Western Alaska LCC

Interim Performance Report*

1. PROJECT INFORMATION

Title	Feasibility of Automated Mapping for Arctic Coastal Plain Surface Landforms
Award number	*???*
Report period	*January 1 to March 31, 2015*
Project End Date	*June 30, 2015*
Report submission date	*April 8, 2015*
Author(s) of Report	Mark J. Lara

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2. PROJECT OVERVIEW

a. **Briefly (4-5 sentences) describe both the research purpose and the underlying need for this research.**
Microtopographic land features, such as polygonal terrain, exert considerable control on ecosystem structure and function in some landscapes, such as the Arctic Coastal Plain of northern Alaska. Accurate representation of small-scale land features is essential for improving present and future representation of biotic and abiotic landscape-level change. This change is simulated in process-based models for projecting change in above/below ground carbon and nutrients, land cover change, and wildlife distributions. The spatial distribution of microtopographic land features, however, is relatively unknown. This work is focused on mapping these important small scale land features across the Arctic Coastal Plain.

b. **List the objective(s) of the project, exactly as described in your Statement of Work.**
- Inventory available bird data

*Guidelines for Final Reporting are available at https://westernalaskalcc.org and http://arcticlcc.org

- Evaluate and select study sites
- Compile Remote Sensing Data Products
- Decide on the target classification scheme

3. PROGRESS SUMMARY

a. **Describe report period progress.**

- Inventory available bird data
  We have been in contact with Richard Lanctot and Sarah Saalfeld from the U.S. Fish and Wildlife Service and Manomet Center for Conservation Sciences, respectively, to discuss current data availability for conducting analysis on the Arctic Coastal Plain. Discussions are ongoing and we will continue to compile these datasets as mapping progresses.
- Evaluate and select study sites
  We plan on comparing our final mapped product for verification relative to other small scale mapping initiatives in various regions of the Alaskan Arctic Coastal Plain. We will compare our product with four existing maps, (1) Jorgenson et al. (2003) Fish Creek, (2) Raynolds et al. (2014) Prudhoe Bay oil field, (3) Lara et al. (2015) Barrow Peninsula, and (4) Komarkova and Webber (1980) Atqasuk. These maps represent a wide range of latitudinal and longitudinal gradients on the Coastal Plain. However, we are still inquiring about other mapped products such as Jorgensen et al. (1996), for the Colville River Delta.
- Compile Remote Sensing Data Products
  LandSat-8 OLI imagery was acquired from the USGS, which is our primary data product used in this mapping initiative. We contacted Peter Hickman from GINA on 21 Jan., and he is currently working on the request of compiling all available Spot 5 imagery for the Arctic Coastal Plain (GINA). In addition, we acquired digital surface models for all of the western and central coastal plain, but processing of the eastern coastal plain is ongoing.
- Decide on the target classification scheme
  A target classification scheme was decided upon, which currently includes ten classes: (1) Sand dunes, (2) Drained slope, (3) High-center, (4) Flat-center, (5) Low-center, (6) Coalescent low-center, (7) Meadow, (8) Pond, (9) River, (10) Lake.

b. **Describe preliminary results.**

After compiling datasets, we are beginning to develop rule sets to map land cover classes (fig 1). Though we have made progress, considerable work needs to be done to fine tune these rule sets spanning different regions on the Arctic Coastal Plain (fig. 2), due to different soil drainage conditions. Future work consists of refining rule sets, determining similarity relative to other map products, and validating maps using ground based data collected by other projects and within the literature.

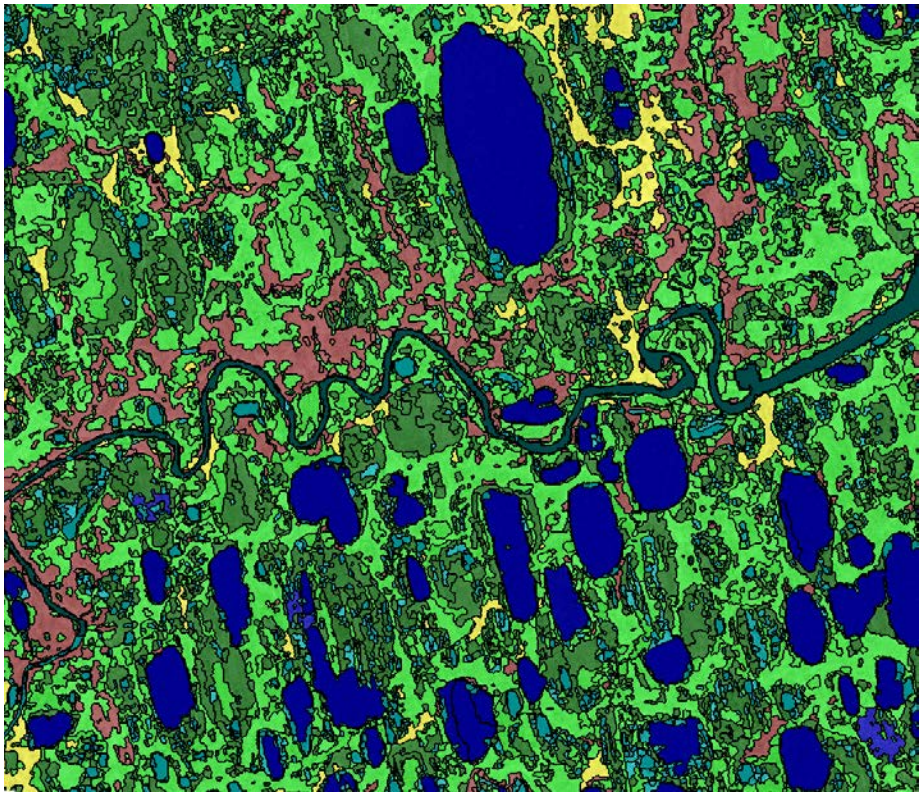

Figure 1: Preliminary mapping progress differentiating land cover in a sub region of the Arctic Coastal Plain. Colors represent lakes (dark blue), river (navy blue), ponds (light blue), low center (light green), coalescent low center and meadows (dark green), flat and high center (yellow), and drained slope (dark orange).

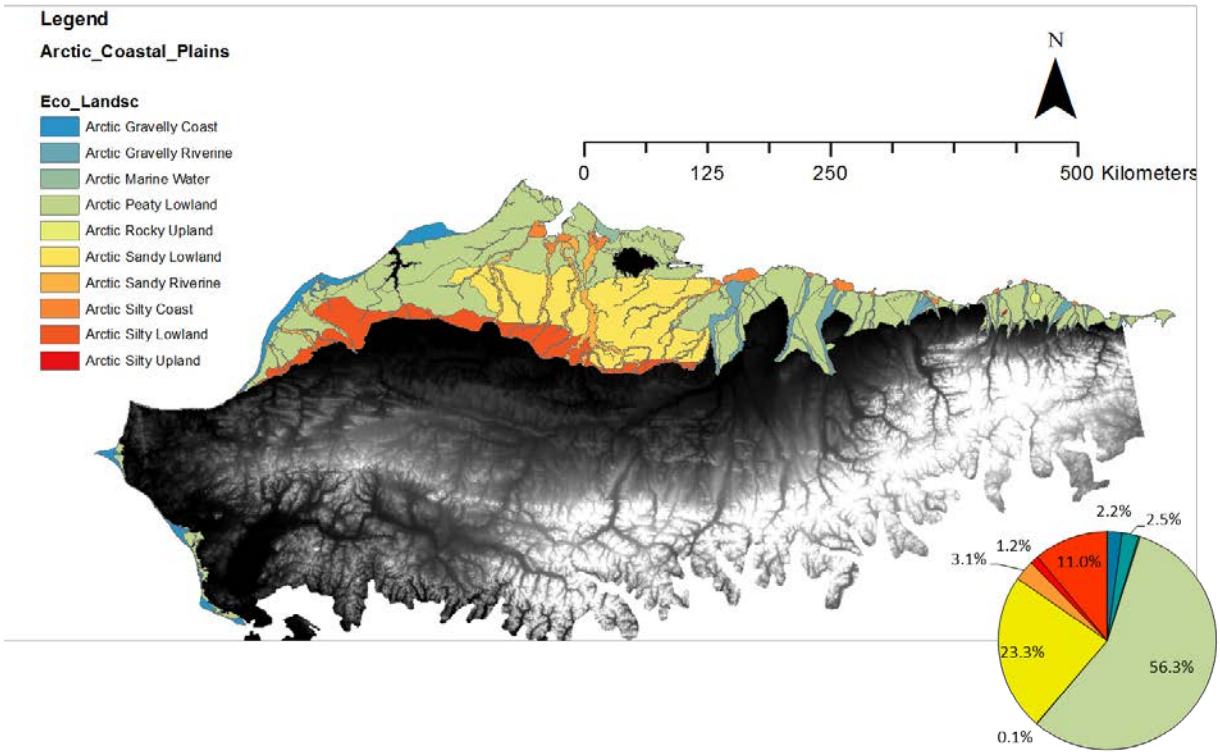

Figure 2: Arctic Coastal Plain, disaggregated by ecosystem type (Jorgenson et al. 2011). Pie chart represents area of land cover by ecotype.

c. Publications, conference papers, and presentations.
Nothing to report

d. Education and outreach.
Nothing to report

e. Other products resulting from the project.
Nothing to report

f. Data management.
All code defined in the rule sets will be published on GitHub under a permissive open source license.

g. Describe any concerns you may have about your project's progress.
The only concern that will arise is the time frame in which this work is scheduled to be completed. Mapping of 10 discrete small-scale land cover types which range from 10 to 100 meters in length over an area of ~70,000 km2are likely to bring new challenges. However, to date, no problems major problems have arose that were not foreseen.

h. Request for LCC assistance.

Nothing to report

4. PROGRESS STATUS

a. **Overall progress**

Good progress has been made thus far. Datasets have been gathered and processing of imagery has begun. Preliminary classification progress has been made, demonstrating that automated classification on this arctic landscape is possible, but the limitations of this approach across scales remain uncertain. We will push to have products completed by the suggested timeline, which do seem feasible at present.

Prior to the next reporting period, a minimum two rule sets for land cover characterization will be finalized for "Arctic Peaty Lowland" and "Arctic Sandy Lowland" (fig. 2) which represents ~80% of the Arctic Coastal Plains. Dependent on our classification success with these two dominant regions, we will continue on completing a seamless land cover map of this region. In addition, an accuracy assessment will be completed on all mapping products.

b. Detailed progress made towards completion of tasks and deliverables.

Task/Deliverable	Progress (% completed)
Inventory available bird data	50%
Evaluate and select study sites	85%
Compile Remote Sensing Data Products	85%
Decide on the target classification scheme	90%

c. How can the LCC highlight the value of this project?

This project is in its infancy, yet showing promise. I am certain that by the next performance report, we will have many interesting highlights to share. We plan to present our progress and preliminary products in an webinar presentation in early September.

The LCC is working to promote and expand collaboration in the region. To be effective in our outreach and communication efforts, we need photographs and other graphics related to the projects we fund. Please send us graphics related to this project. Photographs of landscapes, species of interest, people working, etc. are welcomed, as are other graphics.

- Photo credit will be given, if provided.
- Photographs will be used for online and print outreach materials. Please ensure that recognizable individuals in photographs have given permission for their photograph to be used in these materials, or provide contact information so we may request permission.

Please do not include these images in the body of the report. Rather, send them via email.

___ Yes, I'm attaching images.

_x_ No, I'm not attaching images.