Written Testimony of

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Thank you to Chairman Grijalva, Ranking Member Bishop, and all the committee members for inviting me to testify on the topic of ocean climate action: solutions to the climate crisis. As a former resident of Arizona—a non-ocean state—I want to acknowledge Chairman Grijalva's leadership in introducing H.R. 8632: The Ocean-Based Climate Solutions Act and the recognition that no matter where we as U.S. citizens reside, a healthy and thriving ocean is critical to all of us. I also want to thank the lead sponsors of the other bills (H.R. 3548, H.R. 3919, H.R. 4093, H.R. 5390, H.R. 5589, H.R. 7387, H.R. 8253, and H.R. 8627) being considered during this hearing for their efforts to keep the ocean front of mind and sustain the necessary science and research that informs decision making critical for managing our ocean ecosystems.

I am the Director of Ocean Policy at the New England Aquarium (Aquarium) based in Boston, Massachusetts. The New England Aquarium is a catalyst for global change through public engagement, innovative scientific research, commitment to marine animal conservation, leadership in education, and effective advocacy for vital and vibrant oceans.

For decades, scientists at the Aquarium's Anderson Cabot Center for Ocean Life have been working to protect marine and freshwater ecosystems from human impacts and conserve threatened and endangered animals and habitats. The Aquarium's scientists conduct cutting-edge research to understand, quantify, and reduce the consequences of human activities on the health of marine species and ecosystems by developing science-based solutions and advocating for policies that balance human use of the ocean with the need for a healthy, thriving ocean now and in the future.

I am an oceanographer and a geoscientist. While I was an active scientist, I conducted geochemical research on ocean sediments to understand Earth's climate history. My focus was on reconstructing the climate history of Antarctica for the past 10,000 years. The goal of this research was to understand the causes of past extreme climate events and to use that information to anticipate what we might expect in the present or future as Earth's climate changes in response to excess carbon dioxide and other greenhouse gasses being emitted into the atmosphere. My career in policy has focused on both the energy and environmental sides of climate and, although I currently serve in a role advocating for a healthy ocean, I also have experience working with the energy sector to achieve a balance between energy extraction and protecting the environment, conserving natural resources, and promoting safety.

While the ocean has a central role in my life, I have to remind myself that not everyone is as attuned to the role that the ocean plays in all of our lives whether we live on the coast or

not. For those of us that live on the ocean, it may be easier to see how the ocean is connected to our health and well-being. It provides food, tourism, transportation, and increasingly, clean energy from offshore wind resources. The ocean comprises 71% of the Earth and is responsible for keeping the planet habitable, whether by providing oxygen, absorbing excess carbon dioxide and heat from anthropogenic sources, or storing vast amounts of carbon in deep-sea sediments. The ocean's reach extends far beyond the coasts. It is responsible for controlling weather patterns that determine precipitation for farms and ranches in Oklahoma, prolonged droughts in Colorado, and flooding in Missouri. Persistent heat waves or the intensifying polar vortex are also attributed to changes in our ocean.

Prior to the COVID-19 pandemic, 2020 held the promise of being the "Super Year" for the ocean and climate. The year kicked off with the United Nations Framework on Climate Change (UNFCCC) 25th Conference of Parties (COP) in December 2019. I was at that meeting and appreciated that the Chairman and other members of the committee attended as well. Promoted as the "Blue COP," it was the first time the ocean was integrated in the international climate negotiations with the result that an ocean section was agreed to in the COP decision text. The "Blue COP" was to be followed by the United Nations Ocean Conference, the IUCN World Conservation Congress, the Our Ocean Conference, the 15th meeting of the Conference of the Parties to the Convention on Biological Diversity, and concluding with the 26th UNFCCC COP. Each of these international conferences represented an opportunity to continue reinforcing the need to include the ocean as part of the solution to the climate crisis.

By introducing H.R. 8632: The Ocean-Based Climate Solutions Act, the House of Representatives and the leadership of the House Natural Resources Committee has ensured that efforts to integrate ocean-based solutions to climate change remain at the forefront of decision making and policies that recognize the role of the ocean in keeping the planet healthy and habitable for all life on Earth.

The 15 titles that comprise H.R. 8632 leverage the ocean's capacity to serve as a solution to climate change by advancing offshore renewable energy and limiting offshore conventional energy from fossil fuels, protecting the vast carbon reservoirs stored in the ocean (i.e. "blue carbon), supporting climate-ready fisheries, expanding marine protected areas, and welcoming all stakeholders to the dialogue.

I am testifying today in support of H.R. 8632 in my capacity as both the Director of Ocean Policy at the New England Aquarium and as a geoscientist with professional experience working directly on many of the solutions proposed in the bill. On the whole, the Ocean-Based Climate Solutions Act proposes a comprehensive yet pragmatic framework for taking immediate action to limit the impacts of the climate crisis by harnessing the power of the ocean.

While the Aquarium supports the goals outlined in all 15 titles of the bill, my written testimony addresses those that Aquarium works on directly or has taken a position on in the past.

Blue Carbon and Coastal Resilience

Blue carbon is defined as the carbon captured by the planet's ocean and coastal ecosystems[1]. In particular, coastal ecosystems comprising mangroves, seagrasses, tidal and salt marshes, and estuaries are incredibly effective at storing carbon. Development projects that degrade or destroy these ecosystems not only release the stored carbon back into the atmosphere further exacerbating climate change, they also leave coastal communities vulnerable to the impacts of rising sea levels and intensifying storms.

Coastal wetlands represent less than 1% of the ocean, but they store more than 50% of the seabed's carbon reserves. Moreover, they sequester enough carbon to offset one billion barrels of oil annually. One hectare of mangrove forest is capable of offsetting the equivalent of 726 tons of emissions from burning coal, and one hectare of seagrass can store twice the amount of carbon than that of a terrestrial forest[2].

By providing a mechanism to increase carbon storage in coastal ecosystems and supporting mapping, restoration, and protection of these critically important, but vulnerable, ecosystems, the Ocean-Based Climate Solutions Act capitalizes on the many co-benefits these systems offer in the fight against climate change.

By investing in coastal restoration and resilience, the bill supports nature-based solutions and prioritizes front-line communities. As a cultural institution based on the Boston waterfront, the Aquarium has experienced first-hand the devastating impacts from sea-level rise and flooding from storm surge. Funding that supports efforts to enhance coastal resilience and protect and restore important coastal ecosystems from climate threats is needed for communities like Boston and organizations like the Aquarium to adapt to future climate scenarios. Protecting and restoring coastal ecosystems uses "natural infrastructure" to provide cost-effective solutions that increase resilience for coastal communities and also enhance habitats for birds and fish, improve water quality, and sequester carbon.

As evidence of the value of restoring these ecosystems, a recent study developed an economic evaluation of the Boston Harbor cleanup that was mandated under the Clean Water Act and initiated in 1986. The results from the study show that the cost of the cleanup itself was $4.7 million and that the resulting ecosystem restoration has provided $30-100 billion in services to society[3]. The numbers here speak for themselves regarding the co-benefits of restoring and protecting coastal habitats both to protect coastal communities and store carbon.

Marine Protected Areas

The Aquarium supports the provisions pertaining to Marine Protected Areas proposed in the Ocean-Based Climate Solutions Act. New England Aquarium together with Mystic Aquarium provided the scientific justification that was used to designate the Northeast Canyons and Seamounts Marine National Monument (Monument) in 2016[4]. We subsequently opposed President Trump's proclamation weakening protections of the

[1] https://oceanservice.noaa.gov/facts/bluecarbon.html
[2] https://oceanwealth.org/why-blue-carbon-is-redd-hot/
[3] https://www.frontiersin.org/articles/10.3389/fmars.2018.00478/full
[4] https://www.frontiersin.org/articles/10.3389/fmars.2020.00566/full

Monument in June 2020. The Aquarium conducts regular aerial surveys of the Monument to monitor and measure marine biodiversity visible at the surface and uses this information to inform decision making on the Monument and advocate for the need to maintain strong protections for this highly diverse, but extremely fragile, ecosystem.

The Aquarium also supports the global call to protect 30 percent of lands and seas by 2030 and sees this as the minimum amount of protection required to ensure that the ocean continues to produce oxygen, absorb heat, support healthy and diverse ecosystems, provide a plentiful source of healthy, low-carbon protein for billions, and enhance resilience to climate impacts.

While the Aquarium recognizes that setting aside places in the ocean to protect them from the impacts of human activities may not have wide appeal amongst all ocean users, we view this as a critical and necessary component of any ocean-based solution to climate. The Aquarium also supports balanced uses of ocean and advocates for science-informed decision-making to ensure that human uses of the ocean are sustainable and minimize impacts to habitats and wildlife.

The science on this topic routinely demonstrates the benefits of highly protected Marine Protected Areas. Recently published results show that protecting just 5% more of the ocean can increase future fish catches by at least 20%[5]. These results reinforce the complementary benefits that marine protected areas have for fisheries and make a strong case for expanding marine protected area specifically designed to support productive and sustainable fisheries.

In New England, over the past decade, the Gulf of Maine has warmed faster than 99% of the global ocean[6]. Warming temperatures combined with slow adaptation has contributed to the collapse of the Gulf of Maine cod fishery. In addition, the lobster fishery has been migrating north with estimates that the fishery in Maine may also collapse within five years[7]. The dire outlook for fisheries in New England and elsewhere supports arguments on behalf of strongly protecting marine environments from human activities to enhance resilience and support fisheries. Because of this, the Aquarium recognizes the need to balance both the human communities that depend on the ocean with those of a vibrant ecosystem too often impacted negatively by the industrialization of the ocean. We strongly support conducting the science necessary to ensure this balance is achieved and believe that the ocean—if healthy and well managed—can accommodate multiple uses that support both conservation measures and some extractive uses.

Offshore Energy

The provisions outlined in the Ocean-Based Climate Solutions Act are absolutely necessary if we are to prevent the worst of what has been predicted under a business-as-usual scenario. The evidence is overwhelmingly clear. We must severely curb emissions of greenhouse gasses, and we need to do it now. Prohibiting new oil and gas leasing in all areas of the Outer Continental Shelf while simultaneously enhancing offshore wind energy production to 25 gigawatts by 2030 will help the United States meet its energy needs while

[5] https://www.pnas.org/content/117/45/28134
[6] https://science.sciencemag.org/content/350/6262/809
[7] https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/eap.2006

also enabling the country to achieve its climate targets. Both of these goals are consistent with the Aquarium's overarching mission to protect the blue planet.

In 2018 when the Trump Administration announced a draft plan to open nearly the entire U.S. Outer Continental Shelf for potential oil and gas lease sales, the Aquarium vehemently opposed this course of action because of the risks posed to the ocean and coastal communities that depend on it for their living. The Deepwater Horizon oil spill in 2010 demonstrated the devastating impact that this industry can have on the environment. The commercial fishing industry in the Gulf of Mexico is estimated to have lost $247 million as a result of post-spill fisheries closures with an estimated total loss of upwards of $8.7 billion and 22,000 jobs by 2020. Lost tourism dollars were estimated to have cost Gulf of Mexico states up to $22.7 billion in just the two years after the spill[8]. New England fisheries are the most valuable in the country with scallop and lobster landings worth a combined $1.18 billion in 2018. In New England and elsewhere along the Atlantic coast, these costs simply don't outweigh any benefits for allowing offshore oil and gas to proceed in the Atlantic or elsewhere.

As of November 2, 2020, there were 2,286 active leases in the Gulf of Mexico representing 12,148,609 acres, most of which are in the Western and Central Planning Areas and cover nearly 13% of the total available acreage[9]. In 2012, the Department of the Interior released a report showing that nearly two-thirds of the acreage leased by the industry was neither producing or under active exploration or development[10]. While these numbers have invariably changed since 2011, the fact remains that companies still have the right to develop and produce oil and gas offshore on existing leases. In other words, we do not need to issue more leases when so many go unused, particularly at a time when we must be planning for a clean energy economy instead of planning for more fossil fuel extraction.

Given the Aquarium's commitment to conserving and protecting North Atlantic right whales, we also opposed NOAA's issuance of Incidental Harassment Authorizations to geophysical companies interested in conducting seismic surveys seeking potential offshore oil and gas reservoirs in the Atlantic. The sound produced by these seismic arrays would have been detrimental to North Atlantic right whales and other marine life in the Atlantic. Further, we view these surveys as unnecessary given our view that oil and gas development should not proceed.

Despite our reservations to conventional oil and gas development and production in the Atlantic, the Aquarium fully supports the development of offshore renewable wind energy with the caveat that the industry use the best available science to inform the siting, construction, and ongoing operation of the platforms. The Aquarium is actively involved in the research to support these decisions and mitigate any impacts to North Atlantic right whales and other vulnerable, threatened, and endangered species. We recognize that offshore wind will likely impact the marine environment, but by engaging scientists early and exercising the precautionary principle, the Aquarium strongly feels that the benefits far outweigh the costs by mitigating climate change through this critical energy transition from conventional fossil fuels to clean, renewable offshore wind energy.

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[8] https://www.nrdc.org/sites/default/files/gulfspill-impacts-summary-IP.pdf
[9] https://www.boem.gov/sites/default/files/documents/oil-gas-energy/leasing/regional-leasing/gulf-mexico-region/Lease%20Statistics%20November%202020.pdf
[10] https://www.doi.gov/news/pressreleases/DOI-Releases-Update-on-Unused-Oil-and-Gas-Leases

This isn't the first time Massachusetts—or New England for that matter—has gone through an energy transition. From the 1700s to the late 1800s, whales were used for energy. Oil from whale blubber lit entire cities until the first modern oil well was established near Titusville, Pennsylvania. Communities dependent on whaling went out of business. Now, Massachusetts and New England residents stand to gain immensely in the form of jobs, a clean environment, low-cost energy, and reduced risks from climate change as we transition yet again to benefit from offshore renewable energy. As lessons are learned off our coast, they can be applied elsewhere to help facilitate a wider transition and provide economic benefits across the country.

Climate Ready Fisheries

New England is on the front line of a rapidly changing ocean that is altering our fisheries and forcing us to adapt. Because the Aquarium believes that a healthy ocean is part of the solution to climate change, we also believe that sustainable fisheries are a key component of not only a resilient ocean, but also a low-carbon source of protein for billions of people. As with every other issue pertaining to ocean use, the Aquarium supports strong, science-based decision making and cooperative research that involves the fishing community. Innovative tools and approaches in addition to a robust scientific process are needed to support and implement adaptive measures that help fisheries managers adapt to shifting stocks, decreasing biomass, changes in distribution and abundance, and changes in recruitment, which is supported by the provisions of the bill.

Marine Mammal Conservation

Beyond being an iconic cultural institution and tourist destination, the New England Aquarium is most well-known for its 40-year old research program on the North Atlantic right whale. In addition, our scientists study other cetaceans, pinnipeds, and sirenias (i.e. manatees). As experts in marine mammal research and conservation, the Aquarium was pleased to see marine mammals included as an ocean-based climate solution.

Marine mammals, and specifically large whales, are an essential element of a low-carbon future. Whales not only store a vast amount of carbon in their bodies by virtue of their size (to the tune of 1 Gt per large whale), but also distribute nutrients throughout the water column that support phytoplankton growth, which in turn removes carbon dioxide from the atmosphere and produces oxygen. Ensuring the ongoing recovery of marine mammal populations and the survival of threatened and endangered species is an essential component of any ocean-based solution to climate change.

By directing the National Marine Fisheries Service to establish and implement climate impact management plans for vulnerable populations of marine mammals with the goal of effectively conserving species in the face of climate change, the bill ensures we are planning for the impacts that a changing climate will have on these species.

This bill also addresses the important issue of marine mammal mortality resulting from interactions with shipping vessels. The United States is heavily reliant on the commercial shipping industry; according to NOAA, approximately 75% of all U.S. trade involves some

form of marine transportation[11]. Each year, dozens of large whales in the United States are killed when they are struck by vessels transiting their habitats[12]. In 2020 alone, two young (one was just days old) endangered North Atlantic right whales were killed by vessel strikes. The current estimate of remaining North Atlantic right whales dropped to just 366 animals in 2020.

In addition, widespread shipping activity translates to a sizable carbon footprint. In 2019, domestic and international shipping accounted for 4% of the U.S. transportation sector's energy-related carbon emissions[13]. Shipping contributes to underwater noise, which interferes with marine mammal communication, foraging, and navigation. The ambient noise in the oceans is generally doubling each decade, led by a rise in commercial shipping[14].

The bill's solution to reduce shipping speeds in U.S. waters addresses all three of these issues. Slowing ships down directly reduces carbon emissions and increases fuel efficiency[15], which may provide an economic incentive to comply. As an added benefit, slower vessel speeds are proven to reduce the lethality of strikes with marine mammals as well as reduce underwater noise through decreased propeller cavitation[16]. The Aquarium supports the bill's provision establishing a nation-wide voluntary ship slowdown program administered by the National Oceanic and Atmospheric Administration as a necessary step to both reduce greenhouse gas emissions from shipping and reduce lethal interactions between vessels and marine mammals. The Aquarium hopes that mandatory speed restrictions will be considered in the future in areas that serve as critical habitat for North Atlantic right whales during times when the animals are present.,

Taken together, the provisions in the Ocean-Based Climate Solutions Act will make a meaningful difference in securing the health of marine mammals, which will ensure that they continue providing climate benefits as carbon reservoirs and fertilizers of the ocean.

In closing, the Aquarium is grateful to the Chairman and the committee for their leadership on addressing ocean-based solutions to climate change. As an ocean scientist and an ocean advocate, I am personally grateful for the opportunity to shift the narrative of the ocean as a victim of the climate crisis to the ocean as the hero in providing solutions that mitigate and

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[11] NOAA Office for Coastal Management. Ports. Accessed November 2020 at https://coast.noaa.gov/states/fast-facts/ports.html

[12] Rockwood, R.C., Calambokidis, J., and Jahncke, J. (2018). High mortality of blue, humpback and fin whales from modeling of vessel collisions on the U.S. West Coast suggests population impacts and insufficient protection. PLOS ONE 13(7). https://doi.org/10.1371/journal.pone.0201080

[13] House Select Committee on the Climate Crisis. "Solving the Climate Crisis: The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America." Majority Staff Report, 116th Congress, June 2020. Accessed at https://climatecrisis.house.gov/sites/climatecrisis.house.gov/files/Climate%20Crisis%20Action%20Plan.pdf

[14] Andrew, R.K., Howe, B.M., and Mercer, J.A. (2010). Long-time trends in ship traffic noise for four sites off the North American West Coast, *J. Acoust. Soc. Am.* 129(2): 642-651.

[15] https://link.springer.com/article/10.1057/mel.2013.2#:~:text=Slower%20speeds%20generally%20improve%20vessel,volatile%20and%20expensive%20cost%20item.&text=As%20a%20second%20slow%20steaming,GHG%20emissions%2C%20namely%20CO2.

[16] https://www.researchgate.net/publication/292345445_Propeller_cavitation_noise_and_background_noise_in_the_sea

help humans as well as marine wildlife and ecosystems weather the gathering storm. The solutions detailed in the Ocean-Based Climate Solutions Act, if implemented sooner rather than later, are the key to reducing the intensity of projected impacts and setting us on a sustainable path where humans find balance with the planet.

The Aquarium looks forward to continuing to work with committee members to achieve the ambitious goals of the Ocean-Based Climate Solutions Act.

Thank you again for inviting me to serve as a witness in support of this important and ground-breaking legislation.