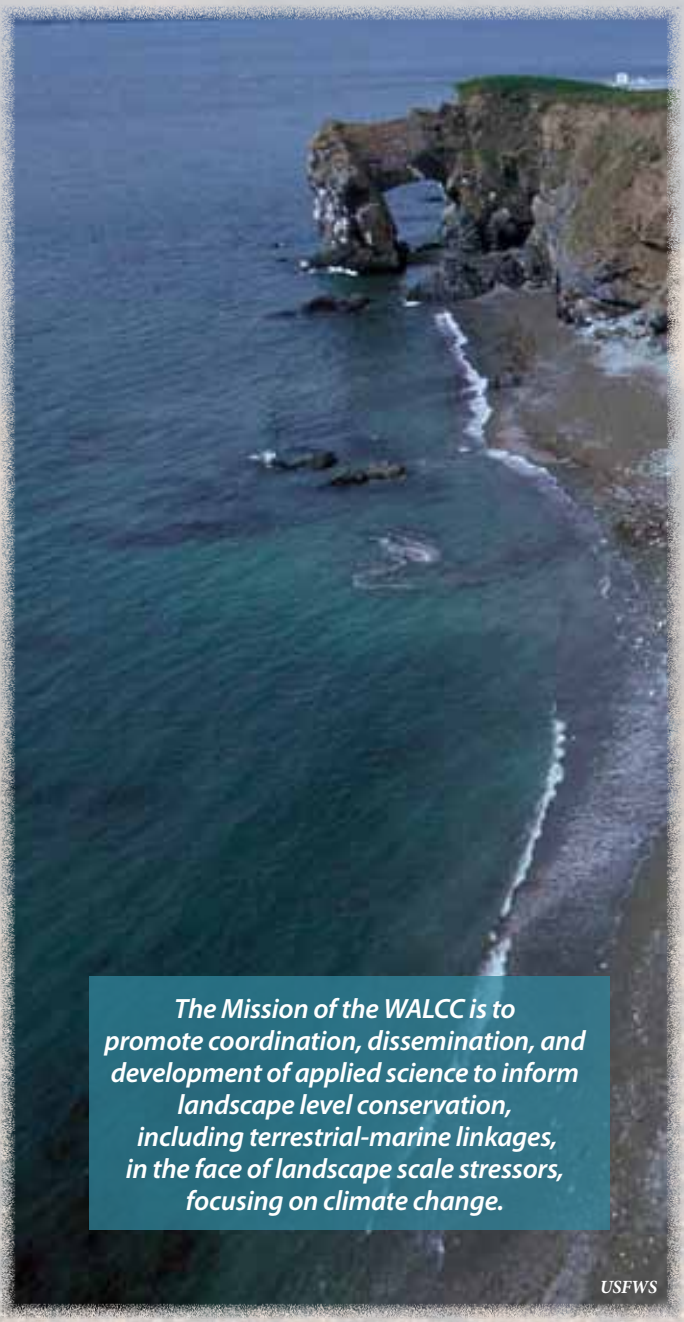
Western Alaska
Landscape Conservation Cooperative

2012 Collaborator Projects

In 2012, the Western Alaska Landscape Conservation Cooperative (LCC) sought projects addressing science needs related to *Changes in Coastal Storms and their Impacts*, a top priority for Western Alaska identified by resource managers, researchers, and local knowledge experts. Based on input from a partnership "organizing team" who recommended the focus for the *Changes in Coastal Storms and their Impacts* pilot program, the LCC solicited proposals related to shorefast ice dynamics, local involvement in monitoring coastal dynamics, effects of changes in coastal storms on coastal biological resources, and opportunities to leverage data collection. The LCC Steering Committee selected 10 projects from 28 proposals. The projects leverage existing efforts in western Alaska and address shared science needs. Collectively, they will produce both short term results and long term benefits to an array of stakeholders.

Two additional projects were developed in partnership with the Alaska Ocean Observatory System (AOOS) to address fundamental information needs for the *Changes in Coastal Storms and their Impacts* pilot program. First, AOOS has expanded an inventory of recent and current coastal processes and systems work in the Chuckchi and Beaufort Seas to include the Western Alaska LCC geography. Next, the LCC, AOOS and the Alaska Climate Science Center (ACSC) are collaborating to host a conceptual modeling workshop to better define the relationships between coastal processes and impacts to help guide science efforts in the future.

In addition to the pilot program projects, the LCC Steering Committee agreed to continue its investment in the multi-year "Alaska Integrated Ecosystem Model" along with the ACSC and Arctic LCC. Following is a brief summary of each project, its principle investigators and collaborators. In all, 11 organizations/entities are involved as project leads or co-leads, and an additional 8 are participating as collaborators. The LCC invested $611,000 in the 10 coastal pilot projects in 2012. These projects collectively included $775,000 in leveraged (contributed) funding or support. An additional $50,000 was invested in the Alaska Integrated Ecosystem Model with leveraged costs of $500,000.



The Mission of the WALCC is to promote coordination, dissemination, and development of applied science to inform landscape level conservation, including terrestrial-marine linkages, in the face of landscape scale stressors, focusing on climate change.

USFWS

NPS

The Western Alaska LCC will spend two years focused largely on the *Changes in Coastal Storms and their Impacts* pilot program while the long-term science strategy for the LCC is developed. The suite of projects funded in 2012 will produce products useful in both the short- and long-term for an array of stakeholders including resource managers, community leaders, planners and researchers. Prior to the selection of these projects we asked decision makers to tell us how they might use the products as described in the proposal abstracts.

The LCC is especially pleased that these projects will advance and refine understanding and modeling of nearshore and coastal surge processes, ultimately providing both near-'real-time', region-wide projections for communities (at a resolution of 100s m) and a framework for assessing fine-scale (10-20m) impacts on key resources in key locales. While distinct, these related capacities are the foundation for investigating surge impacts, historic and in real-time, on coastal communities and resources. Some applications for the selected projects are listed (right).

OCEANOGRAPHIC DATA ACQUISITION AND STORM SURGE MODELING

- Provides vital input for accurate storm surge and wave generation models
- Contributes data for surge model assessment
- Increases efficiency of data collection and robustness of data
- Begins to fill existing data gaps in operational models, improving the ability to forecast coastal storm surge and investigate historic and potential future impacts on communities and resources

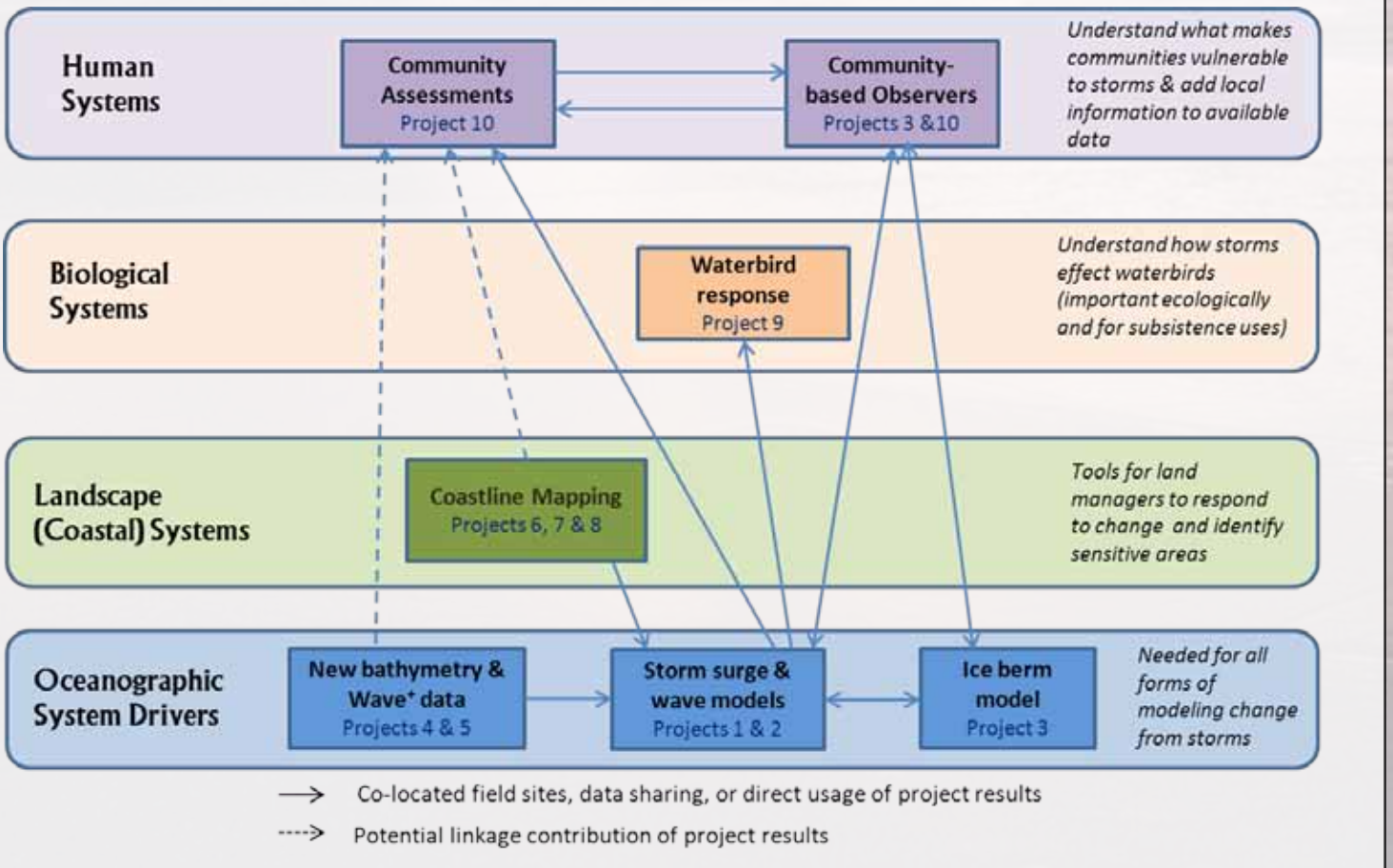
IMPACTS ON COMMUNITIES AND BIOLOGICAL RESOURCES

- Assists decision makers in protecting communities, infrastructure, and lands in Western Alaska
- Contributes to the development of village and borough comprehensive plans
- Aids in long term planning for waterbirds by identifying vulnerable habitats as well as risk and changes to critical habitats

COASTLINE MAPPING

- Provides a baseline for evaluation of ongoing change, including changes resulting from coastal erosion or oil spills
- Informs the evaluation of coastal erosion and coastal construction projects
- Useful for examining coastal conditions near landfills at risk of eroding into marine waters
- Useful in planning community relocation and barge access routes
- Allows for improved delineation of management area boundaries
- Inventories natural and cultural resources to inform response planning for oil spills, shipping accidents, flooding, etc.
- Provides a better understanding of critical habitat occurrence

Relationships among the 10 coastal pilot program projects funded by the Western Alaska LCC in 2012. Each box represents major topics and includes the corresponding project number(s).



NPS

OCEANOGRAPHIC SYSTEM DRIVERS

1 High-resolution model coupling effects of sea ice, tide, wind-driven wave dynamics, and currents in the formation of Storm Surges in Western Alaska

The western coastline of Alaska is highly susceptible to coastal storms, which can cause coastal erosion, flooding, and can affect commercial efforts. The reduction in ice coverage due to climate change could potentially increase the frequency and degree of coastal flooding and erosion. This project will quantify the effect that the reduction of nearshore ice coverage has on coastal flooding by developing a model accounting for sea ice, tide, wind-driven wave dynamics, and currents on storm surges along the Western Alaska coast. Versions of the modeling system will be evaluated for transition into operations at NOAA/NCEP, including experimental real-time predictions of storm surges. In 2012, the LCC is supporting the consolidation and processing of historical storm data, the first step towards development of a fully functional and validated model.

Project Principal Investigator: Robert Grumbine - National Oceanic and Atmospheric Administration (NOAA)
Collaborators: Joannes Westerink and Patrick Kerr (University of Notre Dame); Andre van der Westhuysen, Hendrik Tolman, Jesse Feyen, and Yuji Funakoshi (NOAA)
Anticipated Completion: Part 1 (Winter 2013)
Related Projects: Ravens (2), Atkinson (3), McCammon (4), Kinsman (5), Brubaker (10)


USFWS

2 Storm surge impacts on biological resources in the Yukon Kuskokwim Delta


USFWS

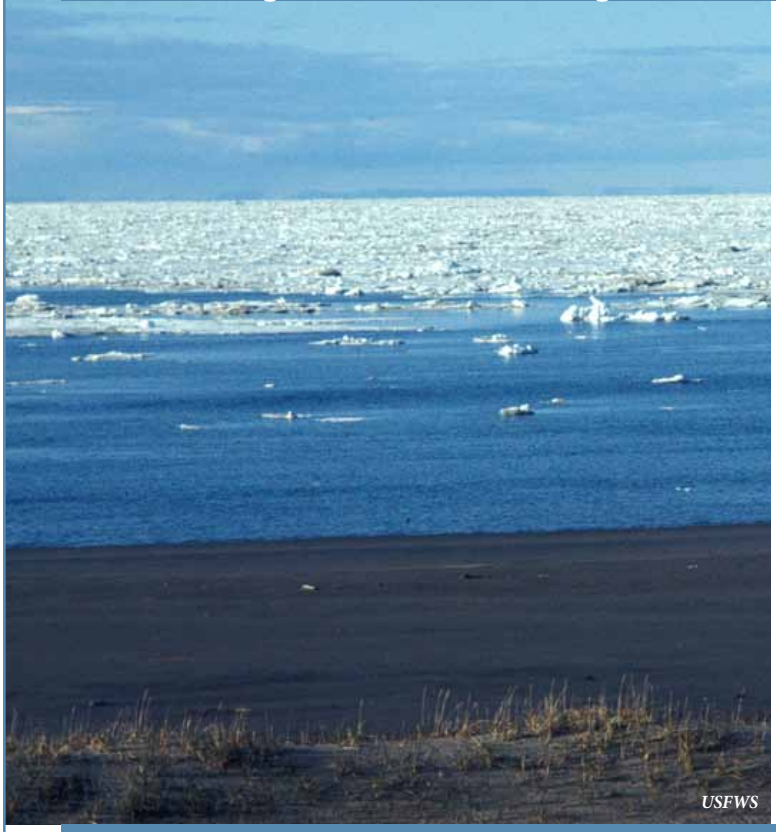
The primary goal of this project is to expand an existing fine-scale storm surge model to span the Yukon-Kuskokwim (Y-K) Delta from Cape Romanzoff to Nelson Island. Results of the model will be used by collaborator Sarah Saalfeld to examine the relationship between flooding due to particular storms and temporal changes in waterbird abundance and nesting locations (see project 9). The model will also have applicability for future studies related to habitat suitability for a variety species on the Y-K Delta.

Project Principal Investigator: Thomas Ravens - University of Alaska Anchorage (UAA)
Collaborators: Sarah Saalfeld - Manomet Center for Conservation Sciences (MCCS)
Anticipated Completion: Spring 2014
Related Projects: Grumbine (1), Saalfeld (9), Brubaker (10)

Collaborator abbreviations: Alaska Department of Natural Resources (ANDR), Alaska Ocean Observing System (AOOS), Alaska Native Tribal Health Consortium (ANTHC), Arctic Landscape Conservation Cooperative (ALCC), Manomet Center for Conservation Sciences (MCCS), National Park Service (NPS), National Oceanic and Atmospheric Administration (NOAA), University of Alaska Anchorage (UAA), University of Alaska Fairbanks (UAF), University of Victoria (UV), U.S. Fish and Wildlife Service (USFWS)

OCEANOGRAPHIC SYSTEM DRIVERS

3 Community observations to delineate factors influencing the formation of ice berms during storms on the Bering Sea coast, Western Alaska


USFWS

Storm winds can create water level surges that inundate low-lying coastal margins, adversely affecting ecosystems and human activity and infrastructure. The Alaska Bering Sea coast is particularly susceptible to surges because it is regularly affected by strong storms and possesses extensive, low-lying regions. The formation of ice berms can either limit or enhance the adverse impact of storm surge. Using community-based observations of ice conditions, combined with NOAA sea-surface temperature maps, this project will result in a simple model of ice berm development.

Project Principal Investigator: David Atkinson - University of Victoria (UV)
Collaborators: Hajo Eicken and Craig Gerlach - University of Alaska Fairbanks (UAF)
Anticipated Completion: Spring 2015
Related projects: Grumbine (1), Brubaker (10)

4 Leveraging opportunity for wave buoy data collection

One of the largest challenges in understanding changes in coastal processes is the lack of measured ocean data in western Alaska. This project will support data collection in the Bering Sea from a Triaxys oceanographic wave buoy to supplement existing stationary sensors for an additional 2 -3 years. Wave buoy data has numerous applications for both science and industry, and it is a primary tool that will provide real-time data about the volume and direction of water movement towards the shore.

Project Principal Investigator: Molly McCammon (AOOS)
Collaborators: John Walsh (UAF); Rob Bochenek (Axiom Consulting and Design); David Atkinson (UV)
Anticipated Completion: Fall 2014
Related projects: Grumbine (1)

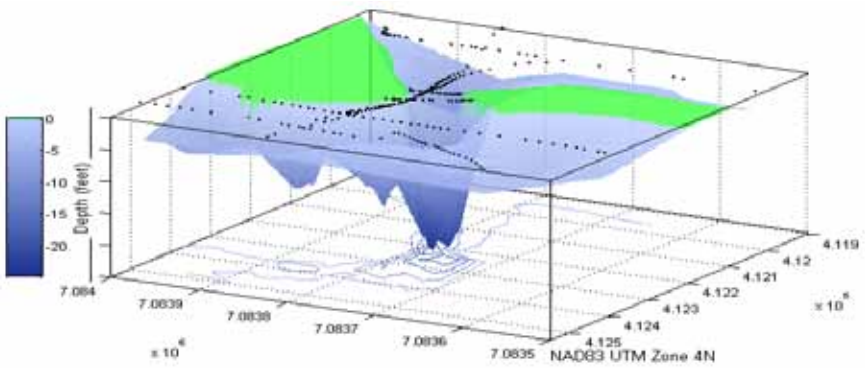

AOOS

OCEANOGRAPHIC SYSTEM DRIVERS

5 Nearshore bathymetric data collection in the vicinity of Western Alaska Communities

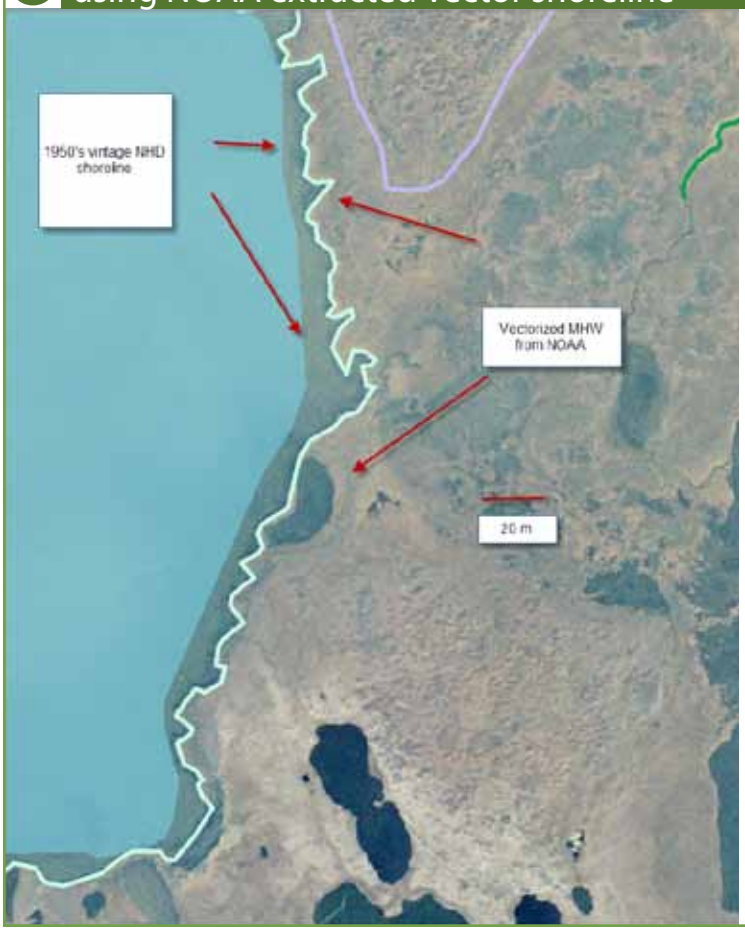
Nearshore bathymetry is a vital link that joins offshore water depths to coastal topography. Seamless water depth information is a critical input parameter for reliable storm surge models, enables the calculation of sediment budgets and is necessary baseline data for a range of coastal management decisions. This project will lead to the collection of nearshore bathymetry around at least five WALCC communities in western Alaska by funding field equipment capable of shallow water measurements in rural settings.

Project Principal Investigator: Nicole Kinsman - Alaska Department of Natural Resources (ADNR)
Collaborators: Molly McCammon (AOOS)
Anticipated Completion: Fall 2014
Related projects: Grumbine (1), Brubaker (10)



LANDSCAPE (COASTAL) SYSTEMS

6 Compilation of NHD Compliant shoreline from Cape Prince of Wales to Cape Espenberg using NOAA extracted vector shoreline



The compilation of an accurate and contemporary digital shoreline for Alaska is a critical step in understanding coastal processes and measuring changes in coastal storm characteristics and impacts. This project is an expansion of work conducted by the National Park Service and will result in a complete, mean high water, digital shoreline for coastal Western Alaska stretching from Cape Prince of Wales to Cape Espenberg. This shoreline dataset will replace existing U.S. Geological Survey (USGS) topographic shoreline data currently represented in the National Hydrographic Dataset and will be publicly available for ongoing investigations into coastal processes. It will serve to strength the ShoreZone mapping project for the Kotzebue Sound and northern Seward Peninsula.

Project Principal Investigator: Andrew Robertson - Saint Mary's University
Collaborators: Joel Cusick - National Park Service (NPS)
Anticipated Completion: Fall 2013
Related projects: Grumbine (1), Neitlich (7), Underwood (8)

LANDSCAPE (COASTAL) SYSTEMS

7 ShoreZone Mapping in Kotzebue Sound

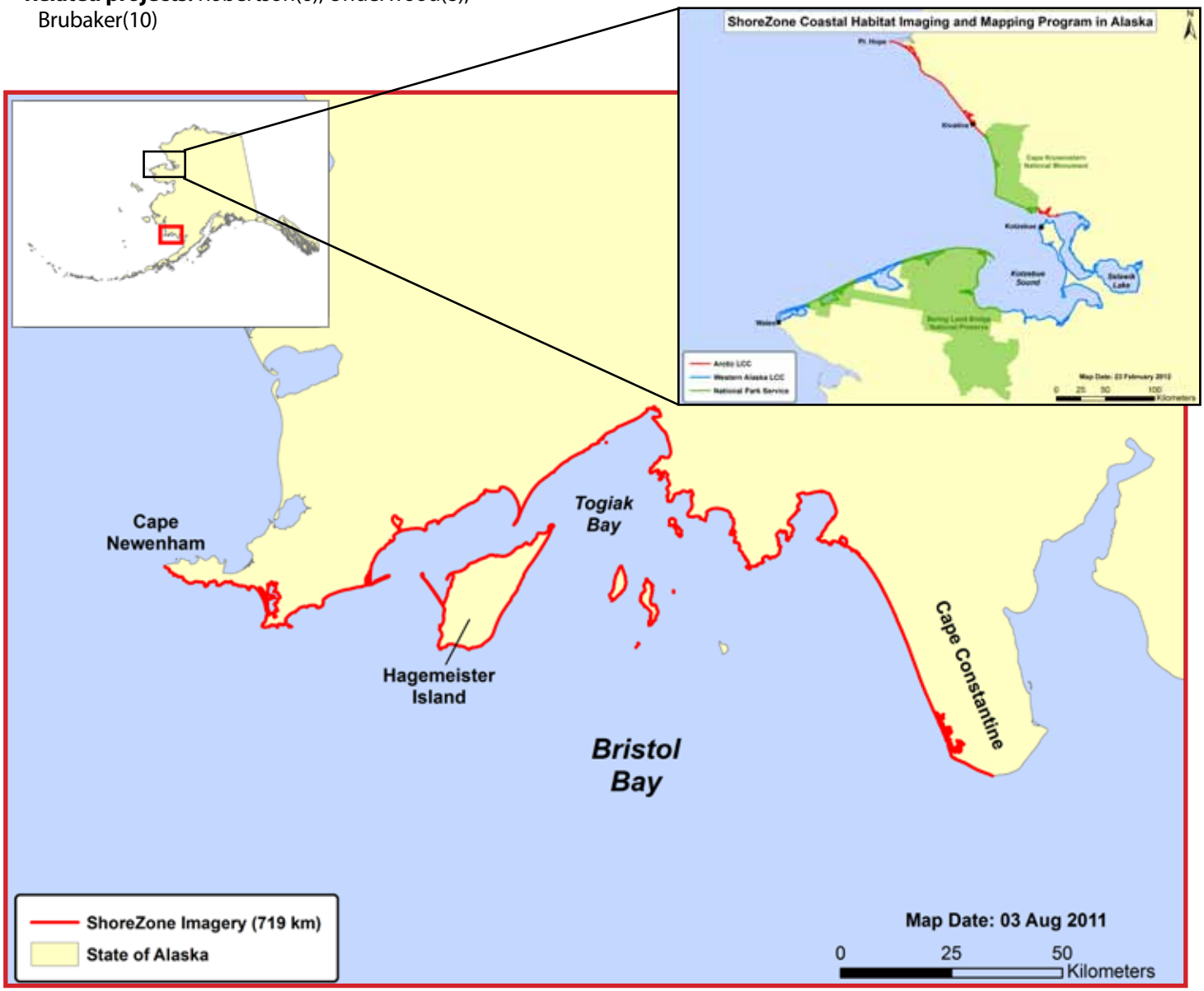
This project will use ShoreZone imagery collected as part of another partnership effort to map nearly 1,600 km of coastline between Wales and Kotzebue, completing the Kotzebue Sound shoreline for inclusion in the state-wide ShoreZone dataset. The complete dataset will be used to conduct a coastal hazards analysis and create maps that identify areas undergoing rapid coastal erosion and areas that are sensitive to inundation by storm surge and sea level rise.

Project Principal Investigators: Peter Neitlich (NPS) and Cindy Hartmann Moore (NOAA)
Collaborators: Tahzay Jones and Steve Lewis (NOAA); Marci Johnson (NPS); Greg Balogh (Arctic LCC); Nicole Kinsman (ADNR)
Anticipated Completion: Winter 2014
Related projects: Robertson(6), Underwood(8), Brubaker(10)

8 ShoreZone Mapping in Bristol Bay

This project will use existing ShoreZone coastal imagery to map 719 km of shoreline in Bristol Bay, from Cape Constantine to Cape Newenham. This section of coastline is an extremely important herring spawning area and an important component of the Bristol Bay fisheries. Intertidal and nearshore vegetation, on which herring spawn, will be catalogued as part of the ShoreZone mapping and, along with shore types, coastal substrate, and coastal biota, added to the state-wide ShoreZone dataset.

Project Principal Investigators: Tevis Underwood - US Fish and Wildlife Service (USFWS); Cindy Hartmann Moore (NOAA)
Collaborators: Steve Lewis (NOAA)
Anticipated Completion: Fall 2015
Related projects: Robertson (6), Neitlich (7), Brubaker (10)



BIOLOGICAL SYSTEMS

9 The impacts of storm surges on breeding waterbirds on the Yukon-Kuskokwim Delta, Alaska: past effects and future projected impacts

The Yukon-Kuskokwim (Y-K) Delta, one of the most productive breeding areas in the world for waterbirds, is already experiencing effects from global climate change. Understanding the potential impacts to waterbird habitat resulting from increased storm intensity and frequency, decreased sea ice, and thawing of permafrost is necessary to effectively manage this key region. To evaluate the potential impacts of changes on waterbird habitat due to climate change, this project examines historic responses of water birds to storm surges on the Y-K Delta by examining waterbird breeding parameters before and after coastal storm surges between 1985 and 2012.

Project Principal Investigator: Sarah Saalfeld (MCCS)
Collaborators: Julian Fischer (USFWS); Thomas Ravens (UAA); Stephen Brown (MCCS)
Anticipated Completion: Spring 2014
Related projects: Ravens (2)

Tasha DiMarzio

HUMAN SYSTEMS

10 Community Observation and Vulnerability Assessment

Millie Hawley

No one has better knowledge, and opportunity to document, how coastal storms affect the coast than the people who live in coastal communities. By training the network of Local Environmental Observers (LEOs), and others, in Alaska to collect coastal storm data we improve local capacity to engage in coastal observations. This project builds on the climate change vulnerability assessments performed in Bristol Bay, expanding the assessment process to Northwestern Alaska, and prioritizing communities for climate vulnerability assessments. Through these efforts, Alaska's climate change surveillance system is strengthened, understanding about climate vulnerability is increased, and partnerships to address impact are expanded.

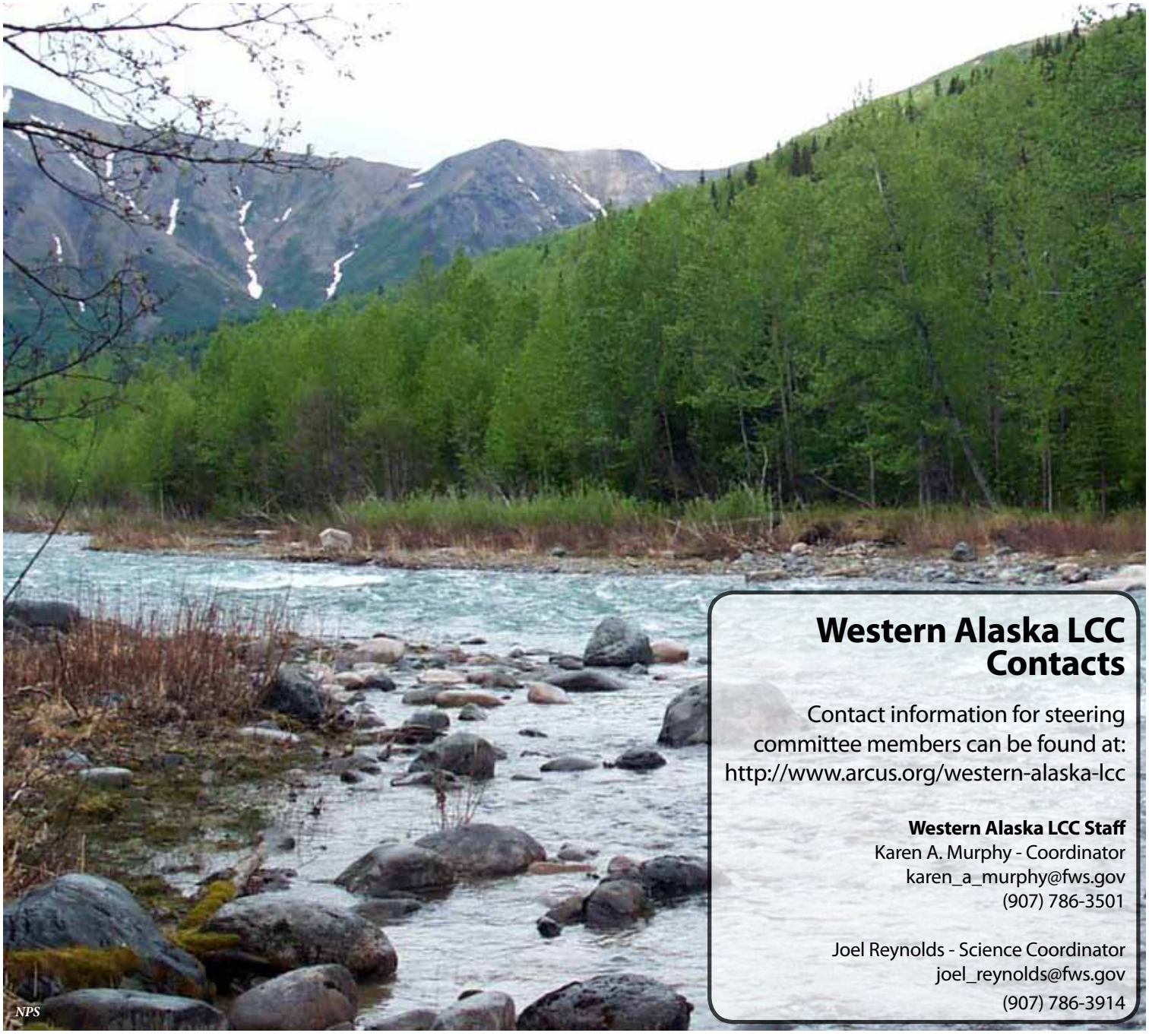
Project Principal Investigator: Michael Brubaker; Alaska Native Tribal Health Consortium (ANTHC)
Collaborators: James Berner (ANTHC); Kevin Zweifel (Norton Sound Health Corporation); Anahma Shannon (Kawerak, Inc.); Paul Eaton (Maniilaq Association); John Chase (Northwest Arctic Borough)
Anticipated Completion: Summer 2014
Related projects: Grumbine (1), Ravens (2), Atkinson (3)

LANDSCAPE SYSTEMS - continuation from 2011

11 Integrated Ecosystem Models for Alaska

This multi-year effort aims to integrate existing models of vegetation, disturbance, and permafrost into a complete ecosystem model for Alaska. Model coupling has been completed and, in collaboration with LCC partners, priority issues have been identified for incorporation into the synchronous model. This year's work will focus on integrating tundra fire processes and treeline dynamics into the model. The completed model will improve understanding and provide accurate change projections to land managers and decision makers across Alaska.

Project Principal Investigators: Scott Rupp and A. David McGuire (UAF)
Collaborators: Amy Breen, Eugenie Euskirchen, Sergey Marchenko, Vladimir Romanovsky (UAF), Arctic LCC, DOI Alaska Climate Science Center, The Wilderness Society
Anticipated Completion: Fall 2015
Related projects: Spalinger (FY11), Fleming (FY11), Romanovsky (FY11), Grosse (FY11)



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