ATLANTIC MARINE BIRD COOPERATIVE

Atlantic Marine Bird Cooperative - Roseate Tern Recovery Group
General Presentation Abstracts
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Overview of the Leach's Storm-Petrel Conservation Plan for Eastern North America [SPECIAL TOPIC - Dec 10]

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Due to significant population declines at eight major breeding colonies in eastern Canada, the Committee on the Status of Endangered Wildlife in Canada assessed the Atlantic population of Leach's Storm-Petrel as threatened in 2020. In 2021, research and conservation partners from Canada, US and Iceland came together to develop a conservation plan for a "thriving Leach's Storm-Petrel population in Eastern North America, where the species is valued by current and future generations for its ecological and cultural significance." Guided by this vision, the project team followed the Conservation Standards - an adaptive management planning framework - to develop the *Leach's Storm-Petrel Conservation Plan for Eastern North America*. This presentation will provide an overview of key elements of the Plan to date, information gaps, and next steps.

Multi-decadal changes in seabird and forage fish distributions in the Northwest Atlantic

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Seabirds are forage fish linked across the full annual cycle. The Northwest Atlantic is undergoing considerable changes to temperatures throughout the water column, current structures and productivity, and fish communities are responding to these new conditions. Offshore wind development is expected to further alter both the distributions of forage fish and seabirds in the region; to understand these effects, an understanding of baseline change is crucial. Using regional long-term surveys, we explored the relationships of spatiotemporal changes in Northwest Atlantic forage fish and seabird populations from 2002-2019 with joint species distribution modeling approaches. Across the study area in the U.S. Atlantic, most seabird species decreased in relative density over the study period, while forage fish species exhibited more variable trends. Seabird annual trends were uncertain, and evidence for correlations between seabirds and forage fish annual

trends was limited. Seabird and forage fish distributions shifted considerably over the study period. In some seasons, these shifts were similar across species (e.g., winter in seabirds), while fall and spring were much more variable. These shifts mostly indicate spatiotemporal tracking among the species, though Atlantic menhaden appears to be becoming more closely linked to some seabirds. Our results suggest widespread regional relative density declines in the seabird community of the Northwest Atlantic, as well as declines in the occupancy of several forage fish species that are important prey for seabirds in the region. These findings reinforce the importance of considering variation in predator-prey dynamics, particularly during periods of rapid change for ecosystems.

Framework for assessing the cumulative effects of offshore wind energy development and other pressures on aerofauna in Atlantic Canada

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We present a framework for assessing cumulative effects to aerofauna (herein limited to birds and bats) from offshore wind (OSW) activities to assist in developing regional management strategies for Atlantic Canada. The proposed cumulative effects assessment (CEA) framework implements a population- or species-centric approach and is based on best practices currently used in Europe, the United States, and Canada. The framework was designed primarily to inform the process of delineating specific boundaries for individual OSW project areas ("sites") that developers may bid on within the preliminary regional boundaries identified for OSW development by the Regional Assessment Committees for Nova Scotia, and Newfoundland and Labrador. Our aim is to develop a cohesive and flexible CEA framework that could be applied to a variety of receptors (i.e., species or Valued Ecosystem Components) that differ in the amount and type of ecological information available for analysis. Our analytical strategy uses spatial optimization methods to minimize the value of a cumulative effects metric (i.e., the variable or parameter used to indicate the presence or magnitude of cumulative effects). The combination of possible sites that may be selected to form a valid solution to the optimization problem may be constrained by factors such as minimum or maximum OSW site size, total area of all OSW sites within the region, total energy produced in the region, and avoidance of areas of concern (e.g., based on pre-defined ecological, social, economic, or logistical factors). Given sufficient spatially explicit information about the density of the selected receptor(s), magnitude of the selected pressures, and cause-effect pathways linking the receptors and pressures, we can tune the spatial optimization algorithm to find solutions that minimize population-level impacts to a receptor or community from the cumulative effects of all pressures. Interpreting the resulting cumulative effects metric in the context of predefined decision criteria provides a standardized, transparent method for making decisions about the future of offshore wind development in Atlantic Canada.

Urban seabird colonies: are they a source or sink?

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South Island (SI) is part of the I-64 Hampton Roads Bridge-Tunnel (HRBT) complex in Hampton, Virginia. From 2009-2019, SI supported Virginia's largest seabird colony. The HRBT Expansion Project commenced in fall of 2019 and required the colony be permanently removed from SI. In February 2020, the Virginia Department of Wildlife Resources was charged with providing temporary nesting habitat for the displaced seabirds until the construction of a new nesting island is completed. Ft. Wool (FTW), an artificial island adjacent to SI, was transformed into a 1.5-acre breeding site. An additional acre of habitat was created on industrial barges in the FTW embayment. We successfully used audio lures and decoys to attract Royal Terns (ROYT) and four other seabird species to FTW and the barges. From 2018-2023, we applied plastic field-readable bands (PFR) on 14,126 ROYT (13,900 young, 226 adults). In 2023, we surveyed other ROYT colonies in Virginia for PFR-banded birds to determine if urban colonies are sources or sinks. We observed 331 marked individuals in two remote colonies of which 64% (n = 211) were banded as chicks on SI and 20% (n = 67) were banded as chicks on FTW. In 2024, we increased our resighting efforts and recorded a combined total of 873 marked individuals at both colonies. The majority of the 2024 resightings were of ROYT banded as chicks on SI and FTW between 2018 and 2020. Data analyses are still ongoing, but these preliminary results suggest that heavily disturbed urban colonies do produce future breeders.

Evaluating effects of attaching GPS tags using leg-loop harnesses on Common and Roseate Tern reproductive success and provisioning behavior in the Northwest Atlantic

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During the 2023 and 2024 breeding seasons, we deployed GPS tags (2.6g nanoFix GEO+RF) with leg-loop harness attachments on Roseate Terns (N=26) and Common Terns (N=132) at breeding colonies in NY, NH and ME. We assessed potential tag effects by comparing reproductive success and provisioning behavior between tagged terns, handled control birds and the unhandled population. We found no significant differences in provisioning rates (prey deliveries per hour) or productivity rates (chicks fledged per nest) between tagged and control nests in either Common or Roseate terns.

Interannual variation in bird abundance at Virginia offshore wind turbines

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Bird abundance, patterns of activity, and avoidance behavior can influence exposure to turbine blades and, consequently, collision risk and displacement risk. Data on offshore bird interactions with wind turbines is limited, and few studies examine interannual variation, which limits informed decision-making and hampers

the effective development of potential mitigation strategies. We installed thermal cameras, a visible-light camera, two bird acoustic detectors, and a VHF receiver for detecting Motus-tagged birds at each wind turbine at the Coastal Virginia Offshore Wind (CVOW) Pilot Project in Virginia. At the conclusion of the first year of study, Dominion Energy extended the study for two more years at one turbine. Peaks in activity during fall migration varied among years, and we observed more evenly distributed bird activity in year 2 compared to year 1. Foraging behaviors were most common with passerines, while non-foraging behaviors were most common with other non-passerine species groups. These results suggest that exposure, collision, and displacement risks vary among years for birds in the offshore environment, and additional years of offshore bird and bat data allowed us to quantify this variability. These data are useful for understanding potential exposure, collisions, and displacement risks with wind turbines in the mid-Atlantic offshore areas. Conducting similar research at other wind facilities would provide insights into the spatial variation in bird and bat behavior with wind turbines, as this study only examined temporal variation at one wind facility.

SCRAM 2: Modeling the movements of listed shorebird and seabird species to estimate collision risk with offshore wind turbines

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Collision risk models are used globally to estimate the risk of avian collisions with offshore wind energy turbines. In the United States (US), a stochastic collision risk model and publicly accessible online web application was released in 2022, called the Stochastic Collision Risk Assessment for Movement (SCRAM). This decision support tool uses movement data from tracking studies to characterize collision risk in three federally

listed avian species that are exposed to offshore wind energy development: the Red Knot (Calidris canutus), Piping Plover (Charadrius melodus), and Roseate Tern (Sterna dougallii). Given a lack of surveys designed to target listed shorebirds or seabirds offshore the US, movement models were developed using automated radio telemetry data to estimate collision risk for these species across the US Atlantic Outer Continental Shelf. Phase 2 of the project (2023-2024) included updates to the SCRAM models and tool to incorporate new sources of data (e.g., satellite-based tracking technology), improve the models, and increase the functionality of the online platform. These updates to SCRAM decreased computation time, enhanced model performance, and reduced both the variability and uncertainty of model results. Current limitations include lack of spring migration data from birds tagged at overwintering sites. Additionally, SCRAM 2 assesses risk to breeding and post-breeding Roseate Terns but not migrating Roseate Terns. To address these limitations, planned updates to SCRAM in Phase 3 (2024-2026) include further advancement of the movement and flight height models (e.g., with new species and datasets from innovative tags), and collaboration with international subject matter experts.

A review of mitigation options for birds and bats at offshore wind facilities

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Mitigation of negative effects of offshore wind (OSW) energy development on aerofauna (birds and bats) can be implemented across various phases of development, but the validation and testing of mitigation approaches offshore is challenging. As a result, some mitigation measures may be considered or implemented without reliable evidence of efficacy, potentially leading to false assurance that effects are being mitigated and to resources being wasted on ineffective mitigation measures. We reviewed the scientific and gray literature for several relevant industries to identify approaches for avoiding, minimizing, or compensating for the effects of OSW development on aerofauna, focusing primarily on minimization approaches. Of 212 mitigation approaches identified from 233 source documents, 59% were not tested to assess effectiveness. Of those that were field tested or implemented, we found evidence of effectiveness in only 36% of cases. Thus, there was no evidence of effectiveness for 86% of the mitigation approaches identified. For birds, minimization approaches related to lighting were the most commonly tested and effective methods for reducing maladaptive attraction and collisions. For bats, minimization via alteration of turbine operations (e.g., curtailment) were most commonly shown to be effective. The limited evidence of effectiveness for most approaches suggests: 1) a need for dedicated testing of commonly suggested and implemented mitigation measures, and 2) that avoidance of effects via careful siting of OSW activity remains the best available option for mitigation. To fully mitigate the effects of OSW development on aerofauna, compensation and offset strategies should also be further explored.

Vessel surveys and seabird restoration in the Gulf of Mexico

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Since 2010, three broad-scale vessel programs have now surveyed the entire northern Gulf of Mexico. This coverage exceeds 700 days and 74,000 km of observer effort using 300-m strip transects. This overview will

give snapshot summaries of recent applications to seabird restoration, identify current projects, and point to future collaborations aimed at applied conservation and management of the Gulf's marine birds.

Standardizing the response: decision tools for robust marine bird mortality assessments

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Given a rise in anthropogenic, environmental, and disease-related stressors contributing to marine bird mortality, there is a critical need to improve the rigor of mortality assessments. Deficits in data collection and mortality estimation often hinder managers' ability to document the scales of losses and assess population level impacts. Resources, capacity, and assets to assess mortality vary across jurisdictions (federal, state, indigenous, local, etc.), and guidance to support mortality estimation is often unavailable or unclear. Here, we present a decision support tool designed to help managers identify and evaluate survey options to assess marine bird mortality across diverse scenarios. The objective of the decision tool is to guide improved data collection and availability which will increase the ability to robustly estimate mortality, given situation-specific attributes and constraints. The tool is designed to guide response when a mortality event is initially encountered and offers suggestions for assessment and reporting procedures in the absence of - or to complement - existing protocols. The tool also aids users in exploring further assessment and monitoring options by posing questions about species prioritization, mortality spatial extent, and the potential magnitude of impacts on affected species. Finally, identification of appropriate survey methods, that address imperfect detection when a complete census is not possible, may be determined by exploring event-specific scope and species characteristics. Ultimately, this tool aims to facilitate and improve standardization of mortality assessments and equip managers with a practical resource to navigate the decision making process for marine bird mortality estimation.

Winter GPS tagging of Roseate Terns in northeast Brazil

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In February 2024 we initiated a study using GPS telemetry to track Sterna dougallii (Roseate Tern) in northeast Brazil to better understand the non-breeding behavior and habitat use of this endangered species. This is the first time this technology has been applied to Roseate Terns in Brazil. Preliminary data from 15 tagged individuals, with successful data retrieval from 11 birds, reveals novel information about foraging patterns along Brazil's vast semi-arid coastal region and previously undocumented migration stopover and roosting sites. The terns conducted daily commutes between offshore foraging areas 30 to 80 km away near the 100 m depth isobath and coastal nocturnal roosting sites. These findings are significant in light of expanding offshore wind energy prospecting/development and other anthropogenic threats that increase collision risks for

seabirds in the region. Furthermore, three tagged birds retained their devices for as long as 103 days, thereby covering the spring migration period and providing the first tracking/movement data on Roseate Tern migration routes, and their overlap with human-made structures. Our study provides proof-of-concept for the effectiveness of GPS telemetry in tracking Roseate Terns during non-breeding periods and demonstrates its potential to identify places where they may confront, providing crucial data for urgent conservation planning in this critical region for the species. By integrating data from Brazil into global conservation efforts, we can better protect Roseate Terns across the Atlantic, shaping both local and international policies to minimize human impacts on migratory seabirds.

Habitat use of Northern Gannets during wintering and migration across a developing wind energy seascape

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Northern gannets (Morus bassanus) have shown high levels of displacement from at-sea foraging areas following construction of offshore wind energy installations near breeding sites in Europe. Along the Atlantic coast of North America, however, current and planned offshore wind energy developments are located along the mid-Atlantic coast of the United States, far from gannet breeding colonies in Atlantic Canada. As a result, near-term exposure to planned wind energy developments is likely to affect gannets during migrating and wintering, when fine-scale habitat relationships are relatively less studied than those of breeding birds. Thus, there is a pressing need to identify key habitat areas of wintering gannets and relationships to at-sea features in order to predict and mitigate future displacement effects. To fill this information gap, we captured gannets at-sea in New York Harbor (n = 10) and followed them through the non-breeding period using tail-mounted GPS transmitters. Although gannets rarely used existing or planned wind energy lease areas for foraging, frequent within-winter movements between New York Harbor and the mouth of the Delaware Bay included transits over areas slated for wind energy development. During northward migration, gannets from New York Harbor crossed through multiple current or proposed wind energy areas. We observed substantial differences in migratory patterns between individuals and years, with gannets tracked in 2023 migrating directly to breeding areas while gannets tracked in 2024 incorporated multiple stopovers in southern New England. Our results confirm New York Harbor as a hotspot for wintering gannets and offer insight into the timing and extent of within-winter movements, which expose gannets to collision or displacement risk across multiple proposed wind farms.

Assessing movement patterns of Brown Pelicans in relation to areas of PFAS concentration

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Both Eastern brown pelicans (Pelecanus occidentalis carolinensis) and American oystercatchers (Haematopus palliatus) breed in high abundance in Charleston Harbor, South Carolina, an area of elevated concentrations of per- and poly-fluoroalkyl substances (PFAS). Charleston Harbor lies at the confluence of three rivers with various inputs of PFAS from industrial sources and military bases. With dissimilar life histories and dietary inputs but similar breeding environments, the relative levels of exposure between these two species are unknown. Differing PFAS body burdens may be reflected in individual and species-specific habitat use. Previous research shows high levels of PFAS in brown pelican eggs regardless of the colony distance from Charleston.

We deployed high temporal frequency GPS tags on 25 brown pelicans and 27 American oystercatchers breeding in and around Charleston Harbor during the summer of 2024 to understand species-specific differences in estimates of space use and high-use areas. We analyzed environmental matrices of contaminant levels of PFAS compared to space use of these species. During the breeding season, American oystercatchers exhibited higher use of the Wando River, which has relatively lower development than the other two rivers. In contrast, breeding Eastern brown pelicans frequently visited all three rivers but had concentrated use along the Ashley River, often downriver of a military base with known PFAS precursors from aqueous film forming foams (AFFF). Additionally, brown pelicans dispersed further across the landscape than American oystercatchers. Given the ubiquity of PFAS contaminants in the environment, this study aims to unravel how differences in space use by highly mobile species may reflect total PFAS body burdens.

Tracking movements of terns that use New England staging sites

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With funding from Bureau of Ocean Energy Management, we (U.S. Fish and Wildlife Service, Massachusetts Division of Fisheries and Wildlife and Mass Audubon) are collaborating on a study that uses GPS-RF tags and an array of base-stations to track movements of Common Terns. The focus of the study is to assess tern movements during the breeding and post-breeding period relative to offshore wind lease areas. In 2024, we tagged 60 Common Terns and deployed an array of 5 base stations at key breeding and staging sites in Massachusetts. The base stations are configured to download GPS data from the tags when the terns are in proximity. The study is conducted in coordination with several other projects using similar technology, from Nova Scotia to New York, leveraging large sample sizes of tagged terns and base stations throughout the broader region. We will attempt to retrap tagged terns next breeding season with the aim of recovering full-annual-cycle data stored on the tags.

Evaluating the performance of machine learning approaches for estimating seabird bycatch in U.S. Atlantic pelagic longline fisheries

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In the Western North Atlantic U.S., seabird bycatch in the pelagic longline fishery continues to be a serious concern. Previous analysis of the Pelagic Observer Program (POP), which monitors the Atlantic longline fishery bycatch, including seabirds, showed that there were significant differences in the gear usage between vessels that catch seabirds and those that do not. This study aims to use those differences found in previous studies to create machine learning models that may predict which vessels are likely to catch birds based on the gear and fishing tactics used. The objective of this study is to develop a machine learning model to predict seabird bycatch events and further identify vessel related fishing tactics that might affect seabird bycatch probabilities. In total 18 different tactics across four categories: effort, depth, lures, and miscellaneous, as well as 7 environmental variables were used to create decision tree, random forest and XGBoost models. Because the events with seabird bycatch observed are less than 1%, relatively rare, using both raw and weighted data sets ranging from 10x to 50x weighting were used. and was bootstrapped with 50 random stratified samples. Sensitivity, specificity and cross validation were used to evaluate the model performances. While there was

not much difference in overall accuracy between the models, the decision tree with 40x and 50x weight had the highest mean sensitivity (42.25% and 42.5% accurate bird haul identification). And while sensitivity was low, all models and all weighting factors consistently identified longitude, hook size, hook density, float density, haul temperature, mainline diameter, mainline length and haul year to significantly influence seabird bycatch probability.

Breeding and post-breeding movements of Great Black-backed Gulls in southern New England

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Although Great Black-backed Gulls (Larus marinus) are among the most common seabirds in the northwest Atlantic, surprisingly little is known about their movement ecology. We hoped to better understand exposure to effects of offshore wind energy development and avian influenza. We used Pathtrack nanofix GPS + GSM transmitters to assess their diel movement ecology. We tagged adults on Block Island, Rhode Island (n = 9) and South Dumpling Island, New York (n = 10) in late May 2024. Transmitters collect a GPS location every 20 min, 24 hrs per day, and upload locations to the GSM network. During the breeding season, most individuals foraged within a 40 km radius of their colony, with foraging locations primarily in nearshore marine habitats and, occasionally inshore wetlands. There was little overlap in movements by individuals from these adjacent colonies that were 37 km apart. We did not observe any foraging activity at nearby tern or shorebird nesting areas; however, we did observe elevated foraging activity in an under-construction wind energy development. Following the breeding season, adults adopted a mixture of resident and migratory strategies, with some dispersing as far south as Chesapeake Bay (550 km) and Delaware Bay (380 km), or north to Cape Cod (150 km). Most individuals took nearshore (and, in some cases, overland) routes to reach post-breeding destinations, although some birds flew far offshore off New Jersey before entering Delaware Bay. These movement data provide some of the most detailed insights into the annual cycle of the world's largest gull.

Identifying the exposure and response of understudied waterbird species to avian influenza viruses

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Despite the exceptional host range impacted by the ongoing outbreak of 2.3.4.4 highly pathogenic H5NX avian influenza in North America, the majority of research into this viral threat remains focused on historic vector species like waterfowl. This presentation will provide a brief recap of the current HPAI situation in North America and then discuss ongoing and completed research exploring how infection with avian influenza impacts a broad array of waterbird species. Specifically, this talk will explore our contributions to the limited data available for understudied species such as summarizing findings of challenge study efforts with wild birds native to North America, and conducting surveillance sampling in non-waterfowl species to identify seroprevalence rates and inform population immunity status. We will discuss how this array of information is currently being used to attempt to understand the role of broader waterbird species in the transmission and persistence of avian influenza viruses, as well as future directions for this effort. We will also identify potential areas of collaboration with other scientists such as how our effort to pair disease sampling of waterfowl with ongoing marking projects to understand how infection impacts movement ecology could be expanded to broader waterbird species.

Foraging hotspot surveys reveal divergent prey patch characteristics used by sympatric breeding alcid species in coastal Newfoundland, Canada

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Interspecific competition can drive niche partitioning in diet and foraging habitat of sympatric breeders. Common Murres Uria aalge, Atlantic Puffins Fratercula arctica, and Razorbills Alca torda in the northwest Atlantic often breed in large numbers on the same multi-species colonies. In coastal Newfoundland, Canada, these species rely primarily on forage fish as prey during the summer breeding season to provision their chicks but may target prey patches with different characteristics as body size and dive ability confer varying competitive abilities. To investigate species-specific prey patch characteristics, we conducted surveys in known foraging hotspots of each species. Archived and contemporary GPS tag-derived foraging locations of chick-rearing alcids were used to determine hotspots (i.e., 50% and 95% kernel densities). Within each hotspot, we conducted paired 2 km hydroacoustic surveys with simultaneous bird counts using standard strip transect methods. Patch quality characteristics quantified included: prey density (g/m2), prey accessibility (depth, m) and competitor density (birds/km2). Prey species were identified from video of hydroacoustic targets and sediment sampling. Using generalized linear models of patch quality indices (determined via principal components analysis), we found that Atlantic Puffins and Razorbills foraged primarily in low prey and competitor density patches, comprised primarily of conspecifics, farther from the colony. By contrast, Common Murres foraged closer to the colony at high prey and competitor densities. Our findings suggest that seabird species will respond differently to changes in prey availability driven by changing environment and human activities.

Atlas of Breeding Sites for Waterbirds in the Northern Gulf of Mexico: A new tool to facilitate the management and conservation of waterbirds along coastal northern Gulf of Mexico

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The coastal zone of the northern Gulf of Mexico supports a diverse array of breeding waterbirds. Because of the dynamic nature of coastal habitats, waterbirds may shift the location of their breeding sites interannually in response to availability, size and stability of substrates. Such changes can affect local population size or structure, foraging locations, and threat exposure. With the planned expansion of renewable energy development in federal (and state) waters in the northern Gulf of Mexico, a coast-wide spatial inventory of breeding sites is needed to support habitat management, monitoring and research, as well as marine spatial planning, oil spill response plans, and post-Deepwater Horizon oil spill restoration. We developed an online tool aimed at facilitating the management of waterbirds along the Gulf coast: the Atlas of Breeding Sites for Waterbirds in the Northern Gulf of Mexico. The atlas integrates existing data from 2010 to 2022, including 38 datasets from 9 data providers, representing more than 44,000 surveys of 42 breeding species at 1,740 sites in all five coastal states. This resource will provide critical contemporary information to understand the distribution and status of breeding waterbirds in the northern Gulf of Mexico.

Assessing diet change in endangered Roseate Terns (*Sterna dougallii*) and congenerics on Country Island, Nova Scotia

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Roseate terns (Sterna dougallii) are an endangered seabird with limited breeding locations in Canada. Persistent declines have been observed on Country Island, Nova Scotia despite management efforts to aid recovery of the species. Low reproductive success in seabirds has been linked to reductions in forage fish populations, and Roseate Terns are known to occupy a narrow dietary niche. Our research objective was to determine current diet of Roseate Tern chicks and congenerics and assess sand lance (Ammodytidae) availability on Country Island, Nova Scotia. Feeding watches were conducted and video footage collected during chick rearing to identify prey items being brought back to Roseate Tern, Common Tern (S. hirundo), and Arctic Tern (S. paradisaea) nests. Two decades of historical feeding watch data of Common and Arctic Tern on Country Island will be used as a measure of sand lance availability at this site. We predicted that sand lance was still the primary prey item for Roseate Terns but found that sand lance availability has declined over time. This research has important implications in understanding what factors may be influencing Roseate Tern breeding success, as their numbers have decreased while Arctic and Common tern numbers increased.

A long-term synthesis: cumulative ecological studies of non-breeding Common Loons

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Cumulative studies of nonbreeding Common Loon ecology and behavior in marine and estuarine habitats form a scientific basis for explanation of the carefully studied 1993 NC emaciation mortality event, and for future study. Atlantic Menhaden is a prime regional CL prey base, and its life history fits well with CL's abundance and distribution during my 1988-96 study period in Chesapeake Bay and coastal NC. Menhaden juvenile population "crash" after ~16 years of abundance fits well as a cause of the 1993 mortality event. Ongoing regional study of Menhaden life history and abundance is essential.

Multi-metric energetic analyses for seabird prey in the Northeast Atlantic

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In the Northwest Atlantic Ocean, climate change is impacting seabirds and other species by altering the timing and abundance of prey availability. Climate can also drive changes in fish energetic content and nutrition, with implications for the growth and survival of their predators. This phenomenon has been previously documented in the Pacific Ocean for sandlance (Ammodytes sp.) and for a range of forage fish from the continental shelf habitats of the Atlantic. However, there is a need for updated and expanded energetics data on prey species that live in estuarine and nearshore habitats, particularly for size classes important to colonial nesting seabird species across the region. Here, we present preliminary data for samples collected across two years (2022-2023) and two locations (Buzzards Bay, MA and Petit Manan Island, ME) as a demonstration for future

analyses anticipated with ongoing collections. Preliminary data include key prey (Atlantic silverside, butterfish, hake, herring, rock gunnel, sandlance, stickleback, and squid) measured using multiple energetic metrics including macronutrient values for %protein and %lipid content determined by colorimetric assays, carbon to nitrogen (C:N) values from stable isotope analyses, and KCal per unit weight determined by bomb calorimetry. This project seeks to engage scientists and managers working on seabird colonies to collect and contribute dropped prey to fill size and species gaps and supplement samples collected during routine fish trawl and seining surveys along the U.S. Northeast coast in 2025.

Strengths and limitations of using participatory science data to characterize a wildlife mass mortality event

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For many jurisdictions, the capacity to characterize mass mortality events is limited. We used data from the Highly Pathogenic Avian Influenza (HPAI) outbreak among waterbirds in eastern Canada, 2022, to directly test how well a participatory science dataset from iNaturalist represented patterns of waterbird mortality as judged against a previously-published, comprehensive dataset. The iNaturalist dataset was effective at identifying species with high mortality (especially Northern Gannets, Morus bassanus), along with the time period and spatial regions with high concentrations of avian deaths. However, iNaturalist data severely underestimated the magnitude, overestimated the taxonomic breadth, and poorly represented the full geographic scope of disease-related deaths. Our results suggest iNaturalist can be used to identify the species, timing, and location of relatively high mortality in situations where no other information is available, and to supplement conventional sources of data. However, iNaturalist alone can neither quantify the magnitude nor pinpoint the mechanisms of mortality and therefore is not a viable substitute for comprehensive mortality assessments.

Draft results of conservation and climate adaptation planning at Great Gull Island, NY

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Great Gull Island, NY currently hosts ~2,200 pairs of the federally endangered Roseate Terns, and ~11,000 pairs of Common Terns. In 2021, administrative changes necessitated the development of a Conservation and Climate Adaptation Plan to prioritize management actions and align those actions with a strategic plan. We have used a process based on the Conservation Standards framework to develop a Conservation and Climate Adaptation Plan to prioritize management actions and align those actions with strategic planning for the Great Gull Island colony. We conducted structured interviews with subject experts and other stakeholders and hosted facilitated workshops. Workshop participants identified key threats, ranked those threats, developed strategic models for mitigating the threats, and identified the characteristics of the tern populations and the island's structure that define viability and sustainability. We used this information to develop an actionable plan for our activities over the next 10-15 years. We will present key threats, and high-level recommended actions to address those threats, and discuss crosscutting challenges of developing a sustainability plan during this period of climate instability.

Stakeholder engagement and ongoing research efforts to inform our understanding of the effects of offshore wind energy development on marine birds

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Offshore wind (OSW) development is rapidly increasing in the U.S., and additional field research and guidance development is needed to better understand the effects of OSW on marine birds in U.S. Atlantic waters. New York's Offshore Wind Environmental Technical Working Group (E-TWG), with support from the New York State Energy Research and Development Authority (NYSERDA), has been working to support research, monitoring, and communications related to the potential effects of offshore wind development on marine birds. In addition, the Department of Energy (DOE) and Bureau of Ocean Energy Management (BOEM) have funded Project WOW (Wildlife and Offshore Wind; https://offshorewind.env.duke.edu/), a five-year study to assess the effects of the first commercial-scale offshore wind energy developments on marine mammals, sea turtles, birds, and bats. We will provide brief updates on three activities: 1) Avian displacement guidance. An E-TWG committee developed monitoring guidance to detect OSW-related changes in habitat use and behavior of marine birds. The guidance identifies key research questions, a process for selecting focal taxa, and data collection methods focused on the individual OSW lease area. This guidance document describes how to design studies that provide adequate statistical power to detect effects, and details the strengths and limitations of study methods, as well as making specific recommendations for the use of observational surveys. The guidance was released in August 2024 (available at nyetwg.com/avian-displacement-guidance) and is intended for use by government and regulatory agencies, OSW developers, and other stakeholders, to improve the quality of site-specific monitoring efforts. A working group of the Regional Wildlife Science Collaborative for Offshore Wind (RWSC), led by US Fish and Wildlife Service (USFWS), is now picking up where this guidance left off. 2) Marine bird GPS tracking. As part of Project WOW, collaborators are deploying 120 GPS/GSM tags in 2023-2025 on Great Black-backed Gulls and Northern Gannets in MA and NY. Deployments are expected to be completed by early 2025. We are also leading an international flight height working group focused on understanding bias in altitude estimates derived from satellite transmitters. We will discuss initial results from these efforts, as well as describing plans for future fieldwork and data analysis. 3) Birds and OSW FAQ. In 2025, a new E-TWG committee will develop communications materials to provide scientifically robust information to stakeholders regarding the potential effects of offshore wind development on birds. The FAQ document will provide an important resource for stakeholders engaging with the public on environmental topics. We are currently seeking volunteers with relevant expertise to serve on this committee.

GPS tracking of Roseate Terns from New England to Brazil

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Roseate Terns breeding in the western Atlantic annually migrate thousands of miles, crossing numerous political boundaries and encountering various anthropogenic threats including offshore wind development, oil drilling, over-fishing and habitat degradation. Biologging devices are now widely available to track these seabirds as they navigate these threats giving us the opportunity to assess population level impacts throughout their range, identify priority research needs, and recommend informed conservation action. In the summer of 2023 we began deploying PathTrack GPS tags on Roseate Terns in Maine, followed by additional tracking in Brazil, New York, and New Hampshire in 2024. Here we present preliminary results following Roseate Terns from their breeding grounds, to their critical staging sites, along their migratory routes, and eventually their wintering grounds. We will also highlight growing collaborative tracking efforts and discuss upcoming plans for future tagging efforts in 2025 and beyond.