

DENALI NATIONAL PARK AND PRESERVE

CENTRAL ALASKA NETWORK

Vegetation Monitoring Program

Summary Trip Report: Fish Creek Mini-grid

2 July – 11 July, 2007



Photo 1. 8m south of southern end of point 11, looking south towards ridge and Healy

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PURPOSE:

The purpose of this work was to install permanent plot stakes and to collect data for the CAKN Long Term Ecological Monitoring Program. There were 2 half days of travel on either end of the trip and 9 full days of working on plots.

PERSONNEL:

James Walton - non-vascular plant composition data, soil data and transect cover.

Brian Dykstra - quadrat and vascular plant composition data, quadrat variable estimates, plot photos and transect cover.

Larissa Lasselle - grid point data, meta-plot data, plot variable estimates, transect cover and trip report record.

ACCESS TO MINI-GRID AND CAMPING POSSIBILITIES:

George Hook, the helicopter pilot, flew us out to this grid via helicopter. Camp was located about 20 meters east of point 18. We flew in two 5-gallon jugs of water to our mini-grid in case we could not find water to pump. Fish Creek was a heavy flowing stream but the water was silty. We were able to find some silt free water trickling in small creeks or in pools of water on the tundra. *Please read below for where we located pumpable water.*

HIKING:

This plot had a few steep sections, but generally was easy walking although there was a good deal of bushwhacking. See “activities” section for more detail.

WEATHER AND ENVIRONMENTAL CONDITIONS:

The weather on this trip was a mix of sun, clouds, rain showers, thunderstorms and even some hail.

PHENOLOGY OBSERVATIONS:

New catkins were on *Alnus viridis* and *Betula nana*. *Salix pulchra* and *Ribes triste*, *Vaccinium vitis-idaea*, *V. uliginosum*, *Dryas octopetala*, *Arctostaphylos rubra*, *Rubus chamaemorus* and *Arnica griseomii* had gone to seed. Some *Ledum decumbens* and *Empetrum nigrum* had gone to seed. *Cornus suecica*, *Rubus arcticus*, *Polygonum bistorta*, *Spirea stevensii*, *Potentilla fruticosa*, and a *Minuartia* sp were flowering. For more detail read under “activities”.

GENERAL NOTES ON PLOT-WORK AND PLOT OBSERVATIONS:

Table 1. Collection series for the Fish Creek mini-grid.

Collector	Identifier	Series
Dykstra	Vascular plants	BD07-83 to BD07-159
Dykstra	Digital Photos	101-0001 to 101-0149, 100-0001 to 101-0037, 107-0701 to 107-0721
Walton	Nonvascular collections	Non-sequential
Walton	Soils	26 samples FISH_CR05-2007183-Ba, FISH_CR08-2007183-Ba, FISH_CR09-2007183-Da, FISH_CR09-2007183-Ca, FISH_CR14-2007183-Da, FISH_CR14-2007183-Ba, FISH_CR14-2007183-Bb, FISH_CR14-2007183-Ca, FISH_CR15-2007183-Da, FISH_CR15-2007183-Ca, FISH_CR19-2007183-Ba, FISH_CR20-2007183-Aa, FISH_CR20-2007183-Da, FISH_CR20-2007183-Ca, FISH_CR20-2007183-Ba, FISH_CR22-2007183-Ba, FISH_CR22-2007183-Ca, FISH_CR23-2007183-Ba, FISH_CR24-2007183-Ba, FISH_CR24-2007183-Bb, FISH_CR24-2007183-Ac, FISH_CR24-2007183-Da, FISH_CR25-2007183-Ba, FISH_CR25-2007183-Aa, FISH_CR25-2007183-Da, FISH_CR25-2007183-Ca
Lasselle	Tree Cores	

The markers for plots 03 and 13 could not be relocated.

ACTIVITIES:

Monday, July 2



Photo 2. From the perimeter of point 5 looking south, southeast to plot center

FC_05: From camp we headed east to the ridge and then walked the ridge for about 1.5 km. Then we walked west and downhill for about 100 to 200 meters until we reached the plot. In 2003 the bird crew visited this mini-grid and put in a permanent plot marker. James used the magnetic detector to find the permanent plot.

We were able to pump water at a slow trickling creek east and south of campsite less than 300 meters away (in a scrubby hole). To the east on top of the ridge looking east and about 3 km away, the Stampede Rd and houses are visible. Also on the ridge to the east of the plot there is an ORV trail that does not look like it has been used in recent times.

There was evidence of moose browse in plot and in vicinity of plot. Moose and dall sheep scat was found in vicinity of plot. Ground squirrel trails, holes and vocalizations in the vicinity of plot. The plot is west of a ridge stretching north to south. The ground slopes to the west and then slopes back up (about 200 meters away) to another ridge. That ridge then drops down to Fish Creek. The abiotic component of the plot and surrounding area is Nenana River gravel, and on the ridge to the east there are Nenana River rocks.

The plot is in tall *Alnus viridis* and some *Salix pulchra* scrub. There is one *Picea glauca* tree west of the plot in Quadrant C. Dominant in the low shrub layer are *Betula nana* and *Vaccinium uliginosum*, with *Ledum decumbens*, *Ribes triste* and *Spirea stevensii*. Dominant forb is *Lycopodium annotinum*. In Quadrant D there is an opening of about 2 meters squared in the scrub cover and *Lycopodium annotinum* and moss densely cover the ground. The dominant gramminoid is *Arctagrostis latifolia*.

Weather:

Tuesday, July 3



Photo 3. Point 06 looking south at Quadrant A.

FC_06: There are signs of heavy moose browse in vicinity of plot and scat in plot. There is also a red squirrel midden in vicinity of plot and vocalizations in vicinity of plot. The physical environment is steep and on an east facing slope. To the west and uphill about 400 meters the terrain is relatively flat. Further west about 650 meters is another ridge. There were new catkins on *Alnus viridis*. *Ribes triste* had gone to seed. *Epilobium latifolium* was not in bloom.

The plot is in a closed to open *Picea glauca* forest with *Betula papyrifera* and *Populus tremuloides* at the eastern, northern and southern edges. To the north is a slightly dense *Picea glauca* forest. To the south there are more broadleaf trees and the forest is more open. The dominant tall shrub is *Alnus viridis*. The dominant low shrubs are *Vaccinium uliginosum* and *Ribes triste*. In the dwarf shrub layer there is some *Vaccinium vitis-idaea*. *Epilobium latifolium* is the most commonly scattered forb on plot. Dominant graminoid is *Arctagrostis latifolium*.



Photo 4. Point 01 looking north to plot center.

FC_01: *Salix* sp. branches showed evidence of moose browse in plot and in vicinity of plot. There is a steep slope to the west. The Viereck code for the plot was classified as open, low birch and ericaceous scrub. On plot *Picea mariana* are 0.5-0.8 meters tall. Dominant shrubs are *Betula nana*, *Salix pulchra*, *Vaccinium uliginosum* and *Ledum groenlandicum*. The most common dwarf shrubs are *Vaccinium vitis-idaea* with some *Empetrum nigrum*. Dominant forbs are *Petasites frigidus* and *Equisetum arvense*. Dominant grams are *Carex bigelowii* and *Arctagrostis latifolia*.

FC_02: Dall sheep fur was found in plot. There was evidence of moose browse and scat in plot. Plot is on a gradual mostly flat slope in the middle 1/3 of major slope. Plot is east of ridge. *Vaccinium vitis-idaea* had gone to seed. Plot is in a mixed, tall *Betula occidentalis* and *Alnus viridis* scrub. In Quadrant D there were 2 *Picea glauca* trees that dominate about 9-10% of the entire plot. In Quadrant C there are *Betula papyrifera* trees. Not a lot of ground

cover, some *Vaccinium uliginosum* and *Vaccinium vitis-idaea*. Dominant herbs are *Cornus canadensis* (only scattered) and *Arctagrostis latifolia*.

Weather:

Wednesday, July 4

FC_03: From camp we hiked south to ridge and then followed ridge. When we were as close to the plot as possible we then dropped down to the southern side of the ridge and headed south downhill and bushwhacked our way to the plot.

We could not relocate the permanent plot marker installed by the bird crew. We used the Garmin and Trimble GPS as well as the metal detector to search. In addition the three of us searched without equipment. We gave up our search after 30 minutes because we were trampling the vegetation. We did not sample the plot this day, but we did take notes on the vegetation occurring in case we did not have time to visit again.



Photo 5. Point 08 looking north at Quadrat C.

FC_04: To get to this plot from point 03 it was a steep bushwhack west. Evidence of humans includes helicopter fly-by and to the south and southeast the Stampede Rd. and houses are visible. There was an arctic ground squirrel in plot as well as vocalizing and munching on vegetation on plot and in vicinity of plot. Plot is slightly bowl shaped and on a south to southeastern facing slope. Terrain gently slopes down to flats. Exposed rocks on plot from cryoturbation.

Dryas octopetala, *Arctostaphylos rubra* and *Arnica grisea* had gone to seed.

Vegetation is predominantly *Arctostaphylos rubra* low dwarf scrub. There are *Picea glauca* saplings scattered around plot and off plot. There are larger *Picea glauca* sapling

surrounding plot. On the north edge there are *Betula nana* and *Betula occidentalis*. On the eastern edge there are tall *Alnus viridis*. *Dryas octopetala* on plot but more dominant off plot. The most dominant forb is *Arnica griscomii*. The most dominant graminoid is *Hierochloa alpina*. There are *Populus tremuloides* saplings in the eastern and southeastern part of plot. The area surrounding the plot is low scrub with open, tall *Picea glauca* and patchworks of low dwarf scrub. There is considerably more frost action on this plot as compared to the surrounding area.



Photo 6. Point 08 looking southwest from perimeter at plot center.

FC_08: From point 04 we hiked northwest up to the ridge and walked to the plot. There were ground squirrel vocalizations in vicinity of plot. There was evidence of moose browse in plot. The plot is next to a ridgeline with Nenana River rocks. There were some exposed rocks and bare ground on plot. The area is relatively flat. Further southwest the flatness drops off to steepness.

Artostaphylos rubra had gone to seed. *Arnica griscomii* was flowering but some were going to seed.

The dominant vegetation type is closed, *Betula nana*, *Vaccinium uliginosum* and *Ledum decumbens* low scrub with some *Alnus viridis*, *Salix glauca* and *Salix pulchra*. There are *Picea glauca* saplings about 0.5 meters tall present on plot. Dominant dwarf shrubs include *Artostaphylos rubra*, *Vaccinium vitis-idaea* and *Empetrum nigrum*. Dominant forbs include *Petasites frigidus*, *Artemisia arctica* (collected) and *Arnica griscomii*. Dominant gram is *Carex bigelowii*. Taller saplings about 2 to 9 meters tall surround the plot. Southeast of plot the dominant vegetation type is closed, tall *Alnus viridis* scrub.

FC_13: We were not able to relocate the permanent plot marker with Trimble or Garmin GPS, or with magnet detector, and the three of us searched for about 30 minutes. We stopped searching because we were trampling the plot. We took notes on the plot biota.

Weather: Sunny and perfect weather until 2 pm and then the sky clouded up and there was thunder and lightning to the southeast.

Thursday, July 5

FC_07: From camp we hiked southeast to the ridge for about 200 meters at which point we dropped down and bushwhacked to plot. Stampede Rd. and houses visible to the west. Evidence of moose and snowshoe hare browse. Plot is on a southeastern facing slope on Nenana River soil. Plot is also east of a sub-ridge on the middle 1/3 of a slope dropping down to flats.

There were new catkins on the *Alnus viridis*. *Spirea stevenii* was in bloom. *Vaccinium uliginosum* had gone to seed.

Vegetation type is predominantly tall *Betula nana* with about 25 percent *Alnus viridis* scrub. Low scrub dominated by *Vaccinium uliginosum*, *Ledum groenlandicum* and some *Spirea stevenii*. Dominant dwarf shrub is *Vaccinium vitis-idaea*. Dominant forbs were *Epilobium angustifolium* and *Cornus suecica*. Dominant gram is *Calamagrostis canadensis* (collected). There were tall *Picea glauca* saplings (4-8 meters tall) about 10 meters from plot. There are short (1-2 meters tall) saplings on the very edge of the plot.



Photo 7. Point 12 looking east at Quadrat A.

FC_12: From point 07 we hiked northwest up to the ridge, then followed the ridge for about 250 meters, then dropped down to the northwest side of point 12. The permanent marker looked like it had been dug out of the ground by a bear (big claw dig marks were at the point where the marker originally went into the ground). We found the stake about 1 meter away from where it had been dug out of the ground and the cap was downhill even further from the stake. Dall sheep scat in plot and in vicinity of plot. Heavy moose browse and scat in plot and

in vicinity of plot. Plot is on steep (23 degrees) northwest facing slope about 50 meters from ridgeline. On Nenana River soil. There are two drainages on either side of the plot; one to the northeast and the other to the southwest. There is no water running in these drainages.

There were catkins on the *Salix glauca* and seed heads on the *Carex* spp.

Vegetation type is predominantly low *Betula nana*, *Vaccinium uliginosum*, *Ledum decumbens* scrub with some *Salix glauca*. To the southwest about 30 meters from the plot edge there is a drainage with tall *Alnus viridis* and *Salix* spp. scrub. To the north and northeast about 40 meters away there is another drainage also with tall *Alnus viridis* and *Salix* sp. scrub. Northwest of plot for about 150 meter the vegetation type is the same as on plot.

FC_11: From point 12 we hiked south back up to ridge and followed the ridge heading slightly north and east until the Garmin GPS meter count stopped dropping. Then we headed further east and slightly south to plot. There was evidence of moose browse in plot as well as moose scat and trail in plot. Site is south of ridge top in flat bench-like area. At the SE edges of plot the terrain drops off to a steep slope.

Cornus suecica in bloom. No catkins left on *Salix* spp. Off plot *Arnica* sp. and *Arctostaphylos rubra* gone to seed.

Also off plot *Minuartia* sp. in bloom. This site is in a tall *Alnus viridis*, *Betula nana*, *Betula occidentalis* scrub with *Salix glauca* and *Salix richardsonii* and one tall (5.5 m) *Picea glauca* sapling. Low shrubs are *Vaccinium uliginosum* and *Ledum decumbens*. Dominant dwarf shrub is *Cornus suecica*. The most common forb scattered through plot is *Epilobium angustifolium*. To the east of plot is an open, nearly barren area that is unique compared to the surrounding vegetation type.

Weather: It rained all night and the sky was cloudy in the morning and was clear by mid-morning. The rest of the day the weather was partly cloudy but sunny and warm with a light breeze. At 4-5 pm clouds started to build in the southeast and there was a thunder storm over there. The sun was still shining over us at 7:30 pm but the clouds were building.

Friday, July 6

FC_10: From camp we hiked southeast up the ridge and followed the ridge heading southwest until the Garmin GPS read 300 to 350 meters. At that point we dropped to over the ridge and headed north to northwest to point 10. En route to the plot we crossed through tall *Salix* spp. scrub.



Photo 8. Point 10 looking west to plot center.

There was evidence of moose browse in plot and in vicinity of plot.

On plot the ground gently slopes west down to Fish Creek to the southwest is another small drainage.

New catkins on *Alnus viridis*. Some *Ledum decumbens* and *Empetrum nigrum* gone to seed.

Plot has two Viereck classes. The first was closed, low *Betula nana* and ericaceous scrub. The second class was closed, tall *Alnus viridis* scrub. Some *Salix pulchra* and *Salix glauca* on plot. Dominant dwarf shrubs are *Vaccinium vitis-idaea* and *Empetrum nigrum*. Dominant graminoid is *Carex bigelowii*. Forbs were not dominant. *Picea glauca* saplings less than 1 meter tall were common in the area, they were not stunted. *Picea glauca* saplings 2-8 meters tall were common in area as well.

FC_15: Headed north down slope to Fish Creek. Site is on alluvium terrace. There were a few jets flying by and there was evidence of moose browse in plot and in vicinity of plot.

Plot is about 5 meters north of Fish Creek on Fish Creek alluvium terrace. Surface is gravelly with river rocks. Gradual slope to the north. Creek to the south running east to west. On the other side of creek to the southwest there is a steep slope leading to the ridgeline. To the southeast of plot on the other side of creek there is another gradual slope.



Photo 9. Point 15 looking west to plot center

Catkins on *Salix* spp. gone to seed. *Rubus arcticus* in bloom. *Vaccinium uliginosum* gone to seed. *Potentilla fruticosa* in bloom (off plot) and *Cornus suecica* in bloom.

Plot is in tall to low *Salix pulchra*, *Salix alaxensis*, *Salix hastatea* scrub with young *Populus balsamifera* scattered around plot and area. Tall *Picea glauca* saplings scattered north of plot. Also common on plot is *Vaccinium uliginosum* and dwarf shrub *Rubus arcticus*. Dominant gram is *Calamagrostis canadensis* (collected).

FC_20: Brushy hike through *Betula nana* from point 15. There were a few jets that flew by. There was evidence of moose browse and scat in plot. Also there was evidence of snowshoe hare browse in plot. Plot is on discontinuous permafrost on a southeast facing bench.

Cornus canadensis, *Valeriana capitata*, and *Spiraea stevenii* in bloom. No flowers or seeds on *Petasites frigidus*. *Empetrum nigrum*, *Rubus chamaemorus*, *Vaccinium vitis-idaea* and *Vaccinium uliginosum* gone to seed.

Low to tall *Betula nana* scrub with *Salix pulchra*. Dominant low shrubs include *Vaccinium uliginosum*, *Ledum decumbens*, *Ledum groenlandicum* and *Spiraea stevenii*. Slightly less than 10% of *Picea glauca* trees and saplings on plot. Considerable number of *Picea glauca* saplings 1.5 meters tall and under. Common dwarf shrub is *Vaccinium vitis-idaea*. Dominant forb is *Petasites frigidus*. Common gramminoids are *Carex bigelowii* and *Calamagrostis canadensis*.

Weather: Sunny in the morning and it began to downpour half way through work on plot 20.

Saturday, July 7

FC_16: From camp we hiked southeast uphill (around vegetation) then traversed east bound to point 16. There was evidence of moose browse in plot. There is a drainage to the north and west. There is a ridge about 100 meters north of plot. Plot is on discontinuous frozen ground.

Polygonum bistorta, *Spirea stevenii* in bloom. New catkins on *Betula nana*.

The dominant vegetation on the southeast to the southwestern edges in and around the plot is closed, tall *Alnus viridis* scrub. But the majority of the plot is dominated by closed, low *Betula nana*, *Vaccinium uliginosum*, *Ledum decumbens* with some *Salix pulchra* and two 1 meter tall *Picea glauca*. The dominant dwarf shrub was *Vaccinium vitis-idaea*. Most common forb was *Polygonum bistorta*. Most dominant graminoid was *Carex podocarpa* (collected). The area surrounding the plot is a mosaic of low *Betula nana* scrub and closed, tall *Alnus viridis* scrub. Also there are taller *Picea glauca* (2-4 meters) in surrounding area.

FC_21: We were able to walk directly (no bushwhacking uphill) from point 16 to point 21. There was a plane flying low in the west. There was a BEE nest on plot and it was very active. There was evidence of moose browse in plot. To the north on the other side of drainage and on the adjacent ridge there was a fox den with adult and at least 4 puppies.

The southeastern side of the plot is on a bench. The northwestern side of the plot is on a steep drop-off that falls down to Fish Creek. From the center of plot to the 16 west transect the slope is 22 degrees. Along the 6a transect the slope is 34 degrees. Along the 16 east transect the slope is 4 degrees and along the 6b transect the slope is 3.

Polygonum bistorta in bloom. There were catkins on *Salix* spp. *Vaccinium uliginosum* and *Vaccinium vitis-idaea* gone to seed.

In the northwestern portion of the plot, facing down to Fish Creek, that drainage invites closed, tall *Alnus viridis* scrub with *Ledum decumbens* and a moss carpet. The rest of the plot is closed, low *Betula nana*, *Vaccinium uliginosum*, *Ledum decumbens* scrub with *Vaccinium vitis-idaea* and *Empetrum nigrum*. In the herbaceous layer *Polygonum bistorta* was the dominant forb and the dominant graminoid was *Calamagrostis canadensis* (collected). There were no trees on plot, just *Picea glauca* saplings. There were taller saplings (1.5 to 6 meters) scattered outside of plot.



Photo 10. Point 22 looking southwest from center at Quadrant C.

FC_22: From point 21 we hiked northwest and downhill to Fish Creek and then we crossed the creek (a quick jump) then on the other side we hiked uphill to a bench near a ridge where point 22 is located. There was no evidence of humans. There was evidence of moose browse in plot. Plot is on a bench just before the ridge. The ridge has exposed rocks and soil. To the south here is a steep drop-off running east to west.

There were catkins on the *Salix* spp. The *Vaccinium vitis-idaea* had gone to seed.

Plot in closed, low *Betula nana*, *Vaccinium uliginosum* and *Ledum decumbens* scrub with *Salix pulchra* and *Salix glauca*. About 5 saplings at 4-5 meters tall on plot. Two trees to core in Quadrants B and C. Dominant dwarf shrubs are *Vaccinium vitis-idaea* and *Empetrum nigrum*. Dominant graminoids include *Carex bigelowii* (collected) and *Calamagrostis canadensis* (collected).

After work on plot we headed downhill to Fish Creek and pumped water (it was clear and silt-free). Then we hiked back uphill on the other side of creek.

Weather: Rainy and cloudy all day. No bugs!

Sunday, July 8

FC_25: From camp we headed northwest down to Fish Creek and crossed. On opposite side of creek we then hiked 500 meters northwest uphill to plot. There was some bushwhacking along the way. There was evidence of moose browse in plot and vicinity and scat in plot. Moose trail in plot. Plot on relatively flat ground with 3 small creeks (0.25-0.50 meters wide) with water running north to south.

Cornus suecica and *Spirea stevenii* in bloom. *Vaccinium uliginosum* gone to seed.

Plot in woodland *Picea glauca* forest with low to tall *Betula nana* and *Salix* spp. Some *Alnus viridis* but mostly in eastern edge of plot. Other common low shrubs include *Vaccinium uliginosum*, *Ledum decumbens* and some *Spirea stevenii*. Common dwarf shrubs are *Vaccinium vitis-idaea* and *Empetrum nigrum*. Common in herb layer was *Cornus suecica*, *Carex bigelowii* and *Calamagrostis canadensis*. On the eastern edge of plot and further off plot where there is tall closed *Alnus viridis* scrub *Rosa acicularis* and *Ribes triste* are common and grams are abundant.



Photo 11. Point 24 looking north at Quadrat B and James.

FC_24: From point 25 we headed southeast to point 24. We had to climb up a small knoll and then trek down hill to plot. Plot marker is under a large *Picea glauca* tree. We could see our campsite on the adjacent ridge to the southeast and across Fish Creek. Spruce grouse scat in plot. Moose browse in plot and vicinity. Moose tracks in vicinity of plot.

Moose trail in plot. Moose scraping on trees. Squirrel midden cones in plot. Plot is on flat ground (5 degree slope) with moss hummocks.

There were catkins on the *Salix* spp. The *Boykinia richardsonii* (some do have newer flowers).

Plot is in a tall *Picea glauca* (with DBH's from 13-43 cm) woodland with tall *Salix pulchra*, *Salix richardsonii* and *Betula nana* in understory. Most common low shrubs include *Vaccinium uliginosum* and *Ledum groenlandicum* and dwarf shrubs are *Vaccinium vitis-idaea* and *Empetrum nigrum*. Common in herb layer are *Equisetum arvense*, *Cornus suecica* and some *Mertensia paniculata* and *Boykinia richardsonii*. Herb layer is diverse but not high dominance of species overall.

FC_23 : From point 24 we headed southeast and were lucky enough to pick up a heavily used moose trail that we were able to follow for about 150 meters. When the distance on the Garmin GPS stopped dropping we left the moose trail and headed north uphill. We could see our campsite on the adjacent ridge to the south and across Fish Creek. There was evidence of moose browse in plot. About 75 percent of plot falls down a steep slope and has exposed soil. The eastern portion of plot is at the top of the hill just west of a ridgeline.

Vaccinium uliginosum and *Vaccinium vitis-idaea* had gone to seed.

There are a few *Picea glauca* saplings and trees on plot and scattered through area. There is a large *Picea glauca* tree at plot center. In the closed, tall *Alnus viridis* patch (which makes up 75 percent of plot) the understory is *Vaccinium uliginosum*, *Equisetum arvense* and *Lycopodium annotinum*. In the eastern side of plot 25 percent of the cover is closed, low *Betula nana*, *Vaccinium uliginosum*, *Ledum decumbens* shrubs with *Empetrum nigrum* and *Vaccinium vitis-idaea* dominant in dwarf shrub layer. As for the herbaceous layer the diversity and abundance was low but there are trace amounts of *Epilobium angustifolium* and *Arctostaphylos uva-urs* and only trace amounts of graminoids.

Weather: Cloudy and a threat of rain in early morning. Partly cloudy and sun by 10:30 am. At point 24 it was sunny for a little while but started raining again. Close to the end of our work on plot 23 we were hailed on and there was a big thunder and lightning storm.

Monday, July 9



Photo 12. Point 09 looking north to plot center.

FC_09: Hiked from camp east back up to the ridge until the Garmin GPS read that we had about 250 meters to point 09. We then headed west downhill and bushwhacked through *Alnus viridis* and *Salix* spp. to plot. There was evidence of moose browse in plot. To the south running west to east there is a drainage.

Oxycoccus microcarpos, *Empetrum nigrum*, *Vaccinium uliginosum* and *Rubus chamaemorus* gone to seed. There were new catkins on the *Alnus viridis*. *Spirea stevenii* was in bloom.

About 65 percent of the plot (basically down the middle of the plot) is closed, tall *Alnus viridis* scrub. On the edge of this vegetation type (to the north and south) there is closed, tall *Salix pulchra*. The dominant low shrub is *Vaccinium uliginosum*. The dominant vegetation in the herbaceous layer is *Lycopodium annotinum*, *Petasites frigidus*, *Calamagrostis canadensis* (collected) and *Carex bigelowii* (collected).

The second Viereck code is low to tall, closed *Betula nana* and ericaceous scrub. The dominant dwarf shrubs are *Empetrum nigrum*, *Vaccinium vitis-idaea* and a considerable amount of *Oxycoccus microcarpos*. The forbs in the herb layer are scattered and the dominant graminoid is *Carex bigelowii* (collected). On the southern side of this vegetation type (closer to the drainage) there are *Sphagnum* spp. tussocks. There were *Picea glauca* saplings about 1 meter tall on plot. There were sapling and trees greater than 1.5 meters tall surrounding area.

FC_19: We had to do a little bushwhacking but did not take long to get to plot. The plot marker was hidden in tussocks. There was no evidence of humans. Fish Creek is about 20 meters west of plot.

There were new catkins on the *Betula nana*. The *Spirea stevenii* was in bloom and some had gone to seed. The *Vaccinium uliginosum* had gone to seed.

There were some *Picea glauca* saplings under 1.5 meters tall scattered around plot. There were tall *Picea glauca* saplings scattered outside of plot. The vegetation type for the plot can be classified as closed, low *Betula nana* and ericaceous scrub with *Ledum decumbens* and *Vaccinium uliginosum* as the co-dominant low scrub. The dominant dwarf scrub was *Vaccinium vitis-idaea*. The herbaceous cover was trace. The dominant graminoid was *Carex bigelowii* (collected) and it covers the ground with tussocks.

FC_14: From point 09 we headed north to point 14. We had to hike uphill and then downhill and cross two drainages. There was a live vole on plot and vole burrows. There was evidence of snowshoe hare browse on plot. Plot is on low ridge southwest of plot. The ground is flat with moss tussocks.

The *Vaccinium uliginosum* had gone to seed. There were new catkins on the *Betula nana*.

Plot vegetation was classified as *Picea glauca* woodland with *Betula nana* dominant in low to tall shrub layer. Also common in low shrub layer was *Vaccinium uliginosum* and *Ledum decumbens*. Common in the dwarf shrub layer are *Vaccinium vitis-idaea* and *Empetrum nigrum*.

Weather: Sunny until 3:30 pm and then a quick rain and sunny again. Then rained again later in evening.

Tuesday, July 10

We pumped water east of camp heading toward the ridge.



Photo 13. Point 03 looking north at Quadrat D.

FC_03: We came back to this point and hammered in a new permanent marker and used the Trimble GPS to take a reading of the latitude, longitude and elevation.

Looking to the south the Stampede Rd and houses are visible. There was evidence of moose browse in the plot and in vicinity. In the *Alnus viridis* vegetation there are earth hummocks covering the ground. The plot is generally convex to slightly domed in the center, sloping downhill (slightly) in all cardinal directions.

The *Epilobium angustifolium* had gone o seed.

There were new catkins on the *Betula nana* and *Alnus viridis*. There were two Viereck codes assigned for the plot. The first code takes up to 65 percent of plot and is closed, tall *Alnus viridis* scrub with tall *Betula occidentalis* and *Betula nana* on the edges surrounding the *Alnus viridis*. *Betula neoalaskana* (collection #93) was a suspect on plot. Also present is *Ribes triste*, *Vaccinium uliginosum*, *Rosa acicularis* and *Ledum groenlandicum*. Forb density is very low but *Moehringia lateriflora* is commonly scattered. *Calamagrostis canadensis* commonly scattered in and near plot.

In the second Viereck code the dominant vegetation is closed tall *Betula nana* with one *Picea glauca* tree. Dominant in the shrub layer are *Salix pulchra*, *Ledum groenlandicum*, and *Spiraea stevenii*. Scattered through the entire plot is *Ledum groenlandicum*, *Vaccinium uliginosum*, *Ribes triste* and *Rosa acicularis*. Common forbs scattered though entire plot are *Cornus suecica* and *Rubus arcticus*. For graminoids, *Calamagrostis canadensis* (collected) is commonly scattered on plot.



Photo 14. Point 13

FC_13: From point 03 we headed north back up to ridge and ate lunch at the top. Then we headed north and bushwhacked down to point 13. We revisited this point and hammered in a new permanent marker and used the Trimble GPS to take reading of the latitude, longitude and elevation. No evidence of humans. There was evidence of moose browse and snowshoe hare browse in plot. Plot is located between drainages.

Spirea stevenii was in bloom and gone to seed.

There were two Viereck codes for plot. The first code is closed, tall *Alnus viridis*. The dominant low shrub is *Ribes triste* with some *Calamagrostis canadensis* (collected) scattered there are low earth hummocks. The second Viereck code is low *Betula nana* and *Spirea stevenii* with a high abundance of *Calamagrostis canadensis* (collected) and tussocks packed in between shrubs. Also common in the herb layer is *Equisetum sylvaticum*.

FC_17: This plot is located about 450 meters east of camp. It was a quick hike to plot from point 13 but there were about 40 meters of bushwhacking through *Salix* spp. before arriving to plot center. The plot was a in this dense *Salix* spp. scrub and is very wet. It is highly recommended to do plot on a dry day. We trampled on the vegetation. There was no evidence of humans. There is evidence of moose browse in plot and in vicinity. A wood frog hopped through plot. Area is wet with scattered standing and running water.

Polemonium acutiflorum, *Aconitum delphiniifolium*, *Rumex arcticus* (collected), *Chrysosplenium wrightii* (collected), *Epilobium ciliatum* ssp. (collected), *Spirea stevenii*, *Rubus arcticus* in bloom.

Plot is in closed, tall *Salix pulchra* with *Spirea stevenii*, *Ribes triste* and *Rubus arcticus* common in the low and dwarf shrub layer. Forbs are diverse but most are scattered and not dominant and include *Polemonium acutiflorum*, *Aconitum delphiniifolium*, *Rumex arcticus* (collected), *Chrysosplenium wrightii* (collected) and *Epilobium ciliatum* ssp. (collected).

There was a dominant *Equisetum* sp. that was collected and not identified in the field. *Calamagrostis canadensis* (collected) is dominant in the gramminoid layer. There are 20 to 30 centimeter moss and *Calamagrostis canadensis* tussocks.

Weather: Weather was mostly sunny!

Wednesday, July 11

FC_18: Plot is located about 20 meters from our camp. There were ground squirrels in plot and midden in vicinity. To the east there were two bull moose about 300 meters from plot. There was moose scat in plot. Plot is beside ridge-top on mostly flat ground. Water drains down to Fish Creek.

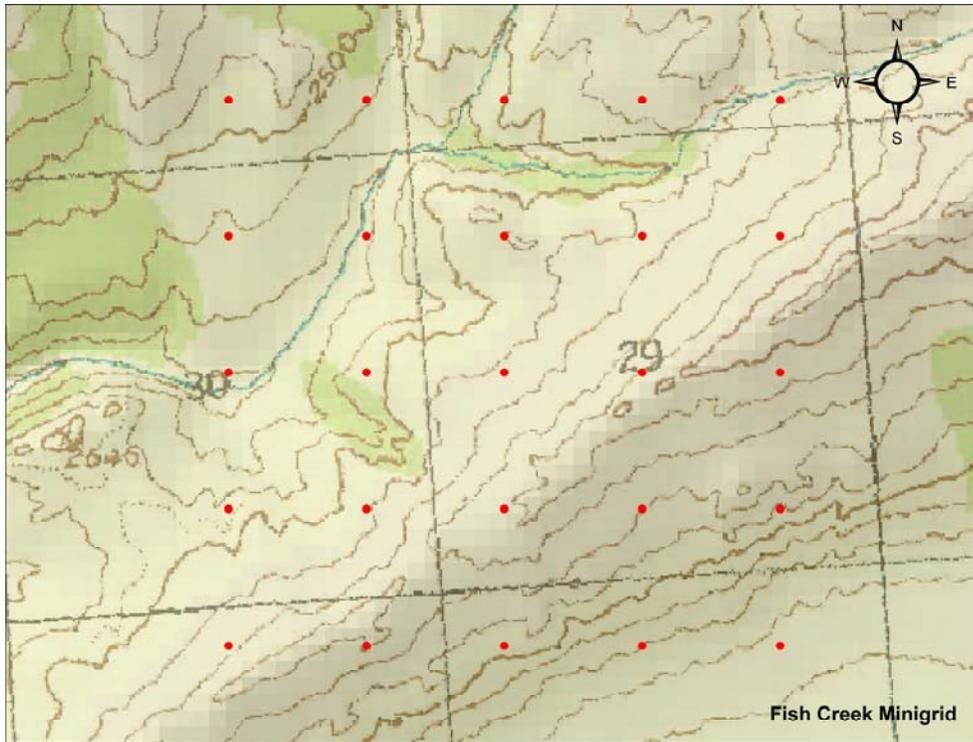
Ledum decumbens, *Arctostaphylos rubra*, *Empetrum nigrum*, *Vaccinium vitis-idaea* and *Vaccinium uliginosum* gone to seed. The *Vaccinium* spp. berries were not ripe.

Vegetation is open, low *Betula nana* (with some *Betula occidentalis*), *Ledum decumbens* and *Vaccinium uliginosum*. Dominant dwarf shrub was *Arctostaphylos rubra* with less but still common *Vaccinium vitis-idaea* and *Empetrum nigrum*. In the herbaceous layer the most commonly scattered forb was *Epilobium latifolium* and for gramminoids was *Hierochloa alpina*. *Picea glauca* saplings in plot and in meta-plot are 0.25-2 meters tall.

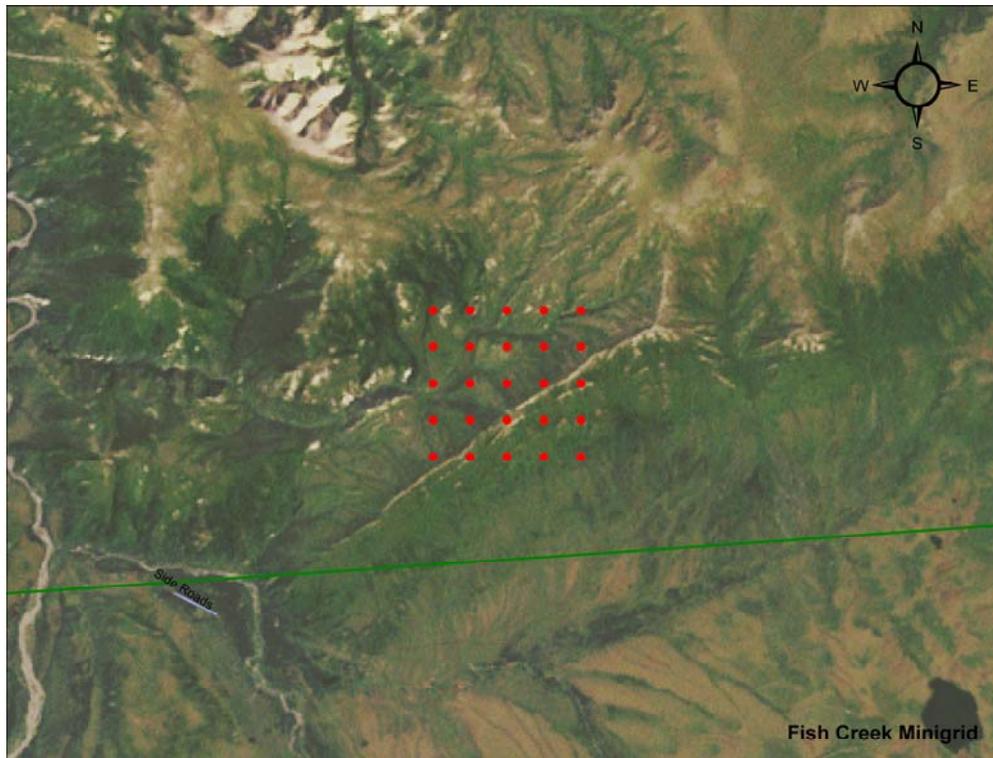
George Hook, the helicopter pilot, picked us up in the helicopter today and took us back to Headquarters.

CONCLUSION AND FUTURE CONSIDERATIONS:

See notes within daily activity sections for future considerations.



Map 1. Topo map of the Fish Creek mini-grid



Map 2. Satellite image of the Fish Creek mini-grid.