Arctic LCC Progress Report

1. PROJECT INFORMATION

Title:	Long-term monitoring of the impacts of climate change on the glaciers and rivers in the Arctic National Wildlife Refuge
Report period	15 December 2011 -- 15 June 2012
Report submission date	12 July 2012
Author of Report	Dr. Matt Nolan

Principal Investigator(s), Co-Principal Investigators and Recipient Organization(s):
Include name(s), affiliation(s), and email contact information

2. PROJECT OVERVIEW

Briefly (4-5 sentences) describe both the research purpose and the underlying need for this research.

We are investigating glacier-climate interactions within the Arctic National Wildlife Refuge, including the impacts of glacier change on the downstream aquatic and terrestrial ecosystems, using McCall Glacier as the primary research glacier and the Hulahula River as the primary research watershed. McCall Glacier has been under intensive study since 1957 primarily by academic researchers, and we hope that this project will facilitate USFWS and the ALCC in their management and scientific goals in this region.

List the objective(s) of the project, exactly as described in your Statement of Work.

- Installation of a temporary weather station and mass balance stake on Esetuk Glacier and delivery of any data recorded there.

- Measurements of glacier ice thickness for the purpose of estimating the total volume of glacier ice draining into the Jago, Okpilak, and Hulahula Rivers. These measurements will be made at about 6 glaciers of varying size, including McCall and Esetuk Glaciers.

- Acquisition of vertical photo mosaics of the Hulahula and Jago Rivers at about 20 cm ground sample distance. The imagery will be made available at full resolution, subsampled to web resolution, in a KML file with flight track, and as a seamless mosaic available to the public over the internet.

- LIDAR-derived DEMs of the Hulahula, Jago, and Okpilak river channels will be made available for gradient mapping.

3. PROGRESS SUMMARY

Describe report period progress.

Weather station. I accessed the weather station on Esetuk Glacier by ski plane in May 2012 and found it still operational. I downloaded the data and replaced the batteries, and performed minor maintenance on it. I measured snow depth and density near the single mass balance pole, that I placed near the weather station when I installed the weather station.

Ice thickness. I modified my ice radar system to make it more rugged and useful and tested it successfully in May 2012 on McCall Glacier. I tested a different antenna that could be mounted to an airplane and it worked successfully. I had hoped to do some airborne measurements this year but have cancelled that in favor of hiking to a number of glaciers surrounding McCall Glacier in August 2012.

Aerial Photography. I took vertical airphotos of the Jago and Hulahula Rivers on 9-10 June 2012, capturing a lot of the aufeis there. I plan to process these to measure aufeis volumes later this year, as well as create orthophotos of these images.

Lidar. I received the final delivery of these data in April 2012. I created glacier outlines from 2008-2011 for more than 400 glaciers in this area. This fall I plan to measure volume change using these data.

Describe preliminary results.

The weather station data look good. The vertical photography looks good. I have not used any of these data scientifically yet.

Publications, conference papers, and presentations.

Nothing to report.

Education and outreach.

I created a blog of our photography missions which can be found on my website.

Other products resulting from the project.

Nothing to Report.

Describe any concerns you may have about your project's progress.

Nothing to Report

4.PROGRESS STATUS

I think the project is progressing well and is on track to accomplish its objectives.

In the next six months, my primary objectives are to measure ice thickness of a number of glaciers surrounding McCall Glacier to improve our ability to extrapolate to determine overall ice volumes in this region. I plan to create orthomosaics and DEMs from my aerial photography of the river channels. I plan to finish QA/QC of the lidar from 2008 and compare these data with our photogrammetric DEMs. I hope to acquire more aerial photography of the Jago and Hulahula Rivers in September or October, just after freeze-up but before snow fall, to capture the formation of aufeis and spring locations.