FAB Issue: Recreational Fisheries

According to Northeast Ocean Data[1] on AIS vessel traffic from 2018-2022, pleasure/sail vessels within the WLA transmitted hourly AIS positions within 100x100m grids ranging on an annual average ranging from 0 – 9 inside the Sunrise WLA. The actual number of leisure vessels using AIS in southern New England is unknown; however, worldwide the percentage of leisure or recreational vessels using AIS is known to be very low. Within the Sunrise Project, and surrounding areas, most of the recreational fishing vessels are not required, and therefore very few, are equipped with AIS. A 2021 study in British Columbia, Canada, showed that only 13% of pleasure crafts and sailboats detected in a particular study area were using AIS.[2] Therefore, we assume with confidence that the density of leisure vessels within the Sunrise Project Area is much greater than what is depicted in the AIS data. While it is unknown how many of these vessels are participating in recreational fishing, it is certain that a component of this vessel activity is involved in recreational fishing. Various sources confirm that several popular recreational fishing areas, particularly targeting HMS species (tunas, sharks, and other pelagics), occur within and around the Sunrise WLA.[3] [4] [5]

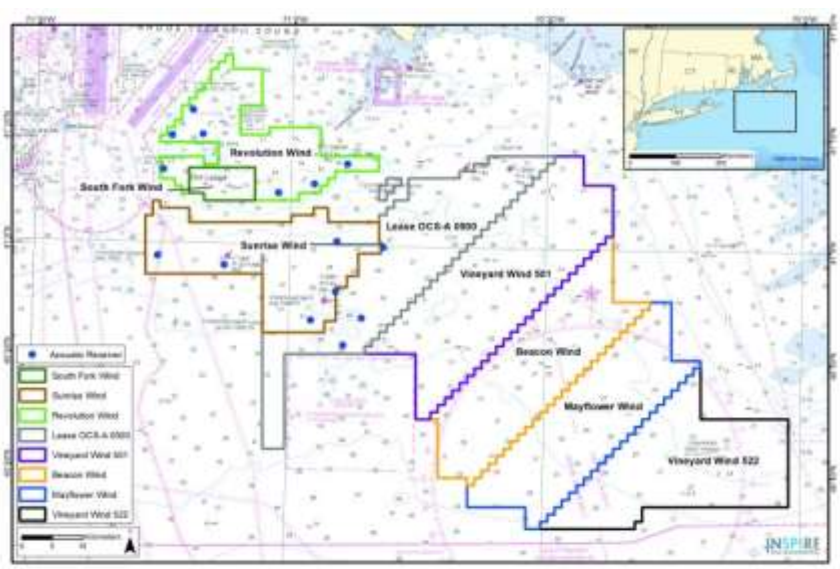

Figure 1. Placement locations of acoustic receivers used in Gervelis and Kneebone 2022 to listen for tagged HMS in wind lease areas. *"...they deployed 15 acoustic receivers - five in each of the three popular fishing areas."* [6]

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[1] https://www.northeastoceandata.org/data-explorer

[2] Serra-Sogas, N., O'Hara, P.D., Pearce, K., Smallshaw, L. and Canessa, R., 2021. Using aerial surveys to fill gaps in AIS vessel traffic data to inform threat assessments, vessel management and planning. *Marine Policy*, *133*, p.104765.

[3] Goldsmith, W. 2021. Offshore impact on HMS. On the Water June 14, 2021. https://www.onthewater.com/offshore-impact-on-highly-migratory-species

[4] Gervelis B, Kneebone J. 2022. Passive acoustic telemetry as a tool to monitor the baseline presence and persistence of highly migratory fish species in popular recreational fishing grounds within the southern New England wind energy area. Newport (RI): U.S. Department of the Interior, Bureau of Ocean Energy Management. 40 p. Report No.: OCS Study BOEM 2022-059 Agreement No.: M20AC00006.

[5] https://www.onthewater.com/news/2020/12/15/survey-for-southern-new-englands-offshore-fishermen

[6] Goldsmith, W. 2021. Offshore impact on HMS. On the Water June 14, 2021. https://www.onthewater.com/offshore-impact-on-highly-migratory-species

Offshore wind energy is likely to affect distribution, localized abundance, ecology, and behavior of HMS and species they interact with as predators and prey. An example of this was seen in a study where semi-captive bluefin tuna were exposed to long-term durations of low-frequency noises created by a simulated wind turbine exhibited schools shrinking in diameter, elevating to sea surface, and some appearing disoriented. [7,8] This study simulated the turbine sound with broad band noise with different characteristic peaks at 50 Hz (≈142 dB ref 1 μPa) at 50 meters from the source. Other studies have estimated sound pressure at 100 m from the WTG source to be between 105 – 125 dB.[9, 10] While there were peaks in sound that reached 160 dB during these studies, the simulated wind turbine sounds the tuna were exposed to were nearly identical in decibel levels to those recorded from an actual wind turbine at 50 m from the source (Figure 2).[11] Therefore, while these are higher decibel levels that fish would encounter at 100 m from the WTGs, they are accurate in depicting decibel ranges at 50 m. Additionally, while this research is imperfect in that it includes semi-captive tuna in large net pens and exposure to noise at limited ranges it is the only research that has been done to observe the effects of WTG noise on tuna species.

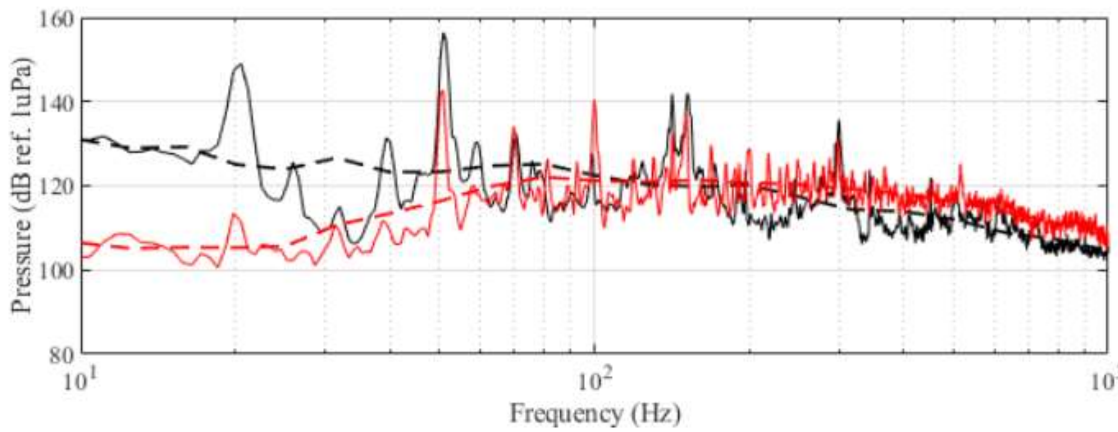

Figure 2. *Original recorded turbine emission (black) and reproduced noise used in the experiment (red). Dashed curves correspond to third-octave levels (dB ref 1 μPa RMS) of the same signals.* Source: Puig-Pons et al. 2021.

While artificial structures such as FADs and oil platforms are known to attract HMS, likely as a trophic-level effect due to increased feeding opportunities, this is not proof that wind turbines will attract HMS. Further, similar studies interpreted the movement patterns in tuna *as a maneuver to avoid this noise*, during windmill sound simulation, and summarized their findings highlighting problems concerning the effects of offshore wind turbine noise on tuna behavior.[12] One study in Japan showed that yellowtail

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[7] Pérez-Arjona, Isabel, et al. "Effects of offshore wind farms operational noise on Bluefin tuna behaviour." Underwater Acoustics 2014. Centro Oceanográfico de Murcia, 2014.

[8] Hogan et al. 2023. NOAA Fisheries **NMFS-NE-291**

[9] Mooney, T.A., Andersson, M.H. and Stanley, J., 2020. Acoustic impacts of offshore wind energy on fishery resources. *Oceanography*, *33*(4), pp.82-95.

[10] Tougaard, J., L. Hermannsen, and P.T. Madsen. 2020. How loud is the underwater noise from operating offshore wind turbines? *The Journal of the Acoustical Society of America*148(5):2,885–2,893, https://doi.org/10.1121/10.0002453

[11] Puig-Pons, V., Soliveres, E., Pérez-Arjona, I., Espinosa, V., Poveda-Martínez, P., Ramis-Soriano, J., Ordoñez-Cebrián, P., Moszyński, M., de la Gándara, F., Bou-Cabo, M. and Cort, J.L., 2021. Monitoring of caged bluefin tuna reactions to ship and offshore wind farm operational noises. *Sensors*, *21*(21), p.6998.

[12] Ibid

exhibited low affinity to a single offshore wind turbine,[13] which could show that the noise-caused deterrent outweighs the trophic level dynamics and feeding-potential attractants. Additionally, Mavrakis et al. (2021)[14] showed that benthic and benthopelagic species utilize wind turbines as feeding grounds for extended periods of time; however, the same did not apply to pelagic species. Therefore, the recreational HMS fishery in the Sunrise WLA will not be able to rely on wind turbine to attract fish, and may witness less HMS within the WLA, or more condensed schools with disoriented fish, or no change at all. In such a case, the wind farms only present navigation hazards and obstacles, particularly if schools of fish become more condensed around wind turbines and therefore more difficult to locate. Landing an HMS, such as a bluefin tuna, on a recreational vessel requires careful and sometimes prolonged maneuvering to ensure the safety of the anglers. Such activity within the WLA would include navigational hazards, particularly if/when the fish in distress due to being hooked, swims in and around wind turbine structures. This could lead to chaffing and breakage of line as it makes contact with the structure, and increased vessel safety hazards due to proximity to the wind turbines.

Additionally, HMS are given their moniker specifically due to their movement across large areas, and therefore targeting HMS involves more searching for schools of fish, than does targeting demersal species. Hence, assuming that fishers will simply choose their second, or maybe third favorite fishing location does not apply the way it does when targeting other species. Furthermore, the cumulative footprint of potential wind farms in southern New England waters ensures that recreational fishers targeting HMS will be excluded from their fishing grounds, regardless of the presumption that wind farms may attract other species and the fishers that follow. The FAB believes it is important to note these cumulative effects, in the optimistic chance that the developer would consider their cumulative footprint on the fishing grounds and impacts to recreational fisheries beyond the project-by-project basis.

HMS are not the only recreational fisheries exposed to the Sunrise and adjacent projects, as other species, such as cod, scup, black sea bass, and fluke are also targeted in the area. While some studies have reported neutral or even positive recreational affects from offshore wind farms,[15, 16] the same and other studies also report negative impacts, as windfarms can displace recreational fishers from their traditional fishing ground, and cause changes in composition, abundance, and distribution of species.[17] Vessel safety is extremely important to mention when considering impacts to any type of fishing in and around wind farms. Like commercial fishers, recreational fishers that fish in offshore waters of New England rely heavily on radar to navigate in fog and rain, and to monitor nearby vessel traffic. A 2022 report from the National Academies of Science concluded unequivocally that wind turbine interference decreases the effectiveness of radar of all vessels sizes, and this problem will be exacerbated with the expected offshore wind farms across the US OCS.[18] Wind turbines negatively affect both magnetron-

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[13] Karama, K.S., Matsushita, Y., Inoue, M., Kojima, K., Tone, K., Nakamura, I. and Kawabe, R., 2021. Movement pattern of red seabream Pagrus major and yellowtail Seriola quinqueradiata around Offshore Wind Turbine and the neighboring habitats in the waters near Goto Islands, Japan. Aquaculture and Fisheries, 6(3), pp.300-308.

[14] Mavrakis et al. 2021. Offshore wind farms and the attraction-production hypothesis: insights from a combination of stomach content and stable isotope analyses. Hydrobiologia 848: 1639-1657

[15] Ten Brink, T.S. and Dalton, T., 2018. Perceptions of commercial and recreational fishers on the potential ecological impacts of the Block Island Wind Farm (US). *Frontiers in Marine Science*, *5*, p.439.

[16] Hooper, T., Hattam, C. and Austen, M., 2017. Recreational use of offshore wind farms: Experiences and opinions of sea anglers in the UK. *Marine Policy*, *78*, pp.55-60.

[17] Hogan et al. 2023. NOAA Fisheries **NMFS-NE-**

[18] National Academies of Sciences, Engineering, and Medicine, 2022. Wind Turbine Generator Impacts to Marine Vessel Radar. https://nap.nationalacademies.org/catalog/26430/wind-turbine-generator-impacts-to-marine-vessel-radar

based and doppler-based radar, and the NAS report states that “no standard approach to active radar deployment in a WTG environment is available.”[19, 20] Despite attempts to identify solutions to this problem, none have yet been successful.[21] Radar interference from wind turbines will not only impact fishers’ ability to navigate safely, but will also severely USCG limit search and rescue capabilities by both vessel and aircraft.[22] Therefore, fishing in and around wind farms is a significant safety hazard that, when combined with the added vessel traffic associated with wind farm construction and maintenance, will prevent fishers from accessing their traditional fishing grounds; a problem guaranteed to be exacerbated by the cumulative footprint of Sunrise and adjacent wind farms.

Figure 3. Image of radar screen on commercial fishing vessel in the South Fork WLA during construction

Multiple data and information sources were used to calculate and/or validate exposure to recreational fisheries from the Sunrise WLA. NOAA’s Marine Recreational Information Program (MRIP) is a state-regional-federal partnership that collects recreational catch and effort data via surveys across coastal states, and specifically uses that data to evaluate the sustainability of recreational and commercial fisheries. These data are used by various state and federal agencies, fishery management councils, interstate marine fisheries commissions, and others to make informed decisions regarding fisheries management. Included in this; MRIP data is used to inform state and federal stock assessment surveys to assess the health and status of fish stocks.[23] While there are imperfections with the MRIP data, and

[19] Ibid
[20] M. Lapp – CRMC Consistency Review for Revolution Wind – Comments 5.9.2023
[21] Ibid
[22] Ibid
[23] https://www.fisheries.noaa.gov/recreational-fishing-data/about-marine-recreational-information-program

potential for miscalculating effort,[24,25] the same can be said for every dataset that is utilized in the WHOI analysis for commercial fisheries (i.e., VTR data used to spatially represent fishing effort); therefore, we suggest that even with its admitted flaws, MRIP data remains the best available dataset there is to estimate recreational fishing catch and effort.

- Hutt and Silva (2019)[26] report that average expenditures for HMS trips on private angler vessels out of New England are $501.58 per trip in 2016$, which equates to $637.01 in 2023$ (a). Hutt and Silva (2019) also report estimate that in 2016, there were 11,573 private angling vessel trips targeting HMS out of New England (b). The multiplier for the economic value added per HMS trip in New England of 0.94 was derived from Hutt and Silva (2019) based on the total direct expenditures and the total value added (c, d). The average participants per HMS vessel trip was 2.9 (e), or 33,562 angler trips at $162.58 ($206.48 in 2023$) per angler per HMS trip with value added (f, g).
- MRIP data[27] from 2016, the year Hutt and Silva (2019) study was conducted, shows that there were 732,929 private boat angler trips in New England in federal waters (3-200 nm) (h). Therefore, we estimate the HMS trips account for 5% of the total New England-based recreational private boat angler trips in federal waters (i), of which Rhode Island-based trips account for 17% (k), based on the 10-year average from 2013-2022 (j, k).[28] Based on the expenditures per HMS trip and estimated number of 5,100 RI-based HMS trips (l, m), we estimate the average annual expenditures for all RI-based HMS trips is $829,225 ($1,053,116 in 2023$) (n).
- NMFS (2023)[29] reports the average expenditure for an angler recreational fishing trip on a private boat out of RI was $27.76 ($32.76 in 2023$) (o). The multiplier for the economic value added per private boat angler trip in New England of 0.7 was derived from Lovell et al. (2020) based on the total direct expenditures and the total value added (p). The majority of marine fishing effort in RI is in state waters (<3nm from shore), whereas most all HMS fishing occurs in federal waters (3-200 nm from shore), where the WEAs occur. Due to the difference between HMS trips and the average private boat angler trip, we confidently assume that the average non-HMS trip that occurs in federal waters is greater than the overall average private boat trip; however, no estimates are available for these trips, and therefore we use the total direct expenditures with value added of $19.55 ($23.07 in 2023$) average provided by NOAA (q).[30]
- Local experts from the Rhode Island recreational fishing community estimate that 15-25% of all RI-based HMS trips occur inside the Sunrise WLA, and another 10% transit through the Sunrise

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[24] Andrews et al., 2018. A Comparison of Recall Error in Recreational Fisheries Surveys with One- and Two-Month Reference Periods. North American Journal of Fisheries Management. ISSN: 0275-5947

[25] Andrews, 2022. Evaluating Measurement Error in the MRIP Fishing Effort Survey: The Effect of Question Sequence on Reporting of Fishing Activity. 01 September 2022

[26] Hutt, Clifford and George Silva. 2019. The Economic Contributions of Atlantic Highly Migratory Anglers and Tournaments, 2016. U.S. Department of Commerce, NOAA Tech. Memo. NMFS-OSF-8, 44 p

[27] NOAA MRIP 2022. Recreational Fishing Data Downloads

[28] Ibid

[29] National Marine Fisheries Service. 2023. Fisheries Economics of the United States, 2020. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS-F/SPO-236, 231 p. Available at: https://www.fisheries.noaa.gov/national/sustainable-fisheries/fisheries-economics-united-states

[30] Ibid

WLA.[31] Therefore, we estimate that 30% of the RI-based HMS trips are exposed to the Sunrise Project; this equates to 1,530 of the estimated 5,100 annual RI-based HMS trips (r, s).

- Kirkpatrick et al. (2017, table 4-11) reports 3.6% (t) of RI-based private angler trips in federal waters are exposed to the RI-MA Wind Energy Area (WEA), which includes Revolution, South Fork, and Sunrise WLAs.[32] The 10-year average number of RI-based private boat angler trips is 554,493 (u), of which 19,962 (v) trips would be exposed to the RI-MA WEA.
- Spatially, Sunrise accounts for 53% of the RI-MA WEA (w) as the boundaries are defined today.[33] The three WLA's that make up the RI-MA WEA (Revolution, South Fork, and Sunrise) are projects owned by the same developer, Orsted, and the FAB would hope that the developer consider cumulative effects of these projects, it is understood that mitigation is on a project-by-project basis.[34] We estimate that the exposure to recreational fishing in Sunrise includes a total of 10,580 private boat angler trips (x); 9,050 of which are non-HMS trips (y), and 1,530 HMS trips. Based on these data points, we estimate the annual value of recreational fisheries exposed in the Sunrise WLA, including cumulative effects from adjacent wind farms, in 2023$ is $315,935 in HMS trips (z) and $208,768 in non-HMS trips (aa). Combined these equate to annual exposure of **$524,703** (2023$) (bb). This is the total mitigation cost for per year of construction and decommissioning.
- Operational years: Local experts from the Rhode Island recreational fishing community estimate that 25% (cc) of all RI-based HMS trips that occur inside the Sunrise WLA will be canceled during the 30-year operations period, and we assume that half that many (12.5%) trips will be reduced in the non-HMS fisheries due to safety concerns and overcrowding issues. This equates to an annual reduction in recreational fishing expenditures of **$105,080** (2023$)(dd, ee), or 20% of the annual trips. Over the 30-year operational period this, with a 3% discount rate, this equates to **$1,999,621 (2023$).**

The final exposure number should be applied 100% during construction, 20% during the operational years, and 100% during decommissioning. The effects of the Sunrise and adjacent wind farm projects should not be underestimated, particularly as the popularity of fishing for tuna and other pelagic species has increased substantially amongst RI-based recreational fishers.[35] Investments in HMS specific fishing gear, and interest in targeting HMS, does not directly translate to non-pelagic species such as fluke or cod. Sunrise will also impact fishing trips targeting these and other species, as restricted access to fishing grounds, combined with the resultant overcrowding and safety hazards (e.g., vessel traffic collisions) can easily dissuade recreational fishers from continuing to participate in the fishery, regardless of target species.

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[31] Rich Hittinger, pers. comm.

[32] Kirkpatrick, A.J., S. Benjamin, G.S. DePiper, T. Murphy, S. Steinback, and C. Demarest. 2017. SocioEconomic Impact of Outer Continental Shelf Wind Energy Development on Fisheries in the U.S. Atlantic. Volume I—Report Narrative. U.S Dept. of the Interior, Bureau of Ocean Energy Management, Atlantic OCS Region, Washington, D.C. OCS Study BOEM 2017-012. 150 pp

[33] BOEM Renewable Energy Areas. Accessed at: https://www.boem.gov/oil-gas-energy/mapping-and-data/atlantic-cadastral-data

[34] Sunrise Fisheries Communication Plan (COP Appendix B page 8 subsection (K)

[35] RIDEM, 2022. Rhode Island Annual Fisheries Report: 2021. https://dem.ri.gov/sites/g/files/xkgbur861/files/2022-08/AnnualRpt_2021.pdf

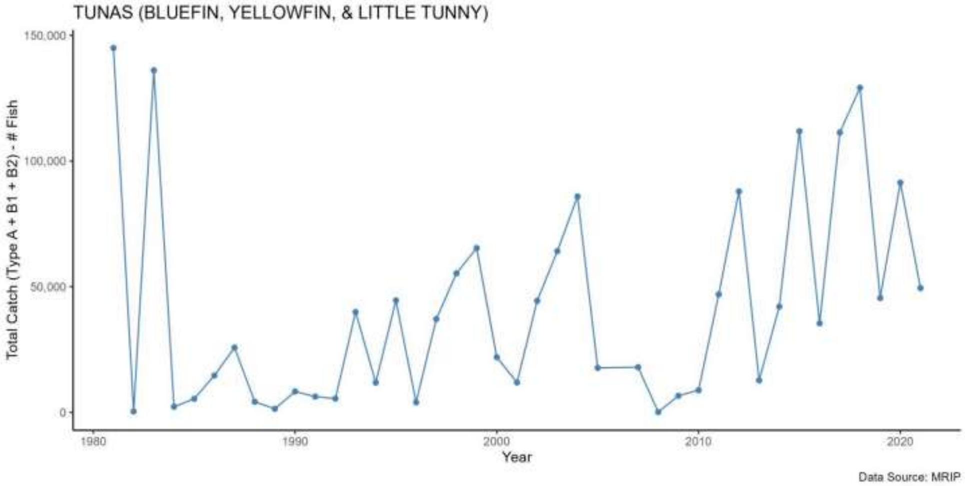

Figure 4. RI recreational catch of Tunas from 1980 to 2021. Graphic taken from RIDEM 2022 (Fig. 49)

The combined value of the FAB's proposed mitigation value for the recreational component, based on the BOEM recommended mitigation plan, with a 3% discount rate applied is: **$2,712,803** (2023$)**.**[36]

[36] Calculation shown in spreadsheet uses same calculation method provided by WHOI exposure analysis