



## Western Alaska Landscape Conservation Cooperative

# 2013 Projects: Coastal Systems

In 2013, the [Western Alaska LCC](#) continued to fund projects addressing science needs related to *Changes in Coastal Storms and their Impacts*. Several of these projects are a result of proposals submitted under the 2012 solicitation related to shorefast ice dynamics, local involvement in monitoring coastal dynamics, the effects of coastal storms on biological resources, and opportunities to leverage data collection. These projects were identified as high priorities in 2012, but were not funded until 2013. The suite of coastal projects, which will result in key datasets for resource managers and researchers addressing climate-related changes to coastal processes and resources, represents a \$395,000 investment by the Western Alaska LCC in 2013, and leverages \$633,000 in contributed support.

In addition to the coastal projects, the LCC invested in two additional projects. In response to the results of a jointly-hosted [Stream and Lake Temperature Monitoring Workshop](#), funding was provided for the creation of a geospatial database to document where temperature data are being collected across Alaska. This project is part of the LCC's mini pilot program on Hydrological Processes, and will provide a segue into the 2014-2015 Freshwater Streams funding focus. Finally, in collaboration with the DOI Alaska Climate Science Center and the Arctic LCC, the Western Alaska LCC continues to invest in the Integrated Ecosystem Model for Alaska and Northwest Canada. Collectively, the LCC invested \$495,000 in 8 projects to address climate-related science priorities for Alaska.

### *Mission*

*The mission of the Western Alaska LCC 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.*

# Coastal

## ...AND THEIR IMPACTS

Through expansion of existing efforts and the inclusion of complementary projects, the 2013 Coastal Storms projects build on work funded by the LCC in 2012 (see <http://westernalaskaLCC.org> for more information). The new 2013 projects continue to target key uncertainties and science priorities identified by managers and scientists for Western Alaska. They will result in improved understanding of nearshore and coastal processes and provide much needed information and products to planners, researchers and resource managers.

Two projects from 2012 were expanded. New projects include a remote sensing image analysis to detect coastal erosion along the entire Western Alaska LCC coast; ShoreZone Mapping on the Alaska Peninsula; expanded instrumentation to merge biological and tidal information on the Yukon Kuskokwim Delta; and leveraging work by the State of Alaska to revisit some tidal benchmarks in western Alaska communities.

### Coastal Projects Funded in 2012

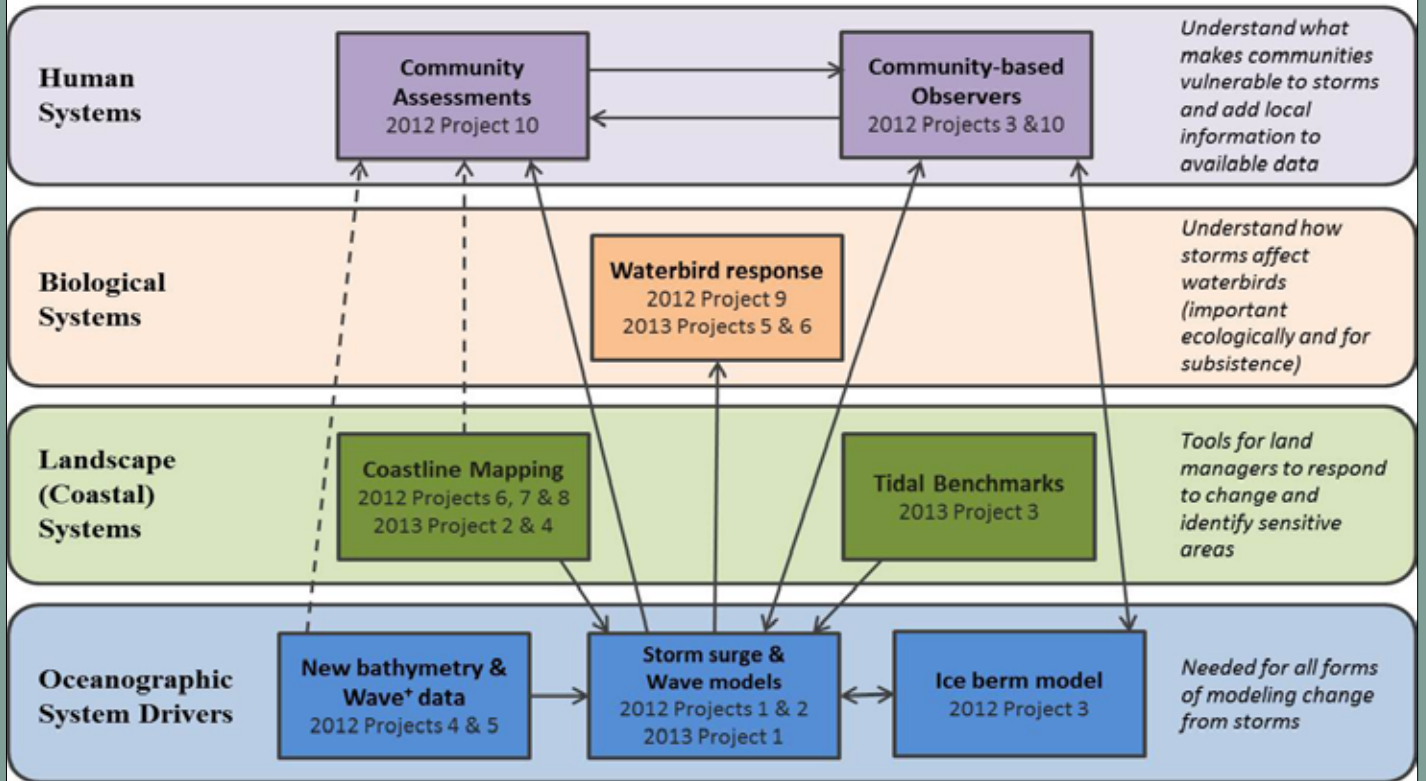
<b>1</b>	High-resolution model coupling effects of sea ice, tide, wind-driven wave dynamics, and currents in the formation of storm surges in Western Alaska (Part 1)
<b>2</b>	Storm surge impacts on biological resources in the Yukon Kuskokwim Delta
<b>3</b>	Community observation to delineate factors influencing the formation of ice berms during storms on the Bering Sea coast, Western Alaska
<b>4</b>	Leveraging opportunity for wave buoy data collection
<b>5</b>	Nearshore bathymetric data collection in the vicinity of Western Alaska Communities
<b>6</b>	Compilation of NHD compliant shoreline from Cape Prince of Wales to Cape Espenberg using NOAA extracted vector shoreline
<b>7</b>	ShoreZone mapping in Kotzebue Sound
<b>8</b>	ShoreZone mapping in Bristol Bay
<b>9</b>	The impacts of storm surges on breeding waterbirds on the Yukon-Kuskokwim Delta, Alaska: Past effects and future projected impacts (Part 1)
<b>10</b>	Community observation and vulnerability assessment

# Storms

## Coastal Projects Funded in 2013

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 (Part 2)
2	Extensive mapping of Bering Sea and Gulf of Alaska coastal change by Landsat time series trend analysis, 1985-2012
3	Reconnaissance static occupation of Tidal Benchmarks in Western Alaska
4	ShoreZone mapping on the southern Alaska Peninsula
5	Expanding environmental monitoring instrumentation on Kigigak Island
6	The impacts of storm surges on breeding waterbirds on the Yukon-Kuskokwim Delta, Alaska: Past effects and future projected impacts (Part 2)

Relationships among the *Coastal Storms & their Impacts* projects funded by the Western Alaska LCC in 2012-2013. Each box represents major topics and includes the corresponding project number(s). Visit [westernalaskalcc.org](http://westernalaskalcc.org).



→ Co-located field sites, data sharing, or direct usage of project results  
 --> Potential linkage contribution of project results

# 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

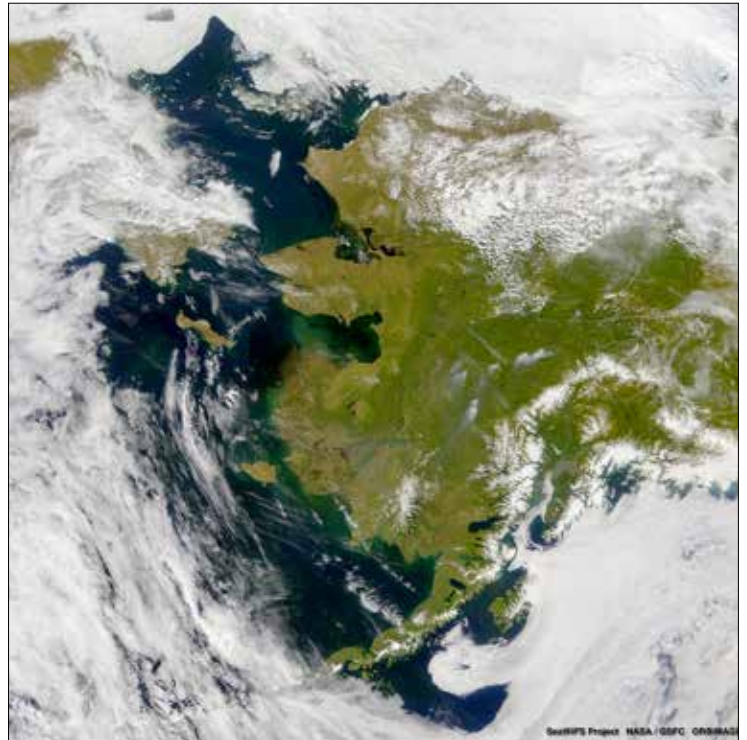
**Principle Investigator:** Robert Grumbine, National Oceanic and Atmospheric Administration

**Collaborators:** Joannes Westerink & Patrick Kerr, University of Notre Dame; Andre van der Westhuysen, Hendrik Tolman, Jesse Feyen & Yuji Funakoshi, National Oceanic and Atmospheric Administration

**Anticipated Completion:** Fall 2014

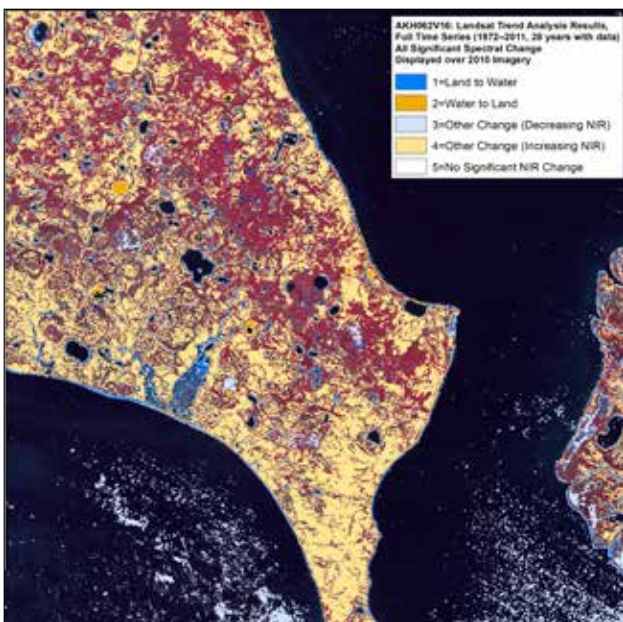
**Related Projects:** 2, 3, 4, 5, 10 (2012)

Reduction in nearshore ice coverage due to climate change may increase the degree and frequency of coastal flooding and erosion along the coastline of western Alaska. This project, which was partially funded by the Western Alaska LCC in 2012, will quantify the effects of reduced ice coverage on storm surges through the development of a model that accounts for sea ice, tide, wind-driven wave dynamics and currents. This work provides the foundation for the development of an improved operational model and better forecasting capabilities for western Alaska.



# LANDSCAPE (COASTAL) SYSTEMS

## 2 Extensive mapping of Bering Sea and Gulf of Alaska coastal change by Landsat time series trend analysis, 1985-2012



**Principle Investigator:** Matthew Macander, ABR, Inc.

**Collaborators:** N/A

**Anticipated Completion:** Fall 2014

**Related Projects:** 7, 8 (2012); 3, 4 (2013)

The extent of change to the coastline and to coastal features, such as spits, barrier islands, estuaries, tidal guts and lagoons, is known to be substantial in some areas along the western Alaskan coast (e.g., portions of the Yukon-Kuskokwim Delta). However, the extent of change along the full Western Alaska LCC coast is not well documented. This project will provide important baseline information on the distribution and magnitude of landscape changes over the past 41 years, and will result in an assessment of habitat loss and identification of hotspots of change, providing guidance for selecting areas for further research and monitoring.

**Phase 1: Feasibility Analysis**

# LANDSCAPE (COASTAL) SYSTEMS

## 3 Reconnaissance static occupation of Tidal Benchmarks in Western Alaska



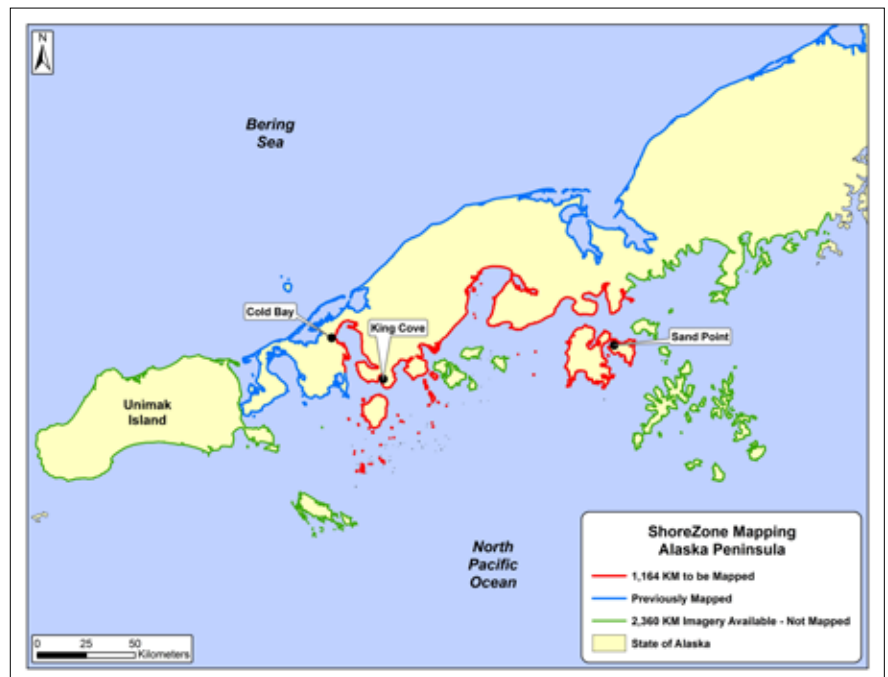
**Principle Investigator:** Nicole Kinsman, Alaska Department of Natural Resources  
**Collaborators:** Jeff Freymueller, University of Alaska Fairbanks  
**Anticipated Completion:** Fall 2014  
**Related Projects:** 1, 2, 7, 8 (2012); 2, 4 (2013)

Understanding the causes of relative sea level rise requires knowledge of changes to both land (uplift and subsidence) and sea level. However, measurements of coastal uplift or subsidence are almost completely lacking in western Alaska. This project will result in precision measurements of prioritized benchmarks across the Western Alaska geography. This will improve the network of published tidal benchmark elevations, allowing for tidal datum conversion in more places, and providing a necessary component for improved inundation studies in coastal communities and low-lying areas.

## 4 ShoreZone mapping on the southern Alaska Peninsula

**Principle Investigator:** Cindy Hartmann-Moore, National Oceanic and Atmospheric Administration  
**Collaborators:** Steve Lewis & Mandy Lindeberg, National Oceanic and Atmospheric Administration  
**Anticipated Completion:** Winter 2015  
**Related Projects:** 6, 7, 8, 10 (2012); 2 (2013)

**ShoreZone** provides an inventory of the biological and geographical resources along Alaska's coast. To facilitate completion of ShoreZone Mapping on the southeastern Alaska Peninsula, the Western Alaska LCC will support mapping of 1,164 km from Cold Bay to Balboa Bay and including Unga Island. Mapping data will be added to the state-wide ShoreZone dataset and will be publically accessible online for oil spill and emergency planning and response, community planning, habitat management, invasive species detection and monitoring, and other uses.



NOAA Map

# BIOLOGICAL SYSTEMS

## 5 Expanding environmental monitoring instrumentation on Kigigak Island

**Principle Investigator:** Melissa Gabrielson, US Fish & Wildlife Service

**Collaborators:** Nathan Graff & Tuula Hollmen, University of Alaska Fairbanks; Thomas Ravens, University of Alaska Anchorage; Sarah Conn, US Fish & Wildlife Service

**Related Projects:** 2, 9, (2012); 6 (2013)

Baseline hydrologic and topographic data in relation to waterfowl productivity is very limited on the Y-K Delta. When considering the potential impacts of climate-driven change to nesting and brood-rearing habitats, these baseline data are important for making informed management decisions. This project takes advantage of a long-term field camp on Kigigak Island to expand instrumentation for monitoring pond water levels and salinities, and tidal dynamics. It will also support elevation surveys and the synthesis of environmental and biological datasets for inclusion in climate change models.



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



**Principle Investigator:** Sarah Saalfeld, Manomet Center for Conservation Sciences

**Collaborators:** Julian Fischer, US Fish & Wildlife Service; Thomas Ravens, University of Alaska Anchorage; Stephen Brown, Manomet Center for Conservation Sciences

**Anticipated Completion:** Spring 2015

**Related Projects:** 2 (2012); 6, 9 (2013)

This project, which was partially funded in 2012, evaluates the potential impacts of a changing climate on waterbird habitat on the Y-K Delta. Utilizing existing, long-term datasets, as well as new storm surge models currently under development (2012 WALCC funding), this project analyzes waterbird distribution and breeding parameters before and after historic storms. It will result in the development of habitat selection models and habitat suitability maps for breeding waterbirds, and will identify potential refugia. Results will inform management decisions related to designing and monitoring surveys, regulating harvest, conserving endangered species, and managing at-risk habitats.

# NON-COASTAL PROJECTS

## FRESHWATER SYSTEMS

7

### Alaska online aquatic temperature site (AK-OATS)

**Principle Investigator:** Jamie Trammell, University of Alaska Anchorage

**Collaborators:** Dan Bogan, Rebecca Shaftel & Marcus Geist, University of Alaska Anchorage

**Anticipated Completion:** Fall 2014

The first of two projects funded outside of the Coastal Processes theme, this work is the beginning of our transition from Coastal topics to Freshwater topics.

Alaska's freshwater resources, vitally important for salmon and other species, are vulnerable to changes resulting from climate change. Though temperature is a critical element in the suitability of aquatic habitats, Alaska's stream and lake temperature monitoring is occurring through independent agencies/partners without a means to link and share data. Because a coordinated network of monitoring data can help scientists and managers understand how aquatic systems are responding to climate change, conducting an inventory of past and present stream and lake temperature monitoring efforts has been identified as a priority science need for Alaska. This project will consolidate existing monitoring site locations and attributes into a statewide, spatially referenced dataset and will result in the development of an online interface that will enable partners to add additional information. This is not a database for storing temperature data, rather the first step in creating a network which should ultimately link data.



USFWS Photo by Katrina Mueller

# NON-COASTAL PROJECTS

## TERRESTRIAL SYSTEMS

### 8 Integrated Ecosystem Model for Alaska and Northwest Canada



**Principle Investigator:** Scott Rupp & David McGuire, University of Alaska Fairbanks

**Collaborators:** Eugenie Euskirchen, Sergei Marchenko & Vladimir Romanovsky, University of Alaska Fairbanks; Arctic LCC; DOI Alaska Climate Science Center

**Anticipated Completion:** Fall 2015

The second project funded outside of the Coastal Processes theme is the result of a multi-year investment by the LCC and other organizations.

The [Integrated Ecosystem Model for Alaska and Northwest Canada](#) is designed to help resource managers understand landscape change due to climate-driven changes in vegetation, disturbance, hydrology, and permafrost. This multi-year project leverages contributions from several partners, and will result in a broad variety of datasets for use by managers and researchers. Currently, IEM is developing new functionality to better address additional ecosystem dynamics, including thermokarst and wetland dynamics.

## Contact the Western Alaska LCC

### Steering Committee

<http://westernalaskalcc.org/governance/sitepages/steeringcommittee.aspx>

Karen Murphy, Coordinator

[karen\\_a\\_murphy@fws.gov](mailto:karen_a_murphy@fws.gov)

(907) 786-3501

Joel Reynolds, Science Coordinator

[joel\\_reynolds@fws.gov](mailto:joel_reynolds@fws.gov)

(907) 786-3914



LANDSCAPE CONSERVATION  
COOPERATIVES