# Arctic Lake Drainage

## The Big Picture

Lakes of the Arctic Coastal Plain of northern Alaska provide essential habitat for many species of water birds and fish. These wetland habitats persist because of the complex interactions among temperature, precipitation, and permafrost. As a result, these habitats are uniquely vulnerable to the effects of climate change. The Arctic Lake Drainage project will provide managers with a spatially-explicit model of projected landscape change to assess the risk of wetland loss due to lake drainage.

**Project ID:** ARCT2010-09
**Year Funded** – 2010
**Start** – July 2010
**End** – September 2011
**Budget** – $94,000

**Research Partners:**
Geophysical Institute, UAF
Alaska Science Center, U.S. Geological Survey

## Vulnerability to climate change and projection of future lake loss on the North Slope

### Project Description

Researchers from the University of Alaska Fairbanks (UAF) and U.S. Geological Survey will develop a spatially explicit model that identifies relative risk of individual lakes to drainage due to natural geomorphic processes that may be enhanced in a warmer climate. The work initiated in 2010 will focus on lakes located across a vast region of western Arctic Coastal Plain and portions of the National Petroleum Reserve–Alaska (Figure 1).

### Why We Are Interested

Mean annual air temperature in Arctic Alaska is projected to increase 7°C by 2100 (5-7 times the national average). A warming climate will influence permafrost in ways that both promote and jeopardize the persistence of individual lakes. Understanding the potential changes in the abundance and distribution of these habitats is an important first step in assessing the vulnerability of species that depend on them.



A lake recently 'tapped' by rapid erosion of the Beaufort Sea coastline. Note the drainage way bisecting the lake basin. Photo courtesy of Benjamin Jones/USGS.

## What Will Be Done

Researchers will use a combination of remote sensing data, digital elevation models, data on surficial geology and permafrost character, rates of lake expansion and coastal erosion, and lake position relative to streams to classify each lake in the study area by its relative susceptibility to drainage.

## Expected Outcomes

This project will generate maps identifying lakes with a high probability of draining in the next 50 to 100 years. In addition, this project will develop a modeling protocol that could be used in other portions of the Arctic LCC when high-resolution elevation data becomes available.
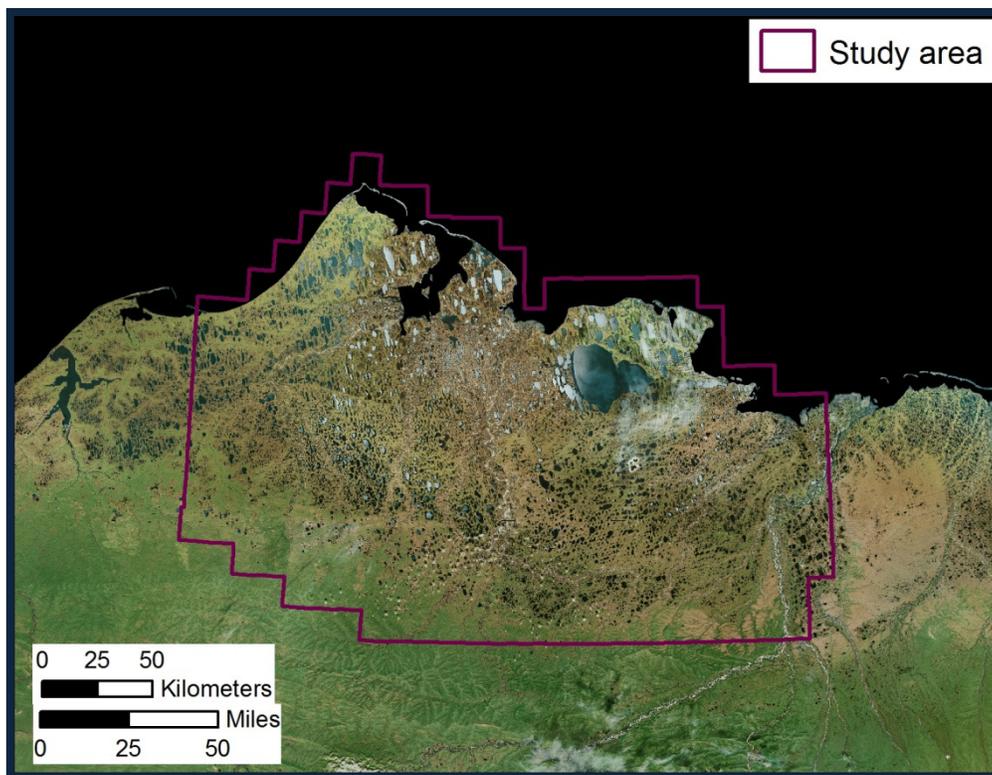


Figure 1: Map depicting the study area for the work funded in 2010. Image courtesy of SDMI-GINA (www.alaskamapped.org).

## Timeline

July 2010-August 2011: Model development and field work.
September 2011: A report summarizing results of this work and spatial data layers will be made available to resource managers, agencies, academia, and the general public.

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 actions among management agencies, conservation organizations, communities, and other stakeholders.

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Warming of air and water temperature will likely increase erosion of permafrost along lake shores allowing some lakes to grow faster. Other lakes, however, may be susceptible to sudden drainage.

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To learn more about this project and other Arctic LCC projects visit: arcticlcc.org
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