Written Testimony of

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Thank you Chairman Westerman, Committee Ranking Member Grijalva, Subcommittee Chairman Bentz, and Subcommittee Ranking Member Huffman for inviting me to testify at this hearing titled *"Examining the impacts of the National Oceanic and Atmospheric Administration's proposed changes to the North Atlantic Right Whale Vessel Strike Reduction Rule."* I am the Associate Vice President for Ocean Conservation Science in the Anderson Cabot Center for Ocean Life at the New England Aquarium. The New England Aquarium is a catalyst for global change through innovative scientific research, commitment to marine animal conservation, education, public engagement, and effective advocacy for vital and vibrant oceans. Our mission is to conduct research on topics related to ocean conservation and to develop science-based solutions to marine conservation problems.

I have been using statistical models to address wildlife conservation challenges for more than 20 years. I studied mathematics as an undergraduate at Colorado College. I learned how to use my mathematics training to address wildlife conservation challenges during my Ph.D. research at the University of California, Berkeley. After graduating with my Ph.D., I was a National Research Council Postdoctoral Research Associate at the National Oceanic and Atmospheric Administration's (NOAA) Southwest Fisheries Science Center. I then worked as a permanent federal employee at the Southwest Fisheries Science Center for over a decade before joining the New England Aquarium in 2019. My research focuses primarily on developing cetacean-habitat models and using predictions from these models to assess risk to cetaceans. I have published numerous scientific papers on a broad range of topics, including species habitat modeling, vessel traffic patterns, the risk of vessels striking whales, the risk of fishing gear entangling whales, the risk of chronic vessel noise to baleen whales, and estimating species diversity to guide designation of marine protected areas. I am currently an associate editor for Frontiers in Marine Science, I served as a guest editor for a research topic in Frontiers in Marine Science about the impacts of shipping on marine fauna, and I serve as an invited member of numerous committees, including the International Council for the Exploration of the Sea's (ICES) Working Group on Shipping Impacts in the Marine Environment, NOAA's Rice's Whale Recovery Planning Workshop, NOAA's humpback whale critical habitat team, NOAA's second Protected Species Assessment Workshop, and the International Whaling Commission (IWC) Scientific Committee.

The Aquarium has been extensively studying North Atlantic Right Whales (NARW; *Eubalaena glacialis*) for more than 40 years. Our scientists focus on solutions-based work and our research provides the information needed to evaluate measures that can be combined to protect this endangered species. For example, we conduct spatial analyses to assess risk from vessel strikes, facilitate communication across the maritime industry to reduce vessel strikes, collaborate with fishermen on new techniques to reduce entanglements in fishing gear, collect the data and conduct analyses needed to understand and mitigate the potential impacts of offshore wind energy development, and work with lawmakers locally, nationally, and internationally to develop science-based protections for the whales. Action is needed across sectors using multiple management measures and tools to prevent the extinction of the statutorily protected NARW.

The Aquarium commends NOAA on recent regulatory steps taken to protect NARW, including the proposed changes to the North Atlantic Right Whale Vessel Strike Reduction Rule (hereafter, Proposed Rule). Our testimony focuses on the Proposed Rule because we believe that the changes in the Proposed Rule are an important component of preventing the extinction of the endangered NARW and that these changes are needed as immediately as possible. While near real-time monitoring is one of the tools that can be used to reduce vessel strikes, more work is required to determine whether it can be used to replace, rather than supplement, vessel speed restrictions. For example, Gende et al. (2019) found that opportunities to detect whales are often limited and temporary. Their study also suggests that the time delays that occur in active whale avoidance must be carefully considered, including the time needed to evaluate competing risks, determine the appropriate action to take, and achieve the new operational state after an action is taken. Finally, near real-time monitoring systems must be rigorously evaluated to quantify the vessel strike risk reduction that they can achieve, particularly in comparison to the risk reduction achieved through other methods, such as speed restrictions and vessel routing changes. The best way of combining multiple methods, such as speed restrictions and real-time monitoring, also needs to be evaluated. However, we cannot afford to wait for further progress on the development of near real-time monitoring to take action to reduce vessel strikes of NARW.

Reducing the likelihood of deaths and serious injuries to NARW from vessel strikes requires immediate, decisive, and bold action. If implemented as immediately as possible, the changes in the Proposed Rule are an essential means of taking the action required. Below, the Aquarium provides testimony on three key points about NARW and NOAA's Proposed Rule:

1) Action is needed now to prevent the extinction of NARW
2) Action is required to reduce the risk of vessels striking NARW
3) NOAA's Proposed Rule is an essential means of taking the action required

Action is needed now to prevent the extinction of NARW

One of the most endangered large whale species in the world, the NARW is protected by statutory law in the United States (U.S.). Specifically, the "take" of the NARW is generally prohibited under both the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA) (16 U.S.C. 1532(19); 16 U.S.C. 1362(13)). Although protected from hunting since 1935, the species recovery has been limited by lethal and sub-lethal effects of human activities (Corkeron et al., 2018; Sharp et al., 2019), including vessel strikes, which are the subject of the Proposed Rule. The annual observed human-caused mortality and serious injury to NARW from

vessel strikes averaged 2 per year from 2015 through 2019, which is higher than the Potential Biological Removal (PBR) of 0.7 for NARW (Hayes et al., 2022). The Marine Mammal Protection Act defines PBR as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. Although measures have been implemented to reduce vessel strikes, mortality and serious injury to NARW from vessel strikes continues. The mortality and serious injury to the statutorily protected NARW from vessel strikes is inconsistent with the law and the best available science. Even one human-caused mortality puts the species at risk of extinction.

The New England Aquarium collates information on NARW mortalities and injuries from vessel strikes as curators of the North Atlantic Right Whale Consortium's photo-identification catalog. We provide this information in annual reports to NOAA (https://www.narwc.org/narw-catalog-reports.html) and in the annual report card of the Right Whale Consortium (https://darchive.mblwhoilibrary.org/browse/title?scope=3afd3800-5620-59b9-8b77-fc901b0c0fec). From 1972 through May 2023, a total of 122 cases with blunt trauma or external injuries (i.e., propeller cuts or gashes) from vessel strikes have been documented in U.S. and Canadian waters (Moore et al., 2004; Sharp et al., 2019; NOAA, 2020; NARWC, 2023; NOAA, 2023b). The evidence for these strikes include observed deaths (determined by the presence of deep propeller cuts that occurred pre-mortem and/or examining a carcass and finding evidence of blunt trauma) and sightings of living whales with cuts or gashes that are categorized as deep, shallow, or superficial. Pirotta et al. (2023) found that vessel strikes associated with deep and shallow wounds decreased a NARW's chance of survival.

The life history of every individual NARW that has been photographed is tracked in the North Atlantic Right Whale Catalog (rwcatalog.neaq.org). These life history data demonstrate the consequences of vessel strikes on the NARW population and show how the loss of each of these whales, particularly females, is compounded by the loss of their reproductive potential. Female NARW can give birth to at least 9 calves in their lifetime (Hamilton and Knowlton, 2021). For example, one whale, Wart, has given birth to seven calves since 1982 and is responsible for at least 29 whales being added to the population so far (Bishop et al., 2022). Wart's contribution to the NARW population emphasizes the effect that a single reproductive female can have on this small population and needs to be considered in the context of vessel strikes. For example, one strike resulted in the death of both a female and her dependent calf who could not survive independently. Another reproductive female, Infinity, was seriously injured in 2021 when she was struck by a 54-foot vessel; she has not been sighted again as of submission of this testimony. This vessel also struck and killed her calf. In 2020, two strikes were also documented for calves born that year: 1) a calf that was struck on two separate occasions between April and June in the Mid-Atlantic and died from the second strike; 2) a calf off the southeastern U.S. that suffered deep wounds on its head from a propeller and was unable to successfully nurse (Sharp et al., 2019; NOAA, 2020; 2023b).

NOAA also declared an Unusual Mortality Event for NARW because a particularly high number of deaths have been observed from Florida, U.S., to the Gulf of St. Lawrence, Canada, since 2017 (NOAA, 2023b). This Unusual Mortality Event remains active as of June 2023. In particular, there have been 36 deaths, 33 serious injuries (defined as likely to die), and 29

morbidity (sub-lethal injury or illness) cases documented and 92% of these cases (i.e., 90 cases) were caused by human activities.

Documented vessel strikes represent minimum numbers of strikes because not every death or injury is observed. Pace et al. (2021) showed that documented mortalities accounted for only 36% of all estimated NARW deaths between 1990 and 2017. Additionally, the lethal and sub-lethal effects of vessel strikes may be delayed. For example, one NARW suffered deep propeller wounds from a vessel strike when she was less than a year old. She survived the strike. However, when she became pregnant with her first calf at age 14, the growth of the fetus caused her wounds to reopen and she (and her unborn calf) died from a resulting infection (Glass et al., 2010).

The estimate for the number of NARW (i.e., the population size estimate) grew from 264 (+6/-4) in 1990 to a high of 481 individuals (+/-3) in 2011. As a result of the impacts to the population, the number of NARW steadily declined from the high in 2011 to 340 individuals (+/- 7) in 2021 (Pace et al., 2017; Pettis et al., 2023). This population decline has been occurring for a decade and the current population size estimate is one of the lowest in the past 20 years (Pace et al., 2017; Pettis et al., 2023). Additionally, the pool of reproductive NARW females has declined to only 72 individuals (Reed et al., 2022). This decline has been caused by a collapse in the fecundity of breeding females and a delay in when females start breeding (Reed et al., 2022), both of which have been linked to increasing levels of human impacts and changes in prey distribution. The survival of every individual NARW matters, as evidenced by the fact that the MMPA PBR is less than one (Hayes et al., 2022). Without immediate and concerted action to address the human-caused lethal and sub-lethal effects of vessel strikes on NARW, this endangered species faces a high risk of extinction.

Action is required to reduce the risk of vessels striking NARW

Reducing the risk of vessel strikes

Vessel strikes of large whales remain a conservation challenge throughout the world. For example, the International Maritime Organization (IMO) adopted nine proposals between 1997 and 2009 to reduce the risk of vessels striking large whales. The proposals focused on four whale species in three regions: NARW in U.S. and Canadian waters and fin (*Balaenoptera physalus*), sperm (*Physeter macrocephalus*), and long-finned pilot whales (*Globicephala melas*) in the Mediterranean Sea (Silber et al., 2012b). Measures used to reduce vessel-strike risk typically involve changing vessel routes and slowing vessels down. The goal of measures that change vessel routes, such as shifting the location or configuration of traffic separation schemes (i.e., shipping lanes) or establishing areas to be avoided, is to reduce the co-occurrence of whales and vessels. The goal of measures that slow vessels down is to reduce the risk of lethal vessel strikes because studies have found that the probability of a lethal strike increases with vessel speed (Vanderlaan and Taggart, 2007; Conn and Silber, 2013). Additionally, slower speeds may allow whales and vessel operators more time to engage in avoidance behavior (e.g., Vanderlaan and Taggart, 2007; Gende et al., 2019).

NOAA's 2008 Right Whale Vessel Strike Reduction Rule

In the late 1990's and early 2000's, NOAA recognized that steps were needed to address the risk of vessel strike to NARW and in 2008 they established several measures to reduce risk in a final rule to implement speed restrictions to reduce the threat of vessel collisions with NARW (hereafter, 2008 Rule; NOAA, 2008). The 2008 Rule was an important step towards risk reduction. However, multiple evaluations of the effectiveness of this rule have shown that further action is needed, and as immediately as possible, to build on that progress.

The 2008 Rule established 10 Seasonal Management Areas (active in defined areas for specific time periods) and Dynamic Management Areas (active in areas where whales are observed). Seasonal Management Areas were established where the risk of a vessel striking a NARW is expected to be higher due to whale or vessel traffic density. These areas differ in size (e.g., from approximately 1,500 to 23,000 km^2), are active during different times of year, and are implemented for different lengths of time (e.g., 2–5 months). When active, all vessels >65 feet (except vessels owned, operated by, or operated under contract to the U.S. government and law enforcement vessels engaged in enforcement or search and rescue) are required to travel at 10 knots or less in these areas. Smaller vessels are requested, but not required, to travel at 10 knots or less.

Analyses of the proximity of NARW vessel strikes to Seasonal Management Areas (Laist et al., 2014) and analyses comparing the number of NARW struck before and after management measures were implemented (NOAA, 2020) suggest that the Seasonal Management Areas have helped to reduce vessel strikes of NARW. However, multiple studies and continued vessel strikes of NARW since 2008 demonstrate that these areas fall short of achieving the risk reduction necessary to prevent extinction of NARW. In particular, multiple studies have shown that these Seasonal Management Areas are insufficient both in space and time (Schick et al., 2009; Laist et al., 2014; van der Hoop et al., 2015). The size of the Seasonal Management Areas was likely insufficient when the 2008 Rule was implemented because nearly one-third of detected NARW vessel strike mortalities occurred outside of the managed space but within managed timeframes (van der Hoop et al., 2015). Additionally, analyses of passive acoustic monitoring data collected from 2004-2014 found almost year-round habitat use of the U.S. East Coast (Davis et al., 2017).

To provide protections to NARW outside of the Seasonal Management Areas, the 2008 Rule established Dynamic Management Areas in real-time when three or more NARW are seen within close proximity. These areas remain in effect for 15 days. All mariners are encouraged to avoid these areas or reduce vessel speeds to 10 knots or less when transiting through these areas. However, these measures are voluntary and there is little cooperation with these requests to slow down (Silber et al., 2012a; NOAA, 2020). These Dynamic Management Areas have not achieved their intended goal of addressing the spatial and temporal shortcomings of the Seasonal Management Areas. Specifically, vessel strike mortalities of NARW have increased outside inactive Seasonal Management Areas (van der Hoop et al., 2015). Limited cooperation with these voluntary Dynamic Management Areas likely contributed to their lack of effectiveness (van der Hoop et al., 2015; NOAA, 2020).

Further evidence that the 2008 Rule does not provide the necessary reduction in vessel strike risk is provided by the vessel strikes of NARW that have occurred since the 2008 Rule was implemented. Specifically, from 2008 through May 2023, there were 13 documented lethal (mortalities and serious injuries) vessel strikes of NARW in the U.S. (NOAA, 2020; 2023b). Five of the 13 have occurred since 2020; at least two of these five strikes involved vessels smaller than 65 feet, which are not currently subject to the mandatory speed restrictions (NOAA, 2020; 2023b). The vessel strikes that have been observed since the 2008 Rule was implemented suggest that further action is required to ensure that this source of human caused mortality and serious injury does not exceed the level established as sustainable in U.S. laws.

NOAA's Proposed Rule is an essential means of taking the action required

Proposed Rule

In 2022, NOAA proposed changes to the 2008 Rule (hereafter, Proposed Rule; NOAA, 2022) to further reduce the likelihood of mortalities and serious injuries to NARW from vessel collisions. The proposed changes for reducing the risk of vessel strikes to the statutorily protected NARW are necessary and based on the best available science. Specifically, Garrison et al. (2022) used the most up-to-date data available about NARW distributions and vessel traffic patterns to develop an encounter risk model for the U.S. East Coast. The methodology used by Garrison et al. (2022) has become a standard for assessing vessel-strike risk for large whales and has been used on the U.S. East and West Coasts (e.g., Martin et al., 2016; Rockwood et al., 2017; Crum et al., 2019; Rockwood et al., 2020). Mortality estimates from encounter risk models developed for fin, humpback, and blue whales have been included in NOAA's marine mammal stock assessment reports (Carretta et al., 2022). Garrison et al. (2022) used the encounter risk model to estimate the reduction in NARW mortalities that could be achieved by implementing speed restrictions in broad areas along the U.S. East Coast. Their broad areas were defined as the areas of highest risk to NARW. They found an approximately 28% reduction in NARW vessel strike risk when 10 knot speed restrictions were implemented in their broad areas.

Below we address three of the four specific changes in the Proposed Rule based on the Aquarium's longstanding expertise and study of the species:

1) Expanding the spatial and temporal extent of Seasonal Speed Zones
2) Expanding the vessels subject to the speed restrictions to most vessels greater than or equal to 35 feet (10.7 m) and less than 65 feet (19.8 m)
3) Implementing mandatory speed restrictions in Dynamic Speed Zones, which are established when whales are detected outside of Seasonal Speed Zones

The fourth proposed change updates the safety deviation provisions in the 2008 Rule. We do not have expertise in this area; consequently, we do not address this change.

Expanding the Seasonal Speed Zones

The Aquarium reviewed the proposed Seasonal Speed Zones (SSZ) and associated best available science, which supports the expansion of the size of the SSZ and the length of time the SSZ are active. We support NOAA's approach to determining whether, where, and for how long speed restrictions should be in place, which recognizes responsible use of the ocean by establishing the smallest spatial and temporal footprint needed to protect the species. Vessel speed restrictions

have been used to mitigate vessel-strike risk because studies (Vanderlaan and Taggart, 2007; Conn and Silber, 2013) have shown that the probability of a lethal vessel strike increases at higher vessel speeds. The SSZ, which are larger and active longer than the Seasonal Management Areas established in the 2008 Rule, address the shortcomings identified in the 2008 Rule's Seasonal Management Areas. In particular, the spatial and temporal expansion of the SSZ ensure that they are better aligned with NARW habitat, cover areas where previous vessel strike mortalities have been detected, and buffer against climate-driven changes in NARW habitat.

U.S. East Coast waters represent year-round NARW habitat (Davis et al., 2017) and contain historic NARW feeding grounds, where water temperatures have warmed faster than most of the world's oceans (Pershing et al., 2015). As a result, NARW distributions have shifted to new areas and there have been changes in the time periods over which they use different areas (Record et al., 2019). For example, NARW have returned to historically important areas, such as southern New England shelf waters. Southern New England shelf waters were formerly a whaling ground and these waters have reemerged as an important NARW habitat (O'Brien et al., 2022). Additionally, studies have shown that climate change has resulted in the peak usage of Cape Cod Bay by NARW occurring later in the season (Pendleton et al., 2022) and in a higher abundance of NARW in Cape Cod Bay (Ganley et al., 2022). The expanded SSZ help to ensure that vessel strike risk is addressed in these areas with documented, climate-driven changes in NARW habitat use.

Additionally, the Proposed Rule will likely benefit other baleen whale species. For example, NOAA declared an Unusual Mortality Event for humpback whales because of an elevated number of humpback whale mortalities along the U.S. East Coast from Maine through Florida since 2016 (NOAA, 2023a). This Unusual Mortality Event remains active as of June 2023. A total of 198 humpback whale mortality cases through May 2023 are included in the UME, with 93% of these cases (184 cases) detected between Massachusetts and North Carolina. Determination of cause of death for recent cases is ongoing. However, half of the 20 mortality events examined from 2016 through April 2017 were attributed to vessel strikes (NOAA, 2023a). The Proposed Rule establishes a SSZ in waters off these states, which would reduce the risk of a lethal vessel strike for humpback whales.

Expanding the vessels subject to the speed restriction

The Aquarium supports the Proposed Rule's expansion of the vessels subject to the speed restriction to most vessels greater than or equal to 35 feet (10.7 m) and less than 65 feet (19.8 m). The 2008 Rule was focused on reducing risk in U.S. waters from vessels over 65 feet in size, which were the vessel sizes thought to be the main threat to NARW at that time. However, at least four of the 13 documented lethal vessel strikes in U.S. waters since 2008 (two before 2019 and two after 2020) involved vessels smaller than 65 feet, which are not subject to the mandatory speed restrictions in the 2008 Rule. Specifically, a 46-foot vessel struck a NARW off Georgia in 2012, resulting in a serious injury (NOAA, 2020). Additionally, a 39-foot vessel struck a whale off Massachusetts in 2014, resulting in propeller cuts and serious injury (NOAA, 2020). These whales could not be identified because they were not photographed; consequently, the ultimate outcome of these strikes are not known. In 2021, a reproductive female, Infinity, was seriously injured and her calf was killed when they were struck by a 54-foot vessel. Infinity was last

sighted four days after the strike with deep propeller wounds to her side and has not been sighted again as of submission of this testimony (NOAA, 2023b).

Mandatory speed restrictions in Dynamic Speed Zones

Static speed management is not sufficient as a sole strategy to reduce vessel strike risk because of variability in species distributions. Consequently it is necessary to include Dynamic Speed Zones in the Proposed Rule and for speed restrictions in these Dynamic Speed Zones to be mandatory. Over a decade of research on the U.S. East and West Coasts shows low compliance with voluntary speed restrictions (e.g., McKenna et al., 2012; Silber et al., 2012a; Freedman et al., 2017; Morten et al., 2022). Consequently, alternative strategies must be used to reduce vessel speeds. Mandatory speed restrictions were found to achieve high compliance when they were implemented and enforced on the U.S. East Coast (Silber et al., 2014). This research suggests that implementing mandatory speed restrictions in areas of high risk identified using the best available science will reduce the risk of lethal vessel strikes for NARW. To ensure that the Dynamic Speed Zones provide the protection needed to reduce vessel strike risk requires the continued use of both visual sightings and acoustic detections. Both monitoring methods require sufficient effort (e.g., surveillance flights and acoustic monitoring stations) to ensure that whales are detected and Dynamic Speed Zones are established.

Conclusion

On behalf of the New England Aquarium, the above testimony is submitted as grounded in the best available science, consistent with the laws that protect the North Atlantic right whales (NARW), and necessary given the potential extinction of NARW. The Aquarium commends the National Oceanic and Atmospheric Administration (NOAA) on recent steps taken to protect NARW, including the proposed changes to its 2008 *Vessel Strike Reduction Rule* (Proposed Rule), which represents the bold and decisive action needed to reduce vessel strikes of NARW as one major contributor to individual deaths and the potential for the extinction of this species. The annual observed human-caused mortality and serious injury to NARW from vessel strikes averaged 2 per year from 2015 through 2019, which is higher than the Potential Biological Removal (PBR) of 0.7 for NARW (Hayes et al., 2022). Consequently, the level of vessel strikes to the statutorily protected NARW is inconsistent with the law and the best available science. Even one human-caused mortality puts the species at risk of extinction. While the 2008 Rule represented an important step in preventing vessel strikes of NARW, vessel strikes have continued since the 2008 Rule was implemented and further action is required.

NOAA's Proposed Rule is an essential means of taking the action required based on the best available science. The scientific methodology (Garrison et al., 2022) used to develop the Proposed Rule has become a standard for assessing vessel-strike risk for large whales, has been used on the U.S. East and West Coasts (e.g., Martin et al., 2016; Rockwood et al., 2017; Crum et al., 2019; Rockwood et al., 2020), and has been incorporated in NOAA's marine mammal stock assessment reports for fin, humpback, and blue whales on the U.S. West Coast (Carretta et al., 2022). Expanding the Seasonal Speed Zones in space and time is necessary to ensure that these zones are better aligned with NARW habitat (e.g., Davis et al., 2017), cover areas where previous vessel strike mortalities have been detected (e.g., van der Hoop et al., 2015), and buffer against climate-driven changes in NARW habitat (e.g., Ganley et al., 2022; O'Brien et al., 2022;

Pendleton et al., 2022). Expanding the vessels subject to the speed restriction to most vessels greater than or equal to 35 feet (10.7 m) and less than 65 feet (19.8 m) is necessary because at least four of the 13 documented lethal vessel strikes in U.S. waters since 2008 (two before 2019 and two after 2020) involved vessels smaller than 65 feet (NOAA, 2020; 2023b). Implementing mandatory Dynamic Speed Zones is necessary because of variability in species distributions and over a decade of research on the U.S. East and West Coasts shows low cooperation with voluntary speed restrictions (e.g., McKenna et al., 2012; Silber et al., 2012a; Freedman et al., 2017; Morten et al., 2022). Mandatory speed restrictions were found to achieve high compliance when they were implemented and enforced on the U.S. East Coast (Silber et al., 2014). Finally, the Proposed Rule will likely benefit other baleen whale species, such as humpback whales which have been undergoing an Unusual Mortality Event since 2016 (NOAA, 2023a). We support NOAA's approach to determining whether, where, and for how long certain vessel sizes should be subject to speed restrictions. This approach recognizes responsible use of the ocean by establishing the smallest spatial and temporal footprint needed to protect the species and incorporating the best available science on the reduction of vessel strike risk. Implementation of the proposed rule as immediately as possible is an important step toward preventing the extinction of the endangered NARW.

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