National Park Service
U.S. Department of the Interior

Schoodic Education
and Research Center

Acadia National Park
P. O. Box 177
Bar Harbor, ME 04609

207 288-8733 phone
207 288-8709 fax

Acadia National Park 2006 Research Summary

The diverse natural and cultural resources of Acadia National Park offer many opportunities for learning and discovery. Acadia has an extensive history of resource research and currently supports an active and multidisciplinary program. This list includes research projects taking place in the park in 2006. For more information about these projects or requirements for conducting research in the park, contact David Manski at (207) 288-8720 or david_manski@nps.gov.

AIR POLLUTION

Soil as a Mediator between Atmospheric Deposition and Streamwater
Holly Ewing, Bates College
Purpose: To validate the DayCent-Chem model to help assess the potential effects of different atmospheric deposition scenarios on the ecosystems of Acadia National Park.

SCIENCE EDUCATION

Humboldt Field Institute Course: Ecology and Conservation of Amphibians
Bryan Windmiller, Humboldt Field Institute
Purpose: To increase the amphibian and reptile surveying skills and overall experience level of post-graduate students taking the course at the Humboldt Field Institute.

NSF GK-12 Teaching Fellows Program
Susan Brawley, University of Maine (Orono)
Purpose:

- to reward outstanding science and engineering graduate students with fellowships to support their graduate research while providing them with opportunities to enhance K-12 science education
- to strengthen interactions between university science faculty and K-12 teachers
- to provide enhanced content and role models in science to K-12 students
- to provide professional development opportunities for teachers

---

VEGETATION

Bryophytes and Lichens in Select Habitats of Acadia National Park: Does Substratum Chemistry Explain Distribution?
Natalie Cleavitt, Cornell University
Purpose:

- to examine the importance of substratum chemistry for communities of mosses, liverworts, and lichens on cliffs and trees in Acadia National Park
- to expand the baseline inventory of these organisms in the park
- to increase understanding about management of vulnerable habitats
- to build on and add to the existing data set, thereby developing our working hypotheses regarding importance of substratum chemistry for bryophytes and lichens
- to amplify public appreciation for and enjoyment of these often overlooked organisms

Comparing the Severity of Paper Birch Diebacks on Two Bedrock Formations at Acadia National Park, Maine
Kelly Omand, Antioch New England University
Purpose: To measure and compare paper birch size, health characteristics, and severity of dieback on stands growing on two bedrock formations. A supporting objective is to conduct soil chemical analysis to explore whether the pattern of dieback is related to soil acidification and resulting low nutrition or aluminum toxicity.

Comparison of Cryptogam Responses to a Gradient of Atmospheric Deposition in Acadia National Park, Maine
Natalie Cleavitt, Cornell University
Purpose: To determine if the ecosystems in high deposition areas at Acadia show effects of elevated deposition. This study aims to provide an understanding of the ecological effects of atmospheric deposition, the potential for recovery of sensitive organisms should deposition levels be reduced, and the reliability of these organisms as indicators of air quality.

Hydrodynamic Regulation of Reproduction in Fucoid Algae: A Regional Model and Consequences for Population Structure
Susan Brawley, University of Maine (Orono)
Purpose:

- to test a model for predicting reproductive timing in fucoid algae and to determine how different this timing is along the Maine coast to produce a regional model
- to determine population structure of *F. vesiculosus* along the Maine coast as a possible function of physical control of reproduction
- to investigate recolonization of the Schoodic shore facing Frenchman's Bay after the March 2004 ice scour, which removed most fucoids

The New England Plant Conservation Program
William Brumback, New England Wild Flower Society
Purpose: To survey rare plant populations in the park.

Northeastern Temperate Network (NETN) Vital Signs Forest Monitoring Project
Geri Tierney, State University of New York College of Environmental Science and Forestry
Purpose: To establish and implement long-term forest monitoring of Acadia.

***Porphyra* in Integrated Mariculture**
Susan Brawley, University of Maine (Orono)
Purpose: To monitor natural populations of *Porphyra* species in intertidal and shallow subtidal zones to assess the timing of different reproductive stages and colonization.

***Sphagnum* in Acadia National Park**
Amanda Little, University of Minnesota (Duluth)
Purpose:

- to inventory the diversity of *Sphagnum* species present in the park
- to describe the dynamics of *Sphagnum* moss communities in response to beaver and human activity
- to establish a baseline of *Sphagnum* species composition and abundance for future studies on the impacts of air pollution on *Sphagnum* in the park

---

WATER QUALITY/WETLAND

Abiotic Controls on the Trophic Status of Oligotrophic Water
Stephen Norton, University of Maine
Purpose: To investigate abiotic processes controlling Al-P biogeochemistry of oligotrophic systems from soil to lake sediment. This study will determine

- soil properties influencing Al-P mobility;
- stream chemistry draining these same soils during varying stream discharge;
- the interaction of the stream water with stream sediments; and
- the long-term record in lake sediments, derived from the same streams, for metals including aluminum, iron, and phosphorus, and diatoms.

Develop a Citizen-Based Monitoring Plan for Mercury in Gauged Watershed Streams at Acadia National Park
Sarah Nelson, University of Maine (Orono)
Purpose:

- to continue the long-term record of mercury data in paired research watersheds at Acadia National Park
- to determine the appropriate timing and frequency of sampling to capture the essential data used to calculate mercury budgets in the watersheds
- to develop a long-term monitoring plan for mercury in these watersheds that includes high school students as citizen scientists

Nutrient Loading to the Sieur de Monts Spring, Acadia National Park
Andrew Reeve, University of Maine
Purpose: To characterize ground-water flow patterns and aqueous nutrient concentrations in the Sieur de Monts area.

WILDLIFE

Determining the Abundance, Distribution, Movements, and Site Fidelity of Wintering Purple Sandpipers (*Calidris maritima*) in the Acadia National Park Region, Maine
Glen Mittelhauser, Maine Natural History Observatory
Purpose:

- to estimate abundance and distribution of wintering purple sandpipers within the Acadia National Park region
- to recommend monitoring protocols to increase the ability to measure and detect changes in populations
- to refine capture and re-encounter methods to allow us to study seasonal movements and site fidelity along the coast of Maine

Developing a Management Plan for the Common Loon on Mount Desert Island, Maine - Pilot Study
David Evers, Biodiversity Research Institute
Purpose: To monitor the breeding activity and reproductive success of common loons on Mount Desert Island and evaluate stressors that impact their success. The study will identify the number of territorial pairs, nest attempts, and hatching and fledging rates. Blood and feather samples and unviable eggs will be collected and analyzed for mercury levels to compare with other data. We will opportunistically collect blood, feather, and/or egg samples from other fish-eating birds.

Early Detection of Invasive Forest Insects in Acadia National Park
Kevin Dodds, USDA Forest Service
Purpose: To monitor and make early detections of invasive forest insects.

Ecology and Management of the European Fire Ant, *Myrmica rubra*, in Acadia National Park
Eleanor Groden, University of Maine (Orono)
Purpose:

- to evaluate feeding preferences and the movement of food through colonies and populations to determine the potential of bait stations for the control of *M. rubra* populations
- to evaluate the potential for increased attraction and specificity of bait stations with treatments of *M. rubra* alarm pheromone
- to examine the association between *M. rubra* and native aphid species

Forest Bird Monitoring at Acadia National Park
Brian Mitchell, NPS-Inventory & Monitoring Program
Purpose: As part of the NPS Inventory and Monitoring Program, this effort is designed to develop long-term data on forest breeding birds.

Monitor the Abundance and Distribution of the Invasive Asian Shore Crab and Its Effects on Intertidal Crab and Bivalve Populations
Aimee Phillippi, Unity College
Purpose:

- to quantify the current population of the invasive crab at its present northern boundary and quantify the current populations of other intertidal crab species
- to quantify the bivalve populations in the same areas where crab populations are being surveyed
- to develop public outreach materials designed to inform the public about invasive species
- to involve undergraduates in field research to increase their knowledge, interest, and skills in science

Parasites or Opportunists? Aquatic Fungal Infection of Wood Frog (*Rana sylvatica*) Egg Masses in Acadia National Park Wetlands
Megan Gahl, University of Maine (Orono)
Purpose: To determine the causes and processes of *Saprolegnia* infection in wood frog eggs.

Predicting and Monitoring the Spread of Marine Invasive Species: Development of Approaches and Application to the European Green Crab and the Asian Shore Crab
David Delaney, McGill University
Purpose:

- to forecast the spread of marine aquatic invaders
- to determine the best approach to monitoring invasive species
- to develop a long-term volunteer monitoring network

Scoping Project for Sea-Run Brook Trout Studies
Ben Letcher, USGS-BRD Conte Anadromous fish Research Center
Purpose: To evaluate the potential for long-term studies on the ecology of sea-run brook trout in Acadia National Park.

Spatial and Temporal Patterns of Amphibian Diseases in Acadia National Park Wetlands: Causal Factors and Potential Management Strategies
Aram Calhoun, University of Maine (Orono)
Purpose: To determine whether there are significant differences in the ecology of the wetlands that harbor healthy amphibian populations in contrast to wetlands inhabited by infected amphibians.

A Spatial Risk Model for *Ixodes scapularis*-borne *Borrelia*
Durland Fish, Yale University School of Medicine
Purpose:

- to measure the risk of *Borrelia* spirochete transmission to humans from *Ixodes scapularis* ticks throughout its geographic range in the U.S.
- to develop and validate a spatially explicit risk model based upon vector population density and *Borrelia* infection prevalence

Spotted Salamander and Wood Frog Egg Mass Estimates at Vernal Pools in Acadia National Park
Robin Jung, USGS Patuxent Wildlife Research Center
Purpose:

- to conduct long-term monitoring of wood frogs and spotted salamanders using egg mass counts and a proportion of area (vernal pools) occupied approach
- to examine variation in egg mass counts and the proportion of vernal pools occupied over time and in relation to environmental variables
- to determine whether populations are stable, declining, or increasing