UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northeast Fisheries Science Center
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Dear Brian;

Right whales are one of the most endangered marine mammals with fewer than 350 animals remaining in the population (Pettis et al. 2022), down from a high of 478 in 2011 and over 400 as recently as 2017 (Hayes et al. 2021). In 2010, right whale foraging distribution began to shift considerably (Record et al. 2019), with a continually increasing number of animals occupying southern New England waters, where almost 50% of reproductive female right whale population has been sighted (Quintana-Rizzo et al. 2021). The most recent right whale habitat modeling shows a considerable increase in right whale habitat use of southern New England waters during recent years (Roberts et al. 2016, Roberts 2022).

Right whale distribution in the southern New England region occurs in and adjacent to offshore wind energy lease areas, which they occupy throughout the year (Davis et al. 2017, Passive Acoustic Cetacean Map 2022), and it is the only known area of winter right whale foraging aggregations (Johnson et al. 2021, Quintana-Rizzo et al. 2021). Of particular importance is the area near the western edge of Nantucket Shoals, which has proven to be an important habitat for right whales and other protected species from seabirds to sea turtles (Dodge et al. 2014, White and Viet 2020, Quintana-Rizzo et al. 2021). The development of offshore wind poses risks to these species, which is magnified in southern New England waters due to species abundance and distribution. These risks occur at varying stages, including construction and development, and include increased noise, vessel traffic, habitat modifications, water withdrawals associated with certain sub-stations and resultant impingement/entrainment of zooplankton, changes in fishing effort and related potential increased entanglement risk, and oceanographic changes that may disrupt the distribution, abundance, and availability of typical right whale food (e.g. Dorrell et al 2022). The focus of this memo is on operational effects, and as such, focuses on potential oceanographic impacts driving right whale prey distribution, but also acknowledges increased risks due to increased vessel traffic and noise. However, unlike vessel traffic and noise, which can be mitigated to some extent, oceanographic impacts from installed and operating turbines cannot be mitigated for the 30-year lifespan of the project, unless they are decommissioned.

Disturbance to right whale foraging could have population-level effects on an already endangered and stressed species. The right whale population is food resource-limited and generally in poor body condition (Greene 2016, Christiansen et al. 2020, Moore et al. 2021, Stewart et al. 2021, 2022 in press). Right whales are chronically stressed from food limitations, entanglement, sub-lethal vessel strikes, and noise. Displacement from a prime portion of their only winter foraging grounds due to disruptions in forage availability/distribution and/or exposure to other stressors (e.g., increased vessel traffic) could have extremely detrimental energetic effects, resulting in reduced calving success (Meyer Gutbrod and Greene 2014, Meyer Gutbrod et al. 2015). Additional noise, vessel traffic, and habitat modifications due to offshore wind development will likely cause added stress that could result in additional population consequences to a species that is already experiencing rapid decline (30% in the last 10 years).

Right whales need dense aggregations of prey to make foraging energetically worthwhile, and disruptions to prey aggregations in the only known winter foraging area for right whales could have significant energetic and population consequences (Baumgartner and Mate 2003, 2005, van der Hoop et al 2019, Kenny et al 2020). Without dense aggregations of prey, right whales will search elsewhere for food, potentially at an energetic loss, given the likely increased metabolic travel costs and that alternative energetically beneficial foraging grounds may not exist during the winter. In addition, searching for new areas may place them in harm's way as occurred during their shift to Canadian waters sometime after 2010, resulting in 17 observed mortalities in 2017 and another 10 in 2019, and estimates of more than 200 total mortalities since (Davies & Brilliant 2019, Pace et al. 2021).

The presence of structures such as wind turbines are likely to result in both local and broader oceanographic effects, and may disrupt the dense aggregations and distribution of zooplankton prey through altering the strength of tidal currents and associated fronts, changes in stratification, primary production, the degree of mixing, and stratification in the water column (Chen et al. 2021, Johnson et al 2021, Christiansen et al 2022, Dorrell et al 2022). Modeling studies in this region have found changes in distribution patterns of planktonic larvae under offshore wind build-out scenarios (Johnson et al. 2021, Chen et al. 2021), suggesting similar impacts could occur with right whale's zooplankton prey. The scale of impacts is difficult to predict and may vary from hundreds of meters for local individual turbine impacts (Schultze et al. 2020) to large-scale dipoles of surface elevation changes stretching hundreds of kilometers (Christiansen et al. 2022). Additionally, offshore substations pose an unknown risk related to water withdrawals and impingement/entrainment of zooplankton and other prey species.

We anticipate that incremental movement on the scale of 20 km or more from the edge of Nantucket Shoals 30 meter isobath for initial proposed development, inclusive of WTGs and DC-convertor OSSs, would reduce the potential for negative consequences to right whale prey and the NARW population. The tidal front associated with the bathymetry defining the edge of Nantucket Shoals aligns with right whale foraging observations. This frontal region typically spans approximately 10-20 km (Potter and Lough 1987, Lough and Manning 2001, Ullman and Cornillon 2001, White and Veit 2020), with its strength and cross-isobath flow potentially influenced by regional winds (Ullman and Cornillon 2001). The estimated location of this front varies from the 50 m isobath to inshore of the 30 m isobath (Ullman and Cornillon 2001, Wilkin 2006). We propose the buffer zone begin at the 30 m isobath, which corresponds with the predicted location of tidal mixing fronts in this region (Simpson and Hunter 1974, Wilkin 2006). A conservation buffer of 20 km also corresponds to the extent of the strongest impacts to depth-averaged velocity, salinity, and sea-surface elevation changes as observed in the North Sea, where the largest impacts extended 20-30 km and where turbines, both height and number, were much smaller than planned development in southern New England (Christiansen et al. 2022). Concentrating development to the southwest and creating a conservation buffer adjacent to the Shoals is expected to reduce risk by reducing overlap between high species distribution and concentrated areas of construction, operations and maintenance activities, including associated vessel traffic and potential changes in commercial and recreational fishing activity. We note that offshore wind maintenance and operational impacts would be for a duration of thirty or more years.

As offshore wind energy projects in southern New England progress in development, in particular around Nantucket Shoals, it is critical to assess the range of impacts/threats and stressors to protected species and the degree to which they can be mitigated. This needs to include taking into consideration the chronic state of right whales and the importance of productive foraging habitats to these species. These impacts should be thoroughly analyzed in any EIS or other environmental reviews associated with offshore wind development.

Sincerely,

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