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President Joe Biden
The White House
1600 Pennsylvania Avenue, N.W.
Washington, DC 20500

February 15,2023

Dear President Biden:

I am appealing to you on behalf of our 4500+ supporters of the Save Long Beach Island (LBI) Inc. organization, who are generally supportive of offshore wind energy as an energy source, but adamantly opposed to the ill-informed and insular decision-making process that has led to the planned placement of massive, noisy wind turbines where they do not belong.

In particular, we want to bring to your attention to an irreconcilable conflict between the planned East Coast offshore wind energy program, using current selected "wind energy areas" for turbine placement, and the survival of the critically endangered North Atlantic right whale. In the interest of preserving both, we ask you to consider the following.

The risks and consequences to the right whale from the wind projects currently planned are major and imminent. Those risks and consequences for all phases of development: vessel surveys, pile driving of foundations, and turbine operation, are described in detail quantitatively in the Enclosure, using the situation off New Jersey as a case study.

All the evidence gathered thus far suggests that:

Regarding wind turbine operation,

- Based on noise measurements from the operation of smaller and moderate size turbines, underwater noise will increase linearly in the decibel scale with turbine power. Based on acoustical mathematics, the range or distance from these turbines at which elevated noise levels will exist increases exponentially with that decibel change.

- Based on analysis from a respected acoustics engineering company, the underwater noise from the operation of the large turbines to be deployed for the project starting 9 miles off LBI would create sound levels **above 130 decibels (dB) out to 93 miles**, which are at least ten times as energy intense as the federal 120 dB level for disturbing whale behavior (see Figure 4).

- Based on past whale observation studies, upon which the federal disturbance criteria was largely based, it is highly probable (approximately 90 percent) that the whale will avoid that noise level.

- There has been **no significant migration** of the right whale **beyond 86 miles** from shore off New Jersey.

- Therefore, the operation of this **project alone will very likely block the whale's essential migration.**

- The underwater noise from planned large turbine operation in **both** the inner lease area and the outer New York Bight areas here will increase the noise levels within 93 miles and extend them much farther out, further increasing the probability of blocking its migration.

- Therefore, off new Jersey, **either the inner or the outer projects must be terminated** to leave a path for the whale, and even then, further restrictions on turbine power size may be necessary.

- A number of wind energy areas along the East Coast have been selected that are in or adjacent to primary right whale migration corridors, and face similar problems (see e.g., Figure 3).

- These obstacles to migration stem from previous ill-informed turbine area siting decisions made without the benefit of an environmental impact statement that considered alternative locations, and knowledgeable public input.

Regarding Geophysical Vessel Surveys,

- A large number of vessel surveys using high-intensity devices to characterize the seabed are underway and planned.

- For surveys off New Jersey, Table 2 shows that with proper noise source, transmission loss factors and disturbance noise levels, the distance from the survey vessel with noise levels above the whale disturbance criteria is not 1/10 of a mile as the National Marine Fisheries Service (NMFS) has assumed, but rather up to 16 to 34 miles depending upon the noise device power and electrode tip number settings, and the disturbance level criteria. Coupled with multiple vessels in the area, and each vessel making passes relatively close together, this means that animals there will experience multiple exposures above the noise disturbance levels.

- There is therefore ample reason to suspect that survey vessel noise is a potential cause of the recent spate of whale deaths. As discussed in the Enclosure, the reasoning behind the recent agency dismissals of that was not relevant to the disturbance problem, but rather focused on permanent hearing damage which is not expected here, and which is often not looked for in post-mortem examinations anyway.

- We therefore ask that you direct the NMFS to conduct a methodical, transparent investigation by a group with the acoustic and marine mammal expertise, and the independence, to determine the likely cause or causes of this unusual number of deaths in a short period of time. Along with that, key data should be released to the public, such as the vessel locations during the whale incident periods and the noise device settings to determine the noise source levels during that time.

Regarding Marine Mammal Protection Programs in General,

- Take Authorizations under the Marine Mammal Protection Act are being routinely made based on optimistic noise source and transmission assumptions that are not consistent with main stream science, and therefore underestimate noise impacts (see e.g., Tables 1 and 2). Key data needed to assess the reasonableness of a noise impact calculation, such as the broadband noise source level and the effective transmission noise loss rate, are often not disclosed, but rather are obscured by "results" from opaque computer models. Cumulative impacts of similar activities in the same geographical area are not assessed. Monitoring and mitigation programs are poorly defined without an assessment of their effectiveness. The criteria being used to approve such activities are questionable, for example, a 33-percent number applied to the "small numbers" test for the Marine Mammal Protection Act, which seems extraordinarily high for an endangered species, and which is inconsistent with a prior Court ruling. The operational noise from the larger turbines being proposed is a major problem as discussed above, but not being addressed. There is excessive reliance on acoustic companies paid by applicants, with little reliance on independent experts.

- Similar problems arise in the preparation of Biological Assessments and Opinions under the Endangered Species Act.

Taken together with the unprecedented scale of turbine deployment proposed, the current offshore wind program poses a major and irreversible threat to marine mammals. The potential for non-compliance with the Endangered Species Act and the Marine Mammal Protection Act should be evident.

All this does not mean that offshore wind energy must stop, but that there needs to be intervention at the highest level to review and change a number of the wind energy areas. We recognize the disruption to the program that entails, but you now face such disruption in the form of years of acrimony and litigation over a program that should not be receiving such.

We call on you to order that mid-course program change, and stand ready to assist in any small way that we can.

Respectfully,

Bob Stern

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cc; NJ Congressional Delegation
Senator Carper
Governor Murphy
Rick Spinrad, Administrator, NOAA
Deb Haaland, Secretary, DOI
Shawn La Tourette, Commissioner, NJDEP
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Enclosure

Risk and Consequences to the North Atlantic Right Whale from Offshore Wind Development with

the Proposed Project off of New Jersey as a Case Study

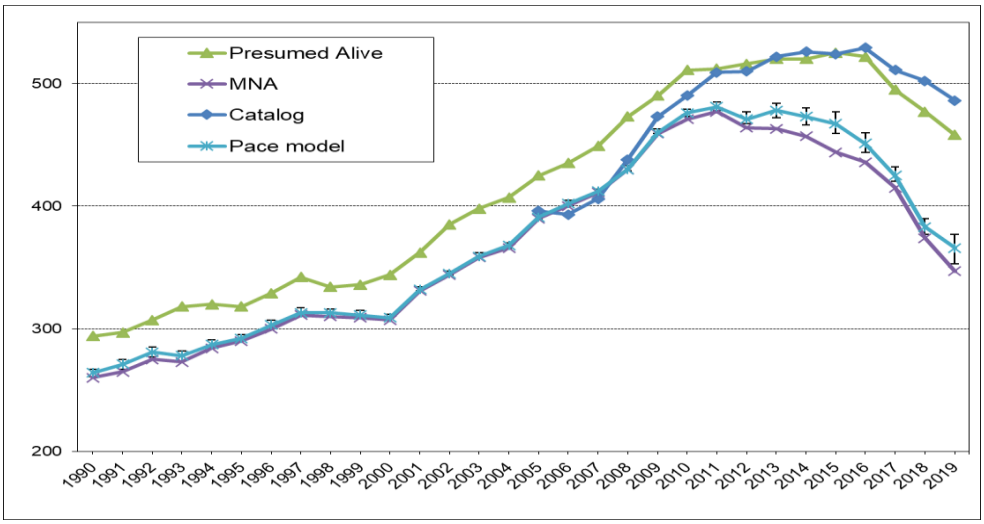
Introduction.

The number of right whales is already very low, at about 350 animals, down from tens of thousands before whaling nearly drove them to extinction, and currently in steep decline (see Figure 1 below). There are fewer than 94 females of reproductive age left.

The National Marine Fisheries Service (NMFS) 2020 stock assessment report for the right whale shows an average per female productivity rate of 0.06 in Figure 4 of that report for the years 2013 to 2017. It also shows in Figure 2a an average female population of 180, leading to 11 average births per year. Table 2 of that report shows estimated human caused fatalities at an average of 18.6 per year for that period. Clearly, with fatalities almost twice births, every successful birth and bringing every calf to maturity is crucial, and their migration is essential to do that.

To ensure the species survival, females must be able to give birth off the warmer waters of South Carolina and Georgia, and then return North to feed. The migration consists disproportionately of reproductive mature females, pregnant females, juveniles and young calves critical to the survival of the species. **So, nothing must imperil that migration**.

Figure 1. Right Whale Population Trend

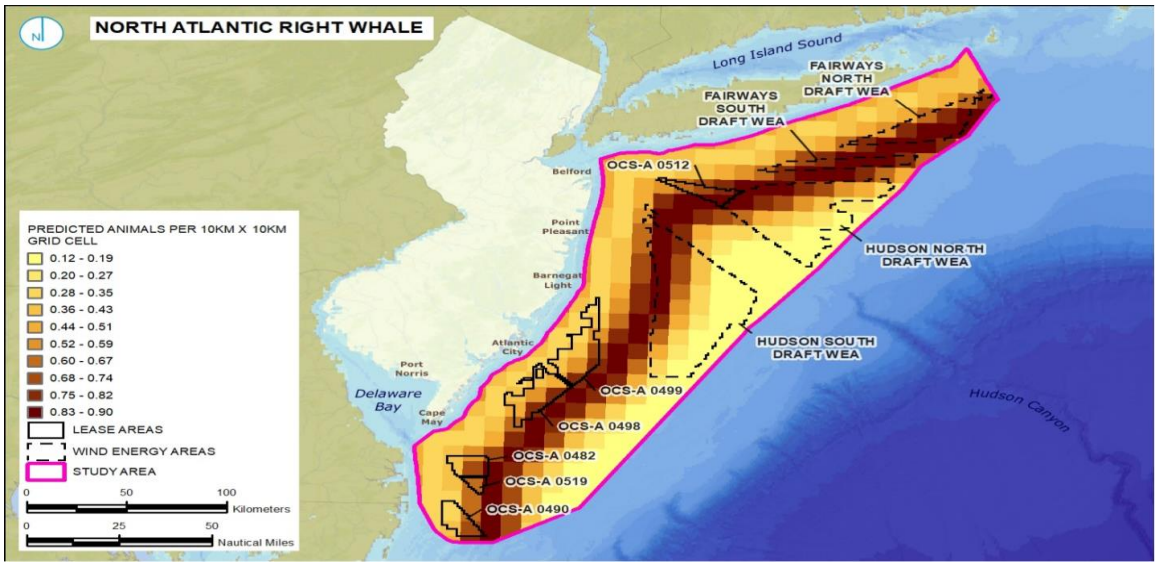


Turbine Operation: but the underwater noise from *turbine operation* may do just that, and potentially block the whale's migration.

A. The Whale's Migration Path

- One whale 12-mile-wide migration corridor off New Jersey intersects with and is adjacent to this close-in wind project area (see map below) [W1, W2]

Figure 2. Right Whale Primary Migration Corridor-in purple



Source, NJ Offshore Wind Strategic Plan, Natural Resource Technical Appendix, Figure 21. Section 2.6.

- The Atlantic Shores Offshore Wind project recently confirmed that intersection in its recent Take Application to the NMFS [W3], as shown below from Figure 9 in their Application for Take Authorization.

Right Whale Migration- from Atlantic Shores Incidental Take Application for Construction

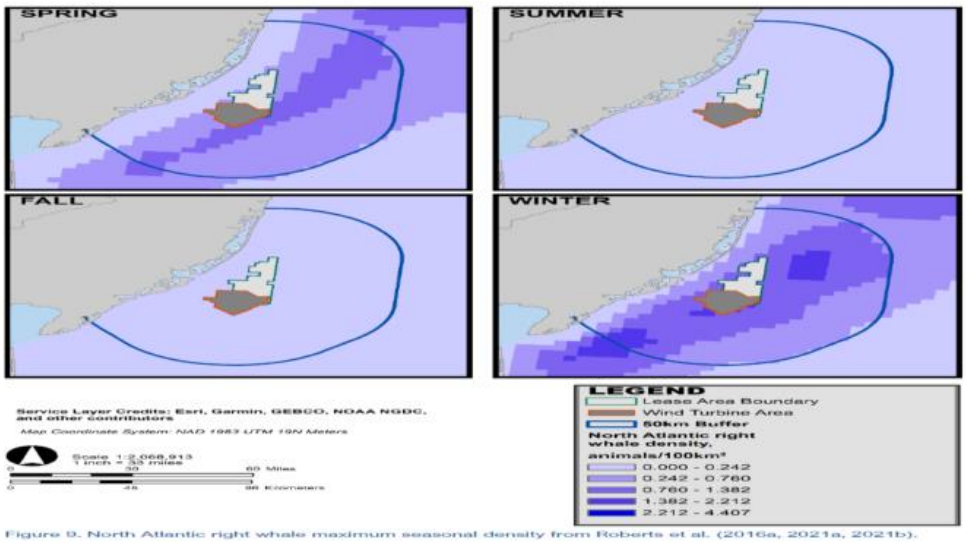


Figure 9. North Atlantic right whale maximum seasonal density from Roberts et al. (2016a, 2021a, 2021b).

- The whale's migration corridor here also uniquely goes between two wind energy development areas-the Atlantic Shores project and the Hudson South projects.
- As far back as 2013 [W2] the authors there recommended that a critical habitat be designated out to 50 km (31.25 miles), not just based on migration but also on the right whale's presence at other times and

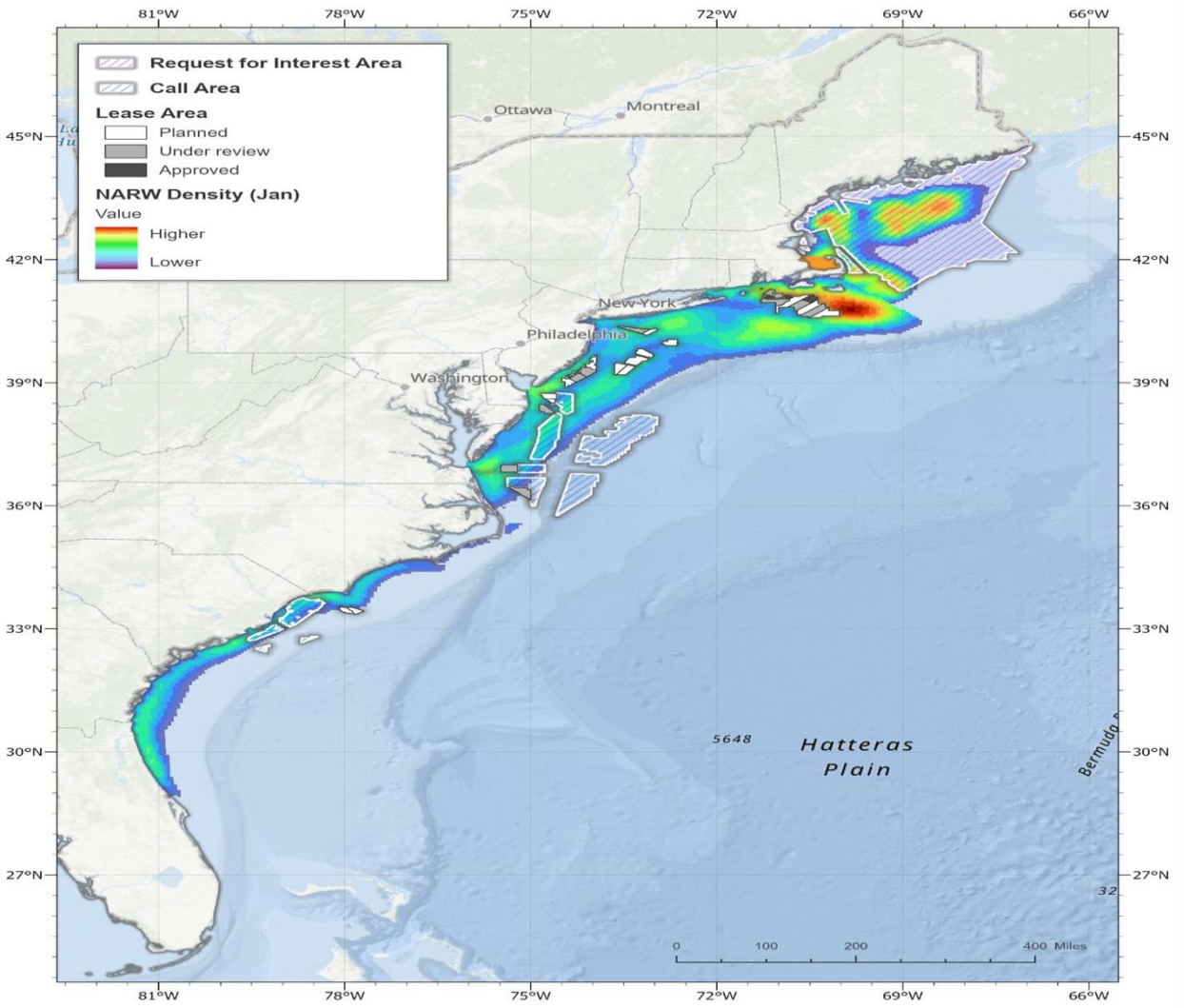
apparent need to feed (see Fig 2 of that report showing significant presence in winter and spring). Their recommendation matches well with the outer edge of the 20 to 32-mile primary migration corridor that we have been using in our comments to the Bureau of Ocean Energy Management (BOEM) and the National Marine Fisheries Service (NMFS). Also, that Figure 2 shows right whale presence closer than 20 miles or 32 km (within, not just adjacent to the 9-20-mile-wide wind project area).

- Those results are confirmed by 11 years of recordings (2004 -2014) from passive acoustic monitors along the U.S. east coast [W23]. Figures 3 and 4 of that study show a distinct presence during the winter migration period extending to about 25 miles offshore.
- More recent right whale density data [W4] compiled by Duke University indicates that whales have been migrating closer to shore than the corridor shown in Figure 2, a range of higher density from **6 to 13 miles.**
- Other Duke University data [W27] shows migration further out, from about 40 to 86 miles, over the January through April period. That data is shown below for January in Figure 3.

Based on a thorough review of available right whale density information [W1, W2, W3,W23,W27,W28,W29], migration has been observed between 6 to 86 miles, but there has been no significant right whale migration beyond 86 miles, and that distance appeared only in one source for one month, March [W27].

- Most of that **outer path would intersect directly** with the areas recently sold for future wind turbine placement in the NY Bight (see Figure 5), which range from 33 miles (lease area A-0541) to 70 miles lease area A-0537), and as shown here,
- All of it would intersect with the noise fields above the 120 decibel(dB) disturbance criteria expected to be generated from Lease area 0537
- Similar intersections of the whale's migration paths occur for other proposed wind energy projects along the east coast [W5, W6, W7, W8] as shown below in Figure 3.

Figure 3. Right Whale Migration- Intersection with Wind Energy Areas - January



Source: BOEM/NMFS Right Whale Strategy Draft Document-January Density Map

B. The Impact of Turbine Operation on Noise Levels in those Migration Corridors.

- Save LBI has commented often and extensively, and provided our own operational noise estimates just for a seven-turbine array, in asking the BOEM and the NMFS to include operational turbine noise in its assessments. Such comments were provided as far back as October 21,2021 on the Notice of Intent to prepare the impact statements on the Atlantic Shores 1 project, on the recent BOEM and NMFS strategy document regarding the right whale, and on the recent Take Application to the NMFS for construction by the Atlantic Shores Offshore Wind project [W9].
- A presentation on operational turbine noise was provided to the North Atlantic Right Whale Consortium in October, 2022 [W10].

- Save LBI commissioned a respected acoustic company to calculate the operational turbine noise levels at various distances from the full 357 turbine wind complex proposed off LBI [W11].
- That study essentially confirmed the estimated noise source level (181 dB) for a single Vesta-236 turbine with a monopile foundation, operating at 13.6 megawatts power. Save LBI had estimated a similar noise level (180 dB).
- The noise source level for a single turbine of 181 dB may be conservative. It is based on extrapolation of broadband noise level trends versus turbine power in the paper titled How loud is the underwater noise from operating offshore wind turbines?, Tougaard et al., Journal of the Acoustical Society of America 148(5), November, 2020. Another paper by Uwe Stober and Frank Thomsen, titled How could operational underwater sound from future offshore wind turbines impact marine life? The Journal of the Acoustical Society of America 149, 1791 (2021), showed the trend in noise source level versus increasing turbine power size for a frequency "spectral" component more indicative of the whale's hearing range. Using those results and extrapolating out to a 13.6-megawatt turbine would result in a noise source level of 192 dB.
- The results of that acoustic firm study, using the conservative 181 dB source level for a single monopile foundation turbine, and accounting for both spreading and attenuation losses are shown in Figure 4 below.

Figure 4. Continuous Noise Levels versus distance from the full 357 turbine Wind Complex, with monopile foundations.

Results - Monopile

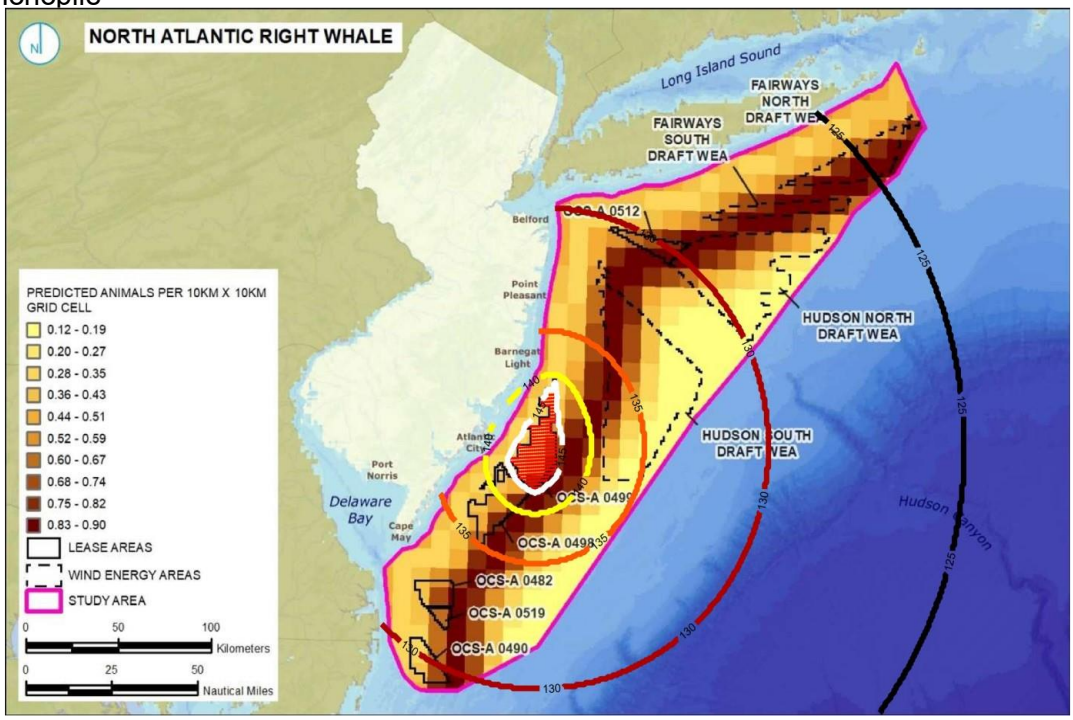


Fig 9– Estimated URN due to source SPL of 181 dB re 1µPa at 1m, spreading loss and attenuation loss

- Those results show that the entire 12-mile-wide right whale migration corridor-in dark red- between the two wind energy development areas will be permeated with continuous noise levels from ***140 to 145 dB***, at least 20 dB above the 120 dB NMFS criteria at which the whale's behavior will be disturbed.
- The results show that levels of **130 dB, 10 dB above the criteria, will be exceeded up to 93 miles** from shore, beyond the maximum observed 86-mile right whale migration offshore distance
- The results show that levels of 125 dB will be exceeded up to 150 miles from shore, and that levels within the wind complex will be well above 145 dB.

Therefore, levels greater than 130 dB are predicted to occur throughout the full observed migration corridor of the right whale, 6 to 86 miles offshore, from turbine operation just in the Atlantic Shores project lease area.

C. The Impact of those Elevated Noise Levels on Right Whale Migration.

- Disturbing the whale's behavior can mean many things. It very often means first, that the whale will seek to avoid the noise or "standoff" from it, potentially in an undesirable direction or location. In a migratory setting that could mean obstruction of, or even blockage of that migration. IT could mean being driven towards the shore seeking relief. It can also involve the whale surfacing to seek a lower noise level at the surface and becoming more vulnerable to vessel strike. It can mean separation of mothers and calves due to the 'masking" of their normal communications by the vessel device noise, and such separation can be fatal for the calf. It can also mean the loss of its navigational capability, cessation of feeding or mating, and the loss of the ability to detect predators or oncoming ships. Finally, because whales use sounds to determine the very nature of their surroundings, the effects may be much more profound than that.

So, behavior disturbance is not as innocuous as the name implies, and this should be the focus of the attention to this operational noise issue.

- A level of 130 dB, or an increase of 10 dB above the 120 dB disturbance criteria means the noise intensity reaching the whale is multiplied by 10, not something to be taken lightly.
- **There is general scientific consensus that the whale will seek to avoid those noise levels [W12]**.
- A previous study [W13] of the migration of another baleen whale, the gray whale, calculated the probability that the whale would avoid certain noise levels from a variety of continuous noise sources.
- Based on that, and other studies, the NMFS established the 120 dB level at which 50 percent of the population would be disturbed, meaning that

a significant percentage of the population could be disturbed at lower levels.

- That study[W13] showed that the **probability that the gray whale would avoid noise levels above 145 dB (within the wind complex) was 98 percent, levels of 140 to 145 dB (between the two project areas) 95 percent, and levels above 130 dB (throughout the entire right whale migration corridor) 90 percent** (see Figure 8.13 of that report for the continuous noise sources).
- Similar responses are expected from bowhead whales based on studies of drillship noise exposure [W32].
- The 120 dB level is said [W30] to evoke a "potential strong behavioral reaction" and the noise intensity levels here, throughout the entire observed 6 to 86-mile migration corridor of the right whale off New Jersey, from the above 130 dB level, are at least 10 times as intense.

Therefore, it is likely that the noise from the Atlantic Shores turbine operation alone will block the entire existing migration corridor of the right whale, leaving no other migratory path to take.

They cannot go: (1) through either wind complex, (2) toward shore, (3) further out to sea, or (4) between the Atlantic Shores and Hudson South lease areas (20 to 32 miles out)

1.Through the wind complexes. The noise levels within the Atlantic Shores wind complex will be much greater than 145 dB, with similar levels expected in the NY bight areas. Therefore, it is highly unlikely the whales will enter any wind complex to migrate.

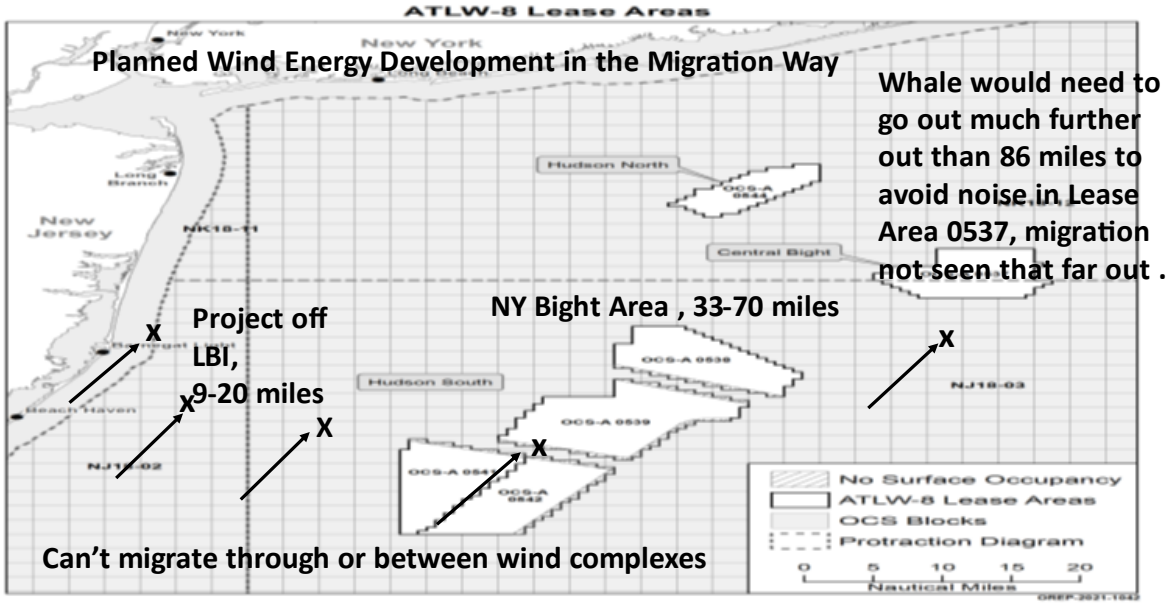
2. Towards Shore. Going toward shore, because of the proximity of the Atlantic Shores project, elevated noise above 135 dB would follow them all the way there, as shown in Figure 4, and they would risk beach stranding looking for an elevated noise free path.

3. Further out to sea. Turning out to sea would requires them to go very far out to get around turbine development expected in lease area OCS A-0537, shown below in Figure 5.

- The farther out NY Bight area is the "Central Bight" Lease Area OCS A-0537, shown in the far right in Figure 5, which extends out to 70 miles.
- For example, using the same formulas in our acoustic study for a 75-turbine array in that lease area, the whales would have to go out over a hundred miles further from the lease area to avoid noise levels above 120 dB.
- With many years of data collected there has been **no significant migration observed off NJ beyond 86 miles** [W2].
- Right whales are being observed to be smaller/lighter than expected for the age in recent years, suggesting that they are not eating enough to grow normally. In this already-compromised condition, they will likely not have enough energy/fat reserves to cope with a much longer-than-usual migration journey.

- Therefore, it is unrealistic to expect the whale to begin migrating that far out.

Figure 5. New York Bight Lease Areas



4. In between the Atlantic Shores and Hudson South Areas. If the whales were to enter the corridor between these two areas, shown in Figure 4, with the elevated noise levels between 140 and 145 dB, they will encounter harm and potential fatality from cumulative noise exposure and hearing loss, as shown below.

A. Whale Hearing Loss from turbine operation noise in the migration corridor.

- A whale proceeding through the migration corridor with noise levels between 140 and 145 dB will amass cumulative **sound exposure levels (SELs)** well above 179 dB, the NMFS criteria for causing temporary threshold shift hearing loss [W15]. That will impair its echolocation and navigation ability [W14], increase its risk of predation and vessel strike, and compromise its ability to make it through the corridor.
- In addition, about 25 percent of the migrating mother/calf population, who travel at slower than average speeds, will potentially exceed SELs above 199 dB, sufficient to cause permanent threshold hearing loss [W15].
- From Figure 4 above, the distance the whale would need to travel in the middle of the 140 to 145 dB corridor to get past the turbine complex is about 59 kilometers (km). The median travel speed for mother/calf pairs is 1.17 km/h[W15] requiring 50.4 hours of travel, and adding 52.6 dB of sound exposure based on the formula: 10 $\log_{10}$ (exposure time in seconds).
- The median travel speed for groups greater than or equal to three is 1.09 km/h, requiring 54.1 hours of travel and adding 52.9 dB of exposure.

- So, for both groups, about 53 dB of sound exposure is added to the 142.5 dB in the middle of the corridor resulting in a **SEL of 195 dB that well exceeds the 179 dB criteria** [W16] **for temporary threshold hearing loss.**
- Worse yet, 25 percent of mother/calf pairs travel at speeds less than 0.6 km/h, [W15, Figure 2] which would add 55.5 dB of sound exposure. Adding that to the 142.5 dB in the middle of the corridor **results in a SEL of 198 dB, dangerously close to the SEL of 199 dB** [W16] **for permanent threshold shift hearing loss. That 199 dB criteria would be exceeded** if a pair traveled closer to the 145 dB part of the corridor, and for those mother/calf pairs traveling slower than 0.6 km/h**.**

Therefore, there is a high potential for permanent hearing loss as well as temporary loss among a significant percentage of mother/calf pairs if they were to enter the migration corridor between the two wind energy areas.

Figure 6. Mother/Calf Pair

B. Masking of communications and mother/calf separation from turbine operation noise.

- The right whale's eyesight is not good. It uses sound to navigate and communicate with others of its species**,** including between mother and calf.
- Its communications employ low-amplitude signals that are susceptible to masking [W17].
- Such communications are made by "upcalls" with a noise source level between 147 and 155 dB [W18]. A calf just 10 meters away from the mother would receive at most, a noise level signal of 135 dB (using the 20 dB spherical spreading loss factor for the near to source-field), which is below the minimum 140 dB level of noise in the corridor from the operation of the wind turbines.
- Therefore, communications between mother and calf would be essentially masked or blocked throughout the corridor.
- Masking of its communications risks the separation of females from calves during migration [W19, W20], which is of course a path to injury and death.

- Therefore, the whales cannot successfully migrate in between the Atlantic Shores and Hudson South areas.

Therefore, it is likely that the noise from the Atlantic Shores turbine operation alone will block the entire existing migration corridor of the right whale, and the whales have no other migratory path to take.

The noise from turbine operation in **both** the Atlantic Shores and the recently purchased NY Bight areas will only increase the noise levels within the 6-86-mile migration corridor, and extend elevated noise above 120 dB much farther beyond that 86 miles, potentially blocking the whale's migration and dooming them to extinction.

There is no way to mitigate this operational noise impact in an electric power delivery setting, **a project on one side of the migration corridor must give way to make a path for the whale.** That **should logically be the Atlantic Shores Offshore Wind project** because it has less wind energy than Hudson South, and it creates serious shore impacts which Hudson South does not.

Noise Impact- Pile Driving.

- In addition to the severe impacts expected from operating turbines, significant noise impact to the whale can occur before that. Such impacts occur during the construction phase from pile driving to place the foundations, and even prior to that when the seabed is characterized by vessel surveys using high intensity noise equipment.
- Regarding pile driving, Save LBI provided extensive comments [W9] to the NMFS noting that the Application for Take Authorization for the project contains many unsupported assumptions and calculations, which taken together, seriously underestimate the noise impact.
- Regarding the noise source level, the Application assumes that broadband noise from the pile driving can be attenuated by bubble curtains and other similar methods by up to 20 dB, when the technical literature justifies only about 5 dB. For the lower frequency noise hearing range of the right whale, our comments contend that no noise source attenuation should be assumed because most of that noise comes primarily from reverberations into and then out of the seabed, which is not attenuated at all by bubble curtains or other shields.
- Regarding noise dissipation, the Application apparently assumes that decibel levels will drop by 15 dB for a doubling of distance, or about 40 dB per tenfold increase in distance which is well beyond the 20 dB from spherical noise spreading which for lower frequencies is the maximum possible that we have seen in the scientific literature for the near field.
- The huge difference in the distance required to meet criteria levels that these numbers make is shown below.

Table 1.

Pile Driving Impacts
-for 15 meter diameter pile-

	Atlantic Shores Application	Other Sources
Sound Energy Level @ 750 meters	165-170 dB (1a)	184 dB (2)
Sound Pressure Level (SPL), broadband	~ 210 (1b)	~220 (3), ~245 (4)
Transmission Loss (TL)	**40 (5)**	**15 dB (6)**
Distance required to 160-140 dB (no source attenuation)	**4-9 miles (7)**	**6-134 miles (8)**
Broadband Source Attenuation , bubble curtains	10 dB (7)	5 dB (6)
Low Frequency Attenuation, baleen whales	10 dB (7)	0 dB (reverberates from seabed)

References cited are available upon request.

- Such large noise dissipation is not consistent with the "practical" noise spreading formula that the NMFS has used elsewhere, which results in a 4.5 dB decrease with a doubling of distance. We asked that either justification for that 15 dB loss be presented, or that more scientifically acceptable and more commonly formulas be used to estimate noise dissipation.
- The pile driving is restricted during four months of the whale's primary migration. However, even with that, using proper source noise levels and realistic noise dissipation formulas, the number of Level A "takes" or instances of serious injury or fatality would be greater [W8] than the whales biological removal rate.

Therefore, we asked the NMFS to require substantial changes to the Application, including addressing turbine operational noise, before it proceeds to a proposed rule-making.

Noise Impact Vessel Surveys

In a recent two-month period, six whales were washed up on New Jersey shores with no evident cause of death, as listed below, another dead whale sighted on January 28th, and there have been an unusual number of close-to-shore sightings.

- 12/05/22 - Keansburg, NJ, infant sperm whale, 12-feet long
- 12/10/22 - Strathmere Beach, NJ, juvenile humpback, 30-feet long
- 12/23/22 - Atlantic City, NJ, near juvenile humpback, 30-feet long
- 01/07/23 - Georgia Ave, Atlantic City, NJ, humpback, 30-feet long
- 01/13/23 - North End, Brigantine, NJ, sub adult humpback, 20-feet long

- 02/13/23 - Whiting Ave Beach, Manasquan, NJ, humpback 25-feet long

According to data from the Marine Mammal Stranding Center, over the last 20 years, there have been an average of seven whales washed up per year in New Jersey. At this recent rate, whale strandings will far exceed those in past years, and the only relevant thing that we are aware of that has recently changed is the large number of wind energy vessel surveys being conducted off the coast concurrently. Those vessels use high intensity noise devices to characterize the seabed for future wind turbine placement. In many cases those vessels are traversing the same areas collecting similar data.

Adding to that coincidence, Save LBI commented extensively [W22] a year ago to the NMFS that the noise impact from these devices was being underestimated.

Taken together, it creates the potential for the vessel surveys as the cause, so, for the whale's sake, let's explore what we know.

- Based on the Coast Guards Local Notice to Mariners of week 1 of 2023 there were at least six vessels doing geotechnical surveys off the New Jersey coast during the December/early January time frame.
- The controlling noise device on these vessels i.e., the one with the highest noise level at the vessel and that spreads the noise underwater in all directions is the Dura Spark UHD unit,
- Based on Table 10 in a reputable and detailed measurement study [W26] that the NMFS cites often, when operating at an energy 750 joules (a level specified in the Atlantic Shores approval), the root mean square noise source level from that device should be 205 or 211 dB based on whether it's operating with 400 or 240 electrode tips respectively.
- But the NMFS survey approval for the Atlantic Shores project accepts a low 203 dB noise source level for the controlling "Dura-Spark 240 unit" in the application-apparently operating with 240 tips. So, this underestimates the source level by 8 dB or about 1/6th of the noise intensity.
- Save LBI also criticized all of the vessel harassment authorizations because the NMFS accepted the use of a 20 dB noise loss factor which is too optimistic. That represents a noise level loss of 20 dB for every tenfold

increase in distance, referenced to a meter from the source, but such "spherical" spreading only occurs in the proximity of the vessel at distances comparable to the water depth. Beyond that, the noise spreads out in a more "cylindrical" manner constrained by the seabed and the sea surface with noise dissipation closer to 10 dB. In many other take reviews that we cited in our comments, the NMFS has used a "practical" spreading factor of 15 dB, and we saw no reason why that wasn't used here.

- The NMFS criteria for permanent hearing loss from impulsive noise for these whales is 183 to 219 dB depending on how calculated, and the criteria for disturbing their behavior is 160 dB.
- Since the thresholds for permanent auditory damage and hearing loss are fairly close to the noise source levels that is not expected to occur here unless the whale was very close to the vessel.
- **On the other hand, the 160 dB threshold for disturbance is much lower, and that is what is of concern here**. Disturbing the whale's behavior can mean many things. It very often means first that the whale will seek to avoid the noise or "standoff "from it. If the whale is in between the shore and the vessel that could mean it being driven towards the shore seeking relief. It can also involve the whale surfacing to seek a lower noise level at the surface and becoming more vulnerable to vessel strike. It can mean separation of mothers and calves due to the 'masking" of their normal communications by the vessel device noise and fatality for the calf. It can also mean the loss of its navigational ability, disruption of a migration, cessation of feeding or mating, and the loss of the ability to detect predators. **So, behavior disturbance is not as innocuous as the name implies, and this should be the focus of the attention to this issue.**
- Taking the low noise source level and high loss rate together, the magnitude and extent of noise disruption to the whales is significantly underestimated. The NMFS estimated that noise levels above the 160 dB criteria **would only exist 0.1 miles from the vessel.**
- Using the 211 dB noise source level and the 15 dB dissipation rate, the distance to meet the 160 dB level **increases exponentially to 16 miles**.
- In addition, the 160 dB criterion was set at the level at which 50 percent of the general animal population would be disturbed by the noise. A significant percent of the population is disturbed by lower levels. The Bureau of Ocean Energy Management (BOEM) and the NMFS have recently adopted the use of the disturbance probabilities developed by Wood et al. [W31] in the recent draft guidance document on pile driving noise and the Take Application for the Atlantic Shores Offshore Wind project respectively. Using those probabilities, 90 percent of the baleen population, including humpback and right whales, would be disturbed by levels above 160 dB, and 50 percent disturbed by levels above 140 dB.
- Regarding humpback whales specifically, since several died here, one study [W24, W25] tracked their behavior in the presence of survey vessels using air guns. It also showed humpback whale avoidance of received noise levels at 140 dB, well below the 160 dB level.

The Table below shows how dramatically the affected range from the vessel survey ship changes using these different source levels, transmission loss factors and

criteria to avoid disturbance. The affected range and the density of marine mammals in it determines the number of disturbances and potential harm.

Table 2

Vessel Surveys –Noise Impact

	NMFS	Alternate
Source Level	203 dB	205-211
Transmission Loss	20	15
Criteria- Noise Level to Get Down to	160	140 (for baleen whales)
Range to 140 dB	**-----**	**13-34 miles**
Range to 160 dB	**1/10 mile**	**1/2-16 miles**

- To reach 140 dB with the use of the 211 dB noise source level and the 15 dB noise loss factor above **requires a distance of 34 miles**. Such a large elevated noise range, with the vessel making passes less than 0.1 miles apart, also results in repeated exposures to marine mammals to those elevated levels.
- Therefore, the distances at which these whales could be disturbed the vessel noise are significantly greater than the 0.1 miles that the NMFS assumes.
- Surveys are typically conducted within 36 miles of shore. Therefore, there is a high likelihood that a **significant percentage of the whale population,** finding itself between the shore and a survey vessel, **will experience elevated noise levels that will disturb its behavior**, and potentially **drive it** away from the source **toward shore** seeking relief.

The Agency Response

- Confronted with the unprecedented number of whale deaths in the area the NOAA and BOEM held a Press Conference that promptly dismissed the vessel noise surveys as the cause. Their reasoning was flawed.
- Several other causes were suggested without evidence, such as climate change, different feeding grounds, and more ship traffic but all those, if they were a cause, are gradual things and do not explain 6 deaths in a brief period.
- It spoke of the lack of information supporting the noise devices "directly" leading to the death of a whale, but as mentioned above that is not the contention here, but rather indirect harm from behavior disturbance.
- It spoke of no "known connections" between offshore wind activities and whale deaths but failed to mention that such potential "connections" in the form of the increased area affected were presented to the agencies a year ago by Save LBI in its comments on the vessel approvals.

- In addition, it is our understanding that auditory damage is rarely looked for in post-mortem examinations.
- So the agencies are reaching a conclusion on something not expected or looked for.
- It was stated that 50 percent of recent strandings were investigated and that 40 percent of those implicated vessel strike or fishing entanglements. But that leaves 80 percent unaccounted for, including 60 percent of those that were investigated.
- The real problem here, behavioral disruptions and the consequences of those, received only one inconclusive line in the response.
- Therefore, their response was not relevant to the problem being faced.

So, to summarize;

- There were an increased number of vessel surveys ongoing during the time of the incidents.
- The noise levels and ranges from the vessel above the NMFS criteria for whale behavior disturbance have been underestimated.
- The noise from the vessel survey devices is not likely to cause permanent hearing damage to whales in the vicinity, so that damage would not show up on post-mortem examinations even if it was looked for.
- However, the noise levels are sufficient to create extended ranges where the whales behavior will be disturbed, potentially leading to other serious outcomes.
- The situation calls for a prompt, serious and transparent investigation by those with the skills and independence to reach fact-based conclusions.
- The NMFS and BOEM response to the episode has not provided relevant justifications to dismiss the matter, and the agencies should create the team necessary to do the investigations.

Therefore, Save LBI will continue to press for the vessel track and operational noise data, including device settings and field noise measurement studies, to see whether or not the vessel surveys are a plausible cause of these recent deaths. On January 16, 2023 we wrote to the NMFS, BOEM and the NJDEP to obtain necropsy report results, field noise measurement verification data which should exist, and vessel-related information to determine whether survey vessels were in the same vicinity at the same time as the above whale death incidents, and therefore find out whether the vessels surveys were or were not a plausible cause of the whale deaths here. We are awaiting that data.

General Program Conclusions and Recommendations.

Our general conclusions from the review of the treatment of operational, pile driving and vessel survey noise are provided below.

Conclusions – General

- **Major issues regarding NOAA "take" authorizations: noise impact estimates, transparency, criteria.**
- **Turbine operational noise not being addressed.**
- **Conflict between right whale migration path and selected turbine areas. No public input to selected areas.**
- **Excessive reliance on acoustic companies paid by applicants, little on independent experts.**
- **Significant risk to marine mammals from the current offshore wind program.**
- **Congress should hold oversight hearings.**

The consistent pattern of underestimation of noise impacts by the NMFS and the BOEM, the failure to address operational turbine noise, or to address the disturbance consequence matter in any quantitative or other systematic manner, points toward endemic problems within those organizations. This creates the potential for substantial harm to marine mammals in the implementation of the offshore wind program.

Recommendations

- The Congress should hold oversight hearings, and mandate better practices.
- Pending that outcome, a team of acoustic and marine mammal experts should be assembled to develop interim practices.

References-Whales

W1. NJ Offshore Wind Strategic Plan, Natural Resource Technical Appendix, Figure 21. Section 2.6.3

W2. North Atlantic right whale distribution and seasonal occurrence in nearshore waters off New Jersey, USA, and implications for management Amy D. Whitt*, Kathleen Dudzinski, Jennifer R. Laliberté Geo-Marine, Inc., 2201 K Avenue, Suite A2, Plano, Texas 75074, US, March 31, 2013.

W3. Atlantic Shores Offshore Wind Application for Marine Mammal Protection Act (MMPA) Rulemaking and Letter of Authorization Prepared by: JASCO Applied Sciences (USA) Inc. September 2022 Submitted to: Permits and Conservation Division, Office of Protected Resources, NOAA Fisheries, Figure 9. North Atlantic right whale maximum seasonal density from Roberts et al. (2016a, 2021a, 2021b).

W4. Habitat-based Marine Mammal Density Models for the U.S. Atlantic: Latest Versions. Jason Roberts et al., updated June. 2022, A Collaboration Led by Marine Geospatial Ecology Laboratory / Duke University, https://seamap.env.duke.edu/models/Duke/EC/

W5. Off Nantucket. MA: Memorandum from Sean Hayes, NOAA to Brian Hooker, BOEM, May 13, 2022

W6. Off North Carolina: Passive acoustic monitoring for North Atlantic right whales at Cape Hatteras, North Carolina, Duke University Marine Laboratory, February 1, 2016, Figure 2.

W7. Off Virginia: Right whale occurrence in the coastal waters of Virginia, USA; endangered species presence in a rapidly developing energy market, Daniel P Salisbury at al., Figures 1 and 2.

W8. Off South Carolina: Comments by Sea Life Conservation, on the BOEM, NMFS right whale Strategy October, 2022.

W11. XI- engineering, Underwater Radiated Noise Modeling, draft, December, 2022

W12. Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations, January 1, 2008, Document.

W9. Save LBI comments to the NMFS on the Atlantic Shores project's Take Application, November 9, 2022

W10. Save LBI Presentation on Turbine Operational Noise to the North Atlantic right whale Consortium, Southall B. et al., Tables 4, 14, and 15.

W13. Bureau of Ocean Energy Management (BOEM) Report # 5586, Investigations of the potential effects of underwater noise from petroleum industry activities on migrating gray whale behavior, phase 2, January 1984 migration, Nyack et al.

W14. Quantifying loss of acoustic communication space for right whales in and around a U.S. National Marine Sanctuary, Leila T Hatch[1], Christopher W Clark, Sofie M Van Parijs, Adam S Frankel, Dimitri W. Ponirakis, PMID: 22891747, DOI: 10.1111/j.1523-1739.2012.01908.x

W15. Swim Speed, Behavior, and Movement of North Atlantic Right Whales (Eubalaena glacialis) in Coastal Waters of Northeastern Florida, USA James H. W. Hain1 *, Joy D. Hampp2, Sheila A. McKenney2, Julie A. Albert3, Robert D. Kenney

W16. NMFS, 2018 Revision to Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0), April, 2018, Table 3.

W17. Acoustic crypsis in communication by North Atlantic right whale mother–calf pairs on the calving grounds, Susan E. Parks, Dana A. Cusano[†], Sofie M. Van Parijs and Douglas P. Nowacek, Published:09 October 2019.

W18. An overview of North Atlantic right whale acoustic behavior, hearing capabilities, and responses to sound, Leanna Matthews, Susan Parks, Marine Pollution Bulletin, March, 2021

W19. Anderson Cabot Center for Ocean Life, A Framework for Studying the Effects of Offshore Wind Development on Marine Mammals and Turtles, May 2019.

W20. Vineyard Wind 1 NMFS Biological Opinion, page 149.

W 21. Protecting North Atlantic Right Whales During Offshore Wind Energy Development, BOEM website (recognizes noise and risk regarding the Endangered Species Act)

W22. Save LBI comments on the Atlantic Shores vessel survey Application.

W23. Genevieve E. Davis et. al., Long-term passive acoustic recordings track the changing distribution of North Atlantic right whales (Eubalaena glacialis) from 2004 to 2014, Scientific Reports, October 18, 2017.

W24. MARINE SEISMIC SURVEYS: ANALYSIS AND PROPAGATION OF AIR-GUN SIGNALS; AND EFFECTS OF AIR-GUN EXPOSURE ON HUMPBACK WHALES, SEA TURTLES, FISHES AND SQUID Prepared for Australian Petroleum Production Exploration Association by Robert D. McCauley, Jane Fewtrell, Alec J. Duncan, Curt Jenner, Micheline-Nicole Jenner, John D. Penrose, Robert I.T. Prince, Anita Adhitya, Julie Murdoch, Kathryn McCabe Centre for Marine Science and Technology, AUGUST 2000

W25. R.D. McCauley, Marine seismic surveys— a Study of environmental implications, 2000.
W26. Crocker and Fratantonio, Characteristics of sounds emitted during high resolution Marine Geophysical surveys March 24, 2016
W27. NMFS, BOEM, NARW Strategy Document , Draft, October 2022, Appendix C, March density data.
W28. Long-term passive acoustic recordings track the changing distribution of North Atlantic right whales (*Eubalaena glacialis*) from 2004 to 2014, Genevieve E. Davis, Mark F. Baumgartner, etal.
W29. Statistical modeling of North Atlantic right whale migration along the mid-Atlantic region of the eastern seaboard of the United States, Jeremy Firestone et al. Biological Conservation, Volume 141, Issue 1, January 2008, Pages 221-232.
W30. Xodus Group, Marine noise inputs, Technical Note on Underwater Noise, Statoil ASA, Table 3.1.
W31. Wood, Southall, Tollit, PG & E Offshore 3-D Seismic Survey Project, 2012.
W32. Richardson, Marine mammals and Noise, Academic press , 1995, page 287.