

Project Summary

Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: Remote sensing of watersheds and lake ice coverage as a template for monitoring and assessment of aquatic resources in the Arctic Network of Parks

Type of Project: Research
Funding Agency: National Park Service
Other Partners/Cooperators: Utah State University
Effective Dates: 8/22/2004 - 12/31/2005
Funding Amount: \$55,052
Investigators and Agency Representative:

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Project Abstract:

The degree of ice coverage on lakes is a fundamental characteristic of arctic lake ecosystems. Aquatic photosynthesis is very low until lakes thaw each spring. Many lakes do not thaw until mid to late June when the photosynthetic light regime is already at summer maxima. The timing of thaw is the dominant characteristic of lake ecosystem function, determining primary production, thermal stratification, and invertebrate and fish growth. Expected and realized climate warming in the arctic affects ice duration on lake, making ice duration a key parameter to consider in the development of monitoring and assessment plans.

The scope of work will consist of four elements related to assessments of aquatic coverage's in Gates of the Arctic National Park and Preserve. Our efforts will be focused in several sub-watersheds where lakes of appropriate size exist and are of importance to park ecologists.

1. Utilize existing GIS layers and previously acquired remoted sensed data for GAAR to classify aquatic ecosystems in relevant areas of the park and preserve.
2. Define and cluster watershed units using available spatial data and images.
3. Inventory and classify lakes and streams using remote sensed images.
4. Use of 2002 and 2003 radar and optical remote sensing to identify lake and stream resources. We will differentiate spatial and temporal patterns of fresh water resources using (1) radar backscatter data, which is highly sensitive to the dielectric constant (low for terrestrial surfaces, high for water) and (2) optical near-infrared (NIR) absorption (high for vegetation, low for water). Data will include 10m resolution daily ERS-1 obtained through collaborations with the Jet Propulsion Laboratory and 250m resolution daily Moderate Resolution Imaging Spectroradiometer (MODIS) NIR data obtained through open access. Data will be merged such that strengths (radar sensitivity to dielectric constant, optically high NIR absorption by water) can be used to offset weakness (radar sensitivity to texture and speckle, optical cloud contamination) of each approach.

Outcomes with Completion Dates:

Final Products include initial study plan (Due 6 weeks after initiation of agreement), detailed preliminary report (Due date: February 1, 2005), and a final report including data analysis and GIS coverages for portions of Gates of the Arctic National Park and Preserve (Due date: August 31, 2005).

Keywords: remote sensing, watersheds, lake, ice coverage, Arctic Network, Utah State University, Vital Signs Monitoring, Gates of the Arctic NP&P, MODIS,

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Date Annual Report Received:
Date Final Report Received:
Publications, etc. on file: