



# 2013 Annual Report

**Arctic Landscape Conservation Cooperative**  
Advancing Science, Understanding Change.



LANDSCAPE CONSERVATION  
COOPERATIVES

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## Our Mission

The mission of the Arctic LCC is to identify and provide information needed to conserve natural and cultural resources in the face of landscape scale stressors, focusing on climate change, through a multidisciplinary program that supports coordinated action among management agencies, conservation organizations, communities, and other stakeholders.

## Our 2013 Accomplishments

In many ways, the Arctic LCC hit its stride in 2013. Our science plan is firmly in place. Our strategic action plan shows how we will pursue our science plan for the next three years. We have evolved beyond being an operation that simply provides funding for disparate arctic-focused study proposals. Instead, we are implementing well-thought-out interdisciplinary study plans addressing broad-in-scope arctic climate issues. We are crafting and implementing a long term Terrestrial Environmental Monitoring Network ([TEON](#)) that has been in demand in the Arctic for years. We are encouraging or enforcing data standards and practices on studies that we fund. We are posting new information products and tools to the web every month; information and tools that we expect will be of use to arctic land and resource managers. Our internal assessments suggest we are headed largely in the direction our partners would have us go, while adhering to our [mission](#) and [goals](#). Guidance from our Steering Committee has allowed us to further refine our mission and goals to something more like a niche that we occupy in an organizational landscape crowded with Arctic initiatives. Our niche can best be described as follows:

We seek to generate and synthesize information on how climate change will affect ecosystems and ecosystem services in an effort to meet the expressed needs of resource managers and local communities. Our focus is on climate affects upon

terrestrial, freshwater and near-shore marine habitats, and the species that depend upon these habitats. Based on the best information available, we will create and apply tools useful to managers, regulators and stakeholders as they contemplate the Arctic of the future. Our policy is to make this information openly accessible to the public.

## Strategic Action Plan

We recently finalized our [strategic action plan](#) for 2014-2016. This document goes beyond laying out our three year work plan, however. It also assesses the LCC's progress in addressing its original 20 conservation objectives, communicates our priority resources, links each item in our work plan to the priority resources that it addresses, and provides an up-to-date listing of all ongoing and completed Arctic LCC projects. Finally, the strategic action plan lists the top 30 anticipated future needs resulting from the Arctic LCC Future Needs Assessment, and provides a list of Arctic LCC projects that are responsive to these anticipated future needs. The distribution of projects spread among the anticipated future needs suggests that our approach of providing information, tools, and services is headed in the right direction, with only limited course correction needed, a course correction that we addressed in our strategic action plan by committing to the focus of additional effort to Arctic Cultural Resources affected by climate change.

## Implementation of [Strategic Science Plan](#)

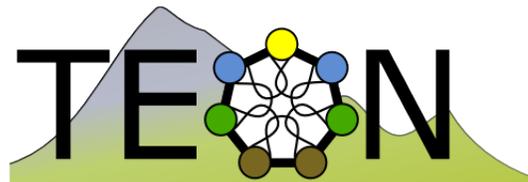
The Arctic LCC's primary niche in addressing Arctic climate science pertains to the potential effects of climate change on conservation of natural resources, including habitats, species, and biological communities. Our science plan emphasizes providing resource managers and other stakeholders with reliable forecasts of future natural resource conditions through an adaptive cycle of **monitoring, modeling, and collaborative interdisciplinary research**.

### *Science Plan Monitoring- Implementing a Terrestrial Environmental Observation Network (TEON) for Change Detection:*

We expect Arctic terrestrial and freshwater systems to change greatly in response to a rapidly warming climate. Exactly how the landscape will change, and at what rate, is difficult to predict. Most terrestrial ecosystem observational data for northern Alaska have been obtained to support short-term research objectives and/or have been limited to a few local study sites. This reduces our confidence that our observations are representative of long-term trends or of the region as a whole. In addition, the data sets that exist are often difficult to access. TEON remedies these problems by providing spatially distributed and consistent, long-term data sets paired with a data management structure that promotes accessibility. TEON will collect, distribute, and synthesize the foundational data needed to detect and forecast effects of a changing climate, hydrology, and permafrost regime on wildlife, habitat, and infrastructure in northern Alaska.

We released a public-review draft TEON [Implementation Plan](#) in February 2013 and have convened a diverse Technical Advisory group to help us address comments and to

work out many details not covered in the draft plan. We continue to receive input on TEON design, most recently via a poster-based solicitation for comments at the Alaska Marine Science Symposium, courtesy of Arctic LCC Steering Committee representatives Cathy Coon (BOEM) and Amy Holman (NOAA). With the assistance of data specialists from the USGS Alaska Science Center, and subject-matter experts, we are developing TEON's data model and data management plan. Work on protocols, data management planning, and partner agreements will proceed in 2014. We expect to implement field measurements in 2015.



### *Science Plan Modeling- Development of an Integrated Ecosystem Model (IEM) for Alaska and Northwest Canada:*

Resource managers are asked to consider the effects of climate change as part of the planning process and in environmental impact analyses. Yet, there are few tools available with which to forecast potential future landscapes. Creating such tools is especially challenging because landscapes, especially those in the Arctic, may change substantially in composition and form through time. IEM is designed to meet resource managers' need to understand the nature and rate of landscape change. It is capable of generating maps and other products that show how arctic and boreal landscapes may be altered by climate-driven changes to vegetation, disturbance regimes (e.g., wildland fire), water balance, and permafrost. The IEM development team is comprised of four model development sub-groups: model coupling, tundra fire and treeline

dynamics, thermokarst and wetland dynamics, and data. In 2013, the IEM sub-groups all made notable progress as follows:

*Model Coupling Sub-group:* A major goal for the IEM is to simulate the interactions and feedbacks of ecosystem processes by “coupling” submodels that focus on separate ecosystem components, allowing them to pass data back and forth at each time step. The team continued to improve the model coupler to increase flexibility and processing efficiency.

*Tundra Fire and Treeline Dynamics Sub-Group:* This sub-group completed development and incorporation of tundra fire & treeline dynamics into the fire submodel “ALFRESCO,” which

previously addressed fire only in the boreal forest zone. The effort included calibration using regional fire parameterization, and an initial set of production runs for Alaska for six AR4 climate scenarios. Calibration and testing of the ecosystem process model DOS-TEM continued, including development of a dynamic vegetation model component which forecasts vegetation community transitions.

*Thermokarst/Wetland Sub-Group:* Along with fire, thermokarst is the major disturbance process in the permafrost environment. The IEM team is breaking previously frozen ground by developing a landscape-scale model to represent thermokarst processes. This submodel is in the conceptual phase, and

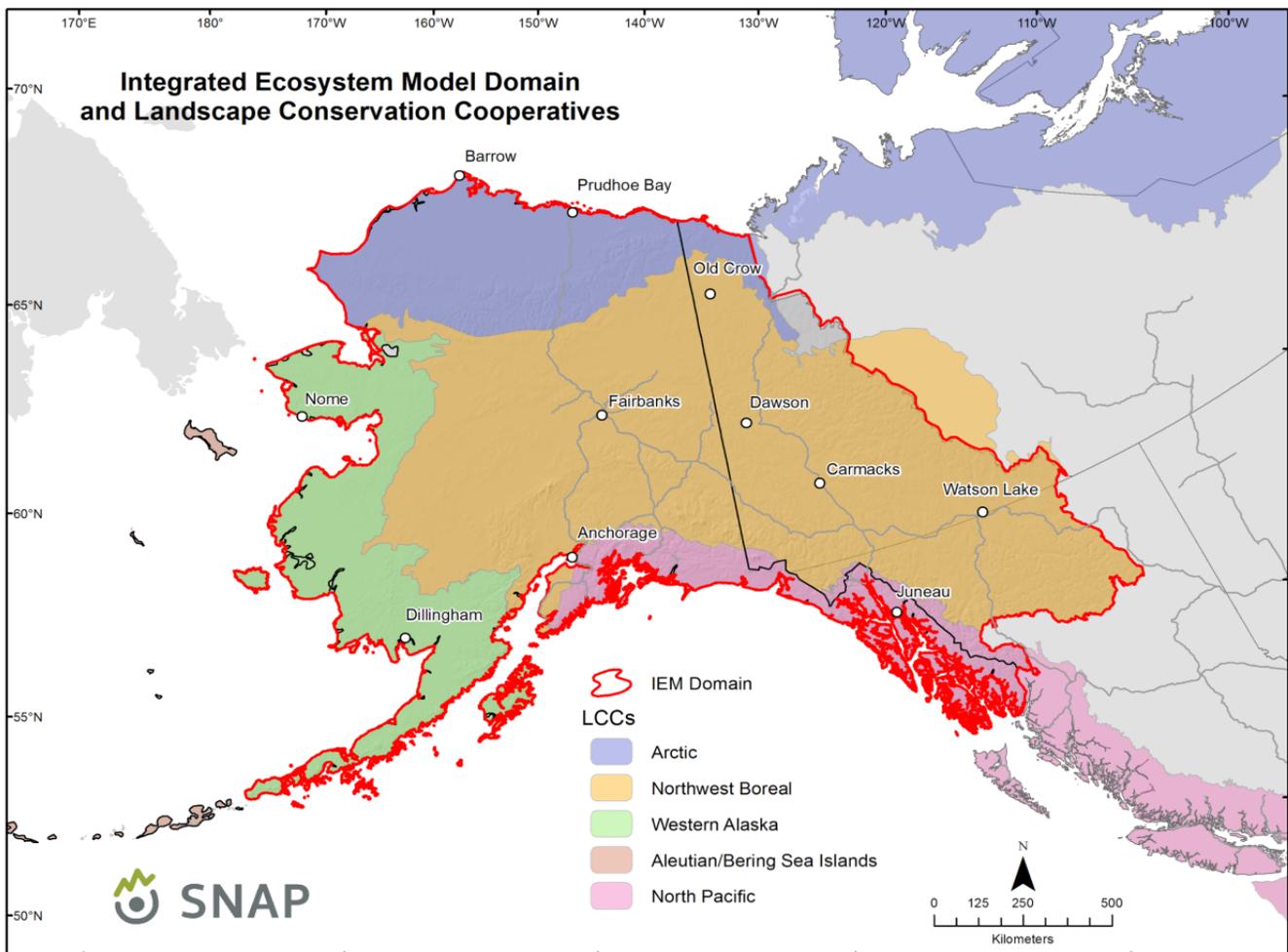


Figure 1: Spatial Domain of the IEM. Image by SNAP.

progress includes a Thermokarst Predisposition Model for application to the IEM Region; logic for landscape transitions in the Alaska Thermokarst Model for tundra and boreal landscapes predisposed to thermokarst; and logic for landscape transitions involving thermokarst lakes in both tundra and boreal areas of the IEM region.

*Data Sub-Group:* The IEM data management plan was completed and accepted by the AKCSC; extensive soil dataset cross comparisons, and collaboration with soil experts, helped them produce a new dataset. All driving data for year 2014 model runs are complete and served on the SNAP website for collaborator use and review.

IEM project materials are online at <https://csc.alaska.edu/projects/integrated-ecosystem-model>. In addition, an [IEM Fact sheet and supplement](#) was produced, distributed, and posted to arcticlcc.org; a list of IEM-related presentations and posters at AGU has been compiled, and the [IEM project was featured on AK CSC homepage](#), in the distributed 2012 IEM Annual Report, and via SNAP and ACCAP's social media platforms.

Arctic LCC staff remains active in all aspects of project coordination, and have taken an active role in the development of the model's thermokarst component.

Anticipated progress in 2014 includes:

- Proof of concept studies for Alaska Thermokarst Model over the Barrow Peninsula and the Tanana Flats driven by AR4 climate scenarios
- Further development of the IEM with wetland dynamics
- Assessment of IEM with tundra and treeline dynamics over the IEM domain driving by

AR4 climate scenarios (three sets of production runs for the IEM region)

- Preparation of all data sets required to drive fully coupled IEM with AR5 climate scenarios
- Complete development of fully coupled IEM with new tundra and treeline dynamics

Project Leads: Alaska Cooperative Fish and Wildlife Research Unit, University of Alaska Fairbanks, Scenarios Network for Alaska and Arctic Planning

Our Partners: Alaska Climate Science Center, Western Alaska LCC, Northwest Boreal LCC.  
<http://arcticlcc.org/projects/ALCC2010-05/>

### ***Science Plan Investigations- Interdisciplinary Research***

In 2011, the Arctic LCC convened a "Species and Habitat Working Group" tasked with identifying the biophysical process shifts associated with climate change considered most influential to broad species assemblages. The working group identified the mechanisms by which fish and wildlife would be affected by each projected habitat change and identified: 1) which species or species assemblages were thought to be most sensitive, and 2) the primary influences on access to subsistence resources for residents of northern Alaska villages. The conclusions reached by this group may be considered our working hypotheses regarding: 1) the pathways by which species and habitats may be exposed to the effects of climate change; and 2) how climate change may affect the resources and access to those resources important to local residents. These effects are primary components of vulnerability of fish, wildlife, and cultural resources to climate change.

In response to the findings of this report, the Steering Committee determined it would be most prudent to issue an RFP in 2012 for



development of broad-in-scope interdisciplinary study plans to test the underlying assumptions and hypotheses identified by the working group. We selected four topics for full study plan development:

### **1. Aquatic and Wetland Habitat and Biological Responses to Climate Variability and Change**

The initial proposal for planning this study focused on the Fish Creek Watershed (FCW) targeting four related landscape-level themes: (1) aquatic habitat connectivity, (2) stream and lake temperature, (3) availability of freshwater habitat, and (4) trophic mismatches. During the PI's interdisciplinary planning workshop, surface-water availability, connectivity, and temperature clearly emerged as the natural linkage among these topics, operating as a coupled system that physically mediated habitat and trophic dynamics of Arctic freshwater ecosystems. These interrelated processes form a shifting mosaic of freshwater habitats across the landscape that can be classified, mapped, understood, and modeled in response to past and future climate and land-use change in a spatial and temporal context. Developing scenarios of freshwater habitat change in this context provides managers and scientists with a flexible template to evaluate a range of potential responses to climate and land-use change. Applying this approach in the FCW is made feasible because of the availability of pre-existing geospatial and monitoring datasets and is immediately relevant to management because of ongoing and planned subsistence and industrial activities. When implemented, this project will engage a diverse interdisciplinary team of scientists that includes climatologists, hydrologists, geographers, ecologists, and fish and wildlife biologists with both basic and applied science experience in the Arctic.

<http://arcticlcc.org/projects/ALCC2012-08/> and [FishCAFE](#)

### **2. Biological Responses to Increasing Water Temperatures in Lakes of the Barrow/Atkasuk Focus Watershed**

Climate change is expected to result in increasing air temperatures across Arctic Alaska, but it is not clear how aquatic ecosystems will respond to these changes. This project examines how change in air temperature alters freshwater temperature regimes and, in turn, affects fish growth, food web structure, and bioaccumulation of mercury. The investigators will develop a predictive model that simulates lake water temperature and ice thickness based on present and future atmospheric and landscape factors. A better understanding of how warming is influencing the ecology of Arctic lakes will help resource managers understand the vulnerability these habitats to climate change, and the degree to which fish, wildlife, and human populations may be at increased risk of exposure to environmental contaminants. The project engages a diverse interdisciplinary team including fish biologists, wildlife biologists, hydrologists, and environmental contaminants experts.

<http://arcticlcc.org/projects/ALCC2012-06/>

### **3. Interdisciplinary Study of How Climate Change May Affect Wetland Habitats and the Associated Waterbirds**

During the brief Arctic summer, tundra wetlands teem with aquatic insects and crustaceans that provide abundant food for migratory water birds. Changes in temperature and precipitation would almost certainly alter shallow wetlands in ways that impact the availability of invertebrate prey during the breeding season. This study will focus on evaluating how climate-mediated changes in wetland habitat affect invertebrate communities and whether those changes could



affect the reproductive success of shorebirds. Results of this study will ultimately allow managers to make strategic decisions that incorporate climate change effects in conservation plans for birds. Understanding how changes in climate cascade down to the organismal level will require a novel combination of field measurements, laboratory analysis, and modeling. The project engages a diverse interdisciplinary team including ornithologists, zoologists, hydrologists, geophysicists, and modelers.

<http://arcticlcc.org/projects/ALCC2012-07/>

#### **4. How Will Marine Food Webs in the Coastal Arctic Respond to Increased Runoff Associated With Permafrost Melt?**

Increased temperatures in the western Arctic have caused thawing of permafrost, increased river discharge and increased coastal erosion. Permafrost meltwater is expected to dramatically affect coastal productivity by altering the delivery of nutrients and carbon to the coastal ocean, largely in the form of tea-colored compounds known as humics. This project will evaluate the response of nearshore marine organisms, such as estuarine plankton and larval fish, to increasing concentrations of humics. Results of this work will provide resource managers with information about how climate change may impact marine food webs, fish populations and seabirds. The project engages a diverse interdisciplinary team of scientists that includes biogeochemists, microbiologists, plankton ecologists, and fish biologists.

<http://arcticlcc.org/projects/ALCC2012-09/>

#### **Study Plan Implementation**

The first two interdisciplinary projects above were approved for full funding by the Arctic LCC, and will begin field work in 2014 (pending availability of funds). The latter two were approved for partial funding and we are

currently working with the PIs to secure partner funding that will make implementation possible. The common thread among all four interdisciplinary studies reflects the importance we and others have placed on understanding more about the effect of climate change on arctic hydrologic systems and aquatic habitat, as well as the effects that aquatic freshwater habitat dynamics have on other Arctic systems.

### **Joint Projects with Immediate Conservation and Management Benefits**

#### ***Effects of Changing Habitats on Ungulate Forages:***

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 phenology of the growing season influences availability and quality of forages important to caribou and other large herbivores, with a focus on the geographic area used by the Western Arctic caribou herd. The first year of data collection (2013) resulted in collection of air and shallow soil temperature data (May - Sept) at 20 locations across the North Slope of Alaska; over 1500 permafrost active layer thaw depth measurements and 225 soil samples; and over 1600 samples for forage quality (energy content, protein, and minerals). It also highlighted the need for increased security around instrumentation to safeguard against curious ursids.

*Project Leads:* USGS Alaska Science Center, National Park Service, University of Alaska Fairbanks.



*Our Partners:* BLM, Red Dog Mine (Teck, Inc.)  
<http://arcticlcc.org/projects/ALCC2012-12/>

### ***Development of the Imiq Data Portal***

The Arctic LCC commissioned the creation of Imiq ([ALCC2010-04](#)), a database of historical hydrologic and meteorological data from across the North Slope of Alaska. Now that these data have been assembled, the next step for the LCC is to make Imiq available to a wide audience. This project has two phases. During the first phase, Imiq will be translated from a proprietary database system into PostgreSQL - an open-source (i.e., software is available free of charge) and powerful database system. The open-source version of Imiq will be made accessible through a simple web and map interface that provides users the simple tools necessary to query, and download Imiq data. During the second phase, enhanced web interfaces will be developed to facilitate access to and analysis of Imiq data.

*Project Leads:* University of Alaska Fairbanks, Geographic Information Network for Alaska.

*Our Partners:* North Slope Science Initiative, University of Alaska Fairbanks, International Arctic Research Center  
<http://arcticlcc.org/projects/ALCC2013-08/>

### ***ShoreZone***

More than 20 partners are helping to make millions of photos, video, and digital data, all geo-referenced, available to the public through the internet. The Alaska ShoreZone Project received the 2009 Coastal America Spirit Award from the Dept. of the Interior.

Our initial contribution to the [Alaska ShoreZone Project](#) was limited to collaborative data acquisition along Western Alaska's coast, in partnership with the Western Alaska LCC, National Park Service and the National Oceanic and Atmospheric Administration (NOAA). In

2013, our involvement became more diverse, with the Arctic LCC collaborating on 4 distinct initiatives under the Alaska ShoreZone Project umbrella.

- **ShoreZone to the Web:** In collaboration with the NOAA, the Bureau of Ocean Energy Management, and the Bureau of Safety and Environmental Enforcement, we will soon realize our goal of getting archived aerial photos, aerial video, and ground-data for the intertidal zone of Alaska's North Slope georeferenced and posted to the ShoreZone website. This intertidal resource inventory serves as an excellent stand-alone tool for oil spill emergency response. In addition, it serves as a baseline data layer for qualitative intertidal resource change detection studies, facilitates community planning for climate change impacts, and allows users to take virtual flights along any stretch of coast that they choose. Posted imagery and video is currently being beta-tested and should be open-access in February, 2014.
- **Arctic Coastal Impressions:** Attendees of the January, 2014, [Alaska Marine Science Symposium](#) will likely have visited the Photo Gallery Exhibit "[Coastal Impressions, A Photographic Journey along Alaska's Arctic Coast](#)". This collection of striking ShoreZone Photos shows the range of coastal habitats in the region, the processes that shape Alaska's North Coast, and the resources that exist between the high and low tide lines. The Arctic LCC was one of many partners who worked together to bring this striking exhibit to Alaska's most important annual scientific conference. Also available at the exhibit is a publication that reproduces all of the gallery images, with associated narrative explaining coastal processes, regional intertidal biology and geology, and climate-



driven forces affecting Alaska's coast and its coastal communities.

- **ShoreZone Sense of Place:** The pilot effort for this project "[Sense of Place: Iñupiat Coastal Knowledge](#)" took place in 2012 in Point Lay and Kaktovik, Alaska. The Kaktovik [Film workshop](#) gave students there the opportunity to make their own movies about traditional knowledge of the coast. Elders were interviewed by students to share their observations of change, their knowledge, and their stories of their surroundings. Seven films were produced by these students and shown to the communities. One student film about coastal erosion ([Weather or Not, by Tracy and Brittany Burns](#)) was subsequently selected to compete in the [2012 Anchorage International Film Festival](#)'s Snowdance category.

The Arctic LCC seeks to continue this successful community outreach effort in other Arctic villages by working with ShoreZone staff and the non-profit organization Media Action, in creating an Iñupiaq Learning Framework for the North Slope Borough School District and making the ShoreZone aerial imagery of the North Slope available to teachers and students.

- **St. Lawrence Island ShoreZone Mapping:** St. Lawrence Island, the largest U.S. island in the Bering Sea, is located within the Aleutian and Bering Sea Islands LCC geographic domain. ShoreZone survey staff [began their efforts](#) to collect high-resolution video and photo imagery of the entire 700-mile shoreline of St. Lawrence Island, including lagoon shores, in July 2013. Geologists and biologists then used the imagery to create maps of shoreline types, stability and biota; maps that are subsequently used by communities and

government agencies for emergency response and all manner of planning. As with all ShoreZone efforts, collected imagery and video will be web-posted and available for free download. In addition, DVDs or hard drives with the information will be provided to the local communities where internet access speed is an issue. A special coastal hazards map will also be created for St. Lawrence Island to show areas of high coastal erosion and areas sensitive to storm surges and sea level inundation. Special photos will also be collected to assist with oil spill contingency planning.

Although this island is located entirely outside of the Arctic LCC, our Steering Committee recognizes that St. Lawrence Island is ecologically part of Alaska's Arctic. In addition, it could be affected by industrial activities taking place within the Arctic LCC. With that in mind, the Steering Committee decided to participate in a cross-LCC project with the Aleutian and Bering Sea Islands LCC, working together to facilitate the mapping of shoreline types, coastal stability and biota for the island.

*Project Leads:* Coastal and Ocean Resources, National Oceanic and Atmospheric Administration

*Our Partners:* Aleutian and Bering Sea Islands LCC, Western Alaska LCC, Alaska Department of Fish and Game, Alaska Department of Natural Resources, Archipelago Marine Research Ltd., Bureau of Ocean and Energy Management, Bureau of Safety and Environmental Enforcement, Cook Inlet Regional Citizens Advisory Council, Geographic Information Network of Alaska, National Park Service, Prince William Sound Regional Citizens Advisory Council, US Forest Service, US Fish and Wildlife Service.



## Data Management

Improving data management and integration is one of the Arctic LCC's four conservation goals. The LCC has focused efforts on facilitating data management and sharing both within and outside the LCC network.

The Arctic LCC is focused on providing both direct access to data products generated with Arctic LCC funds and integration of that data with data produced by other entities. The Arctic LCC is committed to making all data products available to the public through [arcticlcc.org](http://arcticlcc.org). The Arctic LCC is an active participant in the Alaska Data Integration Working Group (ADIwg, <http://www.adiwg.org>). Arctic LCC staff made significant contributions to the on-going development of the ADIwg project and data metadata standards. These standards will facilitate discovery of projects and data and have attracted interest and support from international partners. To support this effort, Arctic LCC staff, in partnership with USGS, initiated development of an open source metadata translator (mdTranslator, <http://www.adiwg.org/mdTranslator>).

Within the National LCC Network, the Arctic LCC participates in data management-related national working groups and projects. During 2013, the Arctic LCC Data Manager served as chair of the LCC Network Data Management

Working Group (DMWG). Arctic LCC staff set up and maintained a web-based workspace for the group. Arctic LCC staff are active participants in the Integrated Data Management Network project (IDMN). The IDMN is funded by the National LCC Network and aims to provide tools that facilitate data integration and sharing among LCCs and with partners.

In the interest of increasing data discoverability, Arctic LCC staff developed a method that allows metadata hosted on [arcticlcc.org](http://arcticlcc.org) to be harvested by Data.gov (<http://catalog.data.gov/organization/alcc-fws-gov>). In addition, staff continues to ensure that all project metadata is kept current and is discoverable through the Geographic Information Network of Alaska (GINA, <http://www.gina.alaska.edu/>).



## Our 2013 Products:

### Spatial Products:

Managers and decision-makers often gravitate towards spatial data products because of the amount of information that is conveyed quickly and in an easy-to-digest format. As such, we seek to develop high quality spatial data products when that is the appropriate format. Our library of spatial data products continued to grow in 2013, with the addition of the products listed below.

#### Updated Ecological Subsection Map for Northern Alaska

Ecological land classifications maps are an important tool for resource agencies. A North Slope-wide ecological subsections map was made available in 2006. However the scale of the map could not support detailed analysis. The revisions resulted in 533 ecological subsections, nested within 55 ecosections and

14 ecoregions covering 413,089 km<sup>2</sup>. Attributes include information on physiography, generalized geology, lithology, soil landscapes, ecological landscapes, elevation, and climate. The updated map was integrated within a web-base map visualization tool with orthoimagery and approximately 14,400 field site photographs.

*Our Partners:* University of Alaska, Fairbanks, Geographic Information Network for Alaska <http://arcticlcc.org/projects/ALCC2011-06/>

#### Updated Climate Projection Maps and Rasters

One objective of the Arctic LCC is to make climate science readily available to all interested parties, not just those directly involved in resource management in Alaska. Climate data, such as temperature and precipitation are available from a variety of sources, but these data are not often in a format that is ready to use without at least some

processing by the user. Arctic LCC staff developed a collection of products that summarizes baseline and projected temperature (°F and °C) and precipitation (inch and mm). The animations and maps are focused on the northern portion of Alaska, while the raster data have a much larger spatial extent covering Alaska and

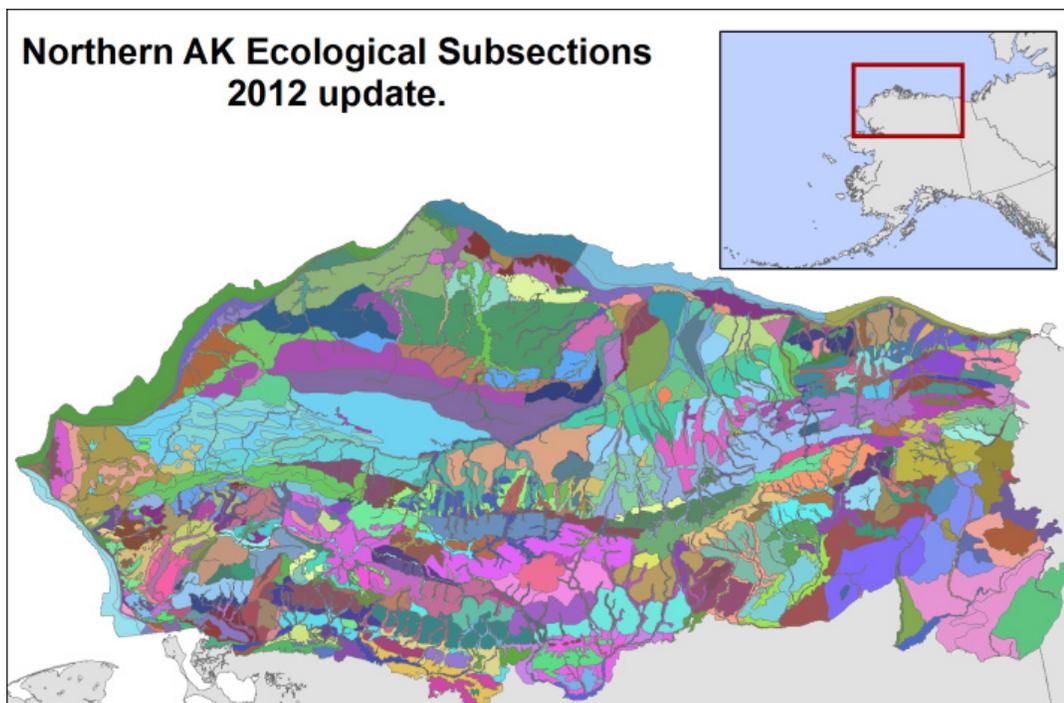


Figure 2: Spatial extent of the Updated Ecological Subsection Map for Northern Alaska. Image by Arctic LCC staff.

Western Canada (YT, BC, AB, SK, and MB). Baseline results for 1961-1990 are derived from Climate Research Unit (CRU) data; results for the other time periods are based on a composite of projections from five Intergovernmental Panel on Climate Change (IPCC) General Circulation Models under the A1B and A2 emissions scenarios.

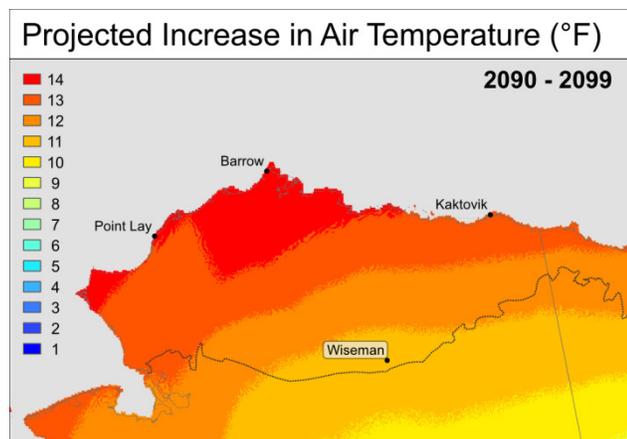


Figure 3: Map showing projected change in temperature from Baseline (1961-1990) to the end of the century (2090-2099). Map created by Arctic LCC staff using data provided by Scenarios Network for Alaska and Arctic Planning (SNAP).

*Our Partners:* Climate data are provided courtesy of Scenarios Network for Alaska and Arctic Planning (SNAP).

<http://arcticlcc.org/projects/ALCC2011-1002/>

### **Completion of a North Slope Landcover Map**

This important product is the culmination of years of effort on the part of many partners. It sets the standard for broad-geographic land cover maps in Arctic Alaska. The Arctic LCC was but one of many partners in the development of this North Slope-wide land cover map. The North Slope Landcover Map identifies 24 land cover classes and covers approximately 60 million acres (24.3 million hectares) stretching from the border of Canada to the western Arctic coast and from the Arctic Ocean south to the Brooks Range.

*Our Partners:* Alaska Natural Heritage Program, Bureau of Land Management, Ducks Unlimited, Inc., National LandFire Program, Natural Resource Conservation Service, North Slope Science Initiative, Spatial Solutions, Inc., University of Alaska, Fairbanks, US Fish and Wildlife Service.

<http://arcticlcc.org/projects/ALCC2011-15/>

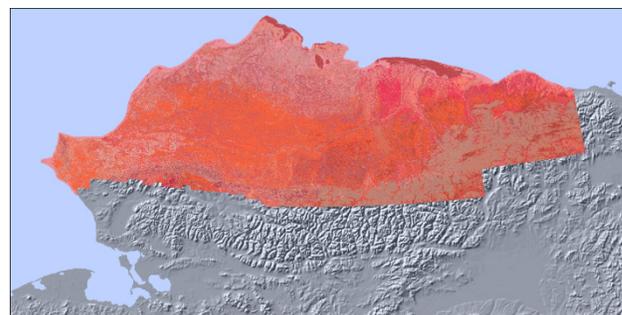


Figure 4: Spatial extent of the NSSI Landcover Map shown in shades of red. Image by Arctic LCC staff.

### **Web application; Ecological Landscapes and Field Site Web-based Tool**

This tool was created as part of the project updating the Ecological Subsection Map for Northern Alaska. Ecological mapping provides an important tool for ecosystem evaluation. Potential uses of this mapping could include stratification for scientific sampling, land cover mapping, integrated analysis such as modeling and also the development of land management zones. Field site photographs were compiled from North Slope land cover mapping efforts that were conducted during the period 1994-2011. Both the map and photos are made available in this [online web based tool](#). This web tool displays photo locations over orthoimagery as well as the interpreted ecological landscapes. Users can click on a photo location or ecological landscape unit and a popup window will provide the appropriate photos and descriptions.

*Our Partners:* University of Alaska Fairbanks, GINA.

<http://arcticlcc.org/projects/ALCC2011-06>

## ***Our Outreach and Coordination:***

It is impossible for one individual, or even a small team, to remain fully engaged in all of the many Arctic initiatives that exist. Indeed, as far as we know, no one has even developed a comprehensive list of arctic-centric organizations and initiatives; although our Steering Committee chairperson came closest with [this](#) Prezi presentation. We do our best to stay connected to as much of the Arctic community by participating in the following groups, processes, and initiatives.

- **ACCAP:** The Arctic LCC Coordinator serves on the Steering Committee for the [Alaska Center for Climate Assessment and Policy](#). This group informs realistic community plans and climate adaptation strategies using the most scientifically accurate, reliable, and up-to-date information. Stakeholder interaction and outreach is integrated into every aspect of their work, including climate modeling and addressing regional vulnerabilities. These interactions include needs assessment, vulnerability assessment, as well as user collaboration in downscaling models, designing research studies, and developing, testing, and evaluating research information products and tools. Their core activities integrate research and decision-support tool innovation.

- **AON:** The Arctic Observing Network program of NSF is reaching out to other agencies to implement coordinated monitoring of the change in the Arctic system. The Arctic LCC Science Coordinator participates through membership on the [SEARCH Observing Change Panel](#).
- **IACG:** The Arctic LCC Coordinator is a regular participant on Interior Arctic Coordination Group conference calls, in which agency representatives in Washington DC and throughout Alaska gather to keep each other apprised of ongoing Arctic activities and forthcoming initiatives. The Coordinator made a web-based presentation about the Arctic LCC to this group in July, 2013.
- **IARPC:** The [Interagency Arctic Research Policy Committee](#) is charged with developing five-year plans for Federally sponsored research in the Arctic region. For 2013 to 2017, the IARPC, which consists of representatives from 14 Federal agencies, departments, and offices, has identified seven research areas that will inform national policy and benefit significantly from close interagency coordination. The Arctic LCC Science Coordinator contributes to the Terrestrial Environment Implementation Team.



- **IEM:** The Arctic LCC Science Coordinator actively engages with the [Integrated Ecosystem Model](#) team to represent stakeholder needs. Consultation occurs at monthly team meetings and through informal communication. Contributions to the thermokarst group includes assessing options for creating a base map of surface landforms, a requirement to run the thermokarst model. The Arctic LCC Geospatial Specialist took the lead in producing outreach documents.
- **NASA ABoVE:** NASA's Terrestrial Ecology Program is in the process of planning a major field campaign, the Arctic Boreal Vulnerability Experiment ([ABoVE](#)), which will take place in Alaska and western Canada during the next 5 to 8 years. ABoVE will seek a better understanding of the vulnerability and resilience of ecosystems and society to this changing environment. The Arctic LCC Science Coordinator has taken a lead role in engaging with the project staff and Science Definition Team to communicate the science needs of LCCs and opportunities for collaboration.
- **National Academy of Science:** The Arctic LCC Science Coordinator was invited to represent US Fish and Wildlife Service on a panel at the [NAS workshop](#) on “Emerging Research Questions in the Arctic,” Anchorage, Alaska, May 7-8, 2013.
- **NFWF:** Both the Arctic LCC Coordinator and Science Coordinator worked closely with the National Fish and Wildlife Foundation in providing input in NFWF’s decision-making process for funding projects in Alaska, especially those associated with Arctic and Alaska-specific funds.
- **NSF:** Both the Arctic LCC Coordinator and Science Coordinator participate regularly in National Science Foundation calls and meetings, particularly on the topic of their Arctic Observing Funders initiative.
- **NSSI:** The Arctic LCC Science Coordinator serves on the [North Slope Science Initiative’s Science Technical Advisory Panel](#) and the Arctic LCC Coordinator participates on the Senior Staff Committee. NSSI facilitates collection and dissemination of ecosystem information pertaining to the Alaskan North Slope region, including coastal and offshore regions.
- **PACMARS:** The Arctic LCC Coordinator and two Steering Committee representatives serve on the Pacific Marine Arctic Regional Synthesis Advisory Board, providing guidance to the PIs in the preparation of their research synthesis that contributes to the understanding of the complex Pacific-influenced coastal shelf ecosystem of the Arctic Ocean.
- **Toolik Lake Environmental Data Center:** The Arctic LCC Science Coordinator serves on the advisory board for the Toolik Lake EDC, which conducts baseline monitoring and data services for Alaska’s flagship arctic research station.



## ***Our Recent Reports and Publications***

- Predicting Breeding Shorebird Distributions on the Arctic Coastal Plain of Alaska.  
<http://arcticlcc.org/projects/ALCC2010-02/>
- Integrated Ecosystem Model (IEM) for Alaska and Northwest Canada Factsheet, 2013.  
<http://arcticlcc.org/projects/ALCC2010-05/>
- Linking North Slope Climate, Hydrology, and Fish Migration Progress Report, 2013.  
<http://arcticlcc.org/projects/ALCC2010-06/>
- Using a Network of Sites to Evaluate How Climate-mediated Changes in the Arctic Ecosystem are Affecting Shorebird Distribution, Ecology and Demography; Progress Report.  
<http://arcticlcc.org/projects/ALCC2010-11/>
- Mapping Suitable Snow Habitat for Polar Bear Denning Final Report.  
<http://arcticlcc.org/projects/ALCC2011-01/>
- Reconciling Precipitation Trends in Alaska: 1. Station-based Analyses.  
<http://arcticlcc.org/projects/ALCC2011-03/>
- Fish Creek Watershed Hydrology Final Project Summary.  
<http://arcticlcc.org/projects/ALCC2011-05/>
- Landscape-Level Ecological Mapping of Northern Alaska and Field Site Photography, Final Report. <http://arcticlcc.org/projects/ALCC2011-06/>
- Snow Datasets for Arctic Terrestrial Applications (SnowDATA) Workshop Report.  
<http://arcticlcc.org/projects/ALCC2012-02/>
- Arctic Landscape Conservation Cooperative Future Needs Assessment: An Assessment and Ranking of Current and Future Science and Information Needs Identified by Land and Resource Managers Working in Alaska's Arctic Region.  
<http://arcticlcc.org/projects/ALCC2012-03/>
- Thermokarst and Thaw-Related Landscape Dynamics: An Annotated Bibliography with an Emphasis on Potential Effects on Habitat and Wildlife.  
<http://arcticlcc.org/projects/ALCC2012-15/>
- The Terrestrial Environmental Observation Network (TEON): Objectives and Implementation Plan. <http://arcticlcc.org/projects/teon/>



## Our Presentations, Papers, Posters and Products

Project	Project Title	Project Status	Product Name
<a href="#">ALCC2010-02</a>	Modeling Shorebird Distribution on the North Slope	Completed	Predicting breeding shorebird distributions on the Arctic Coastal Plain of Alaska Shorebird Habitat Suitability Indices Geodatabase
<a href="#">ALCC2010-03</a>	Expanding the North Slope Fish Distribution and Water Quality Geodatabase	Completed	Aquabase Geodatabase
<a href="#">ALCC2010-04</a>	Hydroclimatological Data Rescue, Data Inventory, Network Analysis, and Data Distribution	In Progress	HydroClimate Data Rescue Progress Report, 2013
<a href="#">ALCC2010-05</a>	Integrated Ecosystem Model (AIEM) for Alaska	In Progress	IEM Datasets Available from SNAP IEM-CSC Factsheet with Supplement May 2013 Integrated Ecosystem Model Reports Integrated Ecosystem Model Presentations
<a href="#">ALCC2010-06</a>	Linking North Slope Climate, Hydrology, and Fish Migration	In Progress	Climate, Hydrology, and Fish Migration Progress Report, 2013
<a href="#">ALCC2010-08</a>	Streamflow Monitoring on Upper Kuparuk and Putuligayuk Rivers	Completed	WERC - North Slope Hydrology Research Projects Data
<a href="#">ALCC2010-10</a>	Threatened Eider Geodatabase for Northern Alaska	Completed	Threatened Eider Geodatabase for Northern Alaska, 2012 Edition
<a href="#">ALCC2010-11</a>	ASDN: a Network of Sites to Evaluate How Climate-mediated Change in the Arctic Ecosystem are Affecting Shorebird Distribution, Ecology, and Demography	In Progress	Arctic Shorebird Demographic Network Progress Report, 2011
<a href="#">ALCC2010-14</a>	Yellow-billed Loon Geodatabase	Completed	Yellow-billed Loon Geodatabase, 2012
<a href="#">ALCC2011-01</a>	Mapping Suitable Snow Habitat for Polar Bear Denning Along the Beaufort Coast of Alaska	Completed	Mapping Suitable Snow Habitat for Polar Bear Denning Final Report

Arctic Landscape Conservation Cooperative: Advancing Science, Understanding Change

Project	Project Title	Project Status	Product Name
<a href="#">ALCC2011-03</a>	Reconciling precipitation trends in Alaska: Comparison of trends in gridded precipitation products and station records	In Progress	Reconciling Precipitation Trends in Alaska: 1. Station-based Analyses
<a href="#">ALCC2011-05</a>	Fish Creek Watershed Hydrology Monitoring	In Progress	Drainage Network Structure and Hydrologic Behavior of Three Lake-Rich Watersheds on the Arctic Coastal Plain, Alaska
			Fish Creek Watershed Hydrology Final Project Summary
<a href="#">ALCC2011-06</a>	Understanding Arctic Ecosystems: Ecological Mapping and Mapping Field Plot Database for the North Slope	Completed	Landscape-Level Ecological Mapping of Northern Alaska and Field Site Photography Report
			Ecological Landscapes and Field Site Web-based Tool
			Ecological Subsections for Northern Alaska 2012 update Spatial Data
<a href="#">ALCC2011-09</a>	Shorebirds and Invertebrate Distribution on Delta Mudflats along the Beaufort Sea	Completed	2011 Post-breeding Shorebird Habitat Use Project Update
			2012 Post-breeding Shorebird Habitat Use Project Update
<a href="#">ALCC2011-1002</a>	Climate Projection Maps and Rasters	Completed	Animations and Presentation Materials
			Temperature Projection Maps - A1B Scenario
			Precipitation Projection Maps - A1B Scenario
			Temperature Projection Maps - A2 Scenario
			Precipitation Projection Maps - A2 Scenario
			Baseline (1961-1990) Rasters
<a href="#">ALCC2011-11</a>	Climate Change Vulnerability of Migrating Bird Species Breeding in Arctic Alaska	Completed	Vulnerability Assessment Fact-sheets for Individual Species
			Climate Change Vulnerability of Breeding Birds in Arctic Alaska - Final Report

Project	Project Title	Project Status	Product Name
<a href="#">ALCC2011-15</a>	North Slope Land Cover	Completed	North Slope Landcover Map and Final Summary Report, 2013
			North Slope Landcover Map Final Summary Report, 2013
<a href="#">ALCC2011-16</a>	Modeling avifaunal responses to climate change in North America's boreal-Arctic transition zone	Completed	Modeling Avifaunal Responses Executive Summary
<a href="#">ALCC2012-02</a>	SNOWDATA: Snow Datasets for Arctic Terrestrial Applications (Alaska Arctic LCC Distributed Snow Property Datasets)	In Progress	SnowDATA Workshop Summary
			SnowDATA Workshop Report
<a href="#">ALCC2012-03</a>	Arctic LCC Facilitation for Current and Future Resource Management and Science Needs	Completed	Arctic LCC Future Needs Assessment
<a href="#">ALCC2012-1001</a>	Arctic LCC Project Tracking System	Ongoing Long-term	Project Tracking System Code Repository
<a href="#">ALCC2012-15</a>	Thermokarst Monitoring at the Landscape Level: a Feasibility Study	In Progress	Thermokarst and Thaw-Related Landscape Dynamics: An Annotated Bibliography
<a href="#">ALCC2013-01</a>	Terrestrial Environmental Observation Network	Ongoing Long-term	TEON FAQs, version 1.0
			TEON Objectives and Implementation Plan
			TEON Focal Watersheds and Observation Sites GIS Data
			TEON Focal Watershed Maps
			TEON Focal Watershed Overview maps



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