7 August 2013

Anne Orlando, Ph. D.
Selawik NWR
PO Box 270
Kotzebue, AK 99752

Dear Dr. Orlando,

This is to acknowledge receipt of your report *Direct snow condition monitoring at key ecological sites in remote western Alaska* on 17 May 2013 in fulfillment of the requirement for a 'Summary Report of the iButton Analyses' as part of the Western Alaska LCC-funded project WA2011_07.

The LCC's main goal in funding this project was to provide instrumentation for the proposed monitoring effort to address a topic of regional concern and to support the associated outreach efforts. Our interest in requiring a summary report on the analyses, while a secondary goal, reflected our interest to learn both
(i) the lessons and recommendations emerging from this effort that could inform other efforts in the region and across the state,
and, given the limited space available in the proposal,
(ii) the details of the analyses by which the data (collected at fine temporal and spatial resolution but only at a few sites) would be used in conjunction with remote sensed data to develop ice layer detection algorithms and, in turn, potentially linked to caribou movement patterns during the limited duration of the project.

From an organizational perspective, it is important that the FWS projects the LCC funds showcase the caliber and quality of the Service's scientific efforts. Such projects are approved by our diverse Steering Committee because they address a recognized, shared need. In these early years of the LCC, these projects are also helping establish the caliber and quality of the LCC's efforts and helping establish and enhance communication, cooperation, and collaboration among partners and stakeholders. The report does not meet these expectations for a project where are main goal was a science product resolving a priority uncertainty. We recognize that for this project the LCC mainly funded instrumentation and outreach, not analyses. That said, in the interest of advancing the overall quality of science conducted by the Fish & Wildlife Service, we offer the following brief comments to clarify LCC expectations of report timeliness and quality.

The analysis report was due 1 Jan 2013 and received 17 May 2013. While I accept some responsibility for this unacceptable delay, please be aware that LCC-funded projects led by FWS staff, while not requiring the formal stipulations of financial agreements established with non-federal entities, are still expected to meet those stipulations with regards to timeliness, prior

approval for no-cost extensions, etc. As of this past year, new FBMS regulations will automatically stop payment on any agreement (with an outside entity) for which products fail to meet agreed upon deadlines. Our project management standards have been updated to reflect this and, for consistency, similar standards will be applied to LCC agreements for Service-lead projects.

The report & analyses do not meet expected standards for organization, clarity, and conciseness. My fundamental concern is the focus of the analyses on detecting 'statistically significant differences' in time and space rather than undertaking the 'heavy lifting' of really working out, for each of the motivating objectives[1],

> (i) the most appropriate response summary (including aspects of temporal scale, spatial scale, and summary characteristic – e.g., mean, median, max, threshold exceedance, etc.), and
>
> (ii) relevant *magnitude of differences*, in time and space, for assessing the observed patterns.

These *Analysis Objectives,* informed by and derived from the underlying *Information Objectives*, then guide development of the most appropriate *analyses* (and *sampling design)*[2]*.* In this case, most of those analyses should probably focus on summary estimates, with appropriate measures of uncertainty, and graphical presentations of temporal and spatial results, not rather arbitrary hypothesis tests.

Monitoring efforts live and die by the quality of their objectives. It is a very worthy goal to design a snow monitoring network to help inform the various objectives identified in the project proposal and report. However, to produce an effective (let alone efficient) monitoring plan requires working through a potentially long process to clearly identify the snow events or characteristics of interest (including their temporal and spatial scale), their pathways for impacting the caribou population(s), and how those impacts might best be quantified (including each measure's temporal and spatial scale). All of these measurement choices will be strongly driven by the resource management questions and decisions motivating the interest in this topic in the first place: different decisions will require different choices of measurement scale (space, time) and different levels of estimate precision. Thus it all starts with the objectives.

Unfortunately, this planning process was not reflected in the report. Completing such a planning process would provide a much clearer organizational structure for presenting the analyses and results, greatly aiding the reader. Decision analysis methods, such as Structured Decision Making, can help guide one through such potentially complex development phases.

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[1] - ground truthing detection of icing events from remote sensing imagery
- informing revised sampling design for long-term monitoring of snow courses and snow depth markers
- informing partner-developed models of caribou movement

[2] See, for example, the discussion in Reynolds, J. 2012. An overview of statistical considerations in long-term monitoring. In Gitzen et al. (eds), *Design and Analysis of long-term ecological monitoring studies*, Cambridge University Press, Pgs 23-53.

The receipt of this report and documentation of submission of the resulting data to the NRCS snow condition database for long-term archiving fulfill all of the expected products to complete all the funding requirements and close this project.

If you further revise this report, we'd appreciate receiving a courtesy copy. Please be sure to submit a copy of all final reports from this project to both ARLIS (http://www.arlis.org/), via Steve Johnson (steven_johnson@fws.gov), and the National Technical Information Service (for submission directions, see http://www.ntis.gov/services/documents.aspx).

Sincerely,

Joel H. Reynolds, Ph.D.
Western Alaska LCC
Science Coordinator
joel_reynolds@fws.gov
907-786-3914
westernalaskalcc.org

CC: Lee Anne Ayres