In 2011, the Arctic Landscape Conservation Cooperative (Arctic LCC) was pleased to fund 21 of the 37 proposals we received, in amounts ranging from $24,000 to $174,000. We were fortunate enough to direct over $1.4 Million to projects addressing climate change and landscape level threats in the Arctic. University programs received just over 40% of available funding, while federal agencies received just under 40%. Non-governmental organizations, mostly non-profits, received the remaining 20% of Arctic LCC funds.

Our 2011 projects can generally be categorized as addressing: 1) immediate land management issues; 2) geophysical processes; 3) biological studies and assessments; 4) human dimensions; 5) geospatial data acquisition and synthesis; and 6) landscape level monitoring and modeling.

Projects were selected by the Arctic LCC Steering Committee following discussion of how each project addressed the conservation goals of the Arctic LCC. Consideration was given to the feasibility of the project and the ability of the LCC to sufficiently fund the project.

Of the 21 funded projects, two address land management issues, six address some aspect of arctic geophysical processes, five are wildlife ecology studies, two address affects of climate change on humans and climate change-related observations made by residents living in Alaska’s arctic, four are contributing to our geospatial knowledge of the landscape, and two are addressing landscape-level monitoring and modeling efforts.

Evidence that LCC borders are, indeed, porous is evident when one considers that 6 of the 21 funded Arctic LCC projects go well beyond the arctic in their scope.

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

Polar Bear Den Habitat Model

**Project description:** This model will ultimately integrate snow physics, high-resolution digital terrain models, and bear biology to produce more refined and accurate maps predicting suitable polar bear den habitat than are currently available. The work will consist of data gathering, consultation between snow and bear scientists, modeling, and sensitivity studies to determine the impact of changing atmospheric conditions on den location and evolution along the Beaufort Coast. It will provide better information to industry and regulatory agencies regarding the likely locations of polar bear dens.

**Project Lead:** Interworks Consulting

**Partners co-funding this work:** National Science Foundation

Fostering Collaboration Across North America’s Arctic

**Project description:** The Nature Conservancy will draw upon its existing Canadian network to coordinate with potential Canadian partners on behalf of the Arctic LCC. TNC will address the Arctic LCC’s need to identify specific overlapping goals, objectives and geographic interest between the Arctic LCC and those potential partners. TNC will provide information about the Arctic LCC to potential Canadian partners; initiate contact and help build relationships with those potential partners; they will summarize current and planned climate-related work and other areas of overlapping interest with the Arctic LCC, and identify the top six to eight most appropriate potential Canadian partners with which the Arctic LCC should engage.

**Project Lead:** The Nature Conservancy

**Partners co-funding this work:** Ducks Unlimited, Canada, and Provincial Government for the Northwestern Territories.
Geophysical Processes

Barrier Island-Lagoon Systems

**Project description:** This effort will investigate the dominant and relative importance of physical processes shaping the modern Arctic coastline as well as decadal responses due to projected conditions out to the year 2100. This study will determine dominant forces responsible for projected changes to the arctic coastal landscape, and to assess the likelihood of Arctic barrier island-lagoon system habitat inundation by seawater in response to changing ocean conditions related to global warming.

**Project Lead:** U.S. Geological Survey

**Partners co-funding this work:** U.S. Geological Survey

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Precipitation Trends in Alaska

**Project description:** This retrospective analysis of precipitation records will determine whether detected inconsistency in station-based precipitation data are associated with changes in station location or the manner in which it is operated, or are related to historical climate variability. It will evaluate actual trends in precipitation using two analytical methods over both short and long analytical periods.

**Project Lead:** The Wilderness Society

**Partners co-funding this work:** The Wilderness Society

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Jago and Niguanak river deltas with barrier islands in the foreground. Photo by Matt Nolan.

West Headwaters Kuparuk metrological station. Photo by Rob Gieck.
Geophysical Processes (continued)

Fish Creek Hydrology

**Project description:** LCC funding for this project will help maintain a network of hydrology monitoring sites in a representative watershed of the Arctic Coastal Plain. The work is being conducted within the context of climate change and impending oil and gas activities in the region, the latter of which is the impetus for focusing on the Fish Creek watershed.

**Project Lead:** Bureau of Land Management

**Partners co-funding this work:** Bureau of Land Management and National Fish and Wildlife Foundation

Glacier Dynamics and Estuarine Chemistry

**Project description:** This effort will further our understanding of the impacts of climate change on the most massive element of the landscape that is likely to change – glaciers – and how loss of these glaciers will impact downstream ecosystems over the next 50 years.

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

**Partners co-funding this work:** National Science Foundation

Terminus of McCall Glacier, Arctic National Wildlife Refuge. Photo by Matt Nolan.
Hydrometeorological Data Rescue

**Project description:** This multi-year data rescue effort will inventory data sets and finalize the geolocated inventory of available climate, hydrology, and aquatic ecology data for Alaska and North Western Canada. In addition, this project will continue to populate the existing hydroclimatological geodatabase with high priority datasets including high-priority datasets held by the Bureau of Land Management. This geodatabase will be made available to the general public through the project website.

**Project Lead:** University of Alaska Fairbanks, International Arctic Research Center

**Partners co-funding this work:** Bureau of Land Management

Kuparuk Hydrology

**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:** University of Alaska, Fairbanks, Water and Environmental Research Center

**Partners co-funding this work:** Alaska Department of Transportation and Public Facilities, National Science Foundation, Department of Energy, and Alaska Department of Natural Resources

**Biological Studies and Assessments**

Modeling Aquatic Insects

**Project description:** This study will enable us to better predict climate-related changes in the timing and duration of insect prey availability for arctic-breeding shorebirds. Using Arctic Shorebird Demographic Network data, these investigators will develop mathematical models that relate the timing and duration of insect emergence and activity to accumulated temperature, weather, and other environmental variables. Resulting models will predict future changes in the timing of arctic insect availability based on climate change projections.

**Project Lead:** University of Alaska, Anchorage, Alaska Natural Heritage Program

**Partners co-funding this work:** Arctic Shorebird Demographic Network
Biological Studies and Assessments (continued)

Post-breeding Shorebird Habitat Use

**Project description:** In addition to quantifying invertebrate resources, this study will assess whether the resources available to shorebirds are sufficient to prepare the birds for their fall migration. This study will also survey the shorelines and consist of taking core samples for laboratory analysis for chemical analysis, population structure, numbers of individuals, and diversity of populations from the interstitial spaces within the littoral zone of coastlines along the Beaufort Sea.

**Project Lead:** University of Alaska, Fairbanks, Alaska Cooperative Fish and Wildlife Research Unit

**Partners co-funding this work:** Bureau of Ocean Energy Management Regulation and Enforcement

![Sandpipers feeding along the Beaufort Sea shoreline. Photo by USFWS.]

Vulnerability Analysis for 55 Bird Species

**Project description:** The Wildlife Conservation Society will assess the climate change vulnerability of bird species that regularly breed in substantial populations in Alaska using the NatureServe Climate Change Vulnerability Index (CCVI) tool. Initial work will focus on 55 Arctic bird species; 18 shorebird, 21 waterfowl and waterbird species (loons, gulls, terns, jaegers), and 16 land bird species (passerines, raptors, ptarmigan).

**Project Lead:** Wildlife Conservation Society

**Partners co-funding this work:** Kresge Foundation

![Dunlin in breeding plumage. Photo by USFWS.]

Biological Studies and Assessments (continued)

Modeling Avifaunal Responses

**Project description:** Using a bioclimatic envelope approach, University of Alberta investigators will project how the distribution and abundance of boreal forest birds across North America will respond to different scenarios of future climate change. Investigation emphasis will be on mapping and quantifying potential range expansions of boreal bird species into Arctic and subarctic regions across Alaska and Canada. The final products will result in a broad continental-scale overview of potential shifts in avian distribution.

**Project Lead:** University of Alberta

**Partners co-funding this work:** U.S. Fish and Wildlife Service, Environment Canada, and University of Alberta

Seasonality of Invertebrates

**Project description:** Investigators on this project will improve our understanding of how climate drives availability of prey for tundra-nesting birds reliant upon aquatic invertebrates in Alaska’s Arctic. They seek to understand how water temperature in ponds on Alaska’s Arctic Coastal Plain regulates the seasonal timing of aquatic insect emergence — a crucial event for a majority of tundra-nesting bird species — and the availability of invertebrate biomass for benthic-feeding birds such as eiders and other waterfowl.

**Project Lead:** North Dakota State University

**Partners co-funding this work:** National Science Foundation
## Human Dimensions

### Rural Alaska Monitoring Program

**Project description:** Project PIs will examine risk that climate change poses to food safety of subsistence users in Alaska, relative to both food storage in ice cellars and exposure to zoonotic diseases. They will also provide information on the risk of zoonotic diseases to the health of the subsistence harvested species.

**Project Lead:** Alaska Native Tribal Health Consortium

**Partners co-funding this work:** Alaska Native Tribal Health Consortium, Indian Health Service, Center for Disease Control

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### BIOMap Alaska

**Project description:** Investigators from the University of Alaska, Fairbanks and Alaska Sea Life Center will test a web-based citizen-science initiative to collect information on marine species of concern, those undergoing range changes, invasive species and local ecological knowledge of the marine ecosystems along the Alaska region of the Chukchi and Bering seas. Community members in Kotzebue, Barrow and Kaktovik will engage in a test to evaluate a reporting system that enables uploading of observations into a central system.

**Project Co-Leads:** Alaska Sea Life Center and the University of Alaska, Fairbanks, International Arctic Research Center
Geospatial Data Acquisition & Synthesis

Ecological Mapping & Field Plot Database

Project description: The Geographic Information Network for Alaska will complete uniform and consistent ecological mapping of the North Slope region and provide a summary of existing field site ecological descriptions (including photos) in a web based environment. Existing automated field information and photos that have reliable geolocation information will be compiled and entered in a web based geographic display based on the ecological mapping.

Project Lead: University of Alaska Geographic Information Network for Alaska

LiDAR Data Processing

Project description: US Geological Survey staff will expediently process LiDAR data acquired in Summer 2010 along the North Slope of Alaska between Colville River and Staines River. As part of this task, the LiDAR data will be quality-checked for relative and absolute accuracy (where ground data are available). The data will be processed and filtered to a representation of bare-earth topography. Data will be tiled in a 2km by 2km grid to allow easy access in GIS software, and will be made available in standard ASPRS LAS point-cloud format and gridded GeoTIFF format.

Project Lead: U.S. Geological Survey

North Slope Land Cover

Project description: LCC funding will allow completion of this ongoing BLM initiative to develop a North Slope-wide cover type map and create a crosswalk that integrates all component cover type maps that comprise the larger overall North Slope cover type map.

Project Lead: Bureau of Land Management

Geospatial Data Acquisition & Synthesis (continued)

Secure Data Services

Project description: This initiative intends to facilitate research within the North Slope science community through improved data sharing and collaboration. This will be achieved through the development and implementation of secure data services (SDS) protocols within the North Slope Science Catalog.

Project Lead: University of Alaska, Fairbanks, Geographic Information Network for Alaska

Partners co-funding this work: University of Alaska, Fairbanks Geographic Information Network for Alaska

Landscape Level Monitoring & Modeling

Integrated Ecosystem Model

Project description: For this large and multi-year effort, a multi-disciplinary team of university-based modelers will develop a modeling framework that integrates the driving components of vegetation succession, disturbance, hydrology, and permafrost dynamics for the state of Alaska. This framework will couple models of disturbance and vegetation succession (ALFRESCO), biogeochemistry (TEM), and permafrost (GIPL).

Project Lead: University of Alaska, Fairbanks, Scenarios Network for Alaska Planning

Partners co-funding this work: Western Alaska Landscape Conservation Cooperative and U.S. Geological Survey, Alaska Climate Science Center

Schematic illustrating how the IEM modeling framework will couple the ALFRESCO, TEM and GIPL models.
Landscape Level Monitoring & Modeling (continued)

Anaktuvuk River Fire Monitoring

**Project description:** In this study, BLM staff will continue to assess the recovery of tundra vegetation and changes in soil properties following the largest, highest-severity wildfire recorded on Alaska’s North Slope since records began in 1956, with an emphasis on impacts to caribou forage.

**Project Lead:** Bureau of Land Management

**Partners co-funding this work:** Bureau of Land Management

To learn more about these projects and other Arctic LCC projects visit: [www.arcticlcc.org](http://www.arcticlcc.org)  
or contact Greg Balogh, Coordinator at greg_balogh@fws.gov  
or Philip Martin, Science Coordinator at philip_martin@fws.gov