Arctic Landscape Conservation Cooperative

Advancing Science, Understanding Change.

Projects Funded in 2012

The Big Picture

In 2012, the Arctic LCC funded wholly, or in part, 16 projects and study planning efforts. Nearly half of the projects are continuations from our 2010 - 2011 funding efforts, while the rest of the projects, and all of the study planning efforts, are new starts. All of these initiatives will further our understanding of Arctic ecosystems and processes as they face rapid changes due to a warming climate.

The Arctic LCC's project dollars were matched by over $2.5 M in partner contributions - nearly a two to one match!

In 2012, the Arctic Landscape Conservation Cooperative (Arctic LCC) provided over $1 Million to fund projects addressing climate change and landscape level threats in the Arctic.

The Steering Committee directed over $300K towards ongoing projects where the goals of the ALCC would benefit from their continuation. The committee also took under advisement the recommendations made by the six established Arctic LCC Technical Working Groups and directed $255K towards 4 Working Group initiatives. Steering Committee members also funded projects that they introduced, or that were responsive to the Arctic LCC RFP. Funding of new starts in 2012 totaled over $600K.

Our 2012 projects can be categorized as follows:

- Immediate land management issues (1 project)
- Geophysical processes (3 projects)
- Biological studies and assessments (3 projects)
- Geospatial data acquisition and synthesis (3 projects)
- Landscape level monitoring and modeling (2 projects)
- Interdisciplinary study plan development (4 teams)

Exposed ice lens. Photo by USFWS.

To learn more about these and other Arctic LCC projects visit: **www.arcticlcc.org**
or contact Greg Balogh, Coordinator at greg_balogh@fws.gov or Philip Martin at philip_martin@fws.gov.

Immediate Land Management Issues

ShoreZone: Aerial Video Imaging of the Coast from Pt. Hope to Wales

Project description: ShoreZone is a coastal habitat mapping system that has been widely applied within Alaska. To date, approximately two thirds of Alaska shoreline has been mapped. The mapping system records georeferenced geomorphological and biological information about the coastal zone; all coastal imagery (video and photos) and data are available on the ShoreZone website. These data provide an important baseline dataset to inter-tidal and nearshore resources and landforms with applications for resource mapping, oil spill contingency planning, and oil spill response. LCC funds will support image acquisition of the coast, from Pt. Hope to Wales, a shoreline length of approximately 3,000 km.

Project Lead: National Oceanic and Atmospheric Administration
Partners: National Park Service

Geophysical Processes

Fish Creek Hydrology

Project description: The objective of this project is help maintain established monitoring sites where physical, chemical, and biological data are collected from streams and lakes in the Fish Creek watershed. Data collected at this site are valuable for detecting and monitoring environmental shifts related to both climate change and land-use impacts from oil and gas activities. Fish Creek is also candidate site for the proposed Hydoclimate Network.

Beaded stream. Photo by USFWS.

Project Leads: University of Alaska Fairbanks, Water and Environmental Research Center; Bureau of Land Management

Partners: Bureau of Land Management; National Fish & Wildlife Foundation

Hydrologic Monitoring of the Hulahula River

Project description: The Arctic LCC partnership with USGS also for continued operation of a stream gage on the Hulahula River. These data are critical in our efforts to developing a better understanding of climate/glacier interactions. Data are available online (http://waterdata.usgs.gov/usa/nwis/uv?15980000) and will be integrated into the Arctic LCC Hydroclimatological database.

Hulahula River valley, Arctic National Wildlife Refuge. Photo by USFWS.

Project Lead: U.S. Geological Survey

Partners: U.S. Geological Survey; U.S. Fish and Wildlife Service.

Streamflow monitoring on the upper Kuparuk and Putuligayuk Rivers

Project description: Hydrologic data for the Alaska Arctic are sparse, and fewer still are long-term (> 10 year) datasets. This lack of baseline information hinders our ability to assess long-term alterations in streamflow due to changing climate. The Arctic LCC is providing stop-gap funding to support continued collection of long time series hydrological data sets in the Kuparuk and Putuligayuk watersheds.

Project Lead: Water and Environmental Research Center, University of Alaska, Fairbanks

Partners: Alaska Department of Transportation and Public Facilities; National Science Foundation; Department of Energy; and Alaska Department of Natural Resources

West Headwaters Kuparuk metrological station. Photo by Rob Gieck.
http://ine.uaf.edu/werc/projects/NorthSlope/upper_kuparuk/w_headwater/images/WH-tower-rob.jpg

Biological Studies and Assessments

Linking North Slope Climate, Hydrology, and Fish Migration

Project description: Loss of stream connectivity poses a problem for migrating fish that must be able to move between breeding and summer feeding areas to scarce overwintering sites. A team of researchers are involved in an interdisciplinary, multi-year study to describe the conditions under which stream drying occurs, and the projected impacts such drying events on seasonal migrations of Arctic grayling in the Kuparuk River.

Project Lead: Water and Environmental Research Center, University of Alaska, Fairbanks; U.S. Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office

Partners: Woods Hole Marine Biological Laboratory; National Science Foundation's Arctic Long Term Ecological Research Program

Shorebird Demographics and Climate Change

Project description: The Shorebird Demographic Network is an international collaboration designed to evaluate how climate mediated changes in the arctic ecosystem (from Nome to Hudson Bay) are affecting shorebird distribution, ecology, and demography. The main purpose of the network is to monitor demographic parameters (e.g. nest success, adult survival) of widely distributed shorebirds, so that we may develop conservation strategies that tackle the most pressing problems facing these declining species. The Arctic LCC contribution supports monitoring components that track key environmental attributes (e.g. water and prey availability) that are expected to link climate with changing shorebird populations.

Sandpipers feeding along the Beaufort Sea shoreline. Photo by USFWS.

Project Lead: Manomet Center for Conservation Sciences

Partners: Cornell University; Environment Canada; Kansas State University; Simon Fraser University; Trent University; University of Quebec; U.S. Fish and Wildlife Service; and Wildlife Conservation Society

Evaluating the "Bottom-up" Effects of changing habitats: Climate Change, Vegetative Phenology, and the Nutrient Dynamics of Ungulate Forages

Project description: The growing season in arctic Alaska is short, but this is the critical time of year when mammals must regain body resources lost during pregnancy, lactation and the long winter. As climate warms, the growing season lengthens, but it is not clear how changes in the growing season might impact forage. The goal of this project is to assess how variation in length and timing of the growing season influences availability and quality of forages important to caribou and other large herbivores.

Caribou grazing with autumn foliage in background. Photo by USFWS.

Project Leads: National Park Service; USGS Alaska Science Center.

Partners: Bureau of Land Management

Geospatial Data Acquisition & Synthesis

Permafrost Map of Northern Alaska

Project description: Permafrost is ubiquitous within the Arctic LCC geography, and it has profound implications for nearly every facet of ecology and land management. Improved mapping has been identified as a science need by the North Slope Science Initiative, Alaska Climate Change Strategy, and the Alaska Climate Change Executive Roundtable. The permafrost map of Alaska was originally drawn in 1965 at a scale of 1:2,500,000 with minor updates in 2008 at a scale of 1:7,200,000. This project will result in a new map at 1:1,000,000 scale or better, and will incorporate information derived from satellite imagery, vegetation and land cover mapping, soil maps, permafrost modeling, site-specific research results, and boreholes made for engineering purposes. A separate component of the project will map permafrost for a single 1:250,000 quad to determine the cost of mapping at that level of resolution for other areas.

Project Lead: Institute of Northern Engineering, University of Alaska, Fairbanks

Snow Maps for Ecological Applications

Project description: Snow is a dominant land feature in arctic tundra. Snow conditions profoundly affect a wide range of hydrologic and ecosystem components and processes, including those related to ecology of flora and fauna, surface energy, moisture stores and nutrient fluxes. Snow datasets currently do not exist at the required spatial and temporal scales needed by scientists, land managers, and policy makers. The goal of this project is to produce spatially distributed, time evolving, snow datasets for Alaska's Arctic that can be used in a wide range of climate, hydrologic, and ecosystem applications. Output variables may include start and end of snow season, snow depth and density, occurrence of icing events, storm frequency, snowmelt runoff, and other parameters to be determined through discussion with user groups.

Arctic Fox in winter. Photo by USFWS.

Project Leads: Interworks Consulting

Partner: USGS, Alaska Climate Science Center

Geospatial Data for the Coastal Zone

The Arctic coastal zone is undergoing rapid change, but remains important to people and wildlife. Compiling spatial data sets for this important interface will facilitate modeling of future shoreline position, erosion rates, availability and character of coastal habitat, nearshore ice extent, water level, coastal tundra productivity, saline intrusion, and many other parameters. The Arctic LCC's Coastal and Geospatial Working Groups reviewed a suite of geospatial datasets and selected three as high-priority for FY 2012 funds.

ShoreZone Shore Stations:
The Arctic LCC will contribute to BOEM's efforts to validate ShoreZone coastal habitat mapping efforts across the Beaufort and Chukchi coast by adding three additional sites to the ShoreZone Shore Stations. The work to be conducted at each of the Shore Stations will include collection of site overview data (e.g., ground level photos that are referenced to a geographic location), characterization of the shape of the shore profile, sediment characterization, information on biota present along the shore profile transect, and collection of samples for hydrocarbon analysis.

LiDAR for River Deltas and Bays:
Over the last 3 years, high-resolution LiDAR elevation data has been acquired for much of the North Slope coast of Alaska in support of the USGS Coastal and Marine Geology Program's

National Assessment of Shoreline Change project. LiDAR data was not collected for large river deltas and bays, however. By partnering with the USGS National Geospatial Program, the LCC can make great strides toward filling in some of these data gaps, specifically over the low-lying deltas and estuaries that provide important habitat for migratory birds and other wildlife.

Historical Orthomosaics for the Coastal Zone:
One of the most comprehensive historical aerial imagery datasets available to the public was developed as part of the Alaska High Altitude Photography Program (AHAP) during 1978-1986. Recent studies examining coastline erosion have clearly demonstrated that the AHAP photos are a valuable baseline for detecting and quantifying change that occurred in Alaska in recent decades. By working with the Alaska Satellite Facility at the University of Alaska, Fairbanks the LCC will make high-quality AHAP orthomosaics of the Arctic Alaska coast available to the public via the Alaska Statewide Digital Mapping Initiative's (SDMI) website.

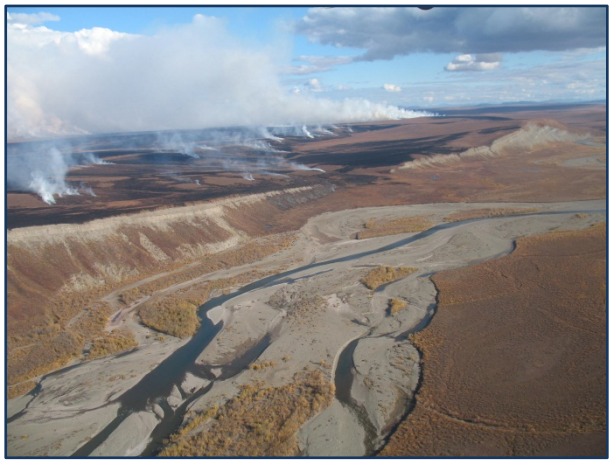
Landscape Level Monitoring & Modeling

Alaska Integrated Ecosystem Model

Project description: For this large and multi-year effort, a multi-disciplinary team of modelers will develop a modeling framework that integrates the driving components of vegetation succession, disturbance, hydrology, and permafrost dynamics for the state of Alaska. The AIEM will improve our understanding of ecosystem change in response to changing climate. It is also expected to inform the structure, design, and location of monitoring activities across agencies and across Alaska's landscape.

Project Leads: USGS Alaska Cooperative Fish and Wildlife Research Unit; University of Alaska, Fairbanks

Partners: USGS Alaska Climate Science Center; Western Alaska Landscape Conservation Cooperative.



Tundra fire on the North Slope of Alaska. Photo by Ben Jones, USGS.

Thermokarst Monitoring at the Landscape Scale

Project description: Thermokarst-related surface disturbance alters hydrology, carbon and nutrient flux, vegetation, and stream sediment-loading. Lake expansion, lake drainage, and development of drainage networks due to thawing ice wedges are examples of thermokarst processes that may be accelerating as climate warms. It is understood that these processes affect availability and quality of fish and wildlife habitat, but the rate and extent of thermokarst-driven surface change at the landscape scale is poorly quantified. This project will review the types of thermokarst events typical of northern Alaska, as well as current and past efforts to assess thermokarst processes at broad scales. In addition, the report will compare scale, costs, and strengths, and weaknesses of different monitoring approaches.

Exposed ice lens, Arctic NWR. Photo by USFWS.

Project Lead: USGS Alaska Science Center

Interdisciplinary Study Plan Development

The ALCC believes that answering questions regarding potential effects of climate change on habitats and species will require integration of information and skills from multiple disciplines, including physical and biological sciences, ecosystem and spatial modelers, remote sensing specialists, and information managers. Recognizing the challenges of accomplishing successful integrative projects, the ALCC solicited proposals from teams to develop study plans to address one or more of the topics identified by the ALCC Species and Habitat Technical Working Groups. In 2012 four proposals were selected for study plan development.

Biological Response to Water Temperature

Description: A team of interdisciplinary researchers will gather to develop a detailed study plan to investigate how stream and lake temperature and water chemistry will respond to warmer air temperatures, and develop predictive models of the effects of warmer temperatures on primary and secondary productivity, fish growth and energetic demands, and contaminant dynamics within the Barrow/Atqasuk watershed.

Leads: USGS Alaska Science Center; University of Waterloo

Climate Change Effects on Wetlands and Waterbirds

Description: An interdisciplinary team will develop a detailed study plan to evaluate whether and how climate change may alter the availability of key freshwater bird habitats around Barrow, Alaska, where collaborators have on-going studies investigating surface hydrology, snow cover, and habitat use of nesting shorebirds.

Leads: U.S. Fish and Wildlife Service; University of Alaska, Fairbanks; University of Missouri.

An Integrated Approach to Arctic Aquatic Habitat Change

Description: An interdisciplinary team will develop an integrated study plan linking 1) aquatic habitat connectivity, 2) stream and lake water quality and temperature, 3) availability of freshwater habitat, and 4) trophic mismatches and productivity. Studies to understand these linkages in a context relevant to policy and management will primarily focus on the Fish Creek watershed, where resource development is active.

Leads: University of Alaska, Fairbanks; Bureau of Land Management; USGS Alaska Science Center; USGS Alaska Cooperative Fish and Wildlife Research Unit

Marine Food Web Response to Runoff

Description: An interdisciplinary team will develop an integrated study plan to determine the potential effects that increased concentrations of nutrients derived from thawing permafrost may have on the productivity and structure of the Arctic marine food web.

Leads: Virginia Institute of Marine Sciences, College of William & Mary; Skidaway Institute of Oceanography; University of Alaska, Fairbanks

To learn more about these projects and other Arctic LCC projects visit: **www.arcticlcc.org**
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