appeared to be particularly rich in water-soluble pigments.

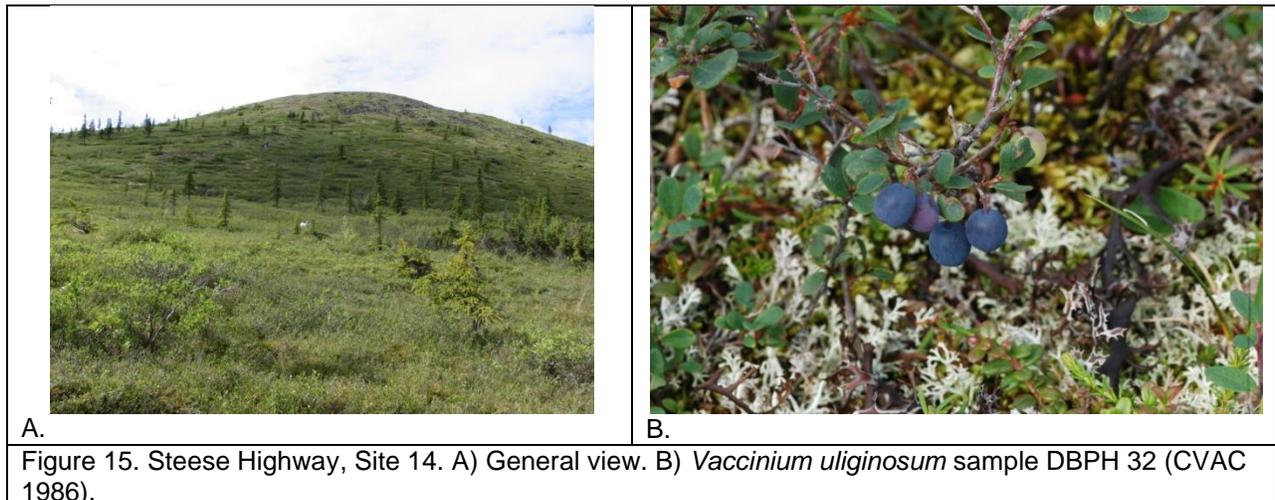


Empetrum nigrum was relatively abundant and productive across the site and we collected fruit and herbarium samples (DBPH 31, PEMP 15).

Vaccinium vitis-idaea subsp. *minus* was relatively abundant across the site but no ripe fruit were present. We estimated that the fruit would ripen in late August or early September.

Site 14. N 65.3918°, W 146.0032°, elevation 890 m

We continued northeast along the Steese Highway to a point at about the tree line. The site was on the northwest side of the highway at the base of a steep, rounded knoll with an elevation of approximately 1,200 m. Small numbers of small *Betula* and *Picea* were scattered across the slopes. *Alnus* and *Salix* were abundant along the roadside. Most of the slope was covered with deep moss.



Vaccinium uliginosum was abundant and relatively productive, with prostrate plants typically rising 10-15 cm high. We collected a fruit sample (DBPH 32, CVAC 1986). During seed removal and cleaning, *Vaccinium uliginosum* sample DBPH 32 appeared to be particularly rich in water-soluble pigments.

Empetrum nigrum was relatively abundant on the site but few fruits were present and we did not collect a sample.

Site 15. N 65.4844°, W 145.4157°, elevation 1111 m

We continued northeast along the Steese Highway to Pinnel Trailhead near Eagle Summit. This site was above tree line in open tundra. Dwarfed *Betula* 20-40 cm high was relatively abundant across the site, mostly on hummocks of moss overlying stones. Stunted *Picea* and *Salix* were scattered sparsely across the site.

Vaccinium uliginosum was scattered across the slope. The plants were prostrate, rising 0-10 cm above the moss. Within the moss, extensive systems of stems, rhizomes, and roots had formed. Some fruit was present with berries average to somewhat above average in size, mostly borne as single fruits. We collected a fruit sample (DBPH 33, CVAC 1987).

Empetrum nigrum was scattered across the site. Although the crop was light and berries small, we collected a sample (DBPH 34, PEMP 16).

We returned to Fairbanks. The samples were kept overnight in an ice chest with a block of ice.

Friday August 29, 2011

The morning was spent updating the logbook, pressing herbarium samples and preparing fruit and plant samples for transport to Palmer. We also entered location data for collection sites into mapping software. During the afternoon, we visited two collection sites.

Site 16. N 64.8558°, W 147.8928°, elevation 146 m

We visited a low-lying site within the city limits of Fairbanks, near the south end of Noah Street and south of Alaska Highway 3. The site was a power line easement approximately 100 m wide which had, reportedly, been mowed in 2010. Vegetation within the easement was highly varied and growing vigorously. Our party consisted of Danny Barney, Patricia Holloway, and Tina Buxbaum-Carr.

Empetrum nigrum was relatively abundant on the site, although the fruit crop was light. We collected a fruit sample (DBPH 35, PEMP 17) from *E. nigrum*.

Rubus chamaemorus, *Rubus strigosus*, *Rubus arcticus*, *Vaccinium uliginosum*, and *Vaccinium vitis-idaea* subsp. *minus* were all relatively abundant on the site but very few fruits were present and we did not collect samples.



Figure 16. Steese Highway, Site 15. A) Dr. Knight collecting at the Pinnel Trailhead near Eagle Summit. B) *Vaccinium uliginosum* sample DBPH 33 (CVAC 1987). C) *Vaccinium uliginosum*. The ruler in C) is 15 cm long.

Site 17. N 64.8038°, W 147.9557°, elevation 130 m

We visited a site owned by Lisa Behr off of Chena Pump Avenue near Chena Pump Road. The low-lying site was mostly grassy meadow and bog with a few higher spots. Small stands of *Betula* and *Populus tremuloides* were scattered on the higher spots.

Vaccinium uliginosum was scattered across the site and abundant under one small stand of trees (ca 150 m²). The berries were large and abundant, with some of the largest numbers of berries per plant that we found on the trip. We collected a fruit sample, DBPH 36 (CVAC 1988).

We concluded the collection portion of the trip and returned the borrowed ARS vehicle.



Saturday August 30, 2011

Danny Barney returned to Palmer with the fruit and herbarium samples. The fruit samples were placed into a walk-in cooler at the USDA-ARS-ASPGB at the end of the day pending seed extraction. Patricia Holloway retained the cuttings for propagation at Georgeson Botanic Gardens.

August 2 – 5, 2011

Seeds were extracted from the fruit samples and placed on filter papers in the laboratory at 22 °C for initial drying for one week. After that, they spent an additional week in a drying chamber with anhydrous calcium sulfate desiccant at 22 °C. Herbarium samples were placed into the curator's laboratory at the ASPGB at 22 °C for drying. *Vaccinium uliginosum* samples DBPH 37, 38, and 40 were transplanted into ca 4 or 8 L black plastic film grow bags and placed into an unheated greenhouse. These three accessions did not survive transplanting from the wild. *Empetrum nigrum* sample DBPH 39 received the same treatment and was still alive October 13, 2011.

August 18, 2011

The dried seeds were placed into metal foil envelopes for long-term storage and placed into a refrigerator at 2-4 °C pending transport to the USDA-ARS National Clonal Germplasm Repository in Corvallis, Oregon.

Appendix A

Collection Proposal

PLANT EXPLORATION IN INTERIOR ALASKA TO COLLECT FRUIT GERMPLASM FOR CROP IMPROVEMENT.

Proposal

Interior Alaska in the region around Fairbanks is rich in cold hardy temperate fruit species. This germplasm is desired for breeding programs for crop improvement. Although plant collections have been made in Alaska before, germplasm from some promising populations is unavailable or underrepresented in the National Plant Germplasm System. How these populations will respond to habitat degradation due to global climate change remains to be determined and it seems prudent to develop *ex situ* collections. Explorations will be made in compliance with Federal and Alaska State laws and ARS policies regarding germplasm collection. Samples of the germplasm will be deposited in the U.S. National Plant Germplasm System (NPGS). Equal samples will be offered to the University of Alaska. Germplasm in the NPGS will be curated on behalf of the U.S. Government and will be available to all qualified scientists/organizations, domestic and foreign, which are eligible to receive it. Germplasm will be collected as seeds, stem cuttings, and rhizomes. When possible, collections will be documented with voucher herbarium specimens. All collections will be documented with complete "passport" data (description, locality of collection, including latitude and longitude, etc.). \$2,000 is requested from USDA National Germplasm Resources for lodging, mileage, and per diem.

1. Submitted by:
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2. Objectives:

a. Taxa to be collected: The main focus will be small fruit wild relative species and *Mentha* species.

Small fruits	<i>Mentha</i>
<i>Empetrum nigrum</i>	<i>Mentha arvensis</i> L.
<i>Fragaria virginiana</i> Mill.	<i>Mentha spicata</i> L.
<i>Rubus arcticus</i> L.	
<i>Rubus arcticus</i> subsp. <i>acaulis</i> (Michx.) Focke	
<i>Rubus arcticus</i> subsp. <i>arcticus</i>	
<i>Rubus arcticus</i> subsp. <i>stellatus</i> (Sm.) B. Boivin	
<i>Rubus chamaemorus</i> L.	
<i>Vaccinium oxycoccos</i> L.	
<i>Vaccinium uliginosum</i> L.	
<i>Vaccinium vitis-idaea</i> L.	
<i>Vaccinium vitis-idaea</i> L. subsp. <i>minus</i>	
<i>Ribes hudsonianum</i> Richardson	
<i>Ribes lacustre</i> (Pers.) Poir.	
<i>Ribes triste</i> Pall.	

b. Specific or general characteristics sought: Additional species representation is sought for *Mentha* and *Vaccinium oxycoccos*. Genes for improved cold hardiness, disease resistance, and fruit yields and quality are the objectives for *Fragaria*, *Rubus*, and *Vaccinium*.

c. Use to be made of germplasm collected: Collected germplasm will be made available to plant breeders and other users with research interests.

3. Dates of travel:

July 24-30, 2011

This date provides the best window for obtaining viable seeds from the target species.

4. Host state:

Our expedition will take place in the Fairbanks region of Alaska. The University of Alaska Fairbanks will be participating in the collections.

5. Suggested participants:

Dr. Danny L. Barney

Professional qualifications: Dr. Barney is Curator/Horticulturist at the USDA-ARS Arctic and Subarctic Plant Gene Bank in Palmer, Alaska and oversees the NPGS germplasm collections for *Empetrum*, *Mentha*, *Ribes* and 30 additional genera. He has extensive knowledge and experience in plant collecting for breeding and germplasm purposes, has conducted numerous collecting trips in the United States, and served as a university small fruit specialist for 22 years before joining the ARS in 2010. He is an experienced *Vaccinium* breeder and has worked intensively with *V. uliginosum*.

Dr. Patricia Holloway

Professional qualifications: Dr. Holloway is Professor of Horticulture and Director of the Georgeson Botanical Garden at the University of Alaska in Fairbanks. She has extensive experience in plant collecting in subarctic regions and has worked for years with cultivation of fruit species native to the Fairbanks region, including *Vaccinium uliginosum*, and *V. vitis-idaea*.

University of Alaska
Georgeson Botanical Garden
117 West Tanana Drive
Fairbanks, Alaska 99775
Phone: (907) 474-6561
Fax: (907) 474-1841
Email: psholloway@alaska.edu

6. Host state requirements to obtain collection permits

Required permits to collect on Alaska public lands will be obtained by the cooperators.

7. Justification:

The Fairbanks region of Alaska is surprisingly rich in *Fragaria*, *Ribes*, *Rubus*, and *Vaccinium* populations. Interior Alaska populations of these wild relatives of cultivated fruit crops are sources of genes for cold hardiness, in particular, and may also help provide improved disease resistance and novel horticultural traits for fruit breeders. *Vaccinium uliginosum* (referred to as Alaska blueberry in this region) is widely distributed across the world but domestication efforts are in their infancy. The crop is harvested from the wild throughout Alaska and there is strong interest there in developing cultivated varieties and cultural practices. *Vaccinium uliginosum* accessions from Alaska are present in the NPGS system, but populations in the Fairbanks area are particularly noted for cold hardiness and desirable horticultural qualities, and are underrepresented in the NPGS collections. This collection will allow selectivity with a particular emphasis on potential breeding parents. Local guides highly knowledgeable about *V. uliginosum* and horticultural crop development in interior Alaska are available to accompany the expedition. Likewise, *Empetrum nigrum* (crowberry) has long been harvested from the wild in Alaska and there is potential for development of improved varieties for cultivation. Despite its abundance in Alaska and long history of indigenous use, only 2 of the 11 *E. nigrum* accession in the NPGS come from Alaska, neither near Fairbanks. *Vaccinium vitis-idaea* (lingonberry) cultivars are available commercially, but have not proven reliable under subarctic conditions. The locally available *V. vitis-idaea* subsp. *minus* is hardy in interior Alaska and is collected there for domestic cultivation. Prospects for

- developing cultivars of that crop and also using the genes to improve winter hardiness of *V. vitis-idaea* appear good.
8. Germplasm currently available: Germplasm for all of the target species is presently in the NPGS system. Some of the species are underrepresented in the NPGS collections, or the germplasm targeted for this collection will expand and enhance the collections, particularly from a perspective of material suitable for small fruit breeding.
 9. CGC or other concurrence: A letter has been requested from the small fruit CGC.
 10. Benefits to host country: Germplasm collected during the trip will be shared equally with the University of Alaska for research and evaluation purposes.
 11. Currency/exchange rates: N/A
 12. Holidays: N/A
 13. Supplies and equipment: All necessary equipment and supplies are available at the USDA-ARS Arctic and Subarctic Plant gene Bank and will be transported by Dr. Barney to Fairbanks.
 14. Travel plan: Itinerary is listed below.
 15. APHIS requirements for import of germplasm: N/A
 16. How accessions will be collected and shipped: Small fruit accessions will be collected in the form of seeds from ripe fruits. Collected berries will be stored on ice in ice chests during the week of the collection. They will be transported to Palmer on ice and refrigerated for up to 1 week pending removal and drying of the seeds at the Arctic and Subarctic Plant Gene Bank.

Ideally, we will collect *Mentha* accessions in the form of seeds. These will be collected dry, placed inside sealable plastic bags, and stored at ambient temperatures pending return to Palmer. If seeds are not available, clonal material in the form of rhizomes and plants will be collected, sealed inside plastic bags, and transported to Palmer on ice for transplanting to nursery containers.
 17. Disposition of germplasm: Collected germplasm will be added to the NPGS collections. *Empetrum*, *Mentha*, and *Ribes* accessions will remain at the Arctic and Subarctic Plant Gene Bank. Other small fruits will be transferred to the National Clonal Germplasm Repository in Corvallis, Oregon.
 18. Contacts and cooperators: See section 5, above.
 19. References consulted:

Barney, D.L. 2003. Prospects for domesticating western huckleberries. *Small Fruits Review* 2 (1):15-29.

Barney, D.L. and K. Hummer. 2005. Currants, gooseberries, and jostaberries: A guide for growers, marketers, and researchers in North America. Food Products Press. Binghamton, NY.

USDA GRIN database.

USDA Plants database.

Vander Kloet, S. 1988. The genus *Vaccinium* in North America. Research Branch, Agriculture Canada.

20. Itinerary

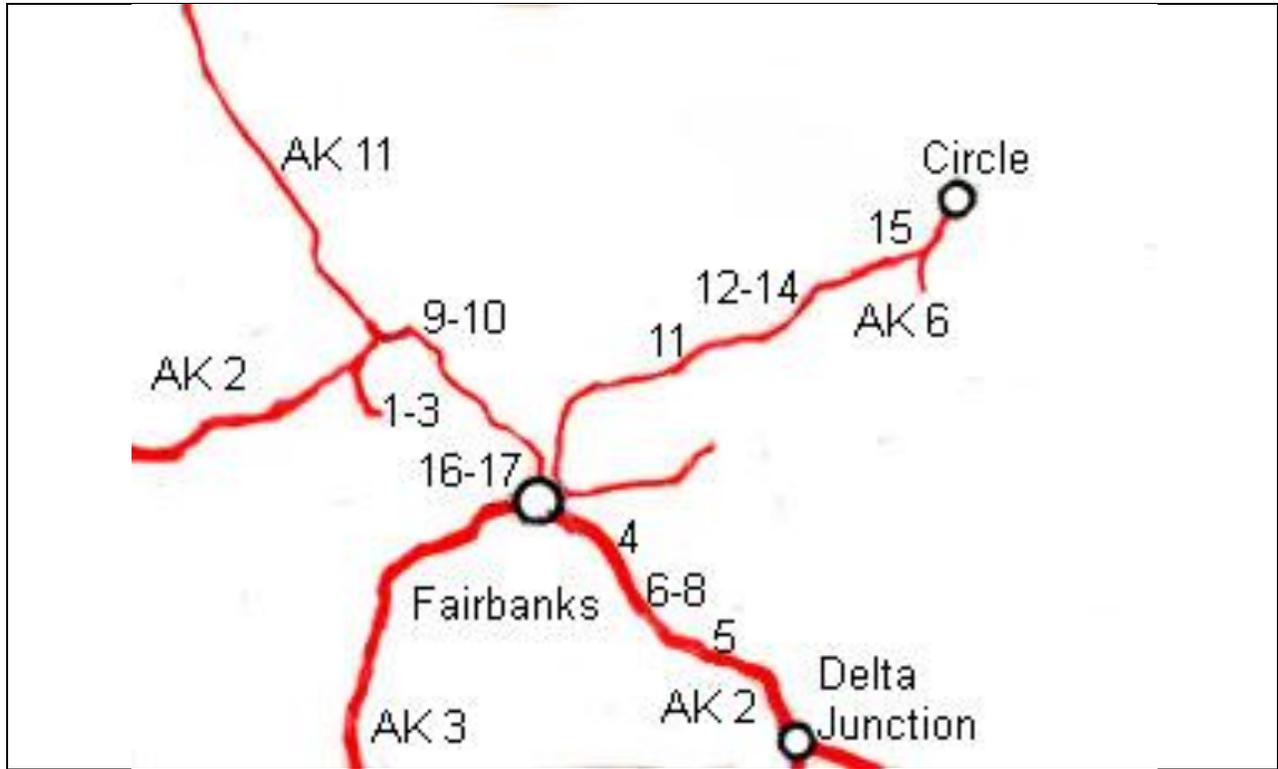
Date	Location	Lodging	Per Diem	Estimated mileage
Sunday, 24-Jul-11	Depart Palmer, AK and arrive Fairbanks	175	80.25	350 POV
Monday, 25-Jul-11	Collect in the Fairbanks area, AK	175	107	100 GOV
Tuesday, 26-Jul-11	Collect in the Fairbanks area	175	107	100 GOV
Wednesday, 27-Jul-11	Collect in the Fairbanks area	175	107	100 GOV
Thursday, 28-Jul-11	Collect in the Fairbanks area	175	107	100 GOV
Friday, 29-Jul-11	Collect in the Fairbanks area	175	107	100 GOV
Saturday, 30-Jul-11	Depart Fairbanks and return to Palmer	0	80.25	350 POV
GOV = government vehicle POV = personal vehicle				

21. ARS Budget estimate:

Item	Cost
Mileage for POV (Barney)	126
Per diem (figures provided by GovTrip) (Barney)	696
Lodging (figures provided by GovTrip) (Barney)	1050
Total ARS	\$1,872

Appendix B

Map of Collection Sites



Alaska state highways are shown as AK 2, AK 3, AK 6, and AK 11. The approximate locations of collection sites are shown by numbers 1-17, corresponding to the site numbers described in this report.

Appendix C

Samples Collected

NPGS GRIN Number	Collector ID Number	Taxon	Material collected			Date collected	Latitude	Longitude	Elevation
			Seed	Clone	Herbarium				
CVAC 1968	DBPH 1	<i>Vaccinium uliginosum</i>	yes	no	no	7/25/2011	N 64.8756°	W 148.0680°	845 m
CVAC 1969	DBPH 2	<i>Vaccinium uliginosum</i>	yes	no	yes	7/25/2011	N 64.8756°	W 148.0680°	845 m
PEMP 10	DBPH 3	<i>Empetrum nigrum</i>	yes	no	yes	7/25/2011	N 64.8756°	W 148.0680°	845 m
CVAC 1970	DBPH 4	<i>Vaccinium uliginosum</i>	yes	no	no	7/25/2011	N 64.9522°	W 148.2574°	695 m
CVAC 1971	DBPH 5	<i>Vaccinium uliginosum</i>	yes	no	no	7/25/2011	N 64.9522°	W 148.2574°	695 m
PEMP 11	DBPH 6	<i>Empetrum nigrum</i>	yes	no	no	7/25/2011	N 64.9522°	W 148.2574°	695 m
PEMP 12	DBPH 7	<i>Empetrum nigrum</i>	yes	no	no	7/25/2011	N 64.9522°	W 148.2574°	695 m
CVAC 1972	DBPH 8	<i>Vaccinium uliginosum</i>	yes	no	no	7/25/2011	N 64.9431°	W 147.9593°	675 m
PEMP 13	DBPH 9	<i>Empetrum nigrum</i>	yes	no	no	7/25/2011	N 64.9431°	W 147.9593°	675 m
CRUB 2629	DBPH 10	<i>Rubus strigosus</i>	yes	no	yes	7/25/2011	N 64.9431°	W 147.9593°	675 m
CVAC 1973	DBPH 11 *	<i>Vaccinium uliginosum</i>	yes	no	no	7/26/2011	N 64.7739°	W 147.2478°	260 m
CVAC 1974	DBPH 12	<i>Vaccinium uliginosum</i>	yes	no	no	7/26/2011	N 64.7739°	W 147.2478°	260 m
CVAC 1975	DBPH 13	<i>Vaccinium uliginosum</i>	yes	no	no	7/26/2011	N 64.7739°	W 147.2478°	260 m
CVAC 1976	DBPH 14	<i>Vaccinium uliginosum</i>	yes	no	no	7/26/2011	N 64.7739°	W 147.2478°	260 m
CRUB 2630	DBPH 15	<i>Rubus strigosus</i>	yes	no	yes	7/26/2011	N 64.6355°	W 147.1242°	275 m
PRIB 1631	DBPH 16	<i>Ribes hudsonianum</i>	Yes	No	Yes	7/26/2011	N 64.6321°	W 147.1071°	275 m
CRUB 2631	DBPH 17	<i>Rubus arcticus</i>	yes	no	yes	7/26/2011	N 64.6321°	W 147.1071°	275 m
CRUB 2632	DBPH 18	<i>Rubus strigosus</i>	yes	no	yes	7/26/2011	N 64.6148°	W 147.1060°	285 m
CVAC 1977	DBPH 19 *	<i>Vaccinium uliginosum</i>	yes	no	yes	7/27/2011	N 65.1500°	W 147.8592°	274 m

CRUB 2633	DBPH 20	<i>Rubus chamaemorus</i>	yes	no	yes	7/27/2011	N 65.1500°	W 147.8592°	274 m
CVAC 1978	DBPH 21 *	<i>Vaccinium uliginosum</i>	yes	no	no	7/27/2011	N 65.1631°	W 147.9349°	381 m
CVAC 1979	DBPH 22	<i>Vaccinium uliginosum</i>	yes	no	yes	7/27/2011	N 65.1631°	W 147.9349°	381 m
CVAC 1980	DBPH 23 *	<i>Vaccinium uliginosum</i>	yes	no	no	7/27/2011	N 65.1631°	W 147.9349°	381 m
CVAC 1981	DBPH 24	<i>Vaccinium uliginosum</i>	yes	no	no	7/27/2011	N 65.1631°	W 147.9349°	381 m
CVAC 1982	DBPH 25 *	<i>Vaccinium uliginosum</i>	yes	no	yes	7/28/2011	N 65.2925°	W 146.4700°	448 m
CRUB 2634	DBPH 26	<i>Rubus chamaemorus</i>	yes	no	yes	7/28/2011	N 65.2925°	W 146.4700°	448 m
CVAC 1983	DBPH 27	<i>Vaccinium uliginosum</i>	yes	no	yes	7/28/2011	N 65.3708°	W 146.0610°	682 m
PEMP 14	DBPH 28	<i>Empetrum nigrum</i>	Yes	No	Yes	7/28/2011	N 65.3708°	W 146.0610°	682 m
CVAC 1984	DBPH 29	<i>Vaccinium uliginosum</i>	yes	no	no	7/28/2011	N 65.3641°	W 146.0890°	678 m
CVAC 1985	DBPH 30 *	<i>Vaccinium uliginosum</i>	yes	no	yes	7/28/2011	N 65.3641°	W 146.0890°	678 m
PEMP 15	DBPH 31	<i>Empetrum nigrum</i>	yes	no	yes	7/28/2011	N 65.3641°	W 146.0890°	678 m
CVAC 1986	DBPH 32 *	<i>Vaccinium uliginosum</i>	yes	no	no	7/28/2011	N 65.3918°	W 146.0032°	890 m
CVAC 1987	DBPH 33	<i>Vaccinium uliginosum</i>	yes	no	no	7/28/2011	N 65.4844°	W 145.4157°	1111 m
PEMP 16	DBPH 34	<i>Empetrum nigrum</i>	yes	no	no	7/28/2011	N 65.4844°	W 145.4157°	1111 m
PEMP 17	DBPH 35	<i>Empetrum nigrum</i>	yes	no	no	7/29/2011	N 64.8558°	W 147.8928°	146 m
CVAC 1988	DBPH 36	<i>Vaccinium uliginosum</i>	yes	no	no	7/29/2011	N 64.8038°	W 147.9557°	130 m
CVAC 1989	DBPH 37 **	<i>Vaccinium uliginosum</i>	no	yes	no	7/25/2011	N 64.9522°	W 148.2574°	695 m
CVAC 1990	DBPH 38 **	<i>Vaccinium uliginosum</i>	no	yes	no	7/25/2011	N 64.9522°	W 148.2574°	695 m
Not assigned	DBPH 39 **	<i>Empetrum nigrum</i>	No	Yes	No	7/25/2011	N 64.9522°	W 148.2574°	695 m
CVAC 1991	DBPH 40 **	<i>Vaccinium uliginosum</i>	no	yes	no	7/28/2011	N 65.2925°	W 146.4700°	448 m

* Samples appeared during seed removal and cleaning to be particularly rich in water-soluble blue and/or purple pigments.

** Clonal samples that did not survive transplanting from the wild.

Appendix D

Permits and Authorizations for Plant Collections

Alaska State Lands

From: Knight, Charles W (DNR) [mailto:charles.knight@alaska.gov]
Sent: Wednesday, July 06, 2011 8:37 AM
To: barney, danny; Pat Holloway
Subject: RE: Permission to collect on public lands

Danny

There is very little regulation about collecting on State land. There is a publication about Non Forest product use on state lands and it allows you to collect up to 100 whole plants per year on state lands without getting a permit, but for taking cuttings, there are no regulations. I will try to find you a copy of the regulations, but nobody is assigned to do any checking, and the only occasion that DNR would be interested is if someone complained that you were decimating natural stands. I look forward to collecting with you when you get to the Fairbanks area.

Charlie

Charles Knight
Northern Region Manager
Division of Agriculture
State of Alaska
(907) 374-3715 (Office)

From: barney, danny [mailto:danny.barney@ARS.USDA.GOV]
Sent: Tuesday, June 21, 2011 1:20 PM
To: Pat Holloway; Knight, Charles W (DNR)
Subject: FW: Permission to collect on public lands

Pat and Charley,

I am following up with obtaining permission to collect plant materials on state and federal public lands. Aside from the national parks, where I cannot collect, I believe the only other federal lands we might be interested in are under BLM control I am working with Michelle Ethun to obtain permission for those collections.

I contacted DNR and was told to talk to Charley Knight about obtaining a collection permit for Alaska State lands. What steps, if any, do we need to obtain clearance for state land collections?

Thanks. I'm looking forward to seeing you in July.

Dan

Danny L. Barney, Ph.D.
Curator and Horticulturist
USDA ARS Arctic and Subarctic Plant Gene Bank
1509 South Trunk Road
Palmer, Alaska 99645
Office phone: 907.746.9463
Email: Danny.Barney@ars.usda.gov



ALASKA STATE PARKS
SPECIAL PARK USE PERMIT
 FOR EXPLORATION, SCIENTIFIC RESEARCH, OR INFORMATION COLLECTION
 11 AAC 18.010(a)(6) and (a)(11)

Danny Barney 1509 South Trunk Road
 Applicant (Person's Name) Address
Palmer, AK 99645
 City, Zip

Representing: U.S. Department of Agriculture/Agriculture Research **Phone:** 907-745-4802
 Name of Organization

is granted permission to organize, sponsor, conduct, or engage in the following research activities:
Collection of native plant seeds and/or limited vegetative material and
limited amounts of topsoil for propagation.

FROM: 07/15/11 **at** 0800am **TO:** 12/31/14 **at** 1400pm
 Date Time AM/PM Date Time AM/PM

AT: Parkwide- Chugach State Park (Eklutna), Mat-Su (Palmer) and Northern
Area (Delta Junction and Fairbanks).

Special provisions: Please review special Stipulations.

Number of People: 8 Adults.

I have read the attached stipulations and permit provisions. The information on this permit is true and complete to the best of my knowledge, and I understand that any false statement or omission may result in suspension or revocation of any permit and forfeiture of the permit fee.

I understand that this permit will not grant any reservation rights or rights of exclusive use; and that facilities are available on a first-come, first-served basis, unless otherwise allowed by special stipulation. I agree to abide by State Park regulations and by the terms and conditions of this permit, and will confine my activities to those described.

Danny L. Barney 7/11/2011
 Applicant's signature Date

Pamela Russell 7/20/11
 Park Representative's signature Date



United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Eastern Interior Field Office
1150 University Avenue
Fairbanks, Alaska 99709-3844
<http://www.ak.blm.gov>



In reply refer to:
8111.1 (LLAKF02000)

Danny Barney, Ph. D.
Curator and Horticulturalist
USDA ARS Arctic and Subarctic Plant Gene Bank
1509 South Trunk Road
Palmer, AK 99645

Dear Danny:

We have reviewed your application for a fieldwork authorization to perform plant survey and scientific seed/plant collection on BLM-managed lands in the following areas, as outlined and illustrated in your application: north and south sides of Alaska Highway 6 between Fairbanks and Circle and east of Alaska Highway 2 between Fairbanks and Livengood.

We find that your proposed action, as described in your application, falls under our category of Casual Use, and therefore does not require a permit from our field office. Further this action is covered under Departmental Categorical Exclusion 1.6, i.e., "Nondestructive data collection, inventory (including field, aerial, and satellite surveying and mapping), study, research, and monitoring activities," and as such does not require any further NEPA review.

Our findings of Casual Use and Departmental CX 1.6 are based upon the proposed activities and locations specifically outlined in your application. If you need to work outside of these specifics, in either proposed field work or location, please contact us for approval. If you have questions, please feel free to contact either myself (474-2320) or Michelle Ethun, Supervisory Outdoor Recreation Planner (474-2223), at any time.

Sincerely,

Lenore Heppler *Acting For*
Manager, Eastern Interior Field Office
BLM, Fairbanks District Office

[ONLY ON FILE COPY, NOT SENT IN MAIL]
LLAKF02000:L.Heppler:M.Ethun:n/a:7/19/11:x2320:NLUR fieldwork authorization USDA Arctic
and Subarctic Pant Gene Bank



P.O. Box 196680

ANCHORAGE, ALASKA 99519-6680

TELEPHONE (907) 787-8700

July 22, 2011

LETTER OF NON-OBJECTION 11-35
Alyeska Letter No. 23965

Danny Barney, Ph.D., Curator and Horticulturist
USDA ARS Arctic and Subarctic Plant Gene Bank
1509 South Georgeson Drive
Palmer, AK 99645

Tel: (907)745-9463 or 745-4802 (lab)
Email: Danny.Barney@ars.usda.gov

RE: Access to/across TAPS facilities;
Access Roads and Pipeline Workpad, Pipeline Mileposts 360 to 445
(Murphy Dome Road Crossing)

Dear Dr. Barney:

By your email received June 30, 2011, on behalf of the USDA ARS Arctic and Subarctic Plant Gene Bank and persons represented by it including any employees, agents and/or contractors ("Applicant"), you have requested non-objection from Alyeska Pipeline Service Company ("Alyeska") to utilize those certain Trans Alaska Pipeline System "TAPS" facilities described in the subject line above ("Subject Property") to gain access via light truck from the Elliott and Dalton Highways to lands outside of the TAPS rights-of-way for the purpose of plant collecting.

This Letter of Non-Objection does not in itself constitute authorization for entry or use of the land underlying Subject Property, and Applicant must secure any authorization(s) that may be required from the pertinent landowner(s). Alyeska does not warrant that the Subject Property is suitable or safe to conduct applicant's activities.

To reflect Applicant's acceptance, please review the conditions stated in this letter and have the appropriate official sign and return one copy. Your retained copy of this letter may be used to demonstrate Alyeska's non-objection in obtaining any additional authorization(s) that may be required.

As agent for the Permittees of the Trans Alaska Pipeline System rights-of-way, Alyeska provides its non-objection to the described use by Applicant of the Subject Property, insofar as Alyeska may do so under rights granted by the pertinent landowners, including the Bureau of Land Management, for a period commencing July 24, 2011 and terminating either on August 15, 2011 and subject to the following conditions:

1. **APPLICANT WILL CONTACT THE ALYESKA PIPELINE AND CIVIL MAINTENANCE SUPERVISOR (P&CM) AT THE FAIRBANKS RESPONSE BASE, TELEPHONE (907)450-5406**, to obtain clearance in advance of Applicant's requested access and to make any other necessary arrangements.

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During the term of this non-objection agreement, Applicant agrees to notify the P&CM periodically as directed by the P&CM and upon completion of the access.

2. **Applicant will contact Alyeska Security, 701 Bidwill Street, Fairbanks, telephone (907)450-5707**, to obtain a key to any gate across the subject property and to provide all information requested from time to time by Alyeska Security to identify each of its persons, including employees, contractor personnel, including any persons not identified by Applicant when non-objection was first requested. Applicant will return the key to Alyeska Security as requested by Alyeska Security but in no case any later than 15 days after the expiration date of this Letter of Non-Objection. Applicant will not have duplicates made of the key(s) issued by Alyeska Security.

Applicant agrees to notify Alyeska Security prior to each and every visit to Subject Property during the term of this non-objection unless the requirement for repeat notifications is specifically waived by Alyeska Security.

3. Applicant understands that there may be times when the access will not be possible due to adverse surface conditions, pipeline-related construction activities or security conditions, and Applicant agrees to abide by Alyeska's decision in this regard.
4. Applicant will not use any motorized vehicle larger than a single-passenger all-terrain vehicle (ATV) on Subject Property between Pipeline Mileposts **i)** 406-409.3 (Wilbur Creek to Ski Jump Hill), **ii)** 436-437 (Big Cut), and **iii)** 442.4-443 (Treasure Creek Hill), unless the P&CM has authorized such specific access in accordance with Condition 1. Applicant will not use at any time any motorized vehicle larger than a single-passenger all-terrain vehicle (ATV) on Subject Property between Pipeline Mileposts 424-425 (north Wickersham Dome).

Applicant will restrict its equipment and vehicles to that speed that is most safe and prudent under the weather and terrain conditions existing at the time of Applicant's use of Subject Property or to the posted speed limit, whichever is slower. Applicant will respect all vehicle block points, will not exit the workpad in vehicles except at established road or trail crossings and will cross all low water crossings with the transmission engaged in four-wheel-drive and at a low speed, creating no waves or splashes, and not disengaging the transmission until all four wheels are on level ground and out of the channel.

Applicant will not back up any vehicle in the direction of the pipeline(s), in either the buried or above-ground mode. All crossings of the oil pipeline shall be made as close as practical to a right angle to the pipeline bearing and will avoid stopping or starting within ten feet of the oil pipeline. Furthermore, Applicant will take all precautions necessary to prevent injuries to persons and damage to property including, but not limited to, disturbance or destruction of roads, pads, survey monuments, cathodic protection devices, monitoring rods or any other Alyeska facilities and will promptly reimburse Alyeska for any related losses or damages.

Applicant will notify the P&CM as soon as possible after Applicant becomes aware of personal injuries or any disturbance or damage to property including, but not limited

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to, any Alyeska facility. Applicant shall be responsible for all repairs for damages caused by its activities within Subject Property that may be reasonably required by the P&CM including, but not limited to any rehabilitation, restoration, revegetation, re-scarification, or seeding.

5. Applicant will not park its vehicles or stage equipment on Subject Property without the specific authorization of the P&CM.

Applicant will not conduct any fueling activities in Subject Property and will keep Applicant's vehicle and/or equipment in sound working order.

6. Applicant will comply with all applicable local, state and federal laws, regulations and ordinances.

Applicant will not conduct any camping, fishing, trapping, hunting or shooting within, from, or across the Subject Property.

Applicant will take all precautions necessary to prevent wild land fires. If a wild land fire is started, Applicant shall immediately report it to the appropriate public agencies and the P&CM.

Applicant will take all precautions necessary to prevent spills or leaks of any hazardous substance as defined by Alaska Statute 46.03.826(5) including, but not limited to, crude oil, fuels, lubricants, hydraulic fluids or antifreeze. If such a spill or leak of any amount does occur, Applicant shall immediately report it to the Alyeska P&CM and to any appropriate public agencies. Applicant is responsible for the containment and cleanup of any such spill to the satisfaction of the responsible public agencies and Alyeska.

7. By acceptance hereof and pursuant to the provisions of the Federal Tort Claims Act, 28 U.S.C. 2671, et. seq., and the Military Claims Act, 10 U.S.C. 2731, et. seq., the Government assumes full responsibility for the Applicant's activities, the operation of its equipment, and the conduct of its personnel. Subject to the availability of funds and without assuming any liability therefore, Applicant agrees to request and diligently pursue the appearance of Justice Department appear on behalf of, and in the defense of the Alyeska Pipeline Service Company and each of its Owner Companies listed below in any action, including but not limited to claims incurred with regard to any spill of oil or other hazardous substance or other environmental damage, arising out of or in any way attributable to the Federal Government's activities or the use or occupancy of the Subject Property which may be brought under the Federal Tort Claims Act or the Military Claims Act and in which the Alyeska Pipeline Service Company and each of its Owner Companies listed below may be joined as parties, on the basis of the execution of this letter of non-objection. "Availability" is here defined as any funds appropriated and which could be legally used for defend Alyeska Pipeline Service Company and/or each of its Owner Companies in such action.

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Failure to fully comply with the conditions set out in this letter of non-objection may result in revocation by Alyeska of its non-objection and may also result in Alyeska's declining to provide its non-objection to Applicant in the future for access across the TAPS right(s)-of-way. After providing written notice to Applicant, Alyeska may, for its convenience and at its sole discretion, terminate this letter of non-objection without penalty or cost.

The undersigned accepts and agrees to all provisions described in this letter of non-objection agreement and represents that s/he has full authority to accept and agree on behalf of Applicant, and to bind Applicant to the terms of this letter of non-objection.

Please call me at (907) 787-8170 if there are any questions.

Very truly yours,

ALYESKA PIPELINE SERVICE COMPANY
Agent for Owners of the
Trans Alaska Pipeline System

BP PIPELINES (ALASKA) INC.
EXXONMOBIL PIPELINE COMPANY
CONOCOPHILLIPS TRANSPORTATION ALASKA, INC.
UNOCAL PIPELINE COMPANY
KOCH ALASKA PIPELINE COMPANY, L.L.C.

By: 
PETER C. NAGEL
Lands Manager

ACCEPTED AND AGREED to this
22 day of July, 2011.

By: 
Signature

Name: Danny L. Barney

Title: Curator, Horticulturist

cc: State Pipeline Coordinator's Office, MS S600
Fairbanks North Star Borough, Land Management
BLM Office of Pipeline Monitoring
Bruce Harris, Mining Claimant at Treasure Creek