National Park Service
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Vegetation and Soils Monitoring Protocol Testing
Arctic Inventory and Monitoring Network
Progress Report, December 2010

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Abstract

The Arctic Inventory and Monitoring Network (ARCN) continued development and field-testing of its vegetation sampling protocol in 2010. Work in 2010 included 1) protocol testing at an additional node in Gates of the Arctic National Park, and 2) reconnaissance of potential node locations in all ARCN NPS units

Introduction

An important component of the ARCN Vegetation and Soils Vital Sign monitoring program is monitoring of permanent plots at selected sites across the Network, known as “nodes”. Details of the sampling design are given in the draft protocol (Swanson and Neitlich, 2011). In 2009 we comprehensively tested the proposed protocol on 34 plots at 2 nodes and reported on our experience in last year’s progress report (Swanson, 2010). Work in 2010 brought us closer to implementation through additional testing at a node with 21 plots, and reconnaissance of potential node locations. We are planning to begin routine implementation of the protocol in the field season of 2011.

Field Sampling

Twenty-one plots at one node were sampled in 2010, at Agiak Lake in GAAR. Sampling was successful and generated baseline monitoring data. A few lessons learned are as follows.

1. Weather was very poor, with nearly constant rain for 4 of 5 days and temperatures in the 40’s F. The Trimble Nomad data recorders worked fine under these conditions, though the crew found it difficult at times to read the screen while wearing an insect headnet when the screen was covered with water droplets. The Canon SLR camera used for plot and pole photographs produced adequate photos but had some fogging problems and required very careful use. The camera was exposed to the rain while taking pole photos (panoramic photographs from on top of a pole). Initial research into waterproof cameras found that available models do not accept a cable remote shutter release and thus would not work with pole photos. The best solution may be to use a waterproof fabric camera cover. These are inexpensive and widely available, but they are designed to be used with a tripod or hand-held, and some testing will be required to ensure that the cover does not interfere with pole photos.

2. The battery failed immediately on the Panasonic field computer borrowed from CAKN to use for data and photo backups, and consequently no backups were made. Luckily, no data

was lost, but in the future, new batteries will be needed if these computers are used for backups.

3. Our initial plan was to sample at Pamichtuk Lake, with Agiak sampling as a backup plan. We were able to obtain information on landing at Pamichtuk Lake from local pilots but not information about camping there. We landed at Pamichtuk and failed to find a suitable site for a base camp and were forced to change plans and move to Agiak, with some added flight expense. The lesson learned was that we needed to make some reconnaissance visits to potential node sites for which camping or landing information is not available. The second half of this report is results of such reconnaissance work.

Reconnaissance of Potential ARCN Vegetation Monitoring Nodes

This section provides descriptions of landing and camping conditions at potential ARCN vegetation node locations. They are based on aerial reconnaissance in GAAR (16 July 2010 while flying to a sample site in a Beaver with Bettles Lodge, and consultation with pilot Tyler Klaes), BELA, CAKR, and NOAT (on 3 and 4 Aug 2010 in a Cessna 185 with Eric Sieh of USFWS, Kotzebue), and KOVA (by helicopter flyover on 21 August 2010 as a part of other fieldwork; and consultation with Eric Sieh). The landing areas marked on the photos below are from marks made on hard copy images by Eric Sieh.

BELA

Kitluk. The initial choice of a lake near the Kitluk River (164° 16.5', 66° 33.0') to access the Bering Straits Lower Coastal Plain (low-relief thaw lake plain) is too shallow for landing and the entire shore is too wet for camping. Eric recommended an ocean beach landing instead. You can usually land a Cessna 206 along the beach in mid-summer after waves have had time to smooth off the beach (winter ice push builds ridges). The proposed node could placed at a small estuary at 164° 21.3', 66° 34.84' (chosen from the satellite image but not examined specifically during the flyover). Camping looks OK here, but there is no prominent beach/dune ridge. The site is an eroding high terrace, but at the mouths of streams there is some dry land that is not active beach sand. The water quality is questionable here, it might be brackish. Bring some fresh water to start off. There are tundra ponds available up on the terrace if needed for drinking. This is a natural node to pair with Cowpack Lagoon on a single trip, as they are close together and both would require a beach landing with a wheel plane. One potential problem with this site is that brown bears patrol the beachg and can cause problems with beach camps. The following email message (Oct 2010) from Guido Grosse, UAF researcher, describes this problem

> Yes, we had frequent bear visits in July 2008 when we camped in the dunes on the beach near the Kitluk River mouth. One night we had 7 bears around camp (1 sow with 3 cubs, and 3 adolescents). They largely stayed away about 200 m from our camp (one junior tried to inspect the camp but was successfully chased away with noise), but it did not make for a pleasant sleep. Judging from all the bear tracks on the beach my thought is that the beach serves as kind of a east-west highway for the bears. Also, depending on the time of the year you are going, the beach is not necessarily more pleasant mosquito-wise than any other spot on the tundra; in June and July it is awful even on the beach, in late August it was fine. We never had bear visits at our camp at lake Rhonda (Aug 2008, June 2010, Aug 2010) or the second camp farther inland (Aug 2008).

A second option is Lake Rhonda (164° 28', 66° 33.8'), which has been used by researchers numerous times in the past. This lake has access to low thaw lake plain and yedoma (higher rolling tundra). It is about 1100 m long, though the half that is formed in low coastal plain could

be shallow. This would work out if the previous or next node to be sampled was by floatplane. Water would not be an issue here.

Cowpack Lagoon. There is good beach landing and camping along the entire barrier to this lagoon. Major landscape components behind the main beach/dune ridge are salt marsh meadows, parallel old beach ridges, and washover flats. The main objectives are to hit the various ecosystems (especially salt marsh, which is hard to reach elsewhere) and avoid the private parcels. Fly in drinking water. The spot depicted on the satellite image (165° 10.35', 66° 27.90') is just east of a private parcel, so we would need to be careful where we camp and sample. The target sample areas are west of the indicated point, which is located on a potential campsite that appears to have a dune ridge (areas just to the west don't have a dune ridge). The bear problems noted above for the Kitluk node might apply here also.

Devil Mountains Lakes. There is a pumice beach along the whole shore of these two joined lakes suitable for camping. In many places it forms a rather high loose berm that is not ideal camping. The far northwest corner of the lake has the beach plus a large alluvial terrace that would be fine for a campsite. The only problem is that with such a big reach, landing could be tricky due to waves with a strong east wind. To avoid this problem Eric recommended camping on the point in between the two lobes of the lake, on the west side. That way you could land on either side to avoid waves. The access to transects here is not ideal, however, plus the campsite a little cramped. I would prefer the terrace near the inlet stream in the far southwest (164° 32.15', 66° 22.15'). This has better wind protection than the northwest corner and good access to landscapes. Avoid the private land along the lake southeast of the stream.

White Fish Lake (164° 45', 66° 23'). A potential landing lake west of Devil Mountain Lakes, has a sand beach but very shallow approach to shore, potentially a very long wade. Also behind the narrow beach is marshy ground. The terrain is like Devil Mountain Lakes, with no particular advantages, so Devil Mountain Lakes is preferred for a node.

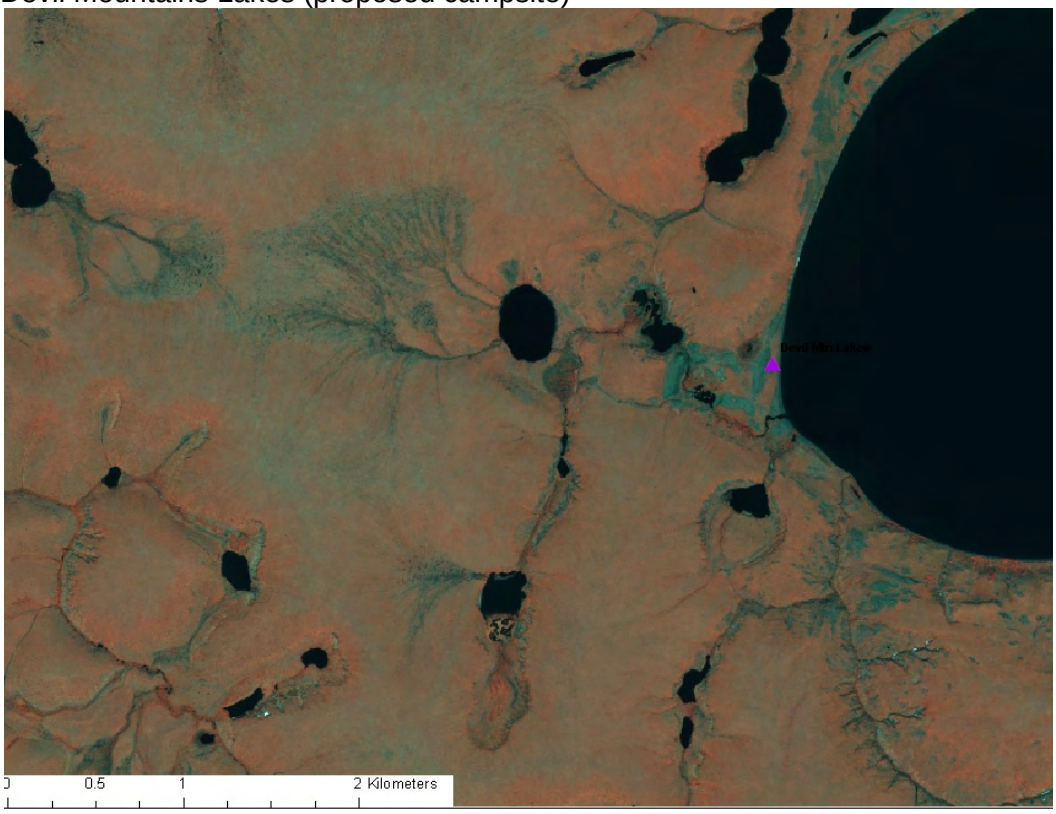
Lava Lake. This lake is deep enough to land on, but rocks in water prevent access to southwest shore. The rest of the shore has a soft mud bottom and a short slope up to tussocks. The best campsite is on the far eastern end of the lake (163° 52.47', 65° 35.38'), where there is a narrow grassy flat with poor visibility upslope and covered with trash. From here it is about a mile over tussocks to new lava to the south or east. This is not a very good option, because the 2 miles of tussock hiking would dominate the day. We may need to skip placing a node at a lava site, or use a helicopter. Given the relative proximity of the lava beds to Nome and road access for fuel caching (Quartz Creek), a helicopter is not a bad option. It would make most sense to sample a node using people involved in WEAR vegetation work (e.g. the reindeer/caribou exclosures) rather than flying the ARCN vegetation crew to Nome for this one job.

Upper Noxapaga. This is another lake east of Lava Lake at -164 ° 6', 32 ° 0' that also borders on lava. This lake has very poor camping, and the lava it borders is actually older and frost-rived, not of particular interest.

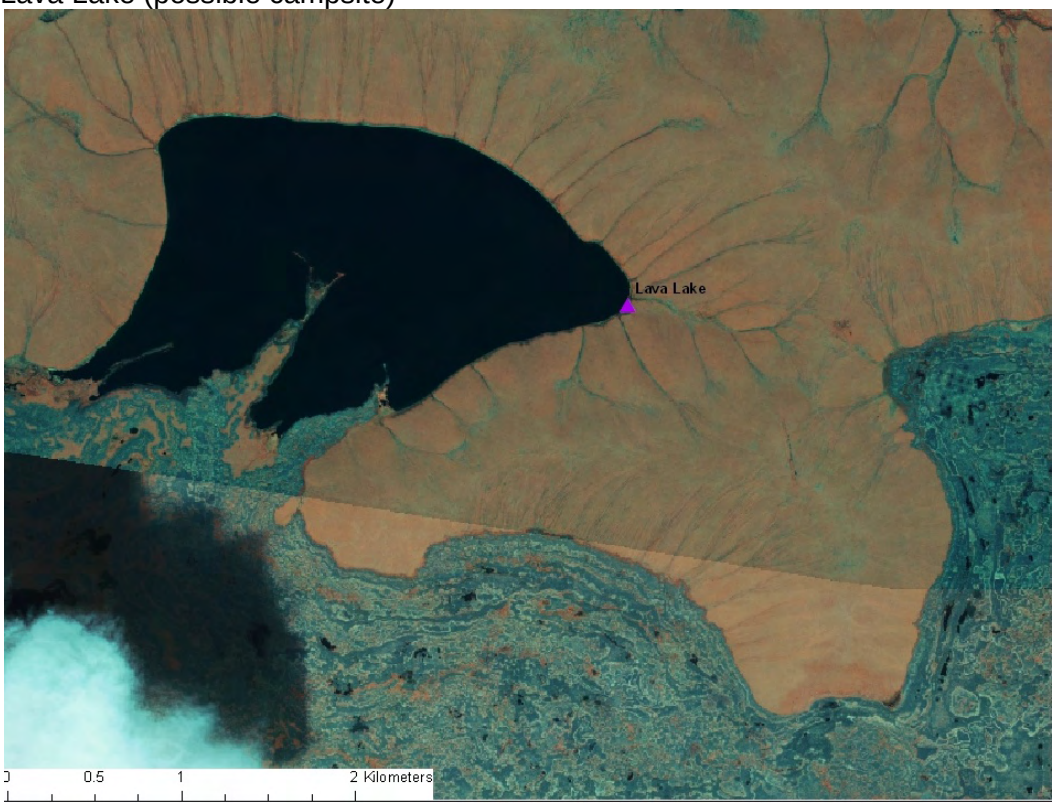
Kitluk (possible campsite) and Lake Rhonda

Cowpack Lagoon (proposed campsite)

Devil Mountains Lakes (proposed campsite)



Lava Lake (possible campsite)



CAKR

Igisukruk Mountain. This potential helicopter-access node is in the forest-tundra mosaic of southern CAKR. A nice campsite is available along the creek just southeast of Igisukruk Mountain. Camp on the bluff above the river at 162° 52.91', 67° 07.96' (marked on the photo below) and cook on the gravel bar to the north. Coordinate the timing of this node with other helicopter work out of Kotzebue, such as climate station maintenance, to avoid paying for the ferry from Nome.

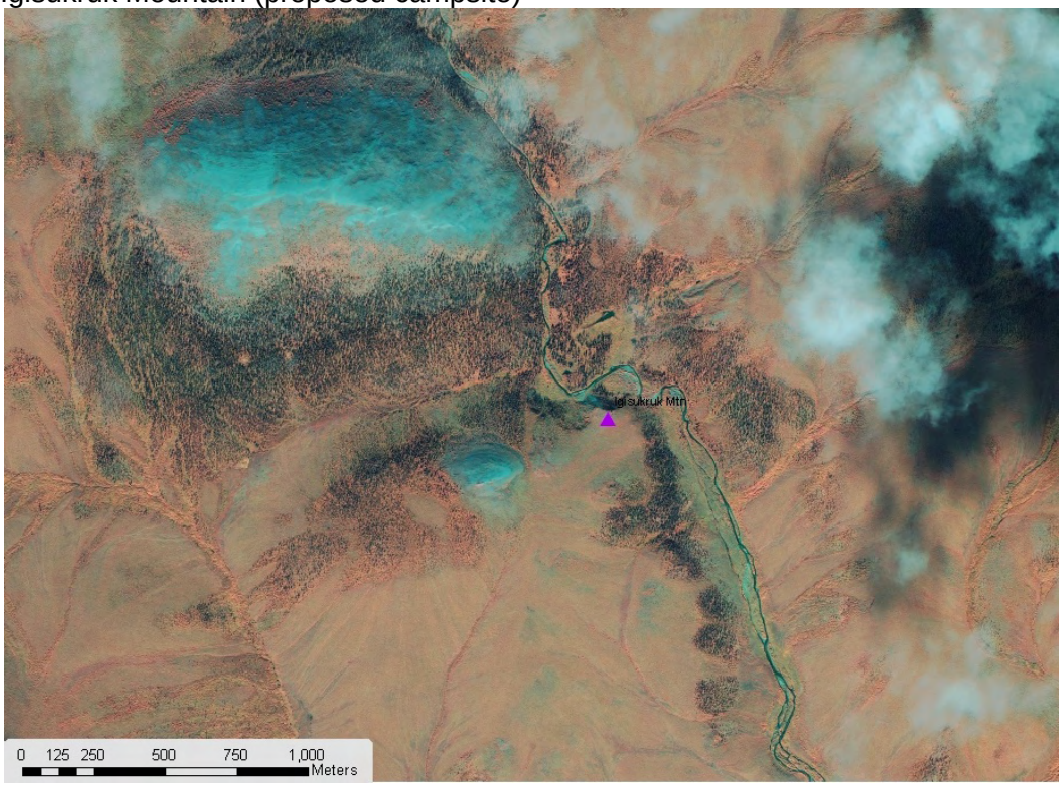
Kotlik Lagoon. The northern end of Kotlik Lagoon is public land. There is a nice sand beach all along here. The ocean beach ridge would be the nicest campsite (marked on the photo below, 163° 52.2', 67°, 24.85'), but water would have to be brought in a (a sample was in 2009 by M. Reynolds and L.M. Clough had salinity of 13.6 ppt, well above the 0.5 ppt Alaska DEC and US EPA drinking water standards). One could also travel east along the beach until reaching a freshwater trickle coming off the tundra to the north. There's a prominent pond and small creek coming off the uplands about 1 km east of the marked point near 163° 51.2', 67° 25.2'. Sample polygonal tundra in the thaw lake plain to north and the ocean beach ridges.

Krusenstern Lagoon. There is a sand beach suitable for camping along most of Krusenstern Lagoon. Land on the lagoon and camp in a spot that gives good access to the various ages of beach ridges. The cultural people will probably want to determine where we camp, and soil pits may not be allowed. If possible I'd suggest camping near 163° 38.91´, 67° 07.13´ to allow access between lakes. Bring drinking water, the lagoon salinity in 2009 according to M. Reynolds and L.M. Clough sampling was about 6 ppt, well above the 0.5 ppt Alaska DEC and US EPA drinking water standards.

Naglatuk Hill (Radio Hill, 163° 40.09528´, 67° 16.07184´). The landing strip here is suitable for a Cessna 185 or 206. The strip provides access to carbonate barrens, tussock tundra, and shrub tundra (to the southeast). The thaw lake plain west of here is too far for efficient access. This would be a dry camp on the airstrip. I would bring in a couple of days of water and then haul some up from the creek below (1/4 mile)

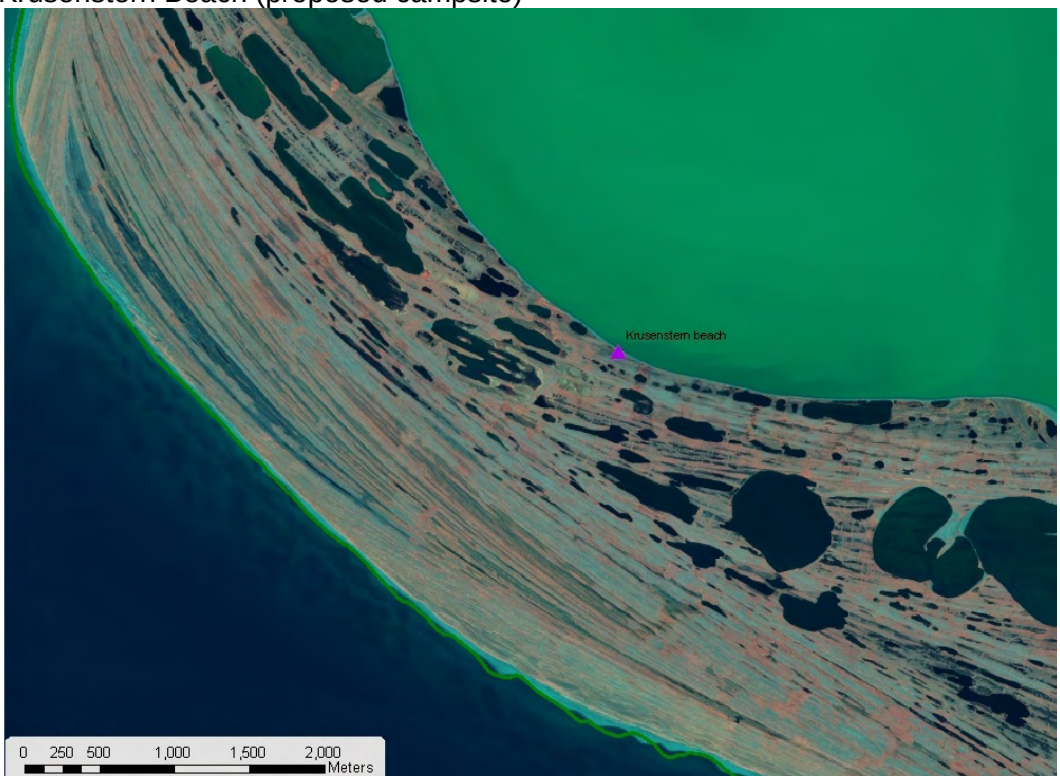
Rabbit Creek. This potential helicopter-access node is in the Mulgrave Hills near the proposed Rabbit Creek climate monitoring station. The landscape is fairly repetitive in this region and many gravel bars along Rabbit Creek appear suitable for camping. The point bar and adjacent gravel terrace with low shrub vegetation (W163° 32.79´, N67° 31.92´) just below the highly braided portion of Rabbit Creek would be a good campsite, with access to tussock tundra, dwarf shrub hilltops, and potentially the braided area (presumably an aufeis field). This node should be sampled if the climate station goes in here, and helicopter use could be coordinated with climate station maintenance.

Igisukruk Mountain (proposed campsite)

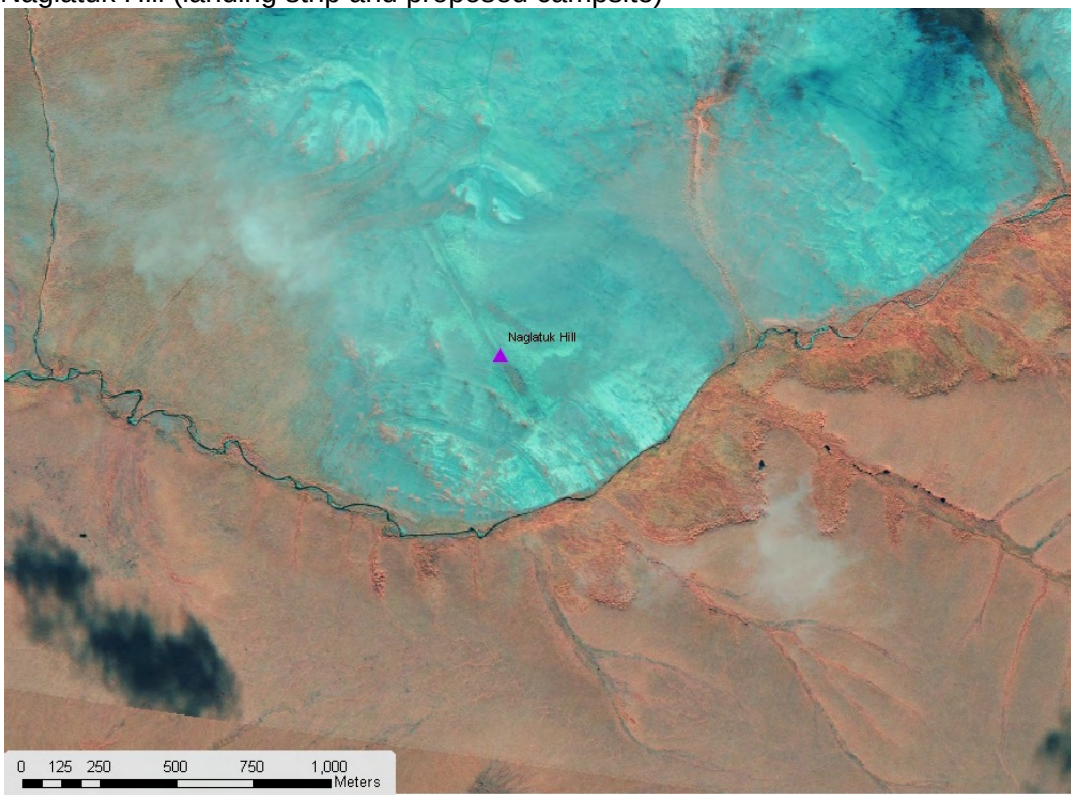


Kotlik Lagoon (possible campsite)

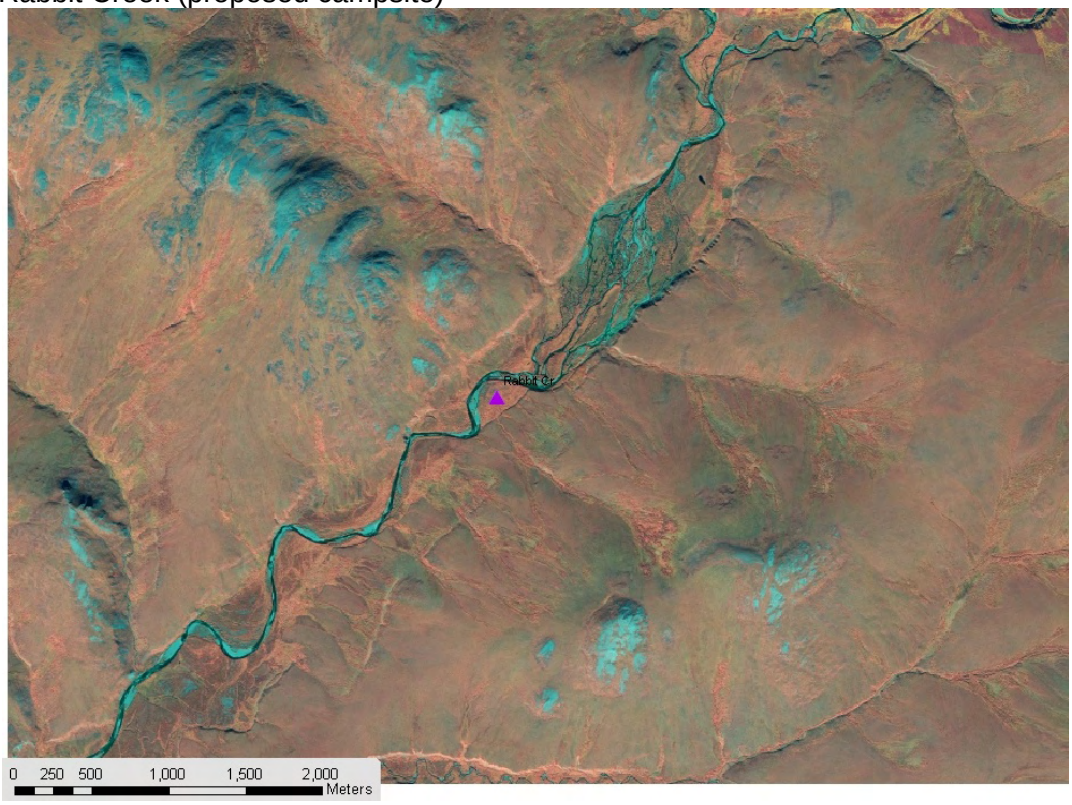
Krusenstern Beach (proposed campsite)



Naglatuk Hill (landing strip and proposed campsite)



Rabbit Creek (proposed campsite)



GAAR

Pamichtuk Lake (152° 13.95', 67° 45.84'). This lake is OK for takeoff in a Beaver with about 1000 lbs of gear and passengers. Camping is poor on all sides. There is a higher bank with tussocks in the southwest that might serve in a pinch, as might the brushy area on the outlet in the east or the wet terrace that rings the rest of the lake. Long slopes feed seepage to the lakeshore so you face the danger of water if there is any rain during your stay. The gradient from mid- to low-shrub tundra up the mountainsides around the lake is of interest We rejected it in favor of Agiak Lake in 2010. If the proposed climate station goes in here, that would be a positive factor. I would consider it for the future if we fail to find anything else suitable for the brushy low tundra environment.

KOVA

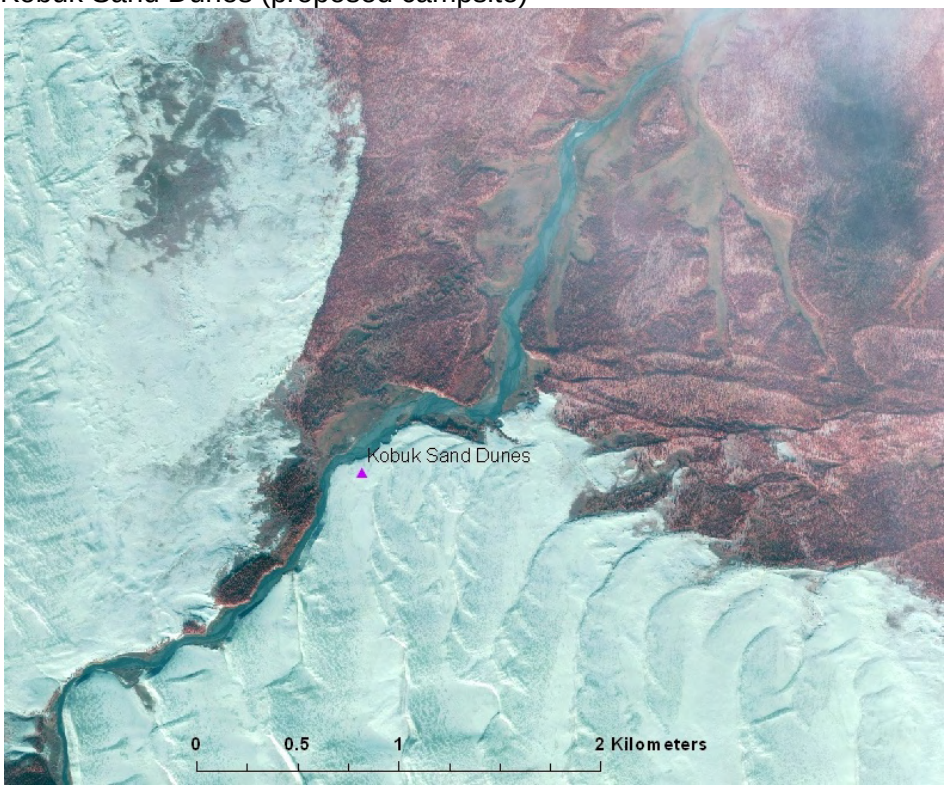
Ahnewetut Wetlandds (Vega lake, 158° 34.04', 67° 05053', nmed for the Vega USGS benchmark near the lake.) During a flyover in a helicopter during fieldwork for another study I identified a sandy ridge stretching along the south shore of the southern member of this pair of joined lakes. The ridge appeared suitable for a small base camp.

Kobuk Sand Dunes. (158° 49.85', 67° 02.51'). Eric Sieh identified 5 places by hand on a satellite image of the whole Kobuk Sand Dunes and also wrote "There are many spots to land, more than this, it varies year to year." For our purposes the landing site along Ahnewetut Creek where it exits the dunes has an optimal combination of water and access to dunes with various amounts of vegetation cover. There is a parcel of private land here that should be avoided for camping and plot placement. I didn't fly over this site, but from the satellite imagery it looks like

you should be able to wade the creek in waders. It looks to be mostly groundwater fed, so the creek level should be relatively constant.

Ahnewetut Wetlands (landing lake; proposed campsite on south shore)

Kobuk Sand Dunes (proposed campsite)



NOAT

Asik. We did not visit this site but Eric confirmed that it's a good place to land a Cessna 185 or 206 on wheels near 162° 13.53', 67° 28.32'. Gravel bar camping is fine also. Before any sampling we would want to consult with the researchers who have worked here for many years. This locality has floodplain spruce forest, colluvial slope spruce, lowland tussocks, and calcareous barrens. Would need to get across the river for the best colluvial slopes and barrens; on a climate station visit we saw someone wade the river, so its possible.

Copter Peak (161° 28.15', 68° 28.39'). We didn't fly over this landing site but Eric Sieh marked it for us on an image. Campsites are not in issue in this terrain. It provides access to gravel terraces, rubbly colluvial slopes, and alkaline barrens.

Kaiyak Lake. The large gravel bar west of the confluence of the Kugururok River and Trail Creek (161° 29.16', 68° 03.46') would be better than the lake, better campsite and access to the floodplain vegetation. The floodplain here is poplars and shrubs, just north of the spruce line so change could be dramatic. The adjacent tundra to the west all burned in 2010, as did the tundra across the river to the east. Most of the tundra west of the shrub bar area is quite wet, not rolling tussock tundra. Some of it is patterned fen. This might be interesting (unique anyway). If access to upland tussock tundra is desired, you would either need a boat to cross the Kugururok, or walk about 3 km across the shrub floodplain and fens. I would not recommend the latter. There are some patches of tussock tundra west of the river are among the wetlands. I would replace this site with Kagvik Creek.

Kagvik Creek (161° 27.27', 68° 17.01'). The gravel strip near the confluence of Kagvik Creek and the Kugururok River has opportunities similar to the Kaiyak lake site. There is typical floodplain brush with poplars here, and adjacent wet tundra. This area looks a bit more typical to me than the Kaiyak lake site.

Lower Noatak Lowlands. Flyover of lake "A" (162° 42.6', 67° 35.4') showed that the pingo on the south shore of the lake was too steep and pointed on top for a good campsite. Lake "B" (162° 34.5', 67°, 35.5') has a pingo on the east side that is very irregular and hummocky, also looked like a poor campsite. The Lake B area burned in 2010, including the pingo. The lake marked with the triangle (162° 40.42', 67° 38.19') looked like the best site in the lowlands. There is a gently sloping hill on the north end that looked suitable for camping. This node is good for sampling a thaw lake plain and pingos. A folding canoe would be nice for accessing transects that would radiate off the lake from various places.

Noatak River. There are numerous gravel bars available for landing along the Noatak River. The best approach would be to choose some potential sites and then ask a pilot if any have good landings spots.

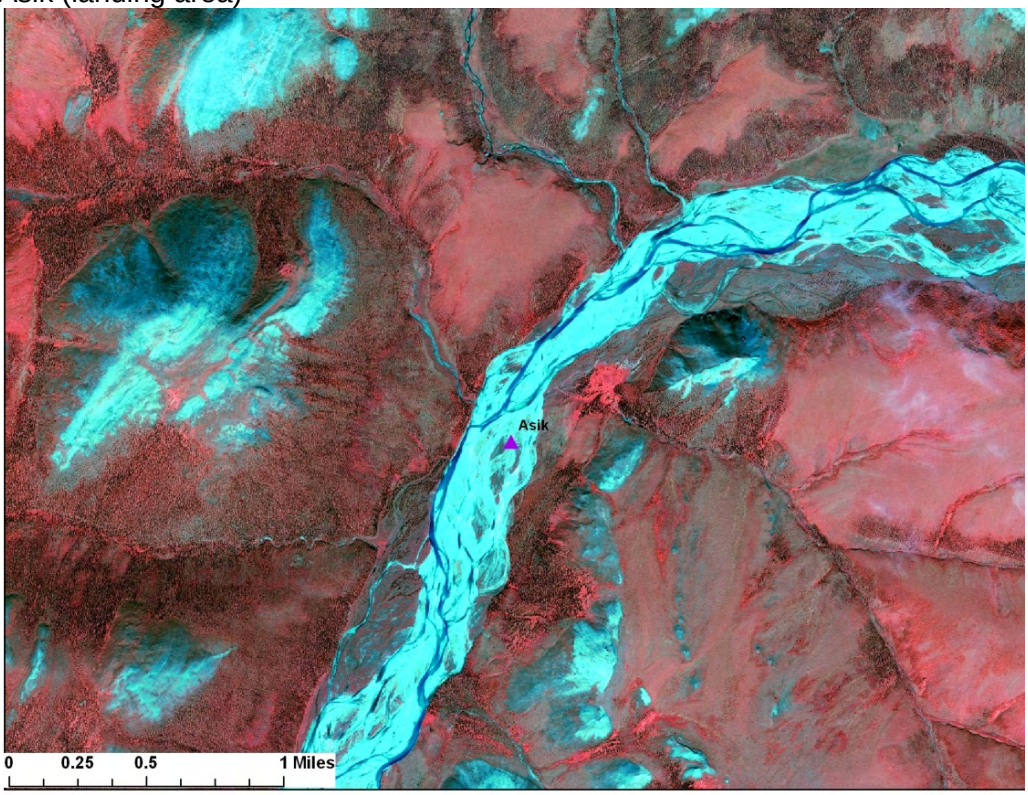
Kelly River landing sites:

Wrench Creek (162° 19.29', 68° 20.83'). The landing site (suitable for a Cessna 206) is on an island in the Kelly River just below the Wrench Creek confluence (bring waders to get to shore). This area is south of the spruce line and has both floodplain spruce and upland spruce (on the colluvial slopes) and some lowland tundra.

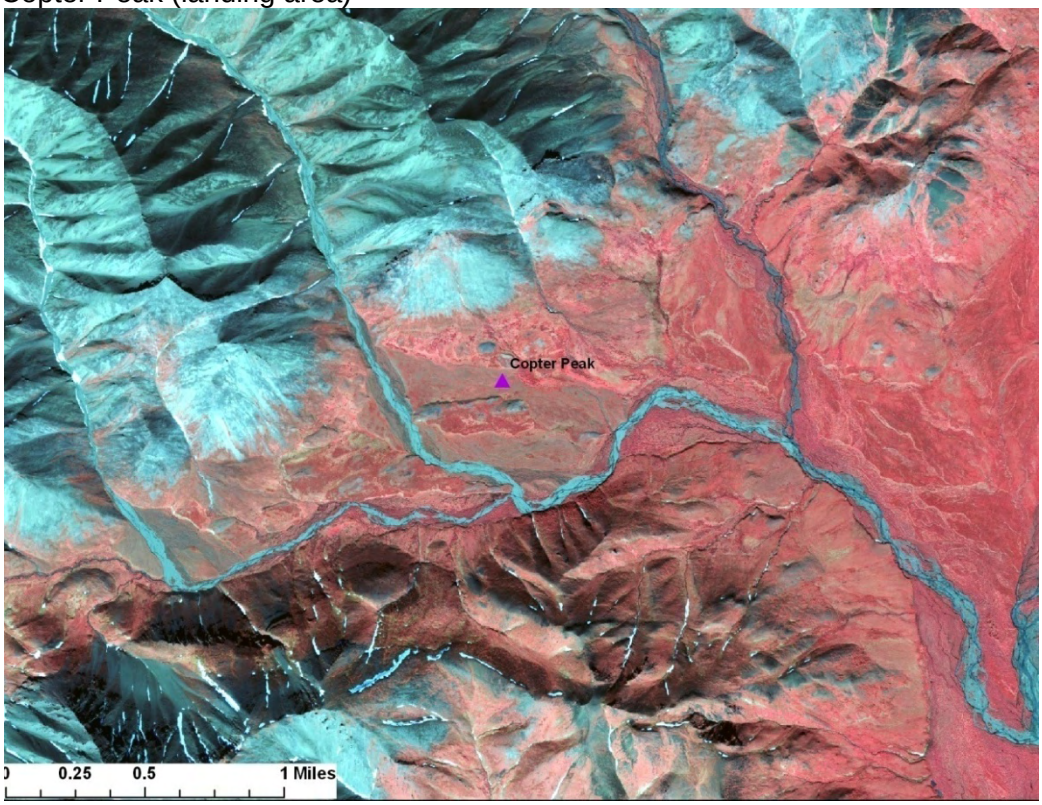
No Name Creek (162° 12.67', 68° 12.06'). This is the next creek north of Wrench Creek. You can land east of the Kelly River at the confluence of the Kelly and this tributary to the west. Allows good access to the long tundra slope to the east but must cross the river to access the vegetated floodplain, and it would be tricky to wade. Across the river are some of the furthest north spruce in the drainage.

Kelly Big Bend (161° 57.94', 68° 20.87'). You can land on a bench above the Kelly east of the big bend, along a small stream. Nice campsite here on a breezy ridge with small stream below. Riparian areas and upland tundra all available. Well beyond the spruce limit.

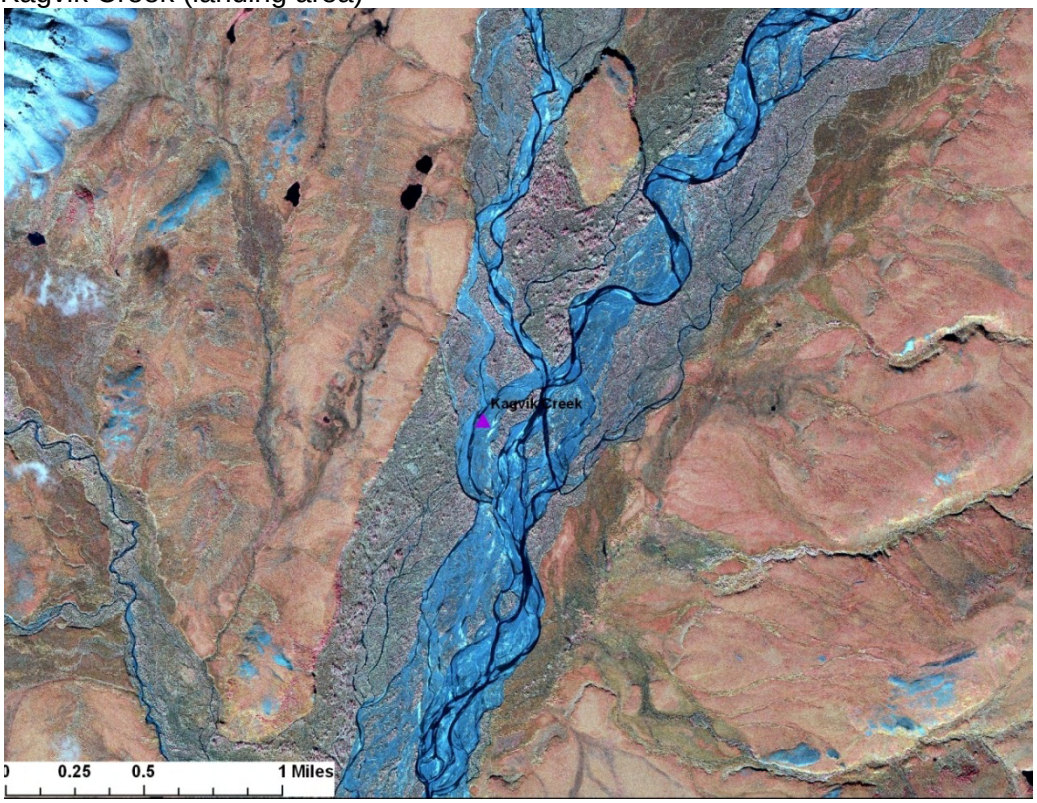
Asik (landing area)



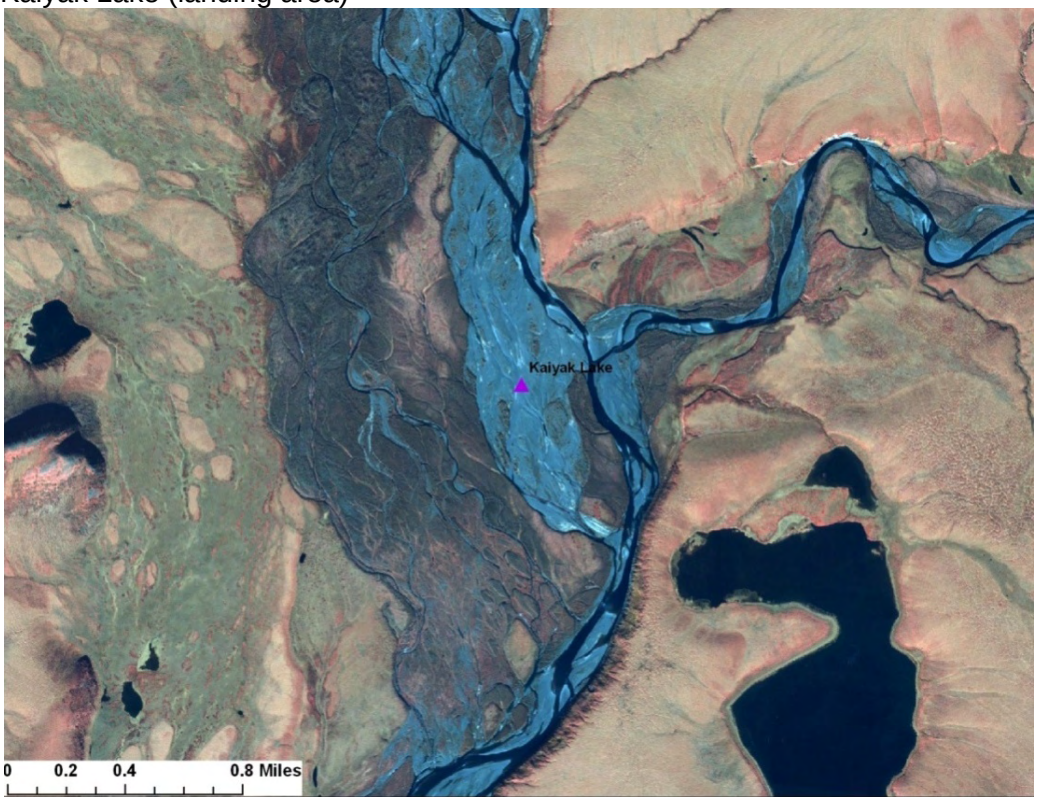
Copter Peak (landing area)



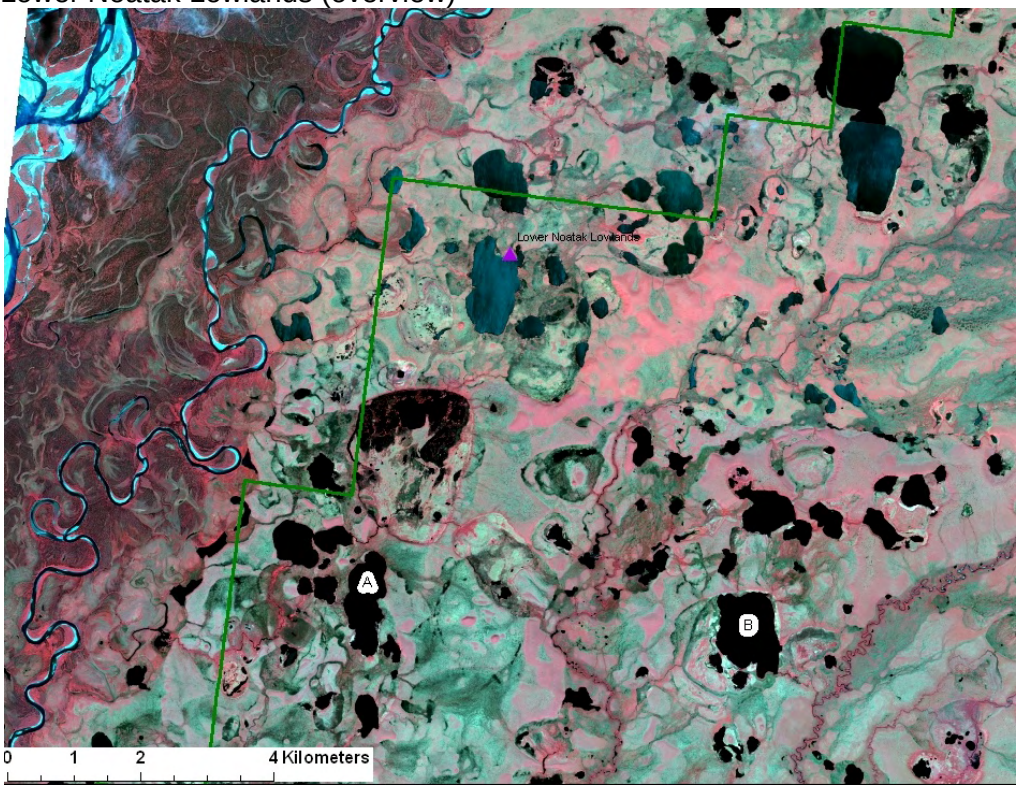
Kagvik Creek (landing area)



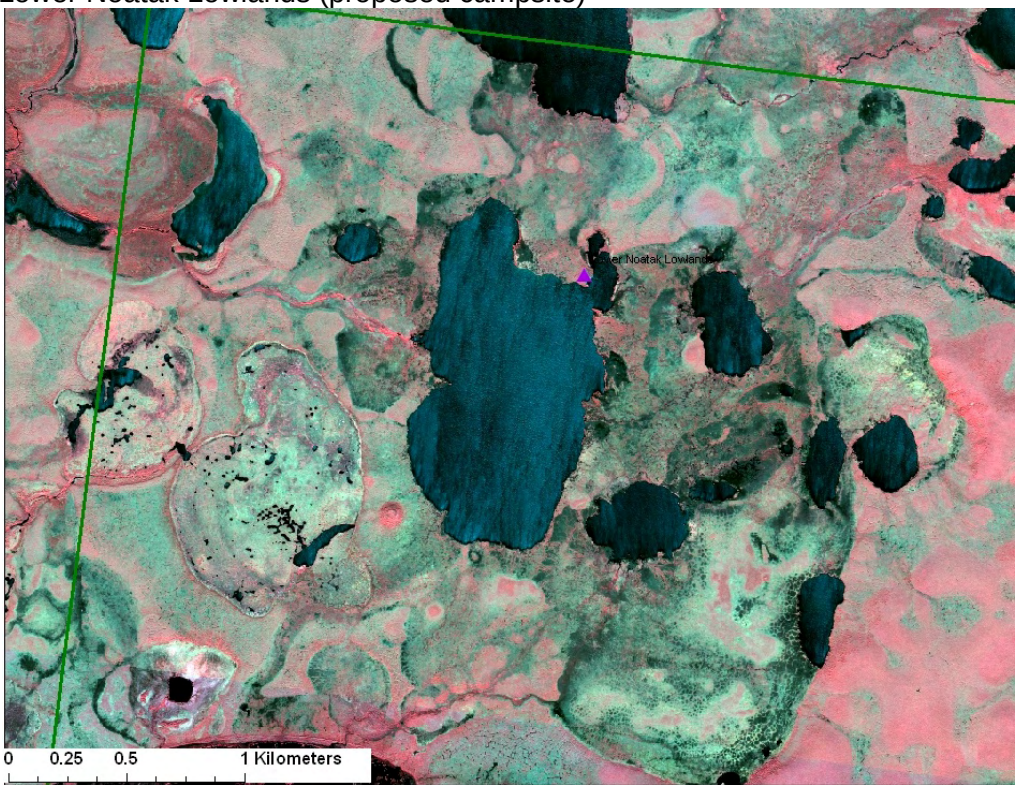
Kaiyak Lake (landing area)



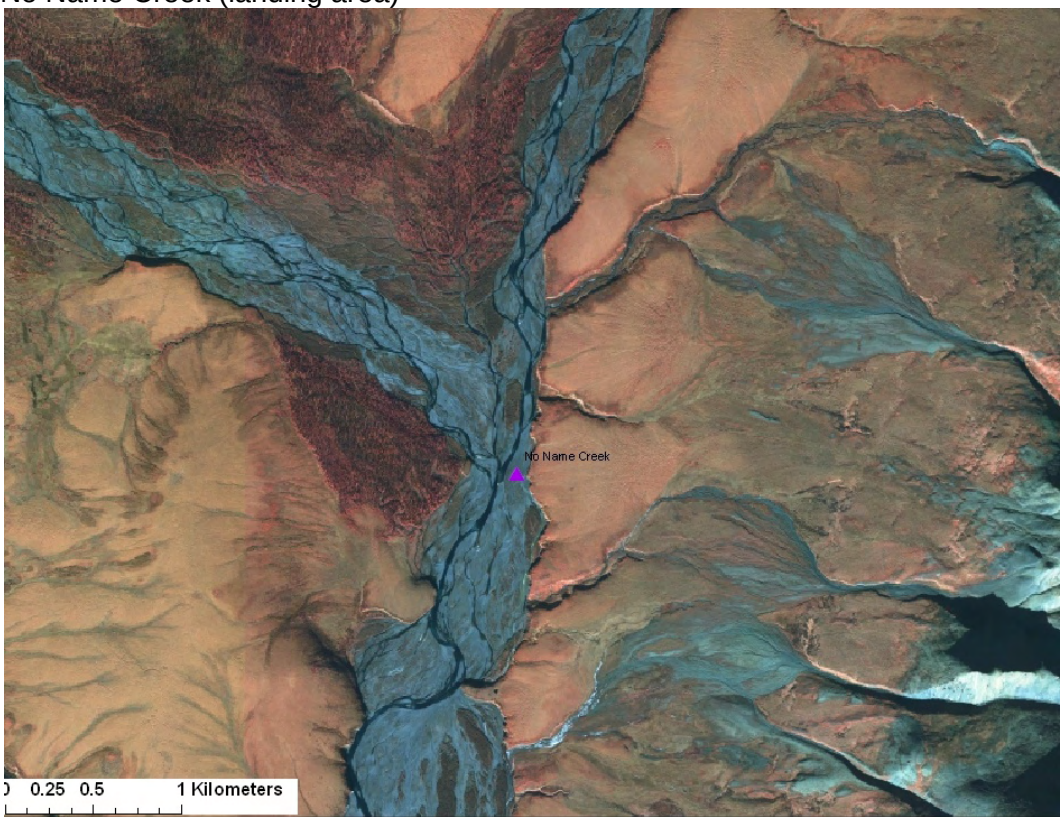
Lower Noatak Lowlands (overview)



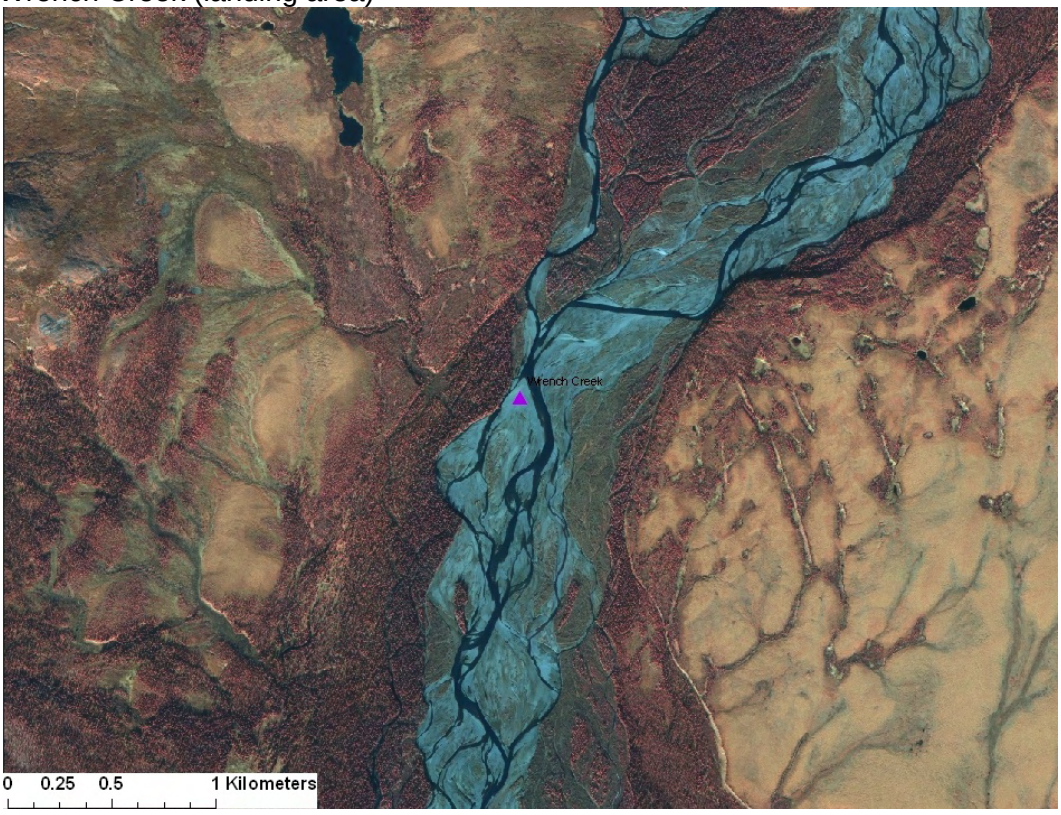
Lower Noatak Lowlands (proposed campsite)



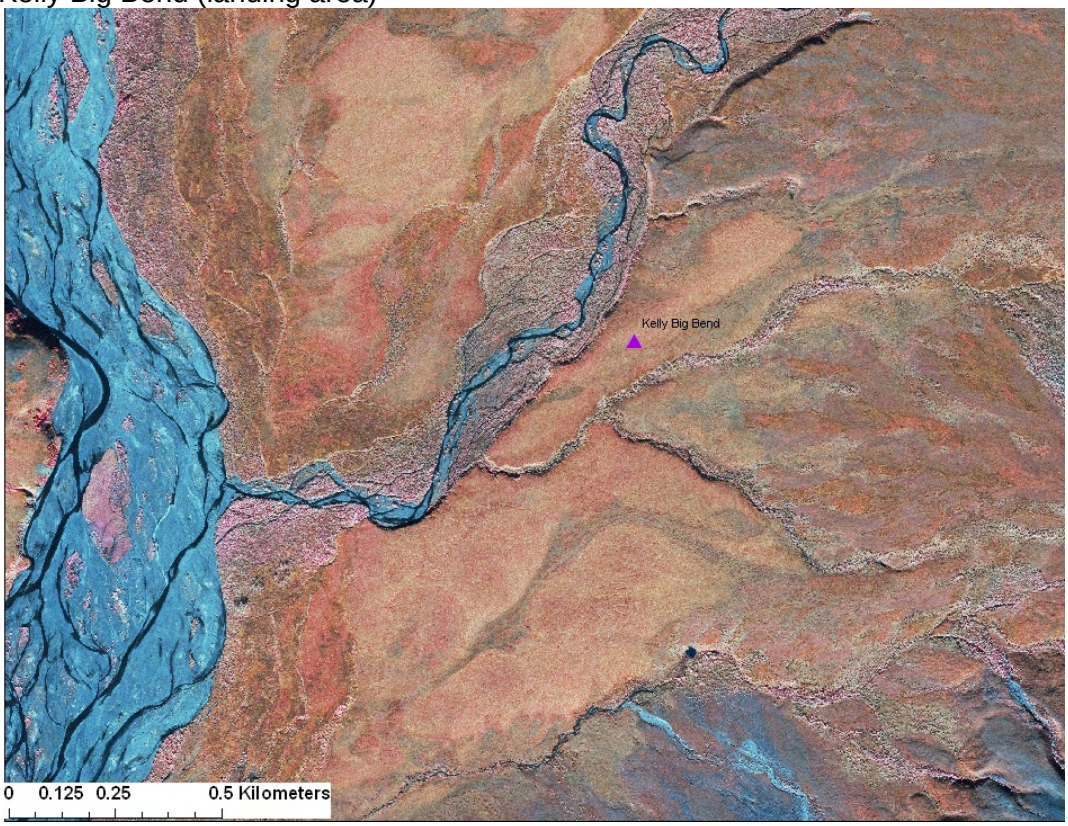
No Name Creek (landing area)



Wrench Creek (landing area)



Kelly Big Bend (landing area)



Resolution of other outstanding issues

My March 2010 progress report identified several outstanding issues about the sampling protocol that remained to be resolved. Consultation, discussions, and thought since that time have led to resolution of two of those issues.

1. Sampling of seedlings and saplings. I was weighing the national FIA vs. CAKN's method for dealing with sampling and seedlings, and have decided to simply follow CAKN's protocol. The reasons are desire for consistency between networks and the advantages of CAKN's larger and more representative plots. FIA measures saplings on a single 13.5 m^2 microplot while CAKN measures them over the whole plot. Sampling over the whole plot can be a burden, but this will only rarely be an issue in ARCN, and I decided that the disadvantages of a single microplot that can land on an odd spot are too great. CAKN measures seedlings in four 4 m^2 quadrats vs. FIA's single microplot. I originally favored FIA because I wasn't setting up the quadrats for other purposes as CAKN does. Now I've decided that setting up the quadrats is not a problem (they are actually easier to define than FIA's circular microplot) and having 4 of them is more representative of the plot as a whole.

2. Network-wide composition sampling. In the previous progress report I noted the weakness of the node system for detecting network-wide changes in vegetation composition. Our abilities here will always be limited by logistical issues and expense. As a reasonable solution we have chosen to include the existing system of lichen inventory & monitoring plots in the protocol and expand the lichen plot system to include Gates of the Arctic National Park and Preserve (Swanson and Neitlich, 2011).

References

Swanson, D. 2010. Vegetation and Soils Monitoring Protocol Testing, Arctic Inventory and Monitoring Network, Progress Report, March 2010. http://science.nature.nps.gov/im/units/arcn/index.cfm?rq=12&vsid=24

Swanson, D. K. and P. Neitlich. 2011. Terrestrial vegetation monitoring protocol for the Arctic Alaska Network: Establishment, sampling, and analysis of permanent monitoring plots. Natural Resource Report NPS/XXXX/NRR—20XX/XXX. National Park Service, Fort Collins, Colorado. http://www1.nrintra.nps.gov/im/monitor/VitalSignsDB/BrowseProtocol.aspx)