Maine Department of Inland Wildlife and Fisheries
Summary of Wildlife Information for Research Array
July 2021

Wildlife Overview

The Gulf of Maine (GOM) hosts over 300 species of seabirds, sea ducks, migrating songbirds, shorebirds, bats, and other species. Offshore population information from aerial and breeding surveys exists for only a limited number of these species in certain locations (such as nesting seabird colonies within certain areas of the GOM), but there are no comprehensive GOM-wide distribution and abundance surveys for all species.

GEO, DMR, and MDIFW met with state and federal agencies and stakeholders over several meetings (see 'Stakeholder Engagement') to identify publicly-available wildlife datasets for the Research Array area of interest (AOI). Stakeholders identified over twenty potentially applicable datasets relevant to offshore wind energy (see Table 1). Many of these studies are not directly applicable to the siting of this Research Array because they do not overlap with the AOI or do not contain spatially-explicit information. However, these data may useful in identifying key research questions addressed by the Research Array.

Due to this limited site-specific data, stakeholders and agency staff identified the Marine-life Data and Analysis Team (MDAT) models (developed by the NOAA National Centers for Coastal Ocean Science , Curtis et al. 2016) as the most comprehensive (albeit coarse-scale) wildlife datasets available for the Research Array AOI. These models depict the predicted distributions and abundances of 47 seabird species from Maine to Florida but also include species not found in the GOM (e.g., brown pelican) and those that are not of conservation concern in Maine (e.g., great black backed gull). To support the state in identifying a location for the Research Array that minimizes potential conflicts with marine species, Biodiversity Research Institute (BRI) conducted a desktop analysis using the MDAT models and a Maine specific vulnerability analysis. BRI presented the methods and received feedback from stakeholders during Wildlife Work Sessions 1 and 2 and reviewed the methods with MDIFW. Additional information on methodology and findings is available in Goodale et. al 2021.

Overview of the Marine-life Data and Analysis Team (MDAT) Model Approach

Using version 2 of the MDAT marine bird relative density and distribution modes, BRI created a series of three maps depicting spatial avian risk for 36 species likely to be present within the proposed Research Array area (detected within 200 km) based on population vulnerability (PV), collision vulnerability (CV), and displacement vulnerability (DV). PV score was determined using regional and state vulnerability rankings (e.g., Maine Species of Greatest Conservation Need Priority, Partners in Flight continental vulnerability rankings, etc.). CV includes information on nocturnal flight activity, diurnal flight activity, avoidance, proportion of time within the rotor swept zone, maneuverability in flight, and percentage of time flying. DV accounts for disturbance vulnerability to ship/helicopter traffic, wind facility structures, and species' abilities to use multiple habitats. Vulnerability categories (PV, CV, DV) were used to weight the existing annual MDAT modeled species density estimates to provide an annual estimate of total avian risk across the proposed Research Array area.

Findings

BRI's results suggest that there may be lower potential risk to marine birds in some specific portions of the AOI. Models of marine bird density based solely on the unweighted MDAT model data (Figure 1) suggest construction of turbines within an area in the east-central portion of the AOI, around the deeper waters of "Mistaken Ground" and extending east through Platts Basin for about 25–30 miles (40–50 km) provide the lowest potential risk to marine birds (areas in blue). In contrast, the shallower areas of the

continental shelf tend to have higher concentrations of birds and likely greater potential risk to marine birds, as demonstrated by the two major banks (Jeffreys Ledge and Platts Bank) being clearly highlighted in red (Figure 1). Weighting the model results by population vulnerability (PV; Figure 2), displacement vulnerability (DV; Figure 3), and collision vulnerability (CV; Figure 4), all confirm that this central section provides the lowest risk to marine birds. Risk, as demonstrated in this analysis, is mostly driven by marine bird abundance across the area (Figure 4), with elevated risk driven by collision potential reducing the area of lowest risk to three smaller subareas in the east-central portion (Figure 3). The easternmost subarea overlaps with the wind exclusion area (red hatching), leaving two remaining areas over Mistaken Ground as the likeliest areas to minimize potential conflict with marine birds.

Since the MDAT models were developed using environmental predictor variables, a separate analysis of covariates in the AOI was not conducted. The MDAT models use a suite of predictor variables as long-term climatologies. Despite the inclusion of 40 predictor variables in the models, only some were consistently more important to the models across many species including: survey transect, day and year, distance to land, depth, chlorophyll *a*, sea surface temperature, turbidity, and wind stress. The first predictors are related to spatial and temporal components of the models and clearly show change in distributions across space and time within and across years. Distance to land is typically correlated with depth, but also takes into account the raw distance from the coast and in some cases colonies for locally-breeding species. Some species are typically found coastally (e.g., Common Eider, Black Guillemot), whereas some species are found almost always in the offshore environment far from shore (e.g., Great Shearwater, Atlantic Puffin in winter), but in general species density tends to decrease with increasing distance from shore. Chlorophyll-*a*, sea surface temperature, turbidity, and wind stress may all relate directly or indirectly to prey availability and/or abundance. These factors are complex and may affect species differently depending on the season. Given the complexity of these relationship, BRI determined that an independent analysis of the variables would be challenging and would be unlikely to provide additional insight into marine bird use of the area of interest.

Next Steps

BRI's analysis indicates that an area around "Mistaken Ground" has relatively lower use by vulnerable marine bird species, likely due to the area's distance from shore, water depth, and lack of significant underwater features. Because other species, such as marine mammals and bats, are likely to be associated with these same environmental characteristics (e.g., underwater features or distance from shore), the Maine-specific MDAT models currently provide the best available comprehensive information to inform siting in areas that minimize impacts generally to wildlife. Inclusion of additional movement and habitat use datasets (e.g., tern foraging, peregrine falcon migration) within the AOI will help us identify additional target species for further monitoring and study.

Key References

Curtice, C., J. Cleary, E. Shumchenia, and P. Halpin. 2016. Marine-life Data and Analysis Team (MDAT) technical report on the methods and development of marine-life data to support regional ocean planning and management. Prepared on behalf of the Marine-life Data and Analysis Team (MDAT).

Goodale, M.W., A.T. Gilbert, and I.J. Stenhouse. 2021. Supporting Siting of the Maine Research Array. Report to the Maine Department of Inland Fisheries and Wildlife & the Maine Governor's Energy Office. Biodiversity Research Institute, Portland, ME. 13 pp.

Maine Department of Inland Wildlife and Fisheries
Summary of Wildlife Information for Research Array
July 2021

Table 1: Overview of Wildlife Datasets Identified by Stakeholders

Target Species	Data Type	Geographic Scope	Date of Collection and Data Scope
Metocean data and physical oceanographic drivers	Varies	Gulf of Maine	Real time data and model forecasts
Multi species	Varies	Platts Bank	July 2005: Multiple trophic levels (zooplankton, fish, seabirds, marine mammals) and fine-scale drivers of trophic interactions
Marine birds, fish, plankton	Shipboard surveys	Gulf of Maine	2014-2016: Multiple trophic levels, summer effort (July)
Marine birds, mammals, bats	Visual surveys, acoustics, video monitoring	Near Castine	2013-2014
Landbird migrants	Acoustic	Monhegan Island	2011
	Banding	Metinic Island, Petit Manan Point, Great Duck Island, Seawall (Acadia National Park)	2009-2011: Summary of historical GOM data, migration ecology, stopover habitat use, migrant condition; not useful for siting, more pertinent for research question interests
	Banding	Acadia National Park and offshore properties	2010-2012: Not useful for siting, more pertinent for research question interests
	Nanotag tracking	Petit Manan Point	2013-2014: Not useful for siting, more pertinent for research question interests
Aerial migrants	NEXRAD	Southern Gulf of Maine	Ongoing migration patterns relative to environmental conditions, time of year/day; info mostly at altitudes above rotor-sweep zone, especially offshore; no species-specific information
Migrant birds/bats	Radar	Monhegan Island	2010: Provides the only offshore flight height info; does not differentiate organisms or species, somewhat weather limited
Bats	Acoustic	Monhegan Island	Provides the only offshore flight height info; does not differentiate organisms or species, somewhat weather limited
	Acoustic	Gulf of Maine DOE study (NERACOOS Buoy E and other nearby locations)	2009-2014
Marine birds	Aerial Survey	Nearshore	2010 to 2014 Limited to nearshore area transects
	Shipboard Surveys	Monhegan Island	2011-2012
Sea ducks	Aerial Survey	Transects every 5 degrees of Latitude from Canada border to Maine/NH border (and to FL) offshore variable distances (16 to 70 NM)	2008-2011
Terns (Common/Arctic)	GPS tag data	3 colony sites in the GOM (NH and ME)	Summer 2019: Local inshore and offshore movements of terns in the vicinity of breeding colonies
Raptors (peregrine falcon, merlin)	Banding, satellite tracking	Cutler	2020 Travel routes of four peregrine falcons and one merlin along the Atlantic Flyway
Northern saw-whet owls	Banding	Cutler, Vinalhaven, Isle au Haut, and other coastal locations	2009-2013 Not useful for siting, more pertinent for research question interests
North Atlantic Right Whale, sea turtles, other cetaceans	Sightings and Photo ID	North Atlantic	1970's through present: North Atlantic Right Whale Consortium

Maine Department of Inland Wildlife and Fisheries
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July 2021

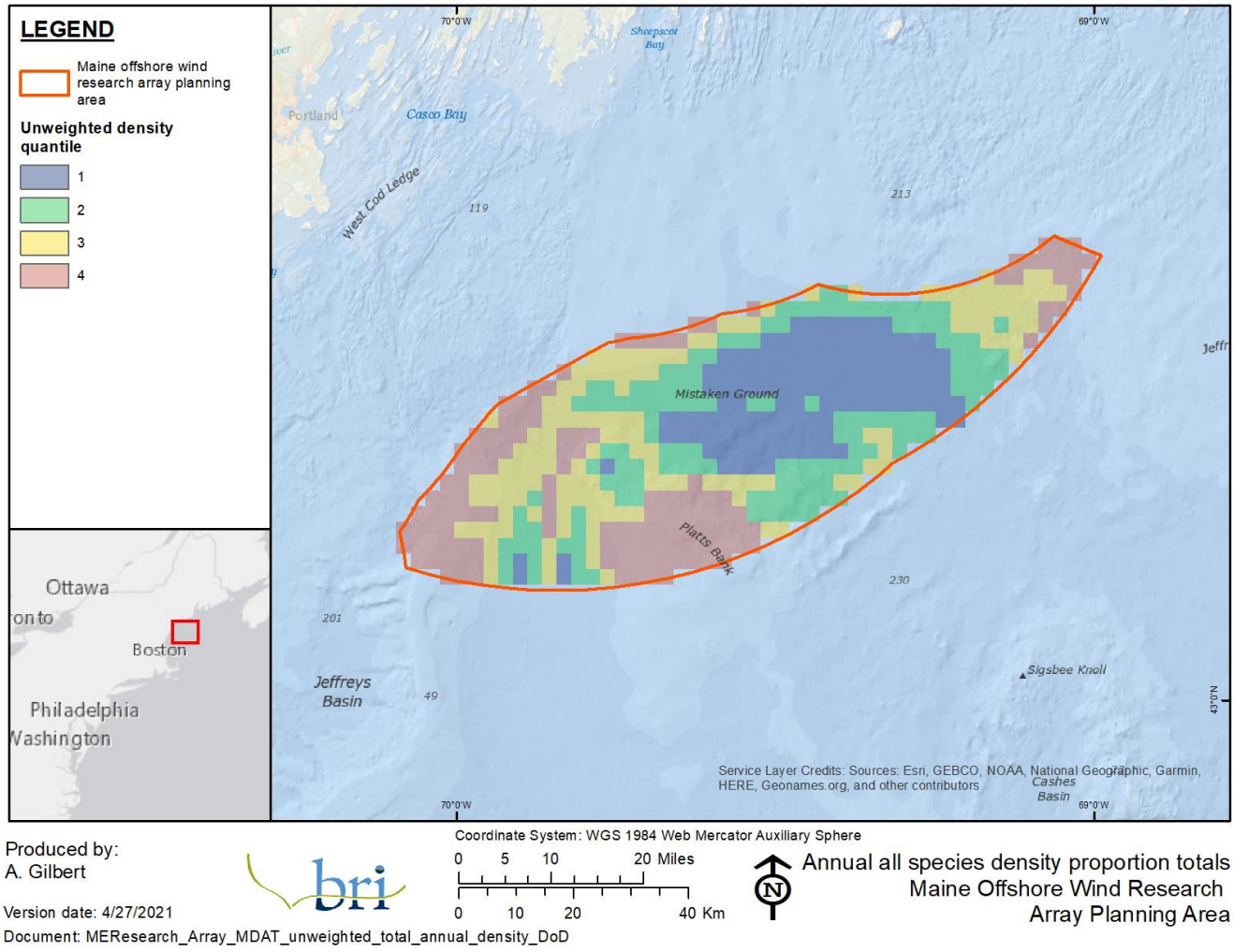

Figure 1. Unweighted MDAT models. Areas in blue indicate the lowest density of marine birds, thus have the least conflict.

Maine Department of Inland Wildlife and Fisheries
Summary of Wildlife Information for Research Array
July 2021

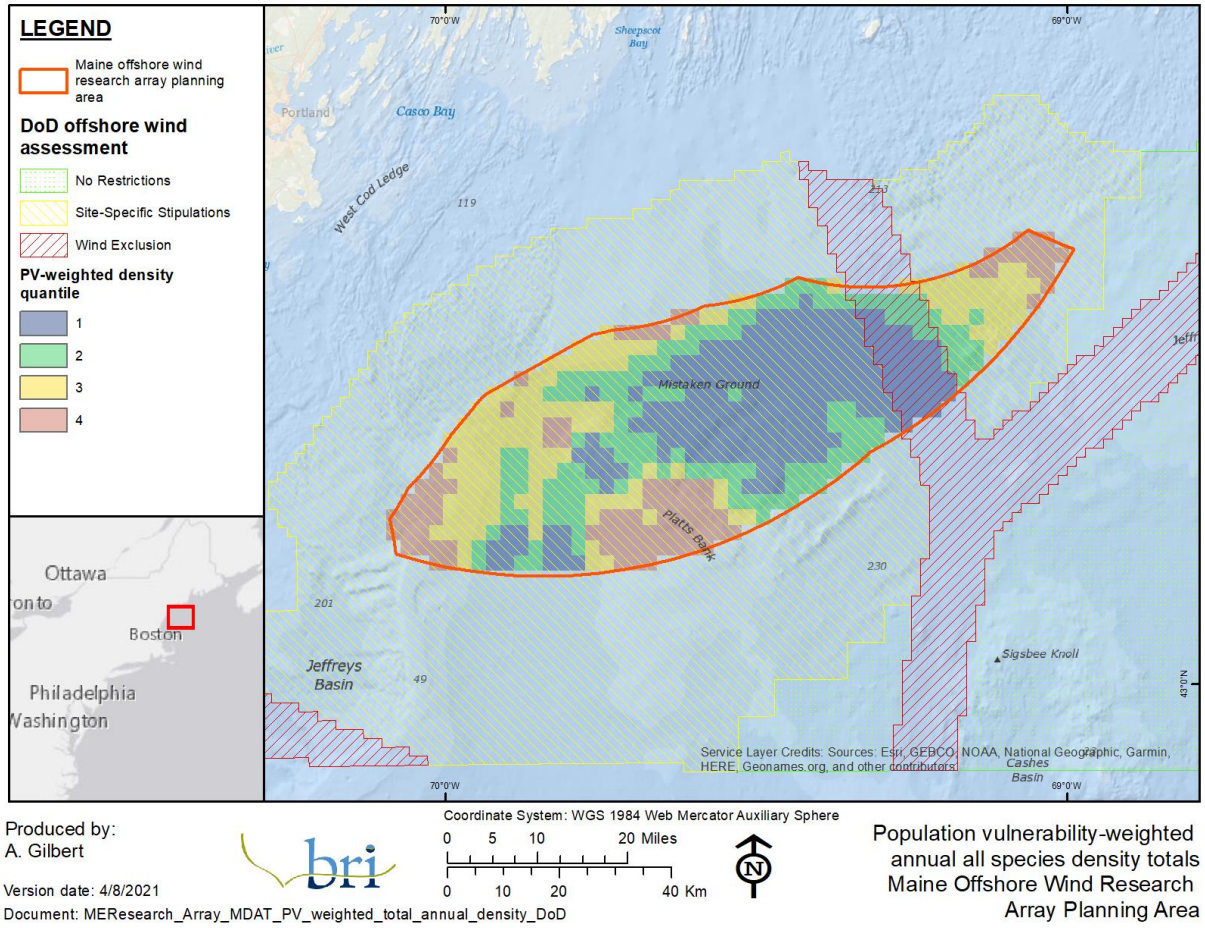

Figure 2. MDAT models weighted by population vulnerability. Areas in blue indicate the lowest density of marine birds, thus have the least conflict.

Maine Department of Inland Wildlife and Fisheries
Summary of Wildlife Information for Research Array
July 2021

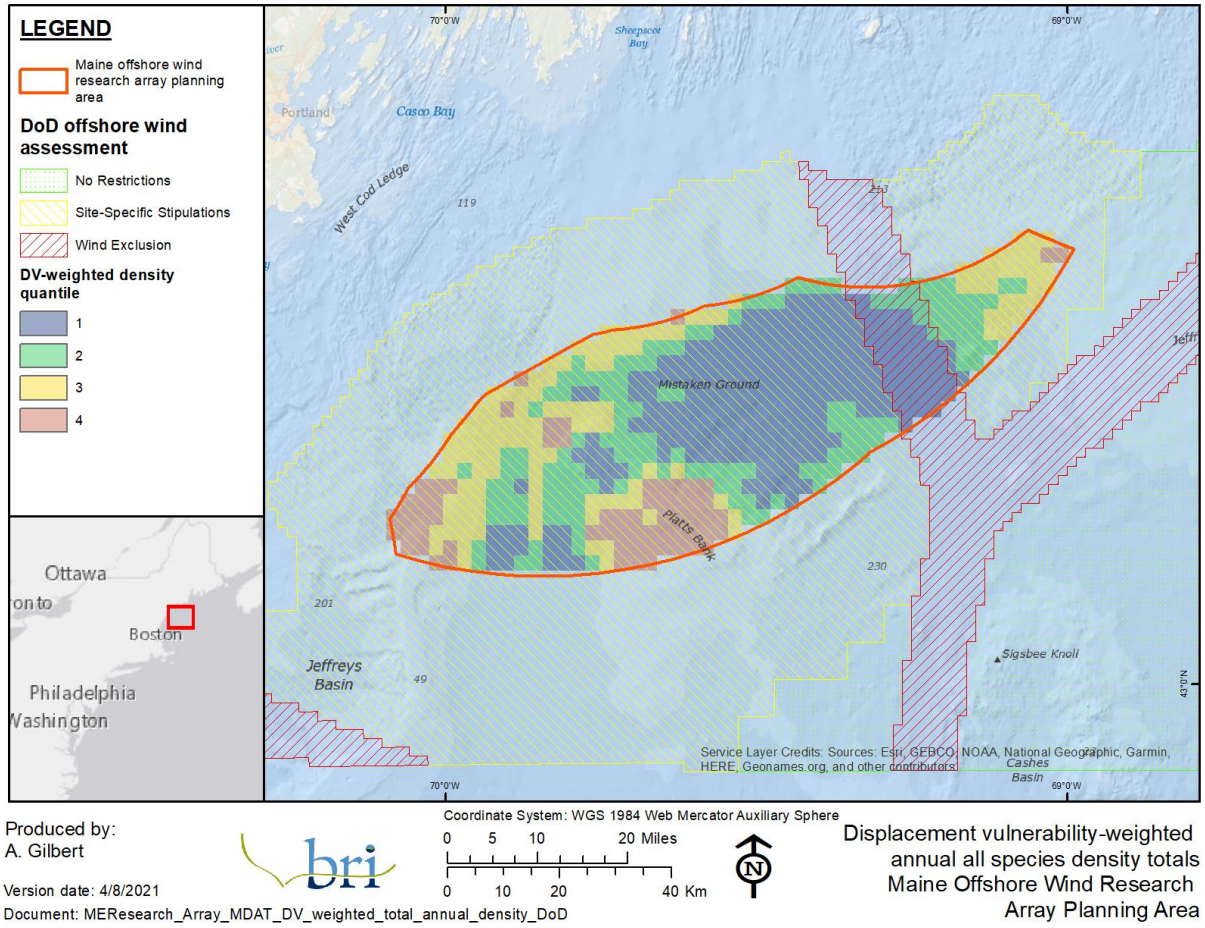

Figure 3. MDAT models weighted by displacement vulnerability. Areas in blue indicate the lowest density of marine birds, thus have the least conflict.

Maine Department of Inland Wildlife and Fisheries
Summary of Wildlife Information for Research Array
July 2021

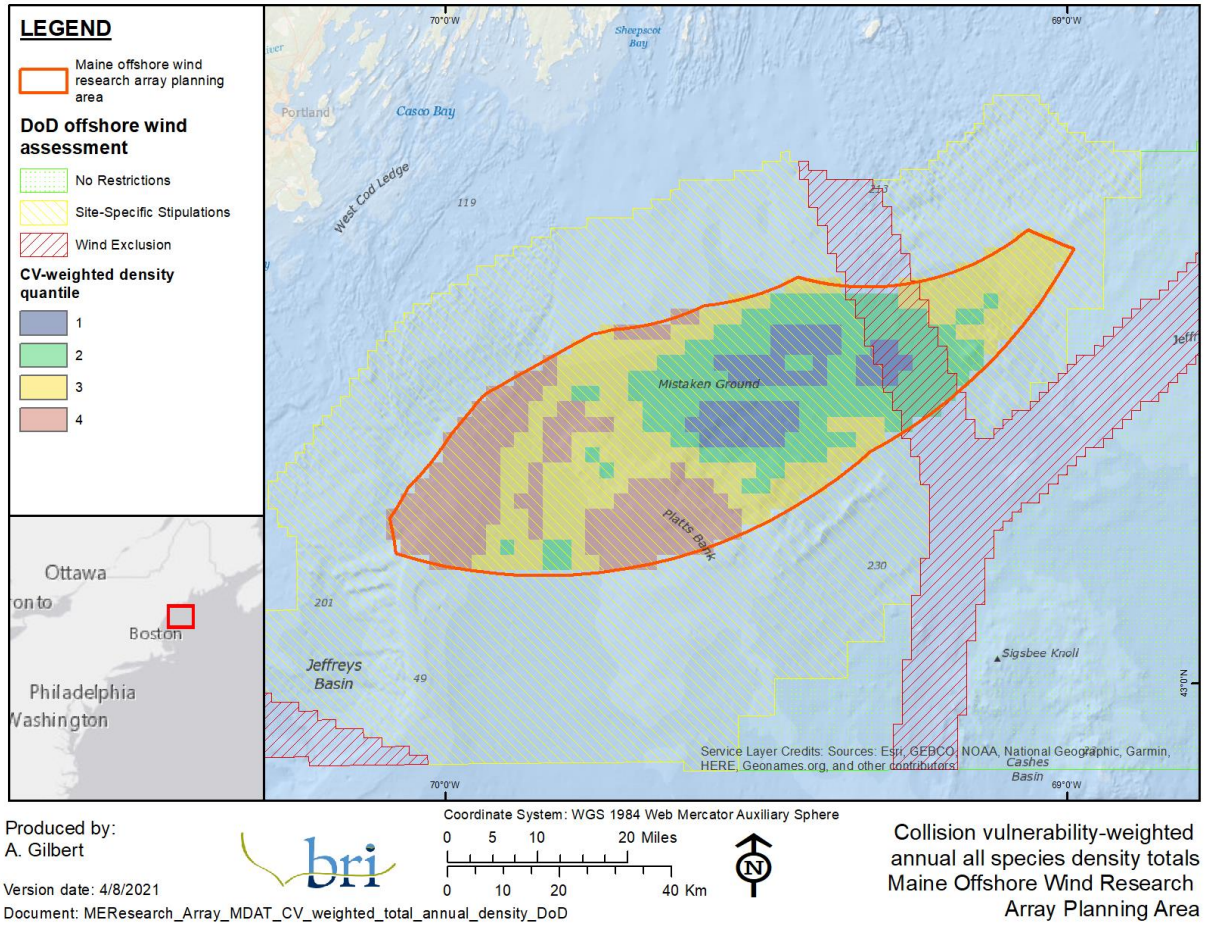

Figure 4. MDAT models weighted by collision vulnerability. Areas in blue indicate the lowest density of marine birds, thus have the least conflict.