Responsible Offshore Development Alliance

March 16, 2020

RADM Andrew J. Tiongson, Commander
U.S. Coast Guard, First Coast Guard District
408 Atlantic Avenue
Boston, MA 02110

Re: Port Access Route Study: The Areas Offshore of Massachusetts and Rhode Island; Docket No. USCG-2019-0131

Dear Commander Tiongson:

The Responsible Offshore Development Alliance (RODA) submits the following comments regarding the United States Coast Guard's (USCG) Notice of Availability of the draft report for its Massachusetts and Rhode Island Port Access Route Study (MARIPARS) (Draft Study).[1]

RODA is a membership-based coalition of fishery-dependent companies and associations committed to improving the compatibility of new offshore development with their businesses. Our approximately 170 members are comprised of major fishing community groups, individual vessels, and shoreside dealers operating in federal and state waters of the New England, Mid-Atlantic, and Pacific coasts.

As detailed in previous comments to USCG and other regulatory agencies, RODA has played an ongoing role in the development of recommendations for turbine layout, orientation, and fishing vessel transit needs in wind energy arrays. Our members greatly value their direct work with these agencies—as well as offshore wind developers—in collaborating on mutually satisfactory solutions that will support coexistence among multiple ocean uses. RODA strives to move quickly toward a future in which fishermen can work together with project proponents and federal and state authorities to productively and efficiently approach project design and mitigation in a manner that effectively reduces risk for both industries.

Despite what we believe are shared goals toward collaboration, as offshore wind energy development is an emerging use of the marine environment it is absolutely imperative that early projects do not set precedents that will lead to large-scale displacement and economic harm to existing sustainable fishing practices. RODA thus continues to urge the regulatory authorities including USCG to exercise special care in conducting analyses and gathering input from impacted fishermen in order to ensure that impacts are effectively addressed.

The comments below detail a number of concerns regarding the Draft Study as it stands. First, the analysis places greater priority on potential future uses of the MA/RI Wind Energy Areas (WEA), rather than on existing uses, by only analyzing one layout—that submitted proposed by the wind energy developers. While previously submitted comments, including layouts with potential transit lanes, are noted in the report, the MARIPARS in its current iteration does not give a full investigation

[1] 85 Fed. Reg. 5222 (Jan. 29, 2020).

of these alternatives and these must be included in the final report. Second, the analysis fails to substantiate the specific impacts that will befall on fishing vessels due to their unique nature. Understanding more than how a vessel will get from point A to point B is prudent as fishermen are often constrained by distinctive operational and management requirements, such as days at sea, that others transiting through an area do not need to consider. Third, based on an expert peer review, the calculations used to justify the 1x1 nm grid spacing do not follow USCG's own guidance to determine the Closest Point of Approach (CPA) for a fixed hazard, which is the appropriate methodology to use and would require substantially wider spacing for transit routing in a gridded array layout. Fourth, despite noting the presence of studies on radar interference within a WEA, the report fails to review these studies or produce any recommendations for mitigation of such interference. RODA respectfully requests that USCG conducts a more in-depth analysis on these and the other key issues raised herein prior to finalizing the MARIPARS report.

I. USCG Must Provide Impartial Analysis based on Safety, Not Energy Contracts

The docket supporting the Draft Study correctly summarizes the numerous discussions, workshops, and other efforts by RODA and a large number of our members leading up to the initiation of the MARIPARS.[2] We especially appreciate USCG's inclusion of the original map RODA developed showing traditional fishing vessel transit routes as well as our letter dated January 3, 2020 requesting analysis of dedicated routing corridors, and hereby reiterate that request.

USCG's duty under the goals of MARIPARS is "to enhance navigational safety by examining existing shipping routes and waterway uses."[3] Rather than starting from a neutral position focusing on existing uses and safety, however, the Draft Study effectively over-prioritizes potential *future* uses by only analyzing the array layout proposed in the November 1, 2019 letter from the wind energy developers. USCG appears to justify this decision by stating that it "is a cooperating agency in [the Bureau of Ocean Energy Management's (BOEM)] review process and has no legal authority to direct placement or orientation of wind turbines."[4] Whether or not USCG can dictate the exact placement of wind turbines, it is the nation's foremost maritime safety expert, with the mission "to ensure our Nation's maritime safety, security and stewardship."

RODA and its members have expressed repeatedly that the fragmented offshore wind energy decision making process does not sufficiently include consideration of fishery needs early enough in the planning process to effect meaningful compatibility. This remains a systemic problem. With regard to the New England lease areas, the agencies needed to adopt a structured approach to maintaining fishing vessels' ability to safely transit the area much sooner.

Fragmentation in the planning process led to the execution of the first power purchase agreement (PPA, on July 31, 2018) with a state before any federal or state regulatory effort to identify fishing vessel transit needs *throughout the entirety of the MA/RI lease areas*, despite a high degree of

[2] RODA members have informed us that the docket does not include several written communications between fishery representatives and USCG after the November 1, 2019 submission of the developers' joint proposal.

[3] 84 Fed. Reg. 11314 (Mar. 26, 2019).

[4] 85 Fed. Reg. at 5223. Presumably this statement relates to the interpretation of the "One Federal Decision" policy that BOEM has ultimate authority over all decisions regarding offshore wind energy project approvals.

dependence on the area for such activity. As a result, that first project, and then others, were contractually locked in to produce energy in amounts and at prices that became difficult to adjust. Most fishermen who attended transit discussions in the second half of 2018 recognized this difficulty and thus attempted to "negotiate" a solution that would be considerate to the developers with contracts but still maintain safe transit. As noted in the docket, those efforts failed to reach a full consensus, both between fishermen and developers but also amongst the multiple leaseholders.

Fishermen, developers, federal, and state agencies collectively recognized the difficulties associated with defining appropriate transit lanes after PPAs during the RODA transit workshops in late 2018. At that time, BOEM was poised to conduct the auction for the three newer MA/RI leases. It issued a "buyer beware" referencing the ongoing development of transit lanes so that any developer acquiring one of those leases could readily recognize that fishing vessel needs may impact the developers' ability to fully build out the new areas.[5]

Since that time, states have continued to sign additional PPAs based on the existing and new lease areas, and RODA is troubled that this continues to occur before USCG and other regulatory authorities have completed the development of unbiased transit recommendations. To meet the multiple goals of preserving safe transit, reducing risk to developers and fishermen, meeting power generation and pricing goals, and promoting efficient environmental review, all parties (both public and private) would benefit from procedural changes or federal leadership that prioritizes up-front conflict reduction. Given the absence of such an effort at this time, USCG must conduct its MARIPARS analysis in a way that does not predetermine the outcome based on the results of a flawed process to date.

II. Unique Nature of Fishing Vessel Needs

Commercial fishing vessels have unique operational requirements while in transit, such as the need for sea room due to weather and potential crew fatigue. RODA relies on the expertise of its members when commenting on safety issues for fishing operations. Our members have consistently and adamantly stated that the risk to their safety is too high to operate within a wind energy area. The footprint of a vessel greatly expands, in both length and width, when fishing gear is actively towed and dramatically reduces the maneuverability of the vessel. However, even when gear is not deployed, just as commercial cargo or passenger vessels, fishing vessels have a need for safe transit and established routing.[6]

RODA is aware of comments from service vessel representatives and others supporting the proposition that the uniform 1x1 grid layout proposed by the offshore wind energy developers and contained as the only alternative in the Draft Study would provide sufficient spacing for their operations. These statements cannot be applied to fishing vessels, which are clearly differentiated from service vessels.[7] As described above, fishing vessels are unique in their operations and cannot

[5] BOEM, Atlantic Wind Lease Sale 4A - Supplemental Information for Bidders: Potential Vessel Transit Corridors (Dec. 10, 2018) (available at: https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/MA/Vessel-Transit-Corridor-Supplemental-Information-for-Bidders-ATLW-4.pdf).

[6] Vessels also have unique spacing requirements to engage in fishing activity within a wind energy array, which is outside the scope of these comments and of the MARIPARS study.

[7] With regard to service vessels, peer-reviewed literature also suggests the need for, and availability of, scientific modeling regarding collision risk from WTGs, particularly as facilities move farther offshore and into

safely transit within a grid layout with the spacing proposed in the Draft Study. In a letter submitted in response to the MARIPARS Notice of Study, BOEM recognized the unique needs of commercial fishing vessels and specifically asked USCG to focus part of its analysis on the specific needs of the commercial fishing industry, including maneuverability when recommending the width of potential transit routes.[8] The specific needs of the commercial fishing fleet need to be analyzed to ensure the safety of the fleet.

Insufficient spacing between turbines forces fishing vessels to transit around wind energy areas, regardless of the weather conditions. This may result in bottlenecks in zones deemed safe for transit due to vessels being rerouted by the existence of wind energy areas. Insufficient spacing directly increases the risk to fishermen's safety when transiting home during poor weather conditions, i.e. strong winds and high seas. Fishing vessels may fish until they are forced to return home because of weather; this is distinctly different to service vessels, which cannot service turbines in poor weather conditions and are less likely to be deployed in those conditions.

Service vessels are likely to make shorter trips in order to resolve an issue on a turbine or sub-station, or remain anchored in a work location for longer periods of time, as opposed to fishing vessels that frequently make active trips averaging 5-10 days in length. The nature of these trips, and of the work of fishing, can lead to significant crew fatigue. Fisheries specific regulations can impact fishing vessel transit behavior too; in some fisheries permit holders are allocated a set number of days at sea (DAS) each fishing year and they will land the maximum amount of fish possible when on a DAS before returning to port. If vessels must cut a trip short, or if it takes extra time "on the clock" to navigate around a WEA because it is unsafe to transit through, the vessel owner and crew will realize a direct financial loss. Once a trip has ended, vessels need to return to port as quickly as possible to sell the freshest product. These reasons limit the vessels' ability to ride out a storm at sea and are why they prefer the most direct route to their port. These important contextual influences, unique to fishing vessels, should be more satisfactorily analyzed in the final MARIPARS report.

III. The Draft Study Has Significant Analytical Deficiencies and Omissions

The Draft Study contains numerous flaws, which prompted our members to request RODA to commission an expert peer review from Dr. Thomas Sproul (Appendix I). They considered this review to be essential given the apparent omissions in the Draft Study, particularly given the importance of safety-at-sea. Dr. Sproul identified a number of shortcomings in the Draft Study analysis, including insufficient application of USCG guidance for Closest Point of Approach (CPA) and errors in the calculation of the minimum spacing between the turbines, in both rows and on the diagonal.

deeper water. *See, e.g.,* Lijuan Dai *et al.*, *Risk of Collision between Service Vessels and Offshore Wind Turbines*, Reliability Engineering and System Safety 109 (2013), at 18–31.

[8] Docket No. USCG-2019-0131-0044 (Jun. 4, 2019).

The Draft Study report utilizes a Netherlands study[9] cited in the UK MGN 543[10] to justify the methodology used in calculations for determining the necessary space for safe passage between turbines. As explained in Dr. Sproul's expert review, it is unclear why the report failed to utilize USCG's own guidance on CPA to determine the recommended width of navigation safety corridors between fixed hazards, such as wind turbines.

Dr. Sproul's expert review outlines the calculations that should be employed using USCG's CPA guidance (Appendix I). The Marine Planning Guidelines in COMDTINST 16003.2B state that under ideal conditions the CPA should be 0.5-1.0 nm from each fixed hazard, and in less than ideal conditions a CPA of 2 nm or more or may be necessary.[11] In addition to guidance on CPA for both sides of a navigation safety corridor, COMDTINST 16003.2B indicates the corridor should be designed for a sufficient number of vessels to pass. This constitutes a recommendation that there should be some space for routing between the CPA buffers, but does not include a precise method for calculating its width. Utilizing the routing width recommendation from either the Baird report,[12] 0.32 nm, or the methods used in the Draft Study of 23 lengths of the largest vessel anticipated (i.e. 0.74 nm for a 195 ft. vessel),[13] the absolute minimum spacing should be 1.32 nm (or 1.74 nm) along the diagonal transit corridors through the grid, corresponding to a uniform grid spacing of 1.87 nm (or 2.46 nm). It should be noted that this spacing minimum is based on calculations for ideal conditions, in which fishing vessels do not always operate as noted above. The wider spacing of 1.32 nm on the diagonal would be the only way to allow for a sufficient straightaway course for transit on the diagonal through the WEA.

The alternative spacing method used in the Draft Study (from the "Netherlands study") is not the best methodology to use for the reasons detailed in Dr. Sproul's report. The justification for why USCG used this method fails to mention that: i) USCG guidance for CPA exists; ii) the Draft Study calculations are below the minimum CPA guidance; iii) NVIC 01-19[14] indicates the older MGN 543 was used to develop the USCG Marine Planning Guidelines, and that USCG reviewed the newer MGN 543 and decided *not* to update the guidelines based on the new information it contained; iv) both the MGN 371 and 543 contain recommendations matching the USCG guidance for CPA where turbines should be placed no closer than 0.5 nm from the nearest edge of a shipping route; v) MGN 543 also includes recommendations for 2 nm buffer zones between wind farms and shipping lanes, and for the "20

[9] Ministry of Infrastructure and the Environment and the Ministry of Economic Affairs of the Netherlands, *Assessment Framework for Defining Safety Distances between Shipping Lanes and Offshore Wind Farms* (2015).

[10] U.K Maritime and Coastguard Agency, *Marine Guidance Note 543, Safety of Navigation: Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response* (Feb. 2016) [hereinafter "MGN 543"].

[11] United States Coast Guard, *Commandant Instruction 16003.2B, Appendix E. Marine Planning to Operate and Maintain the Marine Transportation System (MTS) and Implement National Policy* (June 28, 2019) at E-4.

[12] Baird & Associates, Ltd., *Vessel Navigation Through the Proposed Rhode Island/Massachusetts and Massachusetts Wind Energy Areas* (Oct. 31, 2019) (accompanying the leaseholders' proposal letter).

[13] *See* Appendix I, item 5, at 7.

[14] United States Coast Guard, *Navigation and Vessel Inspection Circular 01-19, Guidance on the Coast Guard's Roles and Responsibilities for Offshore Renewable Energy Installations (OREI)* (Aug. 1, 2019).

degree rule" which requires a 5.5 nm corridor width for 15 nm corridors between turbines;[15] and vi) other methods suggesting wider safety margins were not used in the calculations.

While the methodology used was not the most appropriate for determining adequate spacing, the Draft Study's calculations using the "Netherlands study" methodology are also incorrect. They fail to include an UNCLOS Safety Zone (500 m) on each side of the transit lane (clearly shown in the Draft Study Figure 21, pg. 36). Additionally, the calculations assume vessels with a maximum length of 144 ft., which is the documented length of vessels that is available from AIS data. This is considerably less than the vessel length overall considered in developers' Navigational Risk Assessments[16] and the maximum fishing vessel length cited in the Baird report. From these documents, and feedback from our fishing industry members, Dr. Sproul's assumption that the maximum length of fishing vessels transiting the WEA is 195 ft. appears more accurate.

The Draft Study analysis fails to consider the possibility of search-and-rescue (SAR) along diagonal search paths in the WEA. As identified in Dr. Sproul's expert review, the Draft Study recommends "a minimum of 1 nm between turbines along a search path" (p. 29), which will be confined to taking place only along North-South and East-West SAR paths in the Draft Study recommended layout. Consideration of adequate spacing for SAR along a diagonal path is necessary as vessels are intended to transit along this path, which has been indicated in both the Draft Study (pg. 29) and by fishermen who have historically used the area. Furthermore, as indicated in the Draft Study, because predominant wind patterns include summer winds tending to blow from the Southwest and winter winds from the Northwest, a drifting boat in need of SAR would likely need to be searched for along the diagonal. The Draft Study states that normal flight procedures require a turn diameter of 0.8-1.0 nm, and "spacing less than 1 nm will require aircraft to transit the entire length and conduct turns outside of the windfarm" (pg. 29). This poses obvious concerns for fishermen who may require SAR, due to the large contiguous nature of the MA/RI WEA. Expanding the diagonal spacing to 1.0 nm would require 1.41 grid spacing.[17]

The Draft Study also did not conduct a modeling analysis to estimate the overall impacts on navigational safety caused by changes in navigational behaviors resulting from WEAs as called for in the 2016 Atlantic Coast Port Access Route Study (ACPARS).[18] The report called for a model that included individual and cumulative effects on the marine transportation system. The ACPARS Working Group (WG) was unable to complete such a model, because of a lack of expertise on the WG, but recognized it was critical in order to "determine if routing measures are appropriate and to evaluate the changes in navigational safety risk resulting from different siting and routing scenarios."[19]

Finally, the Draft Study puts the risk on individual vessels by not recommending the use of additional safety measures such as a navigation safety corridor that would account for the cumulative effects of

[15] MGN 543 at 18-20.

[16] Clarendon Hill Consulting, *Vineyard Wind Revised Navigational Safety Risk Assessment* (July 24, 2018), Table 4.0-2 at 46; Deepwater Wind South Fork, LLC, *South Fork Wind Farm Navigational Safety Risk Assessment* (Oct. 2, 2018), Table 5-2 at 71.

[17] *See* Appendix I.

[18] USCG, *Atlantic Coast Port Access Route Summary: Final Report* (July 2015), Docket No. USCG-2011-0351.

[19] *Id.* at i.

multiple vessels transiting through a wind energy area. The ACPARS planning guidelines discuss the use of navigation safety corridors as these may reduce risk to all sizes of vessels, which may be forced to transit closer to each other than they would in open ocean conditions. Environmental conditions dictate the path a vessel takes, which can lead to the actual path taken by a vessel differing from its intended path. Vessel operators must be vigilant to notice if this occurs in a WEA with minimal spacing in order to reduce the risk of collision with turbines or other vessels.

IV. The Draft Study Fails to Consider Concerns Associated with Radar Interference

Wind turbines interfere with radar systems, including those used aboard fishing vessels. The Notice of Study for the MARIPARS report stated that its goal is "to enhance navigational safety by examining existing shipping routes and waterway uses" and that, through the study, USCG would "identify anticipated impacts to navigation that may be experienced by mariners intending to transit in, around and through the study area which includes the MA/RI Wind Energy Area (MA/RI WEA)."[20] In order to accomplish the stated study goals, USCG must carefully consider navigation impacts that may result from degradation of marine radar. This effort must incorporate all relevant existing information and new analyses if appropriate, as USCG has done for previous project reviews.

As described below, USCG, BOEM, and other agencies performed dedicated analyses regarding interference to marine radar associated with the Cape Wind project. RODA requests a similar analysis be conducted for the current generation projects. It would not be adequate to solely rely on these studies for the recent slate of proposed MA/RI projects, since the technology and footprint contemplated for the projects have advanced considerably in the past decade.

a. The Draft Study Arbitrarily Ignores Available Information

USCG did not exercise due diligence in considering navigation hazards posed by radar interference in the draft study, despite the abundance of available information. The subject is only addressed in Section III: "Vessel Traffic and Characteristics Analysis, Subsection H. Radar," (p. 26). The relevant text reads, in its entirety:

> The potential for interference with marine radar is site specific and depends on many factors including, but not limited to, turbine size, array layouts, number of turbines, construction material(s), and the types of vessels impacted. A number of commenters mentioned the potential for radar interference by [wind turbine generators (WTG)]. We reviewed several studies that address correlations between wind turbines and marine radar interference. To date, the USCG is not aware of an authoritative scientific study that confirms or refutes the concern that WTGs will degrade marine radar.

The final sentence is misleading. It has been extensively confirmed that WTGs will degrade marine radar, but exact effects on all vessels and the resulting level of safety risk have not been precisely quantified. Given the continued improvement in radar technology and wide variability in marine radars in use by commercial fishermen, quantifying exact effects is a difficult task. However, exact quantification does not preclude consideration of a safety standard given that effects are known to

[20] 84 Fed. Reg. 11314 (Mar. 26, 2019).

exist. The various navigational risk assessments completed by offshore wind energy leaseholders to date similarly omit consideration of this important issue.

b. Wind Turbines' Interference with Radar Functioning Is Well Documented

The Draft Study's assertions that minimal or conflicting information exists to support a conclusion that wind turbines degrade marine radar directly conflict with USCG's previous statements as well as other readily available information.

1. Information on Turbine Effects to Government Radar Is Readily Available

More than a decade of information available to the U.S. government shows that wind turbines significantly interfere with radar functioning. The Department of Defense has repeatedly raised concerns that "radar clutter (i.e., false targets) from the wind turbine blades would seriously impair the agency's ability to detect, monitor, and safely conduct air operations."[21] In response to early concerns over land- and sea-based turbines, the National Security Council requested the White House Office of Science and Technology Policy conduct an internal study in 2011 that found WTGs interfered with radar used for national defense, security, aviation, and weather forecasting "by creating clutter, reducing detection sensitivity, obscuring potential targets, and scattering target returns. These effects on radar systems tend to inhibit target detection, generate false targets, interfere with target tracking, and impede critical weather forecasts."[22]

This type of information is also well known in Europe. Several countries including the United Kingdom, Germany, Netherlands, Austria and Norway require developers to obtain special permission for wind facilities to ensure that radar conflicts are minimized. Each has also established "protection zones" ranging from 5–50 nm around military radar systems.[23]

More recently, in 2014, an interagency Memorandum of Understanding created the Wind Turbine Radar Interference Working Group (WTRIM), which strives to identify and develop recommendations for newer, more effective mitigation solutions.[24] While that group does not appear to have investigated WTG impacts to marine vessel radar systems, it is unclear why the U.S. government would invest significant attention and resources to only certain aspects of radar interference and not others. The WTRIM's expertise and that of other federal agency subject matter experts should be included to apply lessons learned from these related efforts to the MARIPARS study. All traditional radar systems—and those that are used on most fishing vessels—operate using fundamentally the same technology; there is no reason for fishing vessels' navigation systems to be exempt.

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[21] A brief history of the federal government's awareness of this issue is included in U.S. Department of Energy, Federal Interagency Wind Turbine Radar Interference Mitigation Strategy (Jan. 2016), at 2 (*available at* https://www.energy.gov/sites/prod/files/2016/06/f32/Federal-Interagency-Wind-Turbine-Radar-Interference-Mitigation-Strategy-02092016rev.pdf).

[22] Sandia National Laboratories, *IFT&E Industry Report: Wind Turbine-Radar Interference Test Summary*, SAND2014-19003 (Sept. 2014) (available at: https://www.energy.gov/sites/prod/files/2014/10/f18/IFTE%20Industry%20Report_FINAL.pdf).

[23] United States Department of Defense, *Report to the Congressional Defense Committees: The Effect of Windmill Farms on Military Readiness* (2006) (available at: http://www.defense.gov/pubs/pdfs/windfarmreport.pdf).

[24] U.S. Department of Energy, Federal Interagency Wind Turbine Radar Interference Mitigation Strategy (Jan. 2016), at 2 (*available at* https://www.energy.gov/sites/prod/files/2016/06/f32/Federal-Interagency-Wind-Turbine-Radar-Interference-Mitigation-Strategy-02092016rev.pdf) [hereinafter WTRIM].

2. Marine Radar on Fishing Vessels

In addition to the large body of information showing that WTGs impact all radar systems, USCG has previously documented that wind turbines specifically negatively impact marine radar. In 2008, the Marine Minerals Service (MMS, which preceded BOEM as the lead federal agency for offshore wind energy permitting) reviewed the proposed Cape Wind project. During the course of that review two conflicting reports addressing this issue were submitted to MMS, which then referred the matter to USCG for consideration.[25] To resolve discrepancies between the two studies, USCG commissioned a third report from Technology Services Corporation (TSC), titled "Report of the Effect on Radar Interference of the Proposed Cape Wind Project." In a memorandum to MMS, Captain Perry of USCG concurred with the findings of the TSC report and recommended based on its conclusions that MMS characterize the Cape Wind project's impacts to marine radar as "moderate."[26] Specifically, the TSC report found that the project's implementation would significantly adversely impact the ability of a vessel inside or outside of the wind energy facility to detect a vessel within that facility by radar.[27] These findings were fully upheld by a later study prepared for the U.S. Department of Energy, with USCG support, that surveyed and simulated electromagnetic and acoustical challenges to sea surface, subsurface, and airborne electronic systems posed by offshore wind turbines.[28]

Additional studies exist beyond those previously analyzed by USCG. In but one example, a widely circulated study investigated effects to marine radar of the Kentish Flats wind project in the United Kingdom.[29] It was funded by offshore wind developers and is one of the few field-based studies of which RODA is aware that specifically investigated marine radar interference as it would apply to fishing vessels. That study confirmed some of the findings of the TSC study: "effects were generated on marine radar systems in the vicinity of wind farms," which included interference to the ability of radar operators outside of a wind energy array to identify small vessels within the array. The study also noted some valuable potential mitigation strategies. However, it was limited in that observations occurred only from about 1 nm outside of a wind energy facility and expressly warned it should not be used to draw conclusions outside of its specific context of "collision avoidance in pilotage waters from about 1 nm outside a single small wind farm, not to general navigation close to or within other

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[25] Memorandum from Capt. R.J. Perry, USCG Sector SENE, to COMDT (DCO) regarding Assessment of Potential Impacts to Marine Radar from the Nantucket Sound Wind Facility as Proposed by Cape Wind, LLC (Dec. 30, 2008), at 2.

[26] Per the impact categories submitted by MMS at the time of the review, a "moderate" impact was defined as

> "a. Impacts to the affected activity or community are unavoidable, and
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> b. Proper mitigation would reduce impacts substantially during the life of the proposed action, or
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> c. The affected activity or community would have to adjust somewhat to account for disruptions due to impacts of the proposed action, or
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> d. Once the impacting agent is eliminated, the affected activity or community would return to a condition with no measurable effects from the proposed action if proper remedial action is taken." *Id*.

[27] USCG, *Assessment of Potential Impacts to Marine Radar as It Relates to Marine Navigation Safety from the Nantucket Sound Wind Facility as Proposed by Cape Wind, LLC* (Jan. 2009), at 11. (*available at* https://www.boem.gov/sites/default/files/renewable-energy-program/Studies/USCGRADARfindingsandrecommendationsFINAL.pdf).

[28] Hao Ling *et al.*, *Assessment of Offshore Wind Farm Effects on Sea Surface, Subsurface and Airborne Electronic Systems*, Final Report DE-EE0005380 (Sept. 2013), at 19.

[29] MARICO Marine, *Investigation of Technical and Operational Effects on Marine Radar Close to Kentish Flats Offshore Wind Farm* (Apr. 2007).

anticipated wind farm developments." It is also important to note that the significantly smaller size of turbines in that project compared to those proposed for the MA/RI WEAs.

The realization of these concerns has been documented through informational exchanges with European fishermen who operate in areas where turbines have been installed, including this widely-shared photograph taken by one of RODA's members aboard a fishing vessel in the U.K.'s Thanet Offshore Wind Farm:

This image, and other experiences of RODA members, confirms the degradation of marine radar within wind arrays.

3. In the MA/RI WEAs

Specific to the proposed MA/RI WEAs, and through scoping for the MARIPARS study, fishermen and others have repeatedly raised questions regarding the potential for reduced radar capabilities.[30] USCG has previously recognized these concerns both on and off the record, and its findings in the Draft Study represent a dramatic and perplexing departure from prior statements.[31]

Of primary concern in this area are the enormous differences in size and scope of both the proposed WTGs for these projects (potentially exceeding 18 MW by the time build-out is complete) and the 1400 square mile footprint of the contiguous lease areas, which is by far the largest in the world. In light of clear documentation of larger turbines producing greater radar impacts, and of expanding difficulties in identifying vessels the further they are located within a wind energy array, why would the New England lease areas not merit, at a minimum, the level of desktop analysis USCG performed for the Cape Wind project?

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[30] *See, e.g.,* Letter from RODA to USCG regarding Port Access Route Study, Docket No. USCG-2019-0131-0029 (May 28, 2019); *see also* Letter from Zdenka Willis, Director, U.S. IOOS Program Office, to Andrew Krueger, Project Coordinator, BOEM regarding Commercial Leasing for Wind Power Development on the Outer Continental Shelf Offshore New York (July 14, 2014) ("There are eleven [11] high frequency [HF] radars in New Jersey, New York, and Rhode Island that will be negatively impacted to some degree or another by wind turbines situated offshore Long Island . . . NOS and the U.S. IOOS Program would like to work with BOEM to seek to minimize and if possible eliminate impacts to HF radar operations").

[31] *See* Letter from Chris Glander, USCG to Brian Krevor, BOEM regarding Vineyard Wind Draft Environmental Impact Statement (March 1, 2019), at 4 ("We recognize that potential impacts to marine radar continues to be of concern to mariners. Radar impacts are a function of numerous issues including turbine height and size, proximity to other towers, weather, atmospherics, shipboard radar quality, radar operator proficiency, target size and number, etc.").

The Draft Study also fails to identify effects on airborne radar, which may be substantial. These could affect SAR operations because the gain reduction necessary to remove clutter will obscure small targets, i.e., small craft, which tend to produce a weaker return signal. Small craft are more difficult to identify by airborne radar; for example in the QinetiQ 2004 study using British lifeboats, vessels of about 35-40 ft in length were identified as such (lengths were not given in the study, but are apparent from the photos).[32] As part of the MARIPARS study, a data request was made to the RI Department of Environmental Management, which provided median vessel lengths for the four primary gear types operating out of Rhode Island (scallop dredge, pots and traps, gillnet, and otter trawl), using VTR data from 2013-2017. The median length of a vessel using gillnets was 39.0 ft and the median length of a vessel using pots and/or traps was 42.2 ft. Thus, essentially half of all gillnet and lobster/crab fishermen out of Rhode Island are likely small enough craft to experience difficulty with radar detection.

c. The Final MARIPARS Must Include Mitigation Strategies to Reduce Safety Risk

There appears to be broad agreement among experts that turbine placement is a key strategy to minimize radar interference. It is simply inconceivable that USCG would issue recommendations for turbine spacing in the MA/RI lease areas without any probing analysis of the extent of, and possible mitigation measures for, this interference as part of its comprehensive safety analysis. Therefore, this issue needs to be considered in any spacing recommendations and advance of project layout finalization. Several studies, including many of those referenced above, propose mitigation strategies that could be considered to reduce the impacts of marine radar degradation from turbines.

The WTRIM in its 2016 report stated that methods to minimize interaction to radar from turbines include, *inter alia,* "spacing the specific locations of wind turbines farther apart to enable detection of targets between them," clearly stating that "[t]he most important and straightforward approach [to minimizing wind turbine radar interference] is the proper siting of wind facilities on the landscape as well as 'micro siting' of wind turbines within planned facilities." [33] A separate study funded in part by developer Iberdrola similarly concluded "[d]ue to the great influence of both wind farm layout and dimensions of wind turbines have on the potential impact, associations related to radar services are demanding case by case impact studies before a wind farm is installed".[34]

Changes in turbine spacing are not the only possible mitigation measure. The Final Environmental Impact Statement for Cape Wind project notes this:

> Several mitigation techniques can potentially be employed to reduce the effect of the turbines on radar. Radar mitigation techniques could include reducing the radar cross section (RCS) of the turbines and increasing the RCS of the vessels within or near the wind farm. [35]

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[32] U.K. Maritime and Coastguard Agency, *Results of the Electromagnetic Investigations and Assessments of Marine Radar, Communications and Positioning Systems Undertaken at the North Hoyle Wind Farm by QinetiQ* (Nov. 15, 2004), at 40.

[33] WTRIM at 3.

[34] Itziar Angulo et al., *Impact analysis of wind farms on telecommunication services*, Renewable and Sustainable Energy Reviews 32 (2014), at 91.

[35] U.S. Department of the Interior, *Cape Wind Energy Project Environmental Impact Statement* (Jan. 2009), at 27.

Although the FEIS goes on to conclude that increasing the RCS of vessels within the wind farm would enhance radar visibility but not noticeability and therefore only have a minor effect on navigational safety, other strategies may prove more effective. These could include turbine blades specially engineered to reduce a turbine's radar signature, upgrades to vessels' radar systems, use of AIS transponders, cell towers, radar operator training, and others.

d. The Final MARIPARS Report Must Consider Whether Spacing Adjustments Must Be Made to Mitigate Radar Interference

Some of the available literature contains measurements that may be useful in translating radar interference into turbine spacing or safe vessel distance guidelines. The Cape Wind FEIS indicates that secondary reflections (aka "false targets") cannot occur closer than the second circle of turbines due to physics.[36] In the case of a uniform grid, there are two scenarios to consider. For travel along the horizontal and vertical lines of orientation, the worst-case second circle occurs when a vessel passes between two turbines and has a radius of 1.12 times the uniform grid spacing distance (e.g., 1 nm). For travel along the diagonals, the worst-case second circle occurs when a vessel passes closest to a single turbine on either side and has a radius of 0.79 times the uniform grid spacing distance. Navigation safety analyses with respect to radar interference could consider these distances, in combination with projections of vessel speed, reaction time, and probability of detection to assess the resulting safety impacts. For a vessel among turbines that are tightly spaced, reduced radar range may be needed. However, at least one study shows that at a radar range of 0.75 nm, multiple turbines within that range can create enough clutter as to make small craft difficult to detect or notice.[37]

Other reports may also be informative. For example, the Netherlands study cited in the Draft Study recommends a safe distance of 0.8 nm with respect to radar. Moreover, the USCG CPA guidelines suggest 0.5-1.0 nm minimum distance between vessels and fixed or moving hazards and evidence supports that small craft cannot be distinguished from turbine radar signatures until they are at least 385 m (0.21 nm) away from a turbine.[38] If the CPA was considered to be the minimum safe distance that a passing vessel could be surprised by appearance of a small craft, then this suggests a safe passing distance of 0.71-1.21 nm from the nearest turbine. Applied to travel along the diagonals, these distances would correspond to diagonal corridor widths of 1.42-2.42 nm, or uniform grid spacing of 2.01-3.42 nm.

V. <u>The Draft Study Omits Other Issues Raised in Public Comment</u>

Several important issues that fishermen have repeatedly raised throughout the development process for the MA/RI wind projects are absent from the Draft Study. As directed by COMDTINST 16003.2B, Appendix D, a PARS study must "collect and analyze data and other information on:… (k) economic (costs and benefits) effects and impacts; and (l) any additional information that arises as a result of public comments."[39] We have identified and described some of the additional concerns held by fishermen that the Draft Study fails to consider below.

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[36] USCG 2008 at 27.

[37] Eli Brookner, *Deleterious Effects of Cape Cod Proposed Wind Farm on Marine Radars* (March 2008), at 11-12.

[38] QinetiQ (2004).

[39] United States Coast Guard, *Commandant Instruction 16003.2B, Appendix D. Marine Planning to Operate and Maintain the Marine Transportation System (MTS) and Implement National Policy* (June 28, 2019), at D-3.

a. Funneling effects

In RODA's comments on the MARIPARS Notice of Study,[40] we expressed concern over funneling effects in desired transit routes through a WEA. The Draft Study fails to include risk analysis of any bottleneck points that may arise in transit paths that would be used often and by multiple vessels at the same time (such as the most direct route from a specific port to common fishing grounds). This is an important factor to inform the modeling analysis to estimate safety caused by changes in navigational behaviors referenced in Section III above. It is paramount that these lanes be sufficiently wide enough for that increased volume of vessel traffic to transit safely. Of particular concern, changes in weather may lead to rapid increased transiting of vessels back to their homeport. If lanes used for transiting are not sufficiently wide this would lead to a bottleneck effect and create serious safety risk. Thus, high traffic within these lanes should be considered as sizing is determined.

b. Economic Impacts

The Draft Study does not include any cost benefit analysis or economic analysis of alternative layouts, despite the reference cited above expressly mandating this to be done. The report simply and insufficiently states, "[v]essel operators will have to balance the risks of going through a wind farm against the economic impacts associated with the additional distance, fuel, and passage time." (pg. 32). Costs and benefits that should be considered include:

1. Cost and productivity implications for the production of wind power;
2. Costs borne by all vessels including costs of extra distance traveled and extra time at sea, including fuel, maintenance, and labor costs, as well as opportunity costs due to slower transit or when fishing time is constrained;
3. Costs borne by all vessels related to safety preparation, including purchase of upgraded navigation, radar or vessel tracking systems, radar visibility improvement gear, and in the case of fishing vessels, the potential need for an extra crew member to man the tiller and safety systems during all fishing activities;
4. Costs borne by fishing vessels in terms of potential lost landings value;
5. Cost borne by fishermen and by the public due to impairment of NOAA research vessels for stock assessment (NOAA has indicated that its research vessels currently used to conduct fishery-independent surveys will not pass within 1 nm of a wind turbine, and that large shares of their survey areas are to be compromised by MA/RI WEA); and
6. Costs due to navigation safety risks, including increased frequency and severity of vessel accidents in the WEA following construction, increased use of USCG search and rescue resources in response, increased cost of USCG search and rescue operations due to limitations imposed by the presence of turbines, and resulting increases in estimated loss of life and property from the combination of these factors.

The request of a thorough economic analysis is not unique to RODA members. Dr. Robert Griffin, an assistant professor of environmental economics at the University of Massachusetts-Dartmouth, also presented concerns in response to the Draft Study[41] that: 1) the potential for economic impacts is substantial; 2) the Draft Study, if finalized, would set a precedent that economic factors will not be considered for future wind development layouts; 3) there is an apparent rush to a ruling with

[40] Docket No. USCG-2019-0131-0029 (May 28, 2019).

[41] Docket No. USCG-2019-0131-0054 (Feb. 26, 2020).

insufficient understanding of these impacts; and 4) the Draft Study misses an opportunity to develop a robust science-based procedure for future decisions. RODA urges USCG to conduct a complete economic cost and benefit analysis for all layouts considered for inclusion in the final version of the MARIPARS.

c. Icing

An additional concern held by the fishing industry not analyzed in the Draft Study, is the effect that ice buildup on turbine blades may have on safe passage around a turbine. Ice buildup on the turbines is a known issue for wind energy areas in cold climates. Rime icing is a major concern for wind turbines,[42] and once temperatures rise, the ice is likely to dislodge from the blades. Layouts with minimal spacing between turbines increase the risk to transiting vessels from falling ice. The distance from the turbine that the ice can travel varies, dependent on whether the blades are active or locked down. Some of the additional factors affecting the distance travelled include the rotor diameter, hub height, size of the ice fragment, rotor position, and wind speed.[43] Although the cited studies do not suggest icefall is likely to occur outside of the 500 m buffer zone, the size and height of the turbines, in addition to unique geographic features in New England, indicate that USCG should conclusively ensure that recommended turbine spacing maintains a high level of safety, year round, for vessels operating in proximity to wind energy areas.

* * * * *

Thank you for your consideration of these comments and our request for additional analysis regarding these important issues. Please do not hesitate to reach out if we can provide additional information or clarification.

Sincerely,

Annie Hawkins, Executive Director

Fiona Hogan, Research Director

Lane Johnston, Programs Manager
Responsible Offshore Development Alliance

[42] Colin Morgan *et al.*, *Assessment of Safety Risks Arising from Wind Turbine Icing*, EWEC-CONFERENCE (Oct. 1997), at 141-144.

[43] Henry Seifert *et al.*, *Risk Analysis of Ice Throw from Wind Turbines*, in Proceedings of BOREAS VI April 9-11 2004, Pyhatunturi, Finland (2004) (available at http://web1.msue.msu.edu/cdnr/icethrowseifertb.pdf).

APPENDIX I

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COMMENTS RE: MARIPARS DRAFT OF 01/22/2020: Docket USCG-2019-0131

March 16, 2020

Mr. Michael Emerson, Director
Marine Transportation Systems (CG-SPW)
U.S. Coast Guard, Stop 7501
Washington, DC 20593-751
By email: Michael.D.Emerson@uscg.mil
Also submitted as public comment to Docket USCG-2019-0131 via regulations.gov

Dear Mr. Emerson:

Enclosed is my review of The Areas Offshore of Massachusetts and Rhode Island Port Access Route Study, January 22, 2020 DRAFT (USCG-2019-0131), the "MARIPARS Draft." Preparation of my review was coordinated and funded by the Responsible Offshore Development Alliance (RODA) following direct requests by multiple members of fishing communities. My review was funded through direct contributions from the fishing industry.

The MARIPARS Draft recommends "the MA/RI WEA's turbine layout be developed along a standard and uniform grid pattern with at least three lines of orientation and standard spacing" (p. 2) because this layout would "satisfactorily and expeditiously provide safe navigation and continuity of USCG missions" (p. 34). The MARIPARS Draft explicitly considers the importance of travel along the diagonals of the grid layout in recommending three lines of orientation (pp. 32, 36, 37), and states that "a standard array with adequate spacing between WTGs… would create multiple navigation safety corridors through the WEA" (p. 34).

Clearly, spacing between the turbines must be adequate for safe passage. The MARIPARS Draft recommends corridors for transit and fishing that are 1 NM wide in the North-South and East-West directions and 0.6 – 0.8 NM wide in the Northwest-Southeast direction. In other words, a 1 NM uniform grid is recommended, and the resulting diagonal corridor width of 0.7 NM (due to simple geometry) is deemed acceptable. This recommendation exactly matches

the "uniform 1x1 wind turbine layout" proposal submitted by the New England offshore wind leaseholders on November 1, 2019.

The MARIPARS Draft grid spacing recommendations are insufficient for safety, and they appear to be made in error. On the critical issue of spacing along the diagonals, the MARIPARS Draft departs from USCG guidance and uses an alternative method without adequate justification. Further, only through apparent computation errors in this alternative method do the MARIPARS recommendations match the leaseholders' 1x1 grid proposal.

By my calculations, the absolute minimum spacing should be 1.32 NM along the diagonal transit corridors through the grid, corresponding to uniform grid spacing of 1.87 NM. These calculations use the minimum Closest Point of Approach (CPA) guidance from the USCG (for ideal conditions) combined with the Baird methodology (accompanying the leaseholders' proposal) for calculating the necessary width of a route (between CPA buffers on either side), allowing for vessels to pass and maneuver. This minimum spacing calculation should not be construed as a recommendation – it does not account for many risk factors that are present, nor does it recognize alternative guidelines recommending additional safety margin. It is my opinion that substantially wider spacing is necessary for safety.

Scope of Analysis

My analysis is confined to addressing spacing within a uniform grid layout. This analysis does not evaluate nor endorse a uniform grid layout versus alternatives with additional routing measures or wider navigation safety corridors, such as those requested in the public comment letters of the Massachusetts Lobstermen's Association (May 20, 2019) and Seafreeze Ltd. (May 24, 2019), and in the letters after the public comment period by the RI Commercial Fisheries Center (December 18, 2019) and by RODA (January 3, 2020) in response to the leaseholders' proposal. It is obvious even to a casual observer that a 1x1 grid layout carries additional navigation risk after removal of 4 NM-wide navigation corridors (*aka* "transit lanes").

Findings

1. The MARIPARS Draft defines navigational safety corridors (Appendix B, p. 1) consistently with USCG Marine Planning Guidelines in COMDTINST 16003.2B,[1] Appendix E:

> "Navigation Safety Corridors identify the amount of area necessary for vessels to safely transit along a route under all situations. These corridors are not considered routing measures by the Coast Guard or the International Maritime Organization (IMO), but are a tool to delineate areas where no offshore development should be considered."

Since vessels are allowed, and expected, to pass through all straight-line routes between turbines in the uniform grid proposed to cover the WEA, any such route must be considered a navigation safety corridor: the space between turbines in the uniform grid is clearly both a route where vessels must transit safely and an area where no offshore development should be considered. This fact is confirmed by the explicit statement in the MARIPARS Draft that the uniform grid layout "would create multiple navigation safety corridors through the WEA" (p. 34).

2. Despite this acknowledgment, the Draft fails to mention that the Marine Planning Guidelines contained in COMDTINST 16003.2B, Appendix E, also explicitly provide guidance related to the width of navigation safety corridors: the Closest Point of Approach (CPA) is "the safe distance at which a vessel can pass a fixed or moving hazard" (p. E-4). Depending on the assessment of risk factors, COMDTINST 16003.2B, Appendix E indicates a CPA of 0.5 – 1.0 NM may be acceptable under ideal conditions, but that under less ideal conditions a CPA of 2 NM or more may be necessary (p. E-4).

When identifying a straight-line route as a navigation safety corridor with hazards present on both sides, the CPA guidelines must apply on both sides of any vessel transiting the route after accounting for the necessary room for vessels to pass and

[1] COMDTINST 16003.2B is United States Coast Guard Commandant Instruction 16003.2B, Marine Planning to Operate and Maintain the Marine Transportation System (MTS) and Implement National Policy (June 28, 2019). This document is cited as guidance on page 1 of the MARIPARS Draft.

maneuver. This means the minimum CPA distance of 0.5 NM to either side of a route corresponds to a diagonal navigation safety corridor width of 1.0 NM *plus the width of the route itself*. Even if the width of the route itself is assumed to be zero, a 0.5 NM CPA corresponds to a 1.0 NM diagonal corridor width, which corresponds to 1.41 NM uniform grid spacing due to geometry.

Thus, the leaseholders' 1 NM uniform grid proposal conflicts with the barest minimum USCG guidance for CPA with respect to travel along the diagonals. This conflict is neither mentioned nor evaluated in the MARIPRAS Draft, which makes spacing recommendations exactly conforming to the leaseholders' proposal.

3. The Marine Planning Guidelines in COMDTINST 16003.2B, Appendix E do not give exact prescriptions for the width of the route between CPA buffers on either side, other than indicating that space should be available for "a minimum of two vessels passing abeam of one another and other vessel operations in the area" (p. E-4). Using the calculations in the Baird report accompanying the leaseholders' proposal, the route width would be 0.32 NM. Using the calculation in the MARIPARS Draft (Fig. 21, p. 36), the route width would be 23 lengths of the largest vessel anticipated. Based on submissions by the leaseholders, I use a length of 195 ft (see item 5 on page 7 below) for the calculation, giving a route width of 0.74 NM.

   Depending on the minimum CPA distance being 0.5 NM or 1 NM, these estimated route widths correspond to minimum diagonal navigation corridor widths of 1.32 – 2.32 NM using the Baird methodology, or 1.74 – 2.74 NM using the MARIPARS methodology. Applied to the uniform grid layout advocated in the MARIPARS Draft, these diagonal navigation corridor widths correspond to minimum grid spacing of 1.87 – 3.28 NM using the Baird methodology or 2.46 – 3.87 NM using the MARIPARS methodology. In a general setting where less than ideal conditions are anticipated and a 2 NM CPA is required, diagonal corridor widths are 4.32 NM or 4.74 NM, corresponding to minimum grid spacing of 6.11 NM or 6.70 NM.

   While these distances may seem large in contrast to the leaseholders' proposal, some context is important. Well-known recommendations from Europe (mentioned below)

make either the same "route width + 4 NM" recommendation as derived here for the diagonals, or encourage use of a "20-degree rule" which would require navigation corridors substantially wider than 6.70 NM along the longest transections of the WEA. Similar widths have previously been requested by members of the commercial fishing industry and by RODA.

4. An alternative spacing analysis method, found in the "Netherlands study," is applied to the diagonals in the MARIPARS Draft. Justification for this alternative analysis is provided in Section IV.D. paragraphs 2-4 (p. 34). The justification can be summarized as: i) there is no standard methodology for spacing (par. 2), ii) comments requested we review the British guidance document MGN 543[2] (par. 3), and iii) MGN 543 refers to a Netherlands study… which seems to provide a reasonable approach (par. 4). The justification offered in the MARIPARS Draft is wholly inadequate and fails to mention:

    i) the existence of USCG guidance for CPA;

    ii) that the resulting calculations from the spacing analysis method chosen result in recommendations below the minimum CPA guidance;

    iii) that NVIC 01-19[3] explicitly states that MGN 371 was used in developing the USCG Marine Planning Guidelines, and that "The USCG views MGN 543 as a simplification of its predecessor, MGN 371, and does not deem it necessary or prudent to revise our [Marine Planning] Guidelines" (NVIC 01-19, Enclosure 3, p.1, note 2);

    iv) the presence in both MGN 371 and 543 of recommendations exactly matching USCG guidance for CPA (MGN 371 p. 13, MGN 543 p. 21), in

[2] MGN 543 is the United Kingdom Maritime and Coastguard Agency (MCA) Marine Guidance Note 543, Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response Issues (January, 2016). MGN 371 is its predecessor, issued August, 2008.
[3] NVIC 01-19 is United States Coast Guard Navigation and Vessel Inspection Circular 01-19, Guidance on the Coast Guard's Roles and Responsibilities for Offshore Renewable Energy Installations (OREI) (August 1, 2019). From page 1 of the MARIPARS Draft: "NVIC 01-19 providing [*sic*] further guidance to USCG units and external stakeholders on factors the USCG considers when evaluating risk in OREI."

which both use the term "intolerable" to describe turbines being placed closer than ½ NM from the nearest edge of a shipping route;

v) the presence in MGN 543 of other recommendations that suggest even wider safety margins, such as a 2 NM buffer zone between wind farms and shipping lanes (p. 19), corresponding to a 4+ NM total navigation corridor width, or the "20-degree rule" (pp. 18-20) which is related to the concept of Cross Track Error in COMDTINST 16003.2B Appendix E (pp. E-3, E-4).[4] The 20-degree rule would require a 5.5 NM corridor width for 15 NM corridors between turbines, and proportionally wider corridors for longer rows of turbines (a 65 NM long diagonal corridor is contemplated in the MARIPARS Draft, p. 32, Fig. 20); and,

vi) why, among the new recommendations in MGN 543 (not previously found in MGN 371), only the method suggesting the narrowest safety margin was chosen for use in the MARIPARS Draft and all other methods suggesting wider safety margins were discarded without consideration.

5. The alternative spacing analysis contains computation errors. Corrected computations give diagonal corridor widths of 1.28 NM, and resulting grid spacing of 1.81 NM.

   According to the MARIPARS draft, the calculation is based on the so-called "Netherlands study,"[5] which clearly indicates the 500 m (0.270 NM) UNCLOS Safety Zone applies on each side of the route if vessels are passing between turbines (Appendix 6, p. 62). The calculation error is prominently shown in MARIPARS Figure 21 (p. 36), in which the missing UNCLOS Safety Zone for the second row of turbines breaks the symmetry of the colored bands in the Figure.

[4] Like Closest Point of Approach, concern about Cross Track Error is omitted from the MARIPARS Draft.

[5] "White Paper on Offshore Wind Energy, Appendix 6: Assessment Framework for Defining Safety Distances between Shipping Lanes and Offshore Wind Farms," published by The Ministry of Infrastructure and the Environment and the Ministry of Economic Affairs of the Netherlands. September, 2014.

The recommendations of the alternative spacing analysis depend critically on the maximum length of vessels contemplated to navigate through the developed wind energy area (WEA). The MARIPARS Draft assumes these vessels to be only fishing vessels, and reports their maximum length as 144 ft. With respect to maximum vessel length, there appear to be additional data sources *submitted by the developers* documenting the presence of significantly larger vessels. These submissions were apparently ignored despite BOEM's explicit request that the Coast Guard "consider vessel traffic analyses already submitted through developer NSRAs (Navigation Safety Risk Assessments)." (MARIPARS Draft Appendix E, Synopsis of Comments, p. 4).

The Revised Navigational Risk Assessment (July 24, 2018) submitted by Vineyard Wind as an appendix to their Construction and Operations Plan (COP) reported maximum vessel lengths in the 2016-2017 AIS data to be 197 ft for commercial fishing and 184 ft for recreational vessels (Table 4.0-2, p. 46). In the Baird report accompanying the leaseholders' proposal of a 1x1 uniform grid layout, the maximum fishing vessel length for 2017-2018 was listed at 195 ft for commercial fishing and 300 ft for recreational vessels (Table 2.1, p. 3). Finally, the South Fork Wind Farm (SFWF) Navigational Risk Assessment (COP Appendix X, October 2, 2018) submitted by Orsted reported that 37% of all vessels transiting in the vicinity of the SFWF had a length overall (LOA) of 164-246 ft (Table 5-2, p. 71) using July 2016 to July 2017 data from the AIS (p. 22).

To summarize the above, it appears 195 ft is a more appropriate assumption for the maximum length of vessels transiting the WEA than the 144 ft length assumed in the MARIPARS Draft. A length of 195 ft is still conservative given that it is not known whether larger vessels, including recreational, will continue to pass through the MA/RI Wind Energy Area (WEA) after development. A recent study commissioned by NYSERDA[6] notes "it is generally not prudent for large commercial vessels (>70 meters [220 feet] in length) to transit between [turbines]," (p. 46) but makes no such observation for smaller vessels. As a more extreme example, the leaseholders contend that vessels up to 400 ft may still safely pass through the turbine array.

[6] New York State Offshore Wind Master Plan Shipping and Navigation Study, NYSERDA Report 17-25q. December 2017. Prepared for New York State Energy Research and Development Authority by The Renewables Consulting Group, LLC, New York, NY.

Applying the estimate of 195 ft to the calculation in MARIPARS Section IV.D. (23 vessel lengths) results in an additional 1,173 ft (0.193 NM) needed for the required minimum width of the route, between the UNCLOS safety zones. The full calculation generates required diagonal corridor widths of 1.28 NM, or uniform grid spacing of 1.81 NM. This width is still narrower than the recommendation from USCG CPA guidance.

6. The MARIPARS analysis fails to consider the possibility of search-and-rescue (SAR) along diagonal search paths. Doing so would result in a diagonal spacing requirement of 1.0 NM, corresponding to 1.41 NM grid spacing. It is not discussed that this requirement would exceed the spacing in the leaseholders' proposal. The following considerations emphasize the potential importance of search along the grid diagonals, and/or 1 NM spacing along the diagonals.

    i) As discussed above, both the MARIPARS Draft and the leaseholders' proposal indicates vessels are intended to transit along the diagonals of the WEA. In their seminal text, Soza (1996)[7] defines a "line datum" as including "situations where a vessel or aircraft was known or suspected to have experienced distress while traveling along a straight line connecting two points" (pp. 3-6, 3-7). In this event the highest probability search area will be parallel to that line (pp. 3-7, 3-8). If vessels are transiting along the diagonal corridors of the uniform grid layout, there will inevitably be SAR incidents with a line datum along a diagonal, where a search pattern of sweeps along parallel diagonals may be optimal. The MARIPARS Draft recommends "a minimum of 1 NM between turbines along a search path" (p. 29), based on visual flight rules for helicopters. Unfortunately, this requirement renders diagonal search paths infeasible in the leaseholders' proposed 1x1 grid and suggests the need for a minimum of 1 NM spacing along the diagonal navigation corridors of the grid, or 1.41 NM uniform grid spacing.

    ii) The MARIPARS Draft indicates that disabled vessels are the most common SAR incident in the WEA (p. 27), while Soza states "survivors adrift on the ocean

[7] The Theory of Search, A Simplified Explanation. Soza & Company, Ltd. and Office of Search and Rescue, U.S. Coast Guard. October 1996.

move with the winds and currents" (p. 1-5, among many). The MARIPARS Draft indicates that predominant wind patterns in the area include summer winds tending to blow from the Southwest and stronger winter winds tending to blow from the Northwest (p. 26). While this observation also suggests high probability search along the diagonals, this is likely to be a secondary concern relative to the line datum scenario above: drift motion over periods of "one to a few days" may be somewhat predictable, but is usually quite random over shorter time scales (Soza 1996, p. 5-3). Depending on the density of the grid layout, it may be quite unlikely that a disabled vessel could be adrift for an extended period without encountering a WTG platform.

iii) The MARIPARS Draft notes that "in the event visibility significantly decreases while a helicopter is already operating within the WEA, space may be needed greater than 1 NM in order for a flight crew to safely exit the wind farm area," but acknowledges it is not known how much additional space is needed (p. 30). Implementing 1 NM spacing along the diagonals would allow for both diagonal search and for aircraft facing deteriorating conditions to optionally exit the WEA using the larger 1.41 NM grid spacing available along the horizontal and vertical lines of orientation.

Summary

I would like to conclude my letter with a brief overview of my findings.

On the critical issue of spacing to either side of a navigation corridor, the MARIPARS Draft departs from USCG Closest Point of Approach (CPA) guidance without explanation. In place of the guidance, an alternative spacing analysis method is used without proper justification, and computation errors are made within the alternative method. To make matters worse, the alternative method was previously evaluated and discarded by the USCG.

Though they would not require as much spacing as CPA guidance, search-and-rescue considerations with respect to a search path along the grid diagonals are also ignored.

Altogether, these shortcomings serve to understate the minimum required grid spacing for safe transit by 46% or more by my calculations. Such a severe miscalculation can have dramatic consequences for safe navigation in the MA/RI Wind Energy Area. Furthermore, correcting any one of the oversights identified would lead to recommended grid spacing that is substantially wider than that proposed by the leaseholders. Instead, the MARIPARS Draft fails to discuss any potentially conflicting guidance and issues a recommendation exactly matching the leaseholders' proposal.

After reading my review, I believe you will agree that the MARIPARS Draft cannot and should not be approved as final until substantial corrections are made.

Sincerely,

Thomas Sproul, Ph.D.