Biodiversity Research Institute

Quantitative Wildlife Ecology Research Lab

An Integrated Approach to Wildlife Science

Scientists in BRI's Quantitative Wildlife Ecology Research Lab (QWERL) combine hands-on wildlife research with cutting-edge quantitative tools to answer complex ecological questions and inform real-world conservation and management.

Our Quantitative Wildlife Ecology Research Lab:

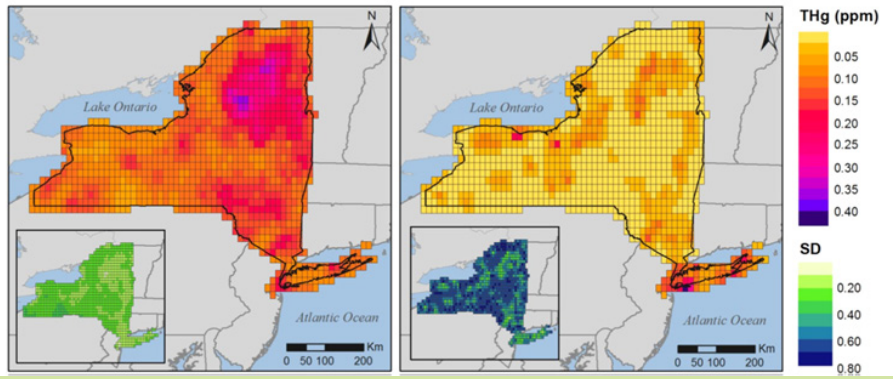
- Applies innovative approaches to answer complex ecological questions
- Brings together an interdisciplinary team with experience in both field studies and conducting quantitative analysis
- Designs rigorous, scalable analytical frameworks specific to each project
- Supports collaborators with study design, data analysis, and data visualization
- Translates complicated technical problems and solutions for diverse audiences
- Transforms wildlife data into actionable insights for conservation and management

QWERL uses data-driven science to help describe environmental change and inform decision making. These **featured projects** show how our team turns complex ecological data into practical insights that protect wildlife, ecosystems, and communities.

Spatial and Temporal Variability in Mercury Contamination Across New York State

BRI led a comprehensive effort to synthesize five decades of mercury data (33,500 samples) across New York State. By utilizing various bioindicators, including fish and bird species, QWERL scientists evaluated spatial and temporal trends to identify biological mercury hotspots.

By creating biological mercury hotspot maps, we identified specific landscapes, such as the Adirondacks and Catskills, where landscape features like wetlands and high-elevation forests make the environment more sensitive to pollution. This synthesis helps stakeholders understand how historical pollutants relate to public health and ecosystem stability.



Spatial distributions of average tissue total mercury concentrations in parts per million in aquatic (left) and terrestrial (right) biota across New York State from 1969 — 2017.

Analytical Expertise

Community Ecology

- ✔ Multi-species data integration and analysis
- ✔ Predator-prey relationships
- ✔ Competition for resources and habitat use

Movement Ecology

- ✔ Animal tracking using satellite, radio, and geolocation data
- ✔ Environmental drivers of behavioral change
- ✔ Analysis of migratory movements and connectivity

Species Distribution, Abundance, and Status Assessments

- ✔ Species density and habitat suitability modeling
- ✔ Population abundance and trends

Cumulative Effects Assessment and Environmental Risk Assessment

- ✔ Integration of anthropogenic, contaminant, and environmental data
- ✔ Quantification of risk to species and populations

Decision Science

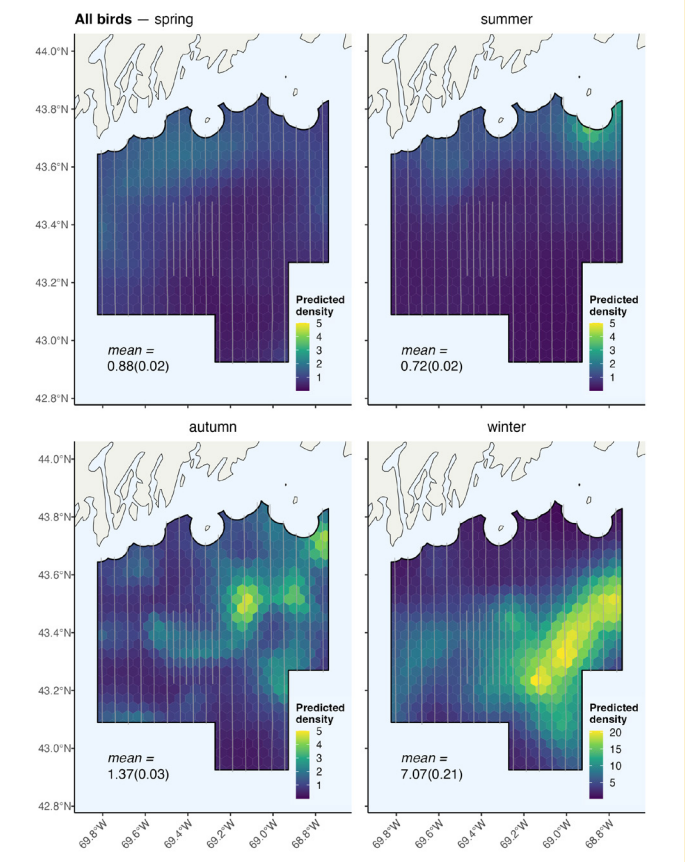
- ✔ Stakeholder engagement and coordination
- ✔ Translating science products into real-world applications
- ✔ Decision support for conservation and management actions

QWERL in Action: Featured Projects

Gulf of Maine Marine Bird Density Models

Spatial modeling allows us to resolve patterns in bird density, offering critical insights at both the local site level and across entire migratory regions. Using digital aerial survey imagery from 2023 – 2024, BRI's quantitative ecologists developed seasonal models of marine bird density in the Gulf of Maine.

These species-specific models provide statistically robust estimates of the number of birds in each cell of a fine-scale grid covering the Gulf of Maine, and how those spatial patterns vary seasonally. This is fundamental information that decision makers need to minimize environmental impacts from offshore wind developments on marine birds.



According to the model, predictied bird densities are higher offshore during the winter and autumn seasons.

Avian Collision Risk Modeling Through Movement Ecology

To address the potential impacts of offshore wind on aerofauna, QWERL developed the Stochastic Collision Risk Assessment for Movement (SCRAM) tool. SCRAM combines avian telemetry data (from Motus, GPS, and satellite tags) with wind turbine specifications to estimate collision risk for federally protected species like the Roseate Tern and Piping Plover.

Piping plovers are a protected species considered in offshore wind planning.

Designed as a user-friendly web application, it allows users to simulate multiple development scenarios, helping developers and federal agencies assess relative risk and make informed permitting decisions.

Benthic Food Web Modeling

Benthic ecosystems (those at the bottom of waterbodies) are highly sensitive to disturbance, and such changes can cascade throughout the ecosystem. QWERL researchers are developing holistic food web models to anticipate how offshore wind structures may alter energy flow through ecosystems and species distributions in the Northwest Atlantic.

This work integrates knowledge of benthic ecosystem dynamics into risk assessments and population consequence models to help regulators implement effective long-term monitoring plans.

To learn more about the work of QWERL, scan the QR code or visit:

www.qwerl.org

For more information, contact QWERL's Co-Directors:

Megan Ferguson, Ph.D.
megan.ferguson@briwildlife.org

Evan Adams, Ph.D.
evan.adams@briwildlife.org

276 Canco Road | Portland, Maine 04103

www.briwildlife.org