

WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE

CENTRAL ALASKA NETWORK

Vegetation Monitoring Program

Summary Trip Report: Boyden Creek Mini-Grid

25 June to 4 July, 2007



Lead Author: Cedar Drake
Contributors: Kim Smith and Ken Lindsay

September, 2007

PURPOSE:

The purpose of this trip was to install permanent vegetation plots and to collect vegetation data at the Boyden mini-grid study area according to the protocols established for the Central Alaska Network (CAKN) vegetation monitoring program. We accomplished the sampling protocols at 14 of the 25 plots logistical difficulties and challenging topography.

PERSONNEL:

Cedar Drake— non-vascular plant data collection, transects data, gridpoint data, metaplot data

Kimberly Smith— vascular plant, transect and soils data collection

Ken Lindsey— plot photography, tree and sapling measurements, transect data

ACCESS TO MINI-GRID AND CAMPING POSSIBILITIES:

At 0700 the WRST CAKN crew began the drive from Glennallen to Slana. The drive takes about 1.5 hours and it is wise to tank up in Glennallen as there are no gas stations that accept government credit cards along the way. We checked in with Vicki Penwell and Thelma Schrank at the Slana Ranger Station and arranged to store our valuables in Vicki's office during our field work. We used the NPS Betty Freed cabin (approximately 6 miles down the Nabesna road from Slana) as our residential base camp during the entire field season. A large, locked, and relatively secure storage shed was made available to house our personal belongings and sampling gear during our field trips. Two small weatherports and several smaller cabins were available on the site for overnight accommodations. The main cabin was used for cooking, washing, and as an office space. There was ample space, and the cabin was well equipped with non-potable running hot water, hot shower, three refrigerators, a large chest freezer, gas range, and a washer/dryer unit. Fresh water was transported in 5 gallon containers from an outdoor spigot behind the Slana ranger station.

It was approximately a 75 minute drive along the Nabesna road from the Freed cabin to the Boyden Creek crossing. Although the Nabesna road was gravel, it was well graded and provided no access problems with a 2WD vehicle until the Lost Creek and Trail Creek stream crossings, which are located approximately 20 minutes driving time before Boyden Creek. Depending on current weather conditions, the stream crossings range from dry to up to 200 meters wide and 2 feet deep across braided stream channels. It is important to check in with the Slana ranger station before traveling through this area for current road conditions. For the same reason, it is also advisable to access the Boyden Creek mini-grid with a high clearance vehicle. We encountered no difficulties crossing both creeks at the beginning and end of the sampling period, although water levels had increased significantly over the 10 day period.



Photo 1. Boyden Creek Mini-grid landscape from Nabesna Road

We were accompanied to our Boyden Creek base camp by Slana seasonal LE ranger, Mark Giddons. Unfortunately, one mile before Boyden Creek the alternator of our NPS vehicle broke and we were temporarily stranded on the road. With the help of a jumpstart from Lee Penwell we managed to reach our access point at Boyden Creek after a short delay. To begin the hike into the Boyden mini-grid base camp, it is best to park a vehicle on the road just before Boyden Creek on the north side of the road.



Photo 2. Boyden Creek (looking upstream) from Nabesna Road: Low water volume

Due to extremely dry conditions, we chose to access our base camp by walking up Boyden Creek along the adjacent gravel bars. The creek was shallow (ankle/knee deep) and rarely wider than 2 meters across. Using this route one must cross the creek approximately 10 times. Access to the base camp is also possible by walking through the forest along the north side of Boyden Creek. Due to significantly higher water levels at the end of the trip, we employed this option on our return route. Hiking time from the Nabesna road to the base camp site is approximately 45 minutes.

Two factors limited our ability to select an optimal location for our campsite in the center of the Boyden mini-grid:

1. Approximately $\frac{3}{4}$ mile above the Nabesna road crossing, Boyden Creek enters a steep walled canyon that continues through the entire mini-grid and beyond. This creates an impediment to north/south travel across Boyden Creek in the mini-grid. There is one location in the vicinity of point 9 that provides access out of the canyon to the north, but the route is steep, rocky, and potentially difficult with heavy backpacks.
2. Other than Boyden Creek there were no dependable fresh water sources in the central portion of the mini-grid. There is an intermittent creek to the east of point 10 at the base of a vegetated lateral moraine, but the flow in this area was low and relatively stagnant. There was also a small flowing creek in the northwest portion of the mini-grid north of point 20.

As a result, we located our base camp approximately 200 m to the southwest of point 10 on a forested bluff approximately 25 meters above Boyden Creek. **Campsite GPS point: 62.48358042° N, -143.10452816° W.** Water access involved a 15 minute walk downstream to Boyden Creek. The water access point is also the easiest place to transition from the creek bed to the ridge leading up to the campsite. Water access GPS point: **62.48222757° N, -143.10574914° W.** We were grateful to have two large capacity drip bag water filters which enabled us to gather water only one time per day. The water in Boyden Creek was clear. Adjacent to the campsite is a rectangular tussock meadow (40m x 10m) where we were able to set up our solar charging station. Beyond the tussock meadow there is a scenic knoll where we established our kitchen.

Due to last minute logistical complications with a lack of anticipated packing assistants from Slana district ranger operation, it was necessary to make two trips from the road to base camp with equipment.

HIKING:

Our decision to camp outside mini-grid due to worries about the potential scarcity of freshwater sources led to long hikes to access the plots. It is possible that a crew could camp in the vicinity of point #9 and thus significantly reduce travel times within the grid. Complex rugged topography made direct navigation to plots difficult. The Boyden Creek canyon creates a barrier for north/south navigation throughout the mini-grid. Soft spongy ground and steep slopes increased travel and sampling time.

WEATHER AND ENVIRONMENTAL CONDITIONS:

It rained at some point every day. Rain ranged from drizzle to thunderstorms. We experienced temperatures in the 40s to the 80s.

We believe that vegetation had not yet reached peak phenology during the period we sampled the area in 2007 (late June/early July).

GENERAL NOTES ON PLOT-WORK AND PLOT OBSERVATIONS

In late June/early July 2007 the CAKN WRST crew completed a 10 day sampling visit to the Boyden Creek mini-grid. Only 14 of 25 plots were completed due to logistical difficulties and to the challenging topography of the area. The Boyden mini-grid was characterized by two prominent alpine ridges bisected west/east by a rugged gorge. The elevational relief of the area was approximately 2000 feet with a range between 2,300 and 5,300 feet. The western and southwestern portions of the mini-grid include open sloping tundra plains with scattered spruce trees. Aspect and elevation appear to be the primary determinants of vegetation patterns in the area. Very little flowing water was evident in the mini-grid other than Boyden Creek and a small drainage situated in the northwest portion of the mini-grid. Above 4000 feet the vegetation is alpine in character in all aspects. Talus and scree slopes were present on steep slopes on both ridges. Vegetation had not yet reached peak phenology during the sampling period. Soils in the alpine plots were shallow to bedrock with a high mineral content and little organic matter. In the boreal areas, soils were extremely wet and characterized by a deep organic layer. Permafrost was encountered intermittently in the lower elevation plots.

Due to a malfunctioning soil thermometer, soil temperature data was not collected for the Boyden mini-grid.

Table 1. Collection series for the Boyden mini-grid.

Collector	Identifier	Series
Smith	Vascular plants	KS-07-001 – KS-07-104
Lindsay	Digital Photos	100-0016 – 100-234
Drake	Nonvascular collections	CD-07-1 – CD-07-21

Auxiliary photo points: Three photos were taken in the Boyden mini-grid without the creation of auxiliary points in the field database. The table below links these photos with their respective plots. These photos have been archived with the standard plot and panorama photos in their corresponding plots. The associated GPS files should be referred to in the field during the next sampling event in order for repeat photos to be taken in the same location.

Table 2. GPS information on photo points not in database.

<u>Mini Grid</u>	<u>Photo pts</u>	<u>Associated Plot</u>	<u>Corr Type</u>	<u>Rcvr</u>	<u>Datum</u>
BOYDEN	Boyden 3,100-0224	Boyd 3	Postprocessed Code	GeoXM	NAD83
BOYDEN	Boyden 2, 100-0219,0220	Boyd 2	Postprocessed Code	GeoXM	NAD83

Table 3. Location information on photo points not in database.

<u>Mini Grid</u>	<u>Photo pts</u>	<u>Associated Plot</u>	<u>GPS elev (m.)</u>	<u>Latitude</u>	<u>Longitude</u>
BOYDEN	Boyden 3,100-0224	3	1193.7	62.480082494	143.085101597
BOYDEN	Boyden 2, 100-0219,0220	2	1287.1	62.481220406	143.074560987

Notes on unsampled plots:

BOYDEN 1: No information.

BOYDEN 5: No information.

BOYDEN 6: Plot is accessible. Continue walking upstream ½ km along Boyden Creek. Plot is located in or adjacent to the creek bed.

BOYDEN 8: Approximately 75 meters east of “access ridge” on steep sideslope with moderate exposure. Drainage narrow and Alnus viridis-choked. May be difficult to access with heavy packs.

BOYDEN 11: Steep talus drainage with LARGE cliffs at/or below plot site. Side walls of drainage are mostly vegetated with alpine tundra. It may be possible to access plot from ridge west of plot and drop into drainage...but this would be very steep.

BOYDEN 12: Accessible from upper ridge. Walk south along lateral ridge from the main Boyden ridge. Access is not dangerously steep. Plot is on the nose of the ridge in alpine tundra.

BOYDEN 13: Potentially accessible via “access ridge” but would involve a very steep sideslope on low alpine tundra with open exposure.

BOYDEN 17: Accessible. Access from Boyden main ridge. Probably involves threading down through bedrock outcrops. Steep slopes.

BOYDEN 18: Accessible but very steep along “access ridge” up to the main Boyden ridge.

BOYDEN 19: No information.

BOYDEN 23: Easy access via “access ridge”. Headwall of alpine basin characterized by low alpine tundra.

BOYDEN 25: Easily accessible from BOYD 20 and 24. Plot situated on hillside on elevated bench.

ACTIVITIES:

Monday, June 25

At 0700 the WRST CAKN crew began the drive from Glennallen to Slana. The drive takes about 1.5 hours. We checked in with Vicki Penwell and Thelma Schrank at the Slana Ranger Station. It was approximately a 75 minute drive along the Nabesna road from the Freed cabin to the Boyden Creek crossing. Although the Nabesna road was gravel, it was well graded and provided no access problems with a 2WD vehicle until the Lost Creek and Trail Creek stream crossings, which are located approximately 20 minutes driving time before Boyden Creek. We were accompanied to our Boyden Creek base camp by Slana seasonal LE

ranger, Mark Giddons. Unfortunately, one mile before Boyden Creek the alternator of our NPS vehicle broke and we were temporarily stranded on the road. With the help of a jumpstart from Lee Penwell we managed to reach our access point at Boyden Creek after a short delay. To begin the hike into the Boyden mini-grid base camp, it is best to park a vehicle on the road just before Boyden Creek on the north side of the road. Due to extremely dry conditions, we chose to access our base camp by walking up Boyden Creek along the adjacent gravel bars. The creek was shallow (ankle/knee deep) and rarely wider than 2 meters across. Using this route one must cross the creek approximately 10 times. Access to the base camp is also possible by walking through the forest along the north side of Boyden Creek. Due to significantly higher water levels at the end of the trip, we employed this option on our return route. Hiking time from the Nabesna road to the base camp site is approximately 45 minutes. We located our base camp approximately 200 m to the southwest of point 10 on a forested bluff approximately 25 meters above Boyden Creek. **Campsite GPS point: 62.48358042° N, -143.10452816° W.** Water access involved a 15 minute walk downstream to Boyden Creek. The water access point is also the easiest place to transition from the creek bed to the ridge leading up to the campsite. Water access GPS point: **62.48222757° N, -143.10574914° W.** The remainder of the first day was spent organizing equipment and establishing camp. Wolf scat and prints were observed along Boyden Creek.

Weather: partly cloudy with brief showers: 70's

Tuesday, June 26

Our first day of data collection was long and difficult; we only sampled plot 21. From our campsite it took approximately 2 ½ hours and 2000 feet of elevation gain to access this plot 21. The site is located in an alpine valley on the backside of the main Boyden ridge that dominates the landscape to the northeast of camp. From here on this ridge will be referred to as the “access ridge” because it provides the easiest access to all plots in the northeast quarter of the mini-grid. To reach the plot from camp, walk uphill towards “the moraine”, eventually passing it on the left side (facing up hill). Continue walking uphill towards a small pass to the left of a “fin” of rock along a dominant ridgeline. Standing in this pass one is on “access ridge”. Continue up to the spine of the ridge until the summit is reached. This is the access route for plots 16, 17, 18, 21, 22, and 23. From the crest, cross over the broad ridge top to the backside. Point 21 is located on the backside of the ridge top on the midslope of a large alpine drainage. The vegetation was characterized by mesic alpine vegetation punctuated by wet seeps. *Dryas octopetala*, *Carex bigelowii*, low Salix (to 0.5 m and heavily browsed), and moss dominate the vegetation.

No flowing water was observed other than the small stagnant creek flowing from “the moraine”. Unfortunately, our soil thermometer displayed an error message upon its first use. We attempted to recalibrate it without any luck. As a result, no soil temperatures were collected for the entire mini-grid.

During sampling we were graced by a fine rainbow that arched over the plot. Four Dall sheep were observed running along a broad pass northeast of plot. Note that caution should be

taken hiking and working on these ridges during periods of thunderstorms. No shelter is available and technicians and their metal sampling staffs can be the tallest features on the horizon. This is particularly true for plot 22.

Weather: showery/ brief sleet: mid 40/50's



Photo 3. Boyd 21 Quadrat D



Photo 4. Boyd 21 rainbo

Wednesday, June 27

On Wednesday, we sampled plot 16 and 22. Access to plot 16 was the same as for plot 21. From the crest of the north Boyden ridge, walk southeast along the ridge top to the headwaters of a steep cliff/talus drainage running to the southwest. The plot is approximately 100 meters below the crest line on steep (~35°), unstable slope. Do not attempt to sample this plot in inclement weather due to the potential for rock fall from above and slippery slopes with moderate exposure. Due to its southerly aspect, plot 16 can be very hot on sunny days. It is safest to approach the plot from the northeast aspect of the drainage. The plot center post was pounded into a scree slope and reinforced with rocks. The plot monument was difficult to install anywhere in the adjacent area due to shallow soils and exposed bedrock. Many reference photos were taken due to the likelihood that the plot marker will shift position. The plot was sparsely vegetated and soils and organic matter are extremely thin or nonexistent. Due to the extremely unstable substrate, field workers must make a concerted effort to minimize impact to the vegetation when sampling this plot. The combination of slope and loose footing make this is a very strenuous plot to sample.



Photo 5. Panorama view of Boyden Creek plot #16

Next we headed to plot 22. In comparison with plot 16 this plot was a dream. Plot 22 is located on the broad ridge top crest adjacent to the “access ridge”. Vegetation was characterized by mesic alpine tundra with slightly deeper soils, abundant *Flavocetraria cuculata*, and a copious substrate of black crust lichen. Plot 22 provides fantastic views but can get very windy. Avoid sampling this site during potential thunderstorm periods. The surrounding area would make an excellent helicopter landing zone.

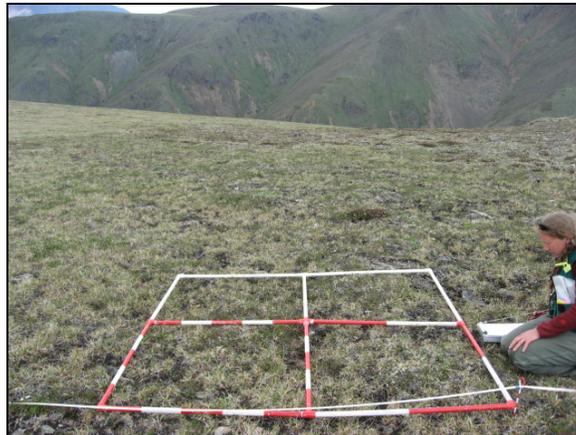


Photo 6. Boyd 22 Quadrat C

Weather: scattered showers/ sunny/windy: 50's to 80's

Thursday, June 28

On 28 June we sampled plot 24. It was approximately a 2 ½ hour hike to access this plot from base camp. From camp, walk northeast ¾ km to small “hanging valley” at approximately 4000 feet elevation. Continue walking northwest until reaching a deeply incised drainage with a small creek. Walk up the drainage on the south side of the creek. Approximately 100 meters before the confluence of two tributaries, hike northwest up to a small pass below a prominent pyramidal stone knob. Plot 24 is approximately 40 meters up the north slope opposite the stony knob. The Plot 24 plot center marker may be difficult to find as it is located in a thick *Salix* sp/ *Betula nana*

patch. This open willow/ shrub birch community was characterized by abundant *Dryas octopetala*, *Potentilla fruticosa*, and *Festuca altaica*. There was a small rock outcrop in Quadrant B.

Weather: mostly sunny/ afternoon scattered thunderstorms: 80's



Photo 7. Boyd 24 Quadrat B



Photo 8. Boyd 24 Overview with Quadrat B

Friday, June 29

On Friday we completed plots 20 and 15. Only 45 minutes from camp, access to plot 20 was fairly straightforward. We experienced some delays obtaining GPS data here due to thick overstory and low satellite coverage. Using the external antenna did not seem to help in this situation. Plot center was situated within an ecotone between *Betula neoalaskana*/*Alnus viridus* closed forest and tall willow/*Betula nana* scrub. There was a large mossy rock (~ 2m x 1m) in plot. This plot posed a challenge with identifying the birch trees to species. The trees exhibited considerable variation in bark coloration and leaf shape and consequently a variety of voucher specimens were collected.



Photo 9. Boyd 20 Quadrat A



Photo 10. Boyd 8 Quadrat B

Plot 15 was located approximately ½ hour from camp. This plot was best described as an open, mossy surface with approximately a 10 degree slope. The vegetation was dominated by

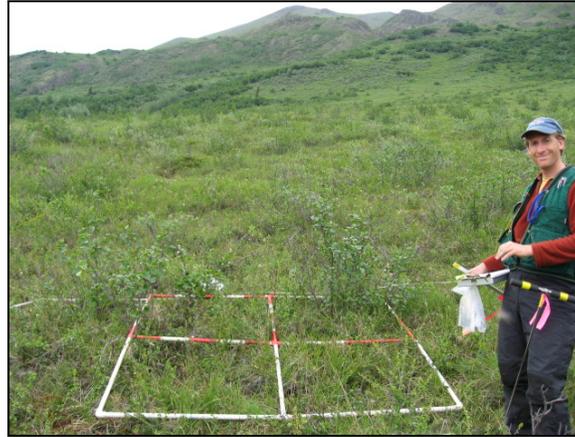


Photo 11. Boyd 15 Quadrat A

Betula nana, *Salix* spp., and *Carex* spp. Common butterworts (*Pinguicula vulgaris*) were found within the plot. Frozen ground was detected at all four soil sampling points at about 30 cm below the ground surface.

Weather: windy/ thunderstorms/ overcast 60's

Saturday, June 30

On 30 June we sampled plots 14 and 10. Approximately 40 minutes from camp, access to plot 14 was relatively straightforward. Plot 14 was situated on a slope approximately 150 meters below a rock fin. The vegetation was characterized by a closed low shrub community with scattered *Picea glauca* clumps and an adjacent *Alnus viridus* stand. This was a very mossy site with impeded wet soils. Permafrost was detected at all four soil sampling points at about 30 cm below the ground surface. During plot setup, we had an exciting encounter with a young black bear who was hunting upland sandpiper nests adjacent to the plot. Because the wind was blowing towards us and the bear was focused on the ground, he was completely oblivious to us, despite being only 50 meters away. Still unaware of our presence, he changed his course and began to run directly towards us. At 35 meters distance, a loud warning sent him running full speed in the other direction. Numerous bear piles and overturned rocks were observed in this area.



Photo 12. Boyd 14 Quadrat C

Plot 10 was located approximately 15 minutes from camp. Access to the plot was very straightforward. The vegetation may be characterized as open *Picea glauca* woodland with a relatively closed low shrub understory of *Betula nana*/*Ledum groenlandicum*. Lots of *Equisetum sylvaticum* was present. The plot was adjacent to a small riparian area and tussock meadow near a vegetated swale. *Betula occidentalis* was potentially found in site and vouchered.

Weather: overcast then rain, rain, rain! 50's



Photo 13. Boyden Creek plot # 10 Quadrat B

Sunday, July 1

On this day we completed plot 4 and 5. Plot 4 was approximately a 45 minute walk from camp. In order to access this site it was optimal to cross Boyden Creek at the water collection site. This plot was located just before a slope break south of a small drainage. Plot 4 was an open tundra site without any trees.

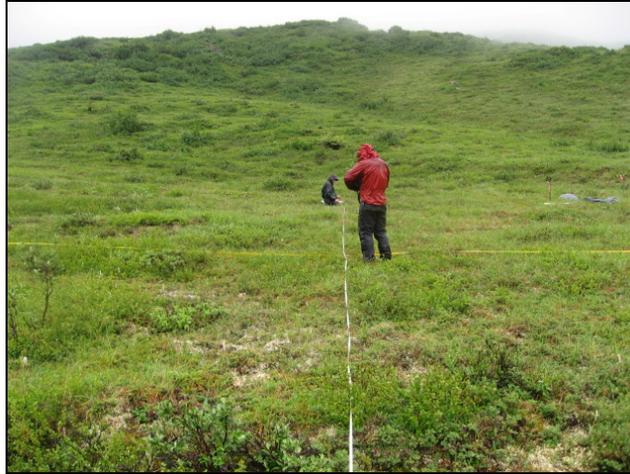


Photo 14. Boyd 4 Looking north towards plot center

Plot 5 was an interesting and complex plot situated directly within the steep banks of a small vegetated drainage channel. Three distinct vegetation communities are represented in this plot: graminoid/herbaceous, tall closed shrub, and low open shrub. There was a small flowing creek running through a corner of the plot. Plot center was situated on an ecotone between a



Photo 15. Boyd 5 Overview



Photo 16. Boyd 5 Quadrat C

graminoid/herbaceous slope and a *Betula nana* shrub community. Plot center is approximately 8 meters east of the creek and 2 meters below the slope break. This plot took a long time to complete due to complex metaplot evaluations, mapping, and high vascular plant diversity.

Weather: morning rain and wind/ afternoon partial clearing 40's

Monday, July 2

On 2 July we sampled plots 9 and 7. Plot 9 lies directly in and adjacent to the Boyden Creek bed just before a large prominent horseshoe bend in the creek. Plot center lies on the south side of the creek. Plot 9 includes an active stream channel, inactive stream channel with braiding,

secondary/tertiary stream terraces, and a portion of the valley wall including a mossy cliff face. Access was relatively direct along the creek bed and involves frequent boulder hopping and stream crossings to knee deep. Due to thin soils, the location of the plot center marker was offset. The true plot center was located 4.37 meters at 345° magnetic from the plot marker. The north end of Plot 9 lies 0.5 m into Boyden Creek. The west end of the transect lies directly on a rock. The south end of the transect was only pulled out to 15m due to the presence of a steep cliff. It was important to note that due to moderate rainfall over the previous few days, the water volume of Boyden Creek increased by nearly 500% to the point where it became impossible to cross without wet boots. Waders maybe useful when accessing plots located in the Boyden gorge.



Photo 17. Boyd 9 Quadrat D



Photo 18. Boyd 9 Quadrat B

To access Plot 7, continue up Boyden Creek from Plot 9 for approximately 1 km. On the north side of Boyden Creek there are two large landslides; the first being smaller than the second. Plot 7 is located on the south side of the creek in an area situated between these two slides on an open scrub bench above a small cliff face. To reach the plot one must “swim” 50 m. through a very dense stand of *Alnus viridus* staying slightly downriver (west) of a small tributary which flows into Boyden Creek. Plot 7 was characterized by an open low *Alnus viridus/ Betula nana/ Salix* community with abundant moss. An ecotone exists with a tall closed shrub community to the east of the plot. It seems quite feasible to access Plot 7 from the south (Plot 2), although we did not attempt to do this.

Weather: drizzly, clearing 60s degrees F.



Photo 19. Boyd 7 Quadrat B

Tuesday, July 3

On 3 July we sampled plots 2 and 3. To access Plot 2 from camp, cross Boyden Creek at the water collection site then head east up a long ramp slope south of Boyden Creek. Angle slightly left below the green summit and sideslope up Boyden Creek valley to a wide bench and a vegetated talus slope. If you have reached a deeply incised gorge, then you've gone too far. Plot 2 is on the lower talus slope approximately 150 meters southeast of a small pond on the bench. The plot center marker was wedged between rocks on the talus slope. The crew endured two cold storms during sampling. Beautiful location.



Photo 20. Boyd 2 Quadrat B



Photo 21. Boyd 2 Quadrat

From Plot 2, walk west along a bench to the crest of small rounded point. Plot 3 lies approximately 100 m to the west on the 35° headwall of a small *Alnus viridus* drainage. Vegetation was a 100% canopy cover *Alnus viridus* thicket on a steep slope. This plot can be likened to wrestling with an octopus... a lot of fun, especially in the rain.

Weather: rain/clear/rain 50's



Photo 22. Boyd 3 Quadrat A



Photo 23. Boyd 3 Plot situated in alder thicket below cliff

Wednesday, July 4

Assisted by Slana District Ranger Mark Thompson, seasonal LE Ranger Mark Giddons, and seasonal hydrologist Hans Klausner, we were able to pack our entire gear out from the Boyden base camp in one trip. The rest of the day was spent downloading data and photos and preparing equipment for the next mini-grid. Soils were stored in the chest freezer at the Betty Freed cabin.



Photo 24. View of slope north of Boyden Creek from Boyden Creek Plot #2

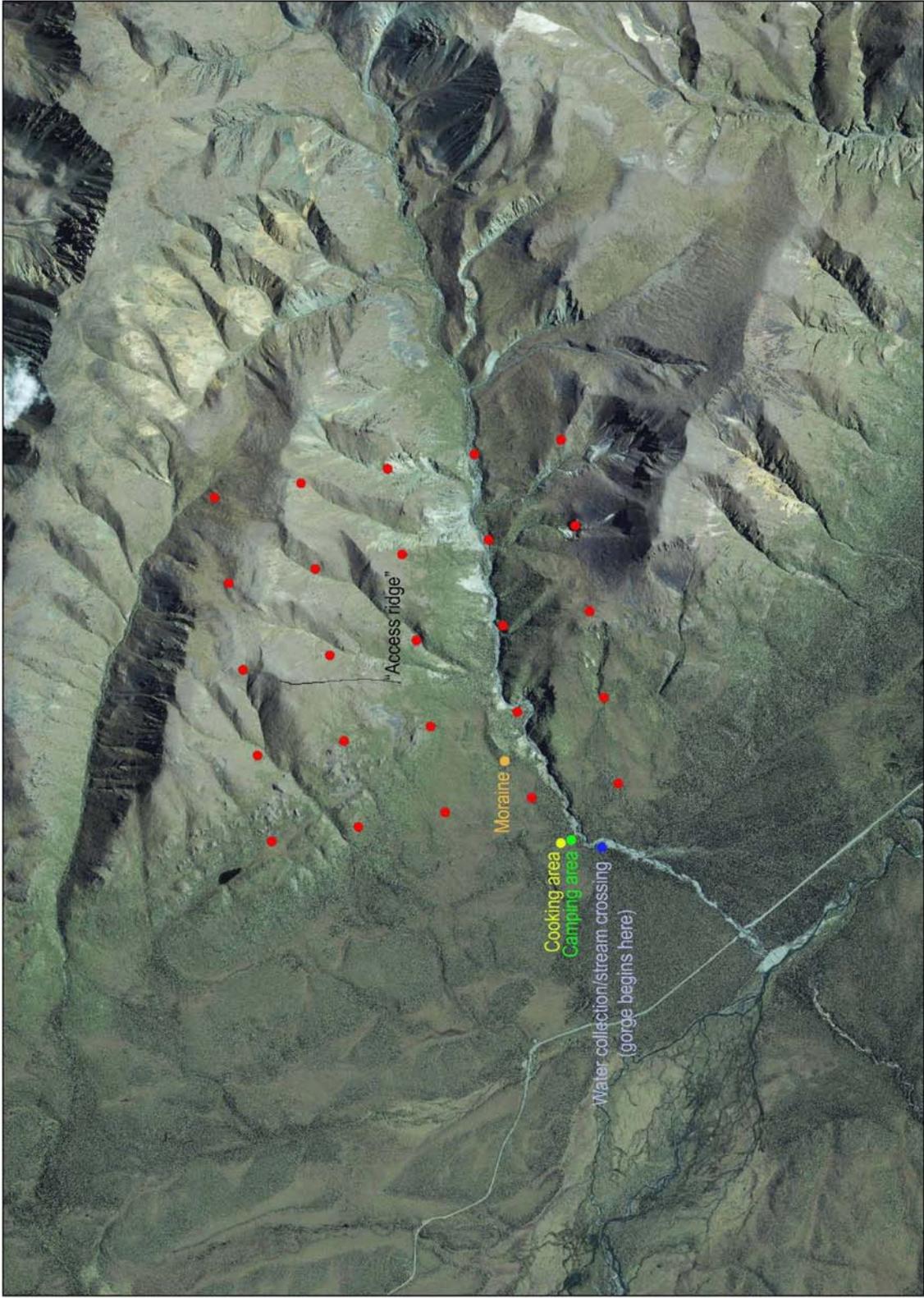
Weather: rainy and cool 50's degrees F

CONCLUSION AND FUTURE CONSIDERATIONS:

1. IKONOS satellite imagery was useful for navigating through the mini-grid. Make sure every trip to bring a laminated copy of the aerial imagery with superimposed plot points.
2. Katadyn "Base camp" drip style water filters were essential for minimizing water purification and transport time to our dry camp. We suggest that every CAKN crew be outfitted with two of these units. They cost \$65 and carry up to 2.5 gallons.
3. Due to its challenging topography, the Boyden Creek mini-grid may require more than 10 days to complete. In order for this mini-grid to be completed in ten days by a single crew we would suggest two options:
 - a. Establish two helicopter access camps near plot 3 and plot 22. Drinking water would need to be flown in to both sites.

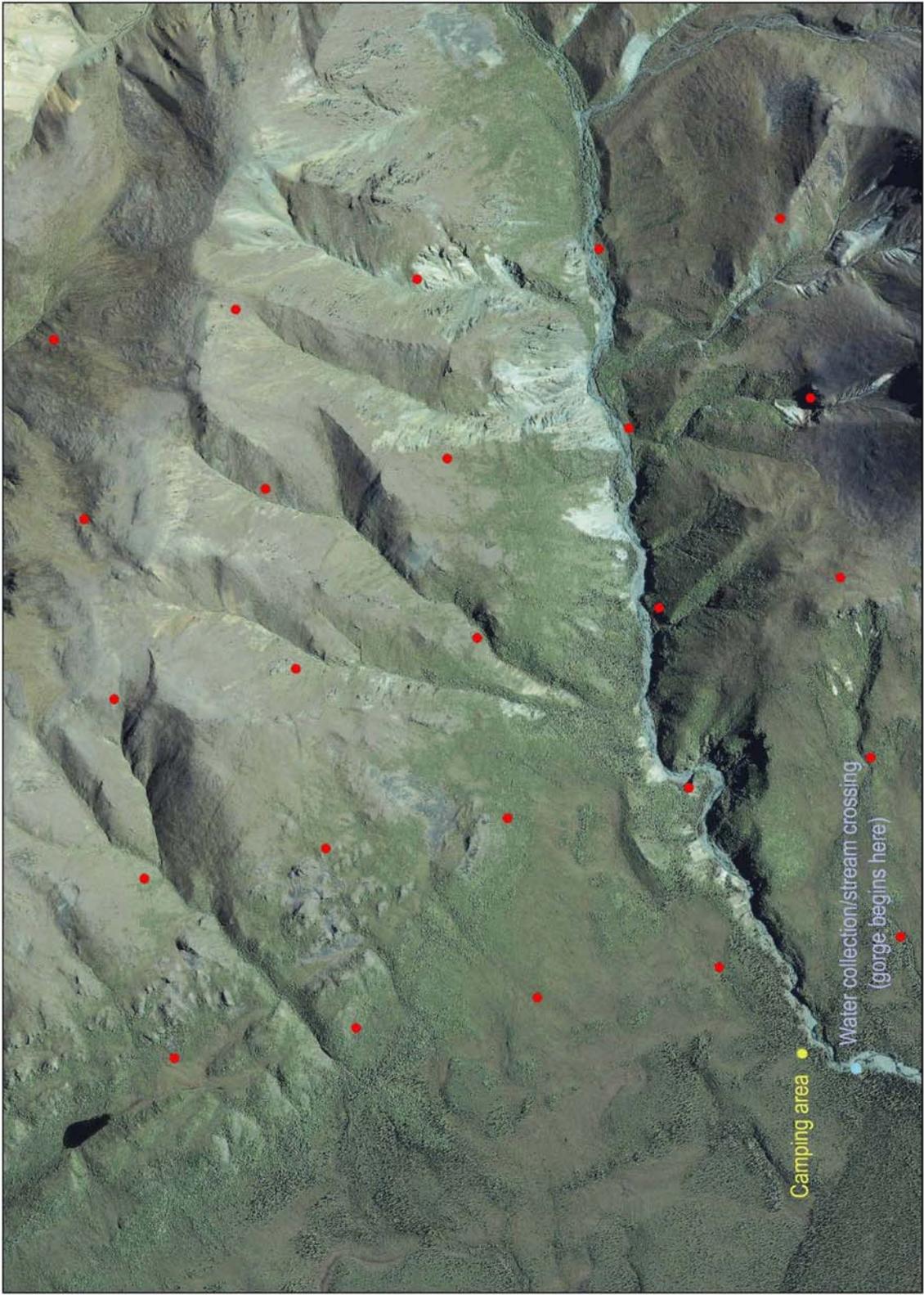
- b. Have two crews base camp at the 2007 site. One crew would sample the northern mountainous portion of the mini-grid and the second crew would sample Boyden Creek canyon and the ridge to the south.
4. If the mini-grid is sampled by a single crew with no aerial support, assistance packing supplies in and out of the site is critical to maximizing sampling efficiency.
5. We suggest that mounting the digital camera on to the top of Hagloff pole is helpful to facilitate rotating the camera from a stable platform when making panorama photos.

Our warmest appreciation goes out to Mary Beth Cook, Eric Veach, Mark Thompson, Mark Giddons, Vicki Penwell, Thelma Schrank, Molly McCormick, Dave Sarafin, and Hans Klausner for their logistical assistance in completing this mini-grid.



0.5 0.25 0 0.5 1 1.5 Miles

Boyden Hills Mini-grid



0.5 Miles
0
0.25

Camping area
Water collection/stream crossing
(gorge begins here)

Boyden Hills Mini-grid - Close

Boyden Hills Mini-grid (private property in orange)

