Atlantic Research & Learning Center

National Park Service (NPS) Research Learning Centers are places where science and education come together to preserve, protect, and understand park resources. Research learning centers support the use of parks as science laboratories and integrate research into visitor experiences, park management, and educational outreach.

A Unique Opportunity for Research

Cape Cod National Seashore (CCNS) is located on one of the largest glacial peninsulas in the world, and includes the largest stretch of undisturbed barrier beach in the United States. The park is comprised of many ecosystems, including estuaries, salt marshes, sandy beaches, barrier spits, nearshore marine, coastal forests, heathlands, ponds, and freshwater wetlands. These systems support a myriad of plant and animal species, and reflect the Cape's glacial origins, dynamic natural processes, and at least 9,000 years of human activity, presenting limitless opportunities for applied research.

Researchers partnering with the Atlantic Research & Learning Center (ARLC) have access to a rich array of natural and cultural resources, and also benefit from the expertise and guidance of CCNS scientists, analytical laboratory support, and decades of baseline data from the park's long term ecological monitoring program.
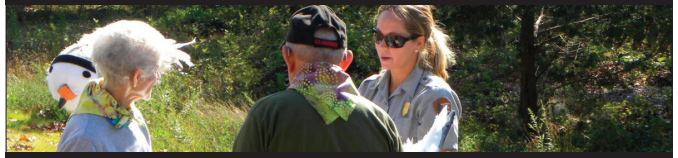
The mission of Research Learning Centers:

Facilitating the use of parks for scientific inquiry

Supporting science-informed decision making

Communicating the relevance of and providing access to knowledge gained through scientific research

Integrating current scientific research into educational and outreach programs

Promoting science literacy and resource stewardship

Priority Research Themes

Cross-cutting priority research themes being pursued by the ARLC include:

- local effects (eg. coastal erosion, habitat degradation) of global/hemispheric processes (eg. climate change, sea level rise, atmospheric deposition)
- importance of CCNS to migratory species, especially threatened and endangered migratory birds
- effectiveness and effects of restoring anthropogenically (human-caused) degraded habitats
- nutrient dynamics in aquatic systems and the relative influences of atmospheric, groundwater, and oceanic inputs

Research at the ARLC

ARLC research partners are typically from academic institutions, state and federal agencies, and non-profit conservation science organizations. Individuals working at the ARLC range from senior principal investigators to post-doctoral fellows and graduate and undergraduate students.

The questions pursued by ARLC research partners are wide-ranging and span a number of physical, chemical, and biological disciplines. Researchers at CCNS have access to an active inventory and monitoring program, Cape Cod Ecosystem Monitoring (CCEM), which has collected decades of long-term monitoring data. CCEM data provide resource status and trend information, which can serve as context for research activities and results. In turn, ARLC research results help describe the cause & effect relationships in observed changes to park resources.

Together, ARLC and CCEM efforts advance coastal ecology science and contribute critical natural resource information important to science-informed management of CCNS.

Support and Services

The ARLC offers a variety of services and support to facilitate research including:

- Nickerson Conservation Fellowship competition
- housing for visiting researchers
- laboratory and desk space
- field equipment
- analytical services
- GIS and long-term ecosystem monitoring data
- collaboration with CCNS scientists
- presentation and discussion classroom
- lecture auditorium
- the Charles S. Davidson Memorial Library
- opportunities for science communication to students, the general public, and other resource managers

The ARLC analytical laboratory and field support facilities are co-located with other NPS facilities at CCNS North Atlantic Coastal Laboratory at the Highlands Center at Cape Cod National Seashore in Truro, Massachusetts.

Analytical Capabilities

The ARLC analytical capacity is an important component of CCNS research partnerships. Example analyses include:

- dissolved nutrients in environmental samples
- C:N:S in tissue or sediment
- % organic matter in sediment

More information and a complete list of analytical services is available upon request. Please contact the ARLC for details.

Research partners from Antioch University measuring shellfish response to estuarine restoration

Red maple flowers, one of the species recorded by the Citizen Science Phenology Monitoring Program

Education & Outreach

The ARLC works to communicate current science themes and research initiatives to a wide array of audiences, fostering a positive exchange of information on the physical and biological systems within the CCNS. Outreach activities include public presentations, publications, providing technical assistance to scientists and teachers, supporting tours, field trips and seminars for students, scientific reviews of scholarly work and funding proposals, and an annual public "Science in the Seashore" symposium.

The ARLC also maintains a website with videos, podcasts, presentations, scientific posters, and reports to disseminate valuable information to the scientific community and extend the visitor experience.

Citizen Science

The CCNS Citizen Science Program is a way for seashore scientists to extend their capacity for monitoring and collect much-needed data on priority resource issues. Citizen science is also a way to engage the public by including them in active monitoring at the Seashore. For example, the Citizen Science Phenology Program utilizes a group of dedicated and well-trained volunteers to collect data over the course of many years. These data will serve to establish baselines and eventually trends in phenology for an array of species and events.

Example citizen science monitoring efforts include:

- freshwater wetlands & adjacent woodlands vegetation
- maritime dune shrub communities
- ice dynamics in kettle ponds
- salt marsh vegetation
- red-winged blackbirds
- mercury monitoring in larval dragonflies

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ARLC Research Highlights

Coastal Change Study
Center for Coastal Studies, NPS
Coastal instability and cross-shore sediment movement in the face of sea level rise
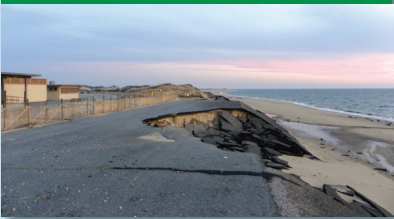
Roseate Tern Resighting
United States Geological Survey, NPS
Breeding season and post-breeding movements and habitat use

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Two Column Aerosol Project
Department of Energy, Los Alamos National Lab
Hosting ARM Mobile Facility, consisting of dozens of instruments for meteorological observations and advanced atmospheric measurements

ARLC at the Highlands Center

Broom Crowberry Demography
University of Central Florida
Population dynamics of a rare heathlands plant in response to fire

Changing Precipitation Effects on Salt Marsh Vegetation
NPS George Melendez Wright Climate Change Fellowship, Nickerson Fellowship
Effects of climate change driven precipitation changes on salt marshes and ecosystem services

Paleoforest at Coast Guard Beach
Woods Hole Oceanographic Institution
Using radiocarbons to date a recently emerged cedar swamp

Gray Seal Live Capture, Tagging & Sampling
Led by NOAA National Marine Fisheries Service
Abundance, morphometrics, health assessment, stock structure, and contaminants research

Race Point Beach

Herring Cove Beach

Head of the Meadow Beach

CAPE COD NATIONAL SEASHORE

Marconi Beach

Nauset Light Beach

Coast Guard Beach

0   1   2 Kilometers
0   1   2 Miles

North