

ABOUT BRI

Biodiversity Research Institute (BRI), headquartered in Portland, Maine, is a nonprofit ecological research group whose mission is to assess emerging threats to wildlife and ecosystems through collaborative research, and to use scientific findings to advance environmental awareness and inform decision makers.

BRI supports 10 research programs within three research centers including the **Center for Ecology and Conservation Research**, the **Center for Mercury Studies**, and the **Center for Loon Conservation**. Within the Center for Ecology and Conservation Research, BRI manages the following programs:

Taxonomic

- Mammal Program
- Marine Bird Program
- Raptor Program
- Songbird Program
- Waterfowl Program

Ecosystems

- Arctic Program
- Tropical Program
- Wetlands Program

Environmental Issues

- Wildlife Health Program
- Wildlife and Renewable Energy Program



BRI has been conducting scientific inquiries for private sector and government clients nationwide and globally since 1998. Using both traditional and innovative approaches, our researchers collect, analyze, and interpret scientific results on how ecological stressors impact living systems.

By incorporating regional data and developing strategies for collecting additional data, BRI has effectively modeled such stressors on species and community distributions, phenology, adaptive strategies and population viability across tropical, temperate, and arctic biomes.

BRI's Wildlife Toxicology Lab has the capacity to analyze various tissue samples for mercury concentrations.

For more information on our capabilities and services, visit: www.briloon.org/services

BRI's MARINE BIRD PROGRAM

Through its Marine Bird Program, BRI focuses research efforts on meeting the conservation needs of marine birds, and using these species as bioindicators to evaluate the health of the marine ecosystem. Three primary areas of research include: (1) surveys and population monitoring; (2) movement studies; and (3) contaminants monitoring.

Research Capabilities

BRI staff are skilled in numerous diverse aspects of marine bird research including:

- **Surveys**—Conducting breeding or at-sea surveys on marine birds to estimate abundance, reproductive success, feeding habits, and space use.
- **Capture and banding**—BRI researchers are experts in the safe and efficient capture and banding of marine birds. Techniques vary by species, season, and geographic region; all methods are approved by required permitting agencies.
- **Transmitter selection and fitting**—Tracking technologies are critical for acquiring important data on marine bird ecology. BRI staff are skilled in selecting appropriate transmitters and safely fitting them to individuals.
- **Laboratory analysis**—BRI's Wildlife Mercury Research Lab has the capacity to analyze various tissue samples for mercury concentrations. Necropsies are performed by BRI veterinarians in our Wildlife Pathology Lab.
- **Ecological analysis and modeling**—BRI staff have expertise in managing and analyzing large and complex multivariate datasets comprised of animal movement, contaminant, or other data.



Sampling blood of a Black Guillemot chick.



Black Guillemot

MARINE BIRD PROGRAM DIRECTOR

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BRI's Arctic Program

The conservation of Arctic ecosystems is one of the greatest ecological and political challenges of our time. BRI's Arctic Program contributes to this effort through collaborative research and participation in conservation initiatives designed to identify new and emerging stressors and to inform policymakers and other stakeholders.

www.briloon.org/arctic



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BIODIVERSITY RESEARCH INSTITUTE

MARINE BIRD PROGRAM



WHY STUDY MARINE BIRDS

Marine birds are found across the globe, from the poles to the tropics, where they live at the interface between air, land, and sea (or ice). The harsh conditions found in these environments have caused unique adaptations in their physiology and morphology and require enormous flexibility in life history strategies.

Some of the evolutionary traits that make marine birds well suited to their environment also make them vulnerable to extinction. Many species are considered threatened or endangered at both global and continental scales.

Around the world, marine birds face multiple ecological and environmental stressors, including habitat loss and alteration, disturbance, hunting, interactions with commercial fisheries, oil spills, persistent pollutants, ocean acidification, and other issues associated with climate change.

As such, marine birds are useful indicators of the general health of the marine ecosystem, and they play an increasingly important role in assessments of marine health and in conservation and marine spatial planning exercises.

Marine Birds We Study

Some species emphasized in BRI's research include:

- Northern Gannet
- Red-throated Loon
- Leach's Storm-Petrel
- Brown Pelican
- Black Guillemot
- Black Skimmer



Northern Gannet with an implanted satellite tag.



SURVEYS AND POPULATION MONITORING

Evaluating the conservation status of bird populations is difficult at the best of times, but gathering reliable data on the abundance and distribution of marine birds at sea is an enormously challenging exercise. We employ a series of traditional and innovative techniques to achieve this, including the broad-scale use of high resolution videography in aerial surveys of the Outer Continental Shelf (in collaboration with HiDef Aerial Surveying, Ltd.).

BRI recently completed a three-year project, funded by the U.S. Department of Energy and the State of Maryland, to study the abundance and distribution of wildlife offshore. Project components included:

- Evaluating the abundance and spatio-temporal distribution of marine wildlife (mainly seabirds, marine mammals, sea turtles) across the mid-Atlantic continental shelf region over two years using high-definition digital aerial surveys.
- Evaluating the abundance and spatio-temporal distribution of marine wildlife (mainly seabirds, marine mammals, sea turtles) in mid-Atlantic Wind Energy Areas over the course of two years using traditional boat-based surveys.
- Modeling the abundance and distribution of marine wildlife across the mid-Atlantic continental shelf region to identify hotspots of consistent use.

TRACKING

Banding, including color-banding, has traditionally been used to gain information about marine bird movements. Recent and continuing innovations in technology, however, have opened up more opportunities to track marine birds across the world's oceans in space and time.

At BRI, we use an array of tracking methods (nanotags, geolocators, satellite transmitters) to track the movements of a variety of marine bird species. Birds fitted with nanotags can be remotely tracked regionally, while birds carrying satellite transmitters are remotely tracked on a global scale.



Black Guillemot fitted with a geocator..

BRI tracking studies include:

- Tracking the annual migration and winter movement patterns of vulnerable marine bird species (Northern Gannets, Red-throated Loons, and Surf Scoters) wintering off the mid-Atlantic region of the United States.
- Linking migratory paths and mercury exposure of shorebirds breeding in or passing through the Gulf of Maine.
- Tracking the annual movements and migration of vulnerable marine bird species (Black Skimmers, Brown Pelicans, Great Egrets) in the aftermath of the Deepwater Horizon oil spill.

Many marine birds breed in the Arctic region.

Learn more about BRI's Arctic Program at:

www.briloon.org/arctic



CONTAMINANT STUDIES

Marine birds are regularly exposed to chemical pollutants, where exposure may be acute or chronic. The impacts of pollutants, such as heavy metals, organochlorines, hydrocarbons, and plastics, may occur at the individual or the population level. In the 1960s and '70s, many coastal and marine fish-eating species were subject to eggshell thinning as a direct result of exposure to the insecticide DDT.

Since then, marine birds have been shown to be useful indicators of coastal and marine ecosystem health because they are generally conspicuous, easily observed, long-lived, and wide-ranging. They are often at the top of their food chain where pollutants are accumulated over time. Studying contaminants in conjunction with tracking marine bird movements and migrations can highlight problem geographical areas or indicate contaminant exposure at particularly critical life stages.

Recent BRI contaminant monitoring projects include:

- Evaluating mercury exposure in a broad range of shorebird species breeding at sites across the North American Arctic from Alaska to Nunavut
- Establishing the trend in spatial and temporal patterns of mercury exposure in sentinel marine bird species breeding in the Gulf of Maine
- Evaluating Northern Gannet exposure to polycyclic aromatic hydrocarbons (PAHs)