

Western Alaska Landscape Conservation Cooperative



The mission of the Western Alaska Landscape Conservation Cooperative (LCC) is to promote coordination, dissemination, and development of applied science to inform landscape level conservation, including terrestrial-marine linkages, in the face of a changing climate and related stressors.

2011 Collaborator Projects

The Western Alaska Landscape Conservation Cooperative (LCC) invested \$1.3 million dollars in 12 projects in 2011. These projects collectively included \$1.75 million dollars in leveraged (contributed) funding or support. The LCC Steering Committee selected these projects, from 78 proposals, to provide a strong foundation for initiating the LCC's applied conservation science efforts.



The projects were selected immediately following the recent LCC Science Workshop, allowing the Steering Committee to focus on addressing science needs frequently raised in the workshop. Over half of the projects focus on improving understanding of changes in important system drivers (such as hydrological and precipitation cycles or permafrost change); the rest focus on landscape systems, biological systems and human systems (see Figure 1).

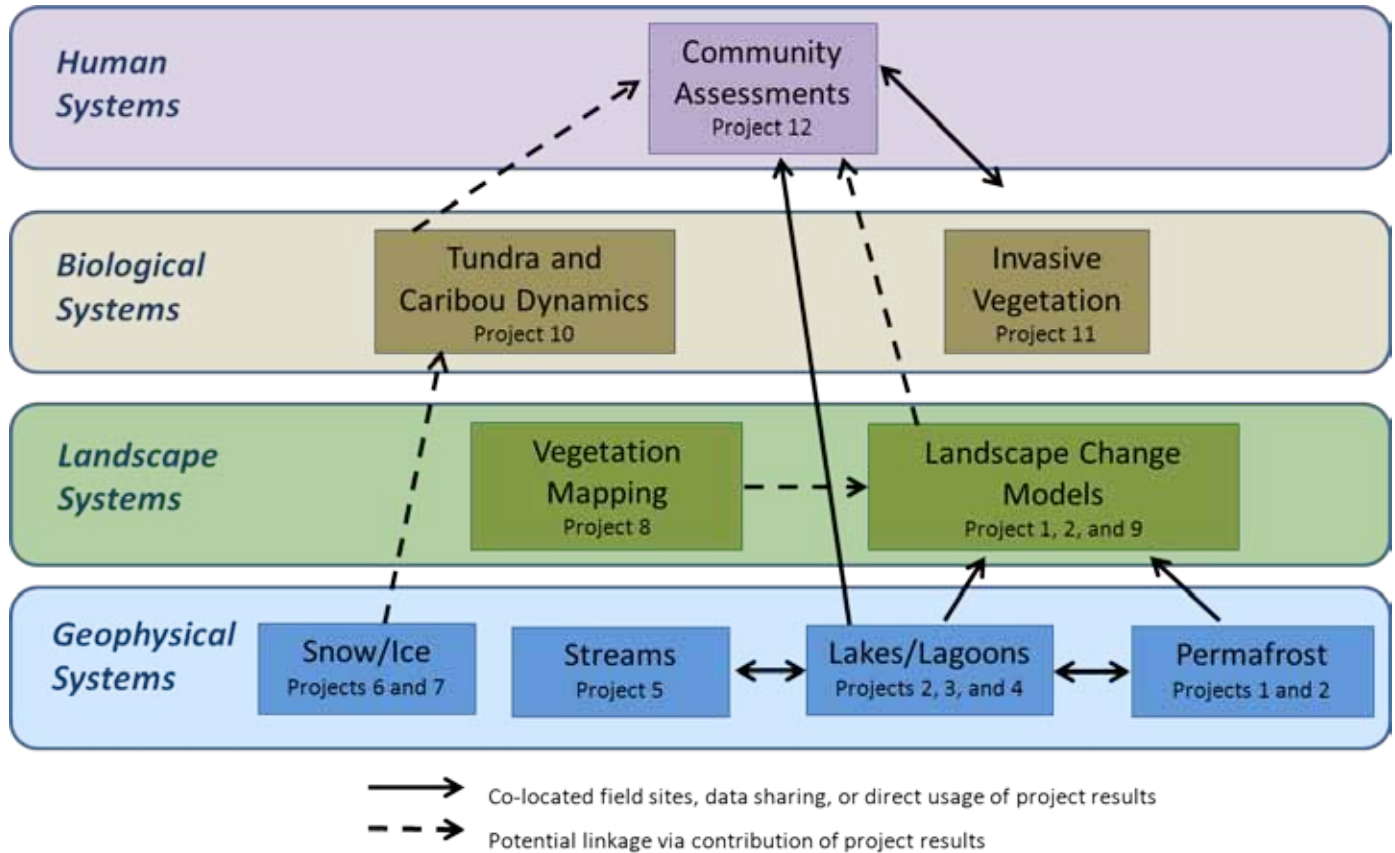
Many projects directly assess changes already expected to occur as a result of changing climate dynamics and/or provide the baseline necessary for future assessment of such changes in key habitats or environmental conditions. While the funded projects span different "system levels" (see Figure 1), they clearly only address a few of the important topics within each level, such as the tundra/caribou and invasive plant categories in Biological Systems. More topics will be addressed as funding becomes available.

The LCC promoted collaboration among the project principal investigators to improve both efficiency and quality. The resulting collaborations include co-locating monitoring equipment (potentially reducing logistic costs as well as allowing for future integration of measurements and increased insight), expanding monitoring coverage through collaborative deployment of equipment, and improved analyses arising from data sharing.



The following briefly summarizes each project, its geographic area of focus, and its principle investigators and collaborators. In all, 15 organizations/entities are involved as project leads or co-leads and an additional 18 are participating as collaborators.

Figure 1: Relationships among projects funded by the Western Alaska LCC in 2011. Each box represents a major topic and includes the names of each relevant project's principal investigator.



In addition to the projects funded directly through the LCC, two additional project proposals were funded by the USGS Alaska Climate Science Center on behalf of the LCC. One project will help improve an existing model describing the interaction of climate, vegetation and fire by building a stronger understanding of how tundra ecosystems respond to fire (a Landscape Systems project). The second uses species distribution modeling to project how the distribution and abundance of boreal birds may expand into arctic and subarctic regions in Alaska and Canada (a Biological Systems project).

Western Alaska LCC Contacts

Contact information for steering committee members can be found at:
<http://www.arcus.org/western-alaska-lcc>

Western Alaska LCC Staff

Karen A. Murphy
 Coordinator
 karen_a_murphy@fws.gov
 (907) 786-3501

Joel Reynolds
 Science Coordinator
 joel_reynolds@fws.gov
 (907) 786-3914

Geophysical Systems Projects

1 *Establishing a Distributed Permafrost Observatory in Western Alaska*

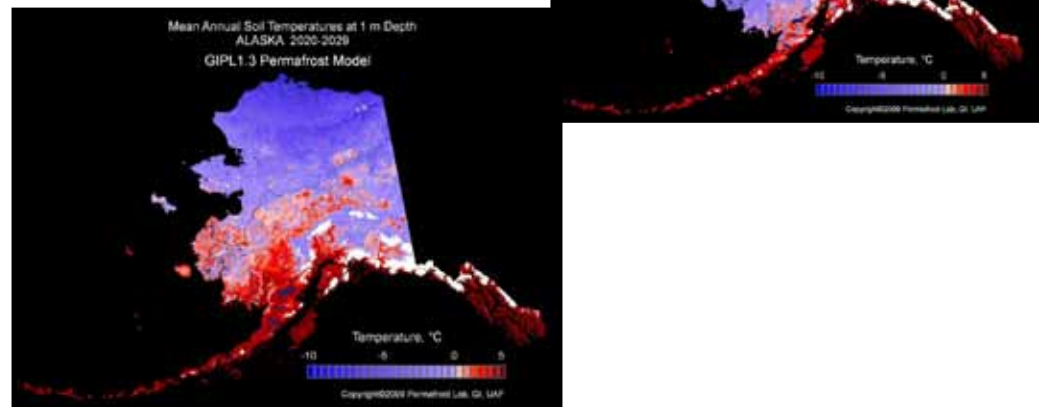
Project Description: Documenting changes in permafrost temperature and stability over time is essential for understanding ecological dynamics in the western Alaska permafrost zone. This project will establish a network of permafrost observatories within the Western Alaska LCC region, in the continuous/discontinuous permafrost boundary area. Active layer and permafrost temperature records will be used to produce a reliable high-resolution model of the present thermal state of permafrost and potentially its past and future changes within western Alaska.

Project Principal Investigator and Affiliation: Romanovsky (UAF)

Collaborators¹: ANTHC, BLM, ISU, LANL, NPS, NWAB, USFWS

Related LCC Projects: Project 2 (Grosse), Project 7 (Orlando), and Project 9 (Rupp)

LCC Region: North region



2 *Broad-Scale Lake and Permafrost Dynamics in the Western Alaska LCC Region*

Project Description: This project focuses on permafrost change and its effect on lake habitat change in major lake districts of the Western Alaska LCC. Land, resource, and wildlife managers as well as local communities in Western Alaska need spatially explicit information to determine past lake habitat changes, identify spatial patterns that could be correlated to climate, and project future habitat changes. Forecasting future changes will assist with developing habitat conservation plans and assessing the stability of freshwater resources for communities.



Project Principal Investigator and Affiliation: Grosse (UAF)

Co-Principal Investigator and Affiliation: Romanovsky (UAF)

Collaborators: ANTHC, NPS, USFWS, USGS

Related LCC Projects: Project 1 (Romanovsky) and Project 3 (Jones)

LCC Region: North and Central region

¹ Collaborator abbreviations: Alaska Native Tribal Health Consortium (ANTHC), Bureau of Land Management (BLM), Idaho State University (ISU), Los Alamos National Laboratory (LANL), National Park Services (NPS), Northwest Arctic Borough (NWAB), University of Alaska Fairbanks (UAF), U.S. Fish and Wildlife Service (USFWS), U.S. Geological Survey (USGS)

Geophysical Systems Projects continued

3 *Thermal Response of Western Alaska Lakes and Lagoons to Past, Present, and Future Changes in Climate*

Project Description: Water temperature in lakes and lagoons play a key role in hydrology, water quality, ecosystem productivity, and suitability as habitat for aquatic organisms (salmon!) and the food webs that support many terrestrial species. The information and data products from this project will fill a fundamental data gap in western Alaska (lake and lagoon surface temperature trends and projections) and can be used by various land managers in climate change studies, habitat evaluations, and land and resource management.

Project Principal Investigator and Affiliation: Jones (USGS)

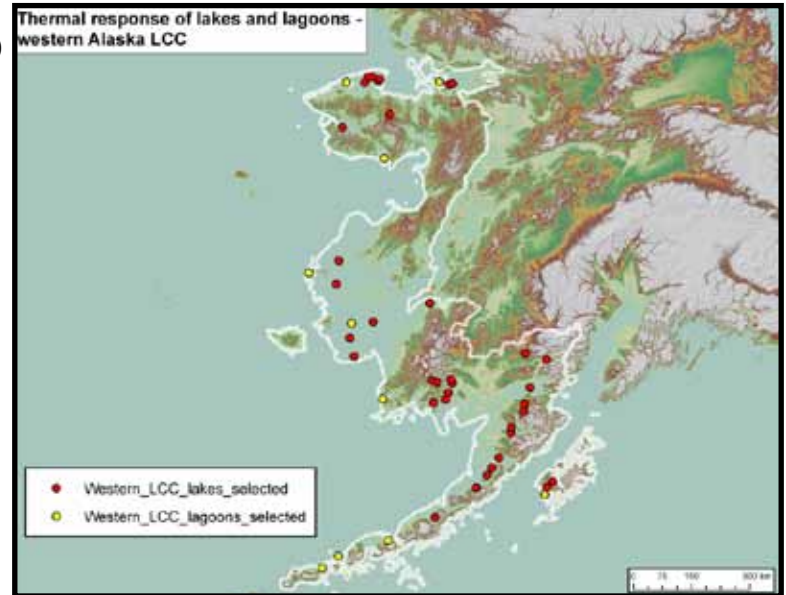
Co-Principal Investigators and Affiliation:

Arp (UAF), Hook (NASA), Shearer (NPS), Lenters (UNL)

Collaborators: ANTHC, BLM, ISU, LANL, NPS, NWAB, USFWS

Related LCC Projects: Project 2 (Grosse), Project 4 (Pyle), and Project 5 (Schindler)

LCC Region: Entire LCC



4 *Moored All-Season Vertical Temperature Arrays in Lakes of Kodiak, Togiak, and Alaska Peninsula/Becharof NWRs*

Project Description: Water temperature monitoring is an essential part of lake management and can provide early warning signs of climate change effects using simple, low-cost techniques. The information and data products from this project will provide a framework for better understanding trend in the quality of lake environments in relation to climate change. All proposed study lakes are important and productive sockeye salmon habitat. These data feed directly into the thermal response project (Jones) described above.



Project Principal Investigator and Affiliation: Pyle (USFWS)

Co-Principal Investigators and Affiliation: Shearer (NPS), Britton (USFWS), Walsh (USFWS)

Collaborators: ADF&G, NPS, USGS

Related LCC Projects: Project 3 (Jones) and Project 5 (Schindler)

LCC Region: South region

Geophysical Systems Projects continued

5

Watershed Control of Hydrologic Sources and Thermal Conditions in SW Alaska Streams: A Framework for Forecasting Effects of Changing Climate

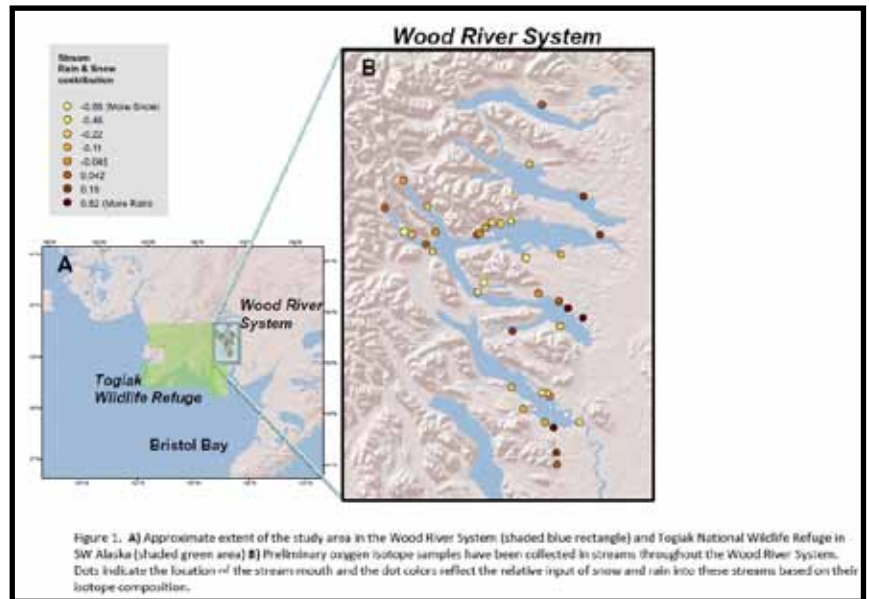
Project Description: A warmer and wetter climate will likely have a substantial effect on important aquatic resources in Western Alaska. This project will help provide an understanding of how current precipitation patterns (e.g. snow versus water) interact with watershed topography to control water sources to streams and, therefore, their thermal regimes. Ultimately, it will provide a valuable and accessible model to help managers strategize for adapting to future warmer climates and to protect the aquatic resources of the region.

Project Principal Investigator and Affiliation:
Schindler (UW)

Collaborators: ADNR, USFWS

Related LCC Projects: Project 2 (Grosse), Project 3 (Jones), and Project 4 (Pyle)

LCC Region: Central and South regions



6 *Timing and Extent of Winter Snow Thaw/Refreeze Events in Alaska 2001-2008*

Project Description: Mid-winter icing events have the potential to lead to population declines of grazing caribou and to some species of small mammals due to reduced survival and reproduction associated with restricted access or lack of forage. Population-level effects of icing events remain unclear partly due to limited information on icing events in Alaska. The assessment results will provide a baseline data set and remote sensing method both of which will have broad interest to a large community of users, allowing them to better understand the recent past, better link changes in ecological drivers and responses of wildlife populations, and helping them plan for the future.



Project Principal Investigator and Affiliation: Wilson (TWS)

Collaborators: NPS, VU

Related LCC Projects: Project 7 (Orlando) and Project 10 (Spalinger)

LCC Region: Statewide

Geophysical Systems Projects continued

7 *Direct Snow Condition Monitoring at Key Ecological Sites in Remote Western Alaska*

Project Description: Climate change is likely to alter snow patterns and characteristics, impacting vegetation, hydrology, permafrost condition, wildlife, and the Alaskans who depend on these resources. Currently, many areas of western Alaska are lacking important data related to snowpack and snow conditions, including the prime winter range for the Western Arctic Caribou Herd (WACH). This project will help monitor snow conditions that are vital to understanding and predicting landscape level impacts of climate change in western Alaska.

Project Principal Investigator and Affiliation: Orlando (USFWS)

Collaborators: ADF&G, BLM, Native Village of Buckland, NPS, NRCS, NWAB, UAF, WACH

Related LCC Projects: Project 1 (Romanovsky) and Project 6 (Wilson)

LCC Region: North region



Landscape Systems Projects

8 *Develop an “Existing Vegetation” Map for the Western Alaska LCC Region*

Project Description: A consistently mapped vegetation data layer for Alaska is needed for conservation management entities across the state. This project will develop a baseline vegetation product using the same basic data and analysis methodology across the entire region. When combined with an ongoing USFS project, the majority of the state will be mapped using the same methodology. This revised data layer will provide an important tool for not only fish and wildlife management agencies but also for fire management, development projects and climate change modeling.



Project Principal Investigator and Affiliation: Fleming (Images Unlimited)

Collaborators: AKNHP, USFS

LCC Region: Entire LCC

Landscape Systems Projects continued

9 Integrated Ecosystem Model for the Western Alaska LCC

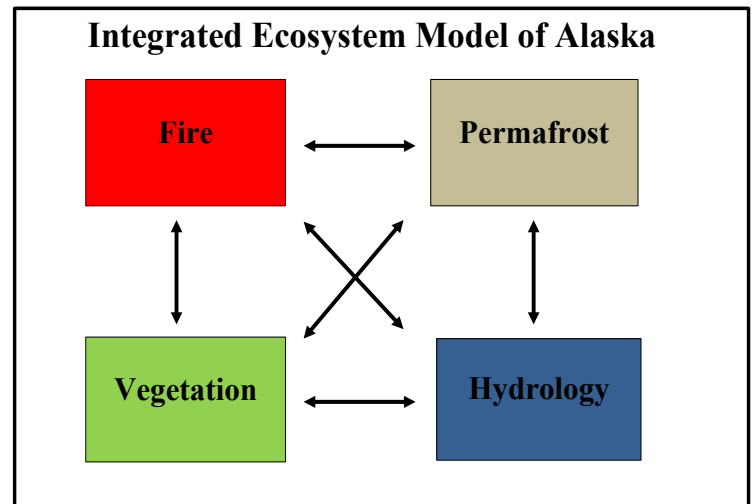
Project Description: Initially funded by the Arctic LCC, this multi-year effort is integrating existing models of vegetation, disturbance, and permafrost into one complete ecosystem model for the state of Alaska. The project is supported by Arctic and Western AK LCCs as well as the Alaska Climate Science Center. The model will integrate existing models on climate, vegetation, disturbance, hydrology and permafrost components to improve understanding and provide accurate change projections to land managers and other groups.

Project Principal Investigator and Affiliation:
Rupp (UAF)

Collaborators: Arctic LCC, TWS, UAF, USFWS

Related LCC Projects: Project 1 (Romanovsky) and Project 2 (Grosse)

LCC Region: Statewide



Biological Systems Projects

10 The Tundra in Transition: Unraveling the Dynamics of Western Alaska Caribou – Tundra Ecosystems

Project Description: Tundra dynamics in southwestern Alaska are poorly understood, yet these systems are critical to support caribou populations. Caribou in southwest Alaska are an important subsistence resource and potentially an indicator of ecosystem function. Understanding the causes behind caribou population declines in the area needs to include an understanding of tundra dynamics and habitat quality. The five caribou herds in southwestern Alaska occupy climatically and topographically unique landscapes allowing a great opportunity to identify habitat limiting factors on caribou population dynamics. This project will establish baseline information of vegetation and drivers and nutrient cycling that effect caribou population dynamics.



Project Principal Investigator and Affiliation: Spalinger (UAA)

Co-Principal Investigator and Affiliation: Collins (ADF&G), Sullivan (UAA), Welker (UAA), Harris (UAF)

Collaborators: ADF&G, CSU, UAF, USACE, USFWS

Related LCC Projects: Project 6 (Wilson)

LCC Region: South region

Biological Systems Projects continued

11

Assessing the Vulnerability of Western Alaska Ecosystems and Subsistence Resources to Non-native Plant Invasion

Project Description: To assess the vulnerability of a region to invasive plants, documentation of the presence or absence of invasive plants is necessary. This project will expand on work initiated by EPA to identify invasive plants in rural communities in the Bristol Bay region. Between the two efforts, 26 villages will be inventoried for invasive plant species; this will provide both an essential baseline for understanding the potential impact from these plants and the opportunity to treat the existing populations before they invade new areas. The second part of the project, courtesy of a University of Alaska Fairbanks graduate student, will use these data to assess the vulnerability of important subsistence plants (blueberry and low-bush cranberry) to changes in pollination as key insect species can be drawn to invasive plant populations.

Project Principal Investigator and Affiliation:

Hope (AACD)

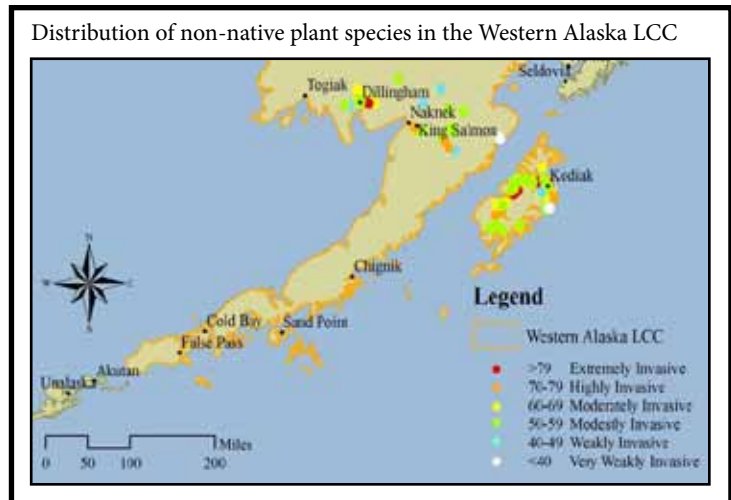
Co-Principal Investigator and Affiliation:

Robinette (Ekuk Tribal Council)

Collaborators: BBNA, EPA, UAF

Related LCC Projects: Project 12 (Flensburg)

LCC Region: Central and South regions



Human Systems Project

12

Climate Change Health Assessments for Three Coastal, Riverine and Lake System Communities

Project Description: Bristol Bay communities seek local scale information to mitigate negative climate effects and develop healthy methods for adaptation. Residents dependent on subsistence plant and wildlife species are concerned about threats to food and water resources, public safety and infrastructure. This project will develop assessment reports about climate change issues related to the local environment for a community in each region (lake, riverine, coastal) that will help those communities address related issues, and provide information useful to neighboring communities. Egegik (pictured below) is one of roughly 30 Bristol Bay Communities from which the 3 will be selected.



Project Principal Investigator and Affiliation: Flensburg (BBNA)

Co-Principal Investigator and Affiliation: Brubaker (ANTHC)

Collaborators: BBAHC, Blue Skies Solutions, UAF Sea Grant, USFWS

Related LCC Projects: Project 2 (Grosse) and Project 11 (Hope)

LCC Region: Central and South regions