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Testimony on: “Our Blue Economy: Successes and Opportunities”

United States Senate
Committee on Commerce, Science, and Transportation
Hon. Roger Wicker, Chair
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Chairman Wicker, Ranking Member Cantwell, and members of the committee, thank you for the opportunity to provide testimony on this critical topic. Having formerly served for five years on the Republican staff of this committee’s former subcommittee on Oceans, Atmosphere, Fisheries, and Coast Guard, first as a Knauss Sea Grant Fellow and then as Professional Staff, it is my great pleasure to appear before you today in my current capacity as Executive Director of the Aspen High Seas Initiative,¹ a new program of the Aspen Institute focused on igniting awareness of the urgent need and inspiring action to protect the health of the High Seas at a global scale.

I also serve as Chair of the Advisory Council to the Center for the Blue Economy (CBE), a program of the Middlebury Institute of International Studies at Monterey, a graduate-level education and research program with the mission to promote a sustainable ocean and coastal economy through leadership in research, analysis, and education. CBE defines the blue economy as distinct from the ocean economy insofar as it includes sustainability as an inherent principle.² This makes the blue economy a subset of the ocean economy—where the latter may include all economic activity on and in the water as well as beneath the seabed, the former only accounts for economic activity that is environmentally sustainable and either benefits from or contributes to healthy oceans and coasts. For purposes of this testimony, therefore, reference to the blue economy will mean the portion of the ocean economy that meets these criteria.

Much of my past work, here for the committee and subsequently in my role as Director of Ocean Policy at the Center for American Progress, focused on management of the United States’ ocean resources and our own blue economy. However, my current position with the Aspen High Seas Initiative has widened my focus to cover the two thirds of the global ocean—45 percent of Earth’s surface—that comprises the High Seas, the area of the ocean beyond any single nation’s

¹ Aspen High Seas Initiative homepage, available at: <https://www.aspeninstitute.org/programs/high-seas-initiative/>

² Center for the Blue Economy homepage available at: <https://www.middlebury.edu/institute/academics/centers-initiatives/center-blue-economy>

jurisdiction. And while I recognize that this committee is primarily concerned with issues that affect the coastal economy of the United States, any discussion of the blue economy must begin by acknowledging that our ocean is singular, global, and an inextricable component of the system that allows all life to thrive here on Earth. In short, what happens in the ocean doesn't stay in the ocean.

The ocean acts as the lungs of our planet, producing half the oxygen we breathe and absorbing half of the carbon dioxide humans have pumped into the atmosphere. It acts as the heart of our planet circulating heat and nutrients around the globe and ensuring our climate remains livable at all latitudes. And it acts as our liver and kidneys, filtering and absorbing waste. Just like in our bodies, we must take great care not to over tax these systems lest we put them at risk of breaking down.

When we think about the blue economy, we must first think in broader terms. If our respiratory, circulatory, and waste filtration systems fail, our entire life support system fails. And so, to extend the metaphor, we must think in terms of a Hippocratic Oath for the ocean: First, do no harm.

Today's hearing title focuses our attention on the "successes and opportunities" related to the blue economy. My testimony will be divided into three sections. The first section will discuss the need to define and measure the economic drivers and fundamental ecosystem science in the ocean and our coastal regions. This knowledge gap is a fundamental hurdle we must clear if we are to account for and ultimately grow the blue economy. The second section will include an overview of some of the threats to the health of our ocean and coasts that we must minimize for the sake of our economic and existential future. These threats must necessarily begin with carbon pollution and our changing climate, proceed to the potential negative impacts of offshore oil and gas development, and to overfishing and unsustainable aquaculture. Then, with a fuller understanding of what we do and don't know about these threats, we can move to a discussion of what we're doing well and opportunities to maximize our return and minimize harm.

Ultimately, America's future, and indeed the world's, is irrevocably tied to the health of our ocean. Fifty years ago this past Christmas Eve, three American astronauts on the Apollo 8 mission became the first humans to orbit the moon. As they circled back around from the dark side, William Anders spotted our home planet seeming to "rise" above the moon's desolate gray surface. He scrambled for the mission camera, loaded a roll of color film, and snapped what has been called "the most influential environmental photograph ever taken."



Figure 1: "Earthrise" Image credit: NASA.

That image, "Earthrise" (figure 1), showed the world two fundamental truths that Anders and his fellow astronauts grasped immediately. First, that Earth is a blue planet—it's one thing to understand intellectually that 70 percent of its surface is covered with seawater; it's another for us as creatures of the land to see it captured on film. And second, the immense fragility of our existence on this blue marble, wrapped delicately in an atmosphere as thin as the skin on an apple.

Earth's ocean is unique in the known universe. It is the single most vital building block for life and ensures that our planet remains habitable. It is, quite simply irreplaceable and fundamental to our very existence. The more we research and explore, the more we understand how human activity is putting our planetary life support system at risk. And now that we know, there is only one responsible choice: We must reduce our footprint, wean ourselves off the destructive behaviors. Humanity has set our climate on the verge of a catastrophic point of no return, decimated fish populations and put countless species—from microscopic plankton to the largest animals on the planet—at risk of extinction and turned the ocean's gyres into plastic soup and strewn waste from the poles to the depths of the Marina Trench. If we fail to treat this system with an abundance of precaution, it won't just be our blue economy that will suffer in the long run; it will be our entire planetary economy.

As this discussion moves into what the blue economy is, how we measure it, and the threats and ultimately opportunities it presents for us, we must not lose our grip on this image, and what it represents for all of humanity. Earth is our one functional spaceship in the otherwise hostile lifelessness of space. Everything we do must be with an eye toward protecting our planetary life support system. As recognized in the one universal truth broadcast on signs held by inspirational young climate protestors around the world just ten days ago during the Youth Climate Strike: There is No Planet B.

Defining and Measuring the Blue Economy

This discussion must begin by calling out an important distinction between two terms that are often used interchangeably: the *ocean economy* and the *blue economy*. Both lack widely agreed upon and applied definitions, but the most common distinction made is that the ocean economy is comprised of *all* activities in the ocean that generate economic activity. The National Ocean Economics Program (NOEP)—which was initially established under the auspices of the National Oceanic and Atmospheric Administration (NOAA)—measures ocean-related employment, wages, and gross domestic product contributions from Bureau of Labor Statistics data in the construction, living resources, minerals, ship and boat building, tourism and recreation, and transportation sectors.³ This database is now housed at the CBE.

Meanwhile the blue economy includes an element of sustainability. CBE defines the blue economy as comprising “the economic activities that create sustainable wealth from the world’s oceans and coasts.”⁴ Again, note the inclusion of principles of sustainability. Like the Center for the Blue Economy, the World Bank defines the blue economy to include an element of sustainability (see infographic below), clarifying that it is “sustainable use of ocean resources for economic growth, improved livelihoods and jobs, and ocean ecosystem health” (figure 2). The United Nations Development Program also adheres to this sustainability element in its definition of the blue economy, calling it “the utilization of ocean resources for human benefit in a manner that sustains the overall ocean resource base into perpetuity.”⁵ Similar definitions with an inherent sustainability component can be found in other UN bodies,⁶ and throughout the current scope of literature on the topic. By these definitions, activities such as oil and gas extraction or sand and gravel mining which are accounted for in the ocean economy should not be thought of as part of the blue economy.

³ National Ocean Economics Program. Available at:

<http://www.oceaneconomics.org/Market/ocean/oceanEcon.asp>

⁴ Center for the Blue Economy homepage available at: <https://www.middlebury.edu/institute/academics/centers-initiatives/center-blue-economy>

⁵ Hudson, Andrew, “Blue Economy: a sustainable ocean paradigm,” United Nations Development Programme, 26 November 2018. Available at: <http://www.undp.org/content/undp/en/home/blog/2018/blue-economy-sustainable-ocean-economic-paradigm.html>

⁶ United Nations Conference on Trade and Development, “Oceans Economy and Fisheries.” undated. Available at: <https://unctad.org/en/Pages/DITC/Trade-and-Environment/Oceans-Economy.aspx>

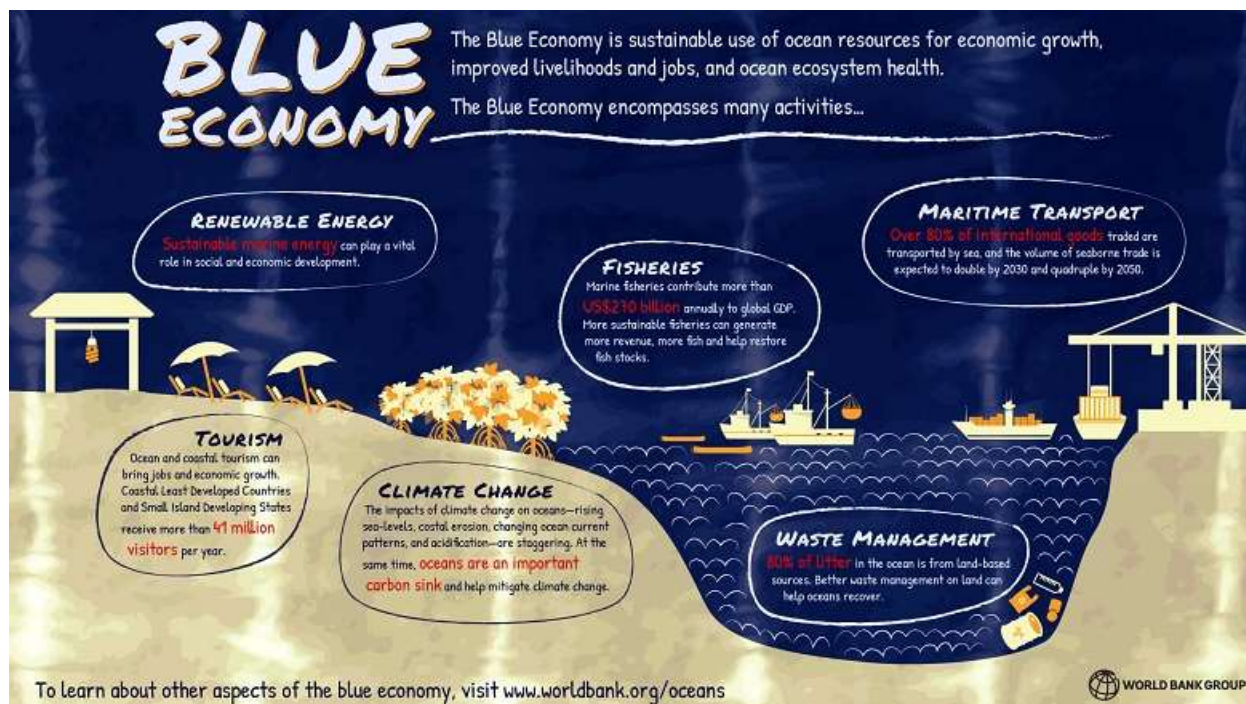


Figure 2: Image credit: World Bank Group.

As such, when we talk about the blue economy, the focus should be on industries that either contribute to or are dependent on healthy ocean and coastal ecosystems. These include such sectors as sustainably managed commercial and recreational fisheries, tourism and other low impact forms of ocean and coastal recreation, offshore renewable energy development, and coastal resilience and restoration activities. It necessarily excludes such activities as offshore oil and gas exploration and development, sand and gravel or deep seabed mining, some higher-risk forms of open water aquaculture, and other extractive industries.

With a definition of the blue economy in hand, the next step must be accumulating enough tools and methodologies to measure its size, scope, and influence. Yet our tools for carrying out this critical mission remain woefully inadequate, even compared to other economic sectors in the United States. For example, the U.S. Department of Agriculture operates an Economic Research Service (ERS), with a stated mission to “anticipate trends and emerging issues in agriculture, food, the environment, and rural America and to conduct high-quality, objective economic research to inform and enhance public and private decision making.”⁷ ERS’s annual budget has averaged approximately \$86 million over the past three years.⁸

By comparison, there is no entity charged with a similar mission for the ocean or blue economy, and NOAA’s total annual investment in this area is estimated to be less than \$1 million. Yet collectively, the US ocean economy, to the extent we are able to measure it, is estimated to

⁷ United States Department of Agriculture, Economic Research Service, “About ERS,” undated. Available at: <https://www.ers.usda.gov/about-ers/>

⁸ FY2019 President’s Budget Request: Economic Research Service, see page 16-2. Available at: <https://www.obpa.usda.gov/16ers2019notes.pdf>

provide 3.1 million jobs, more than the crop production, telecommunications, and building construction sectors combined (figure 3), and this is likely a lowball conjecture.

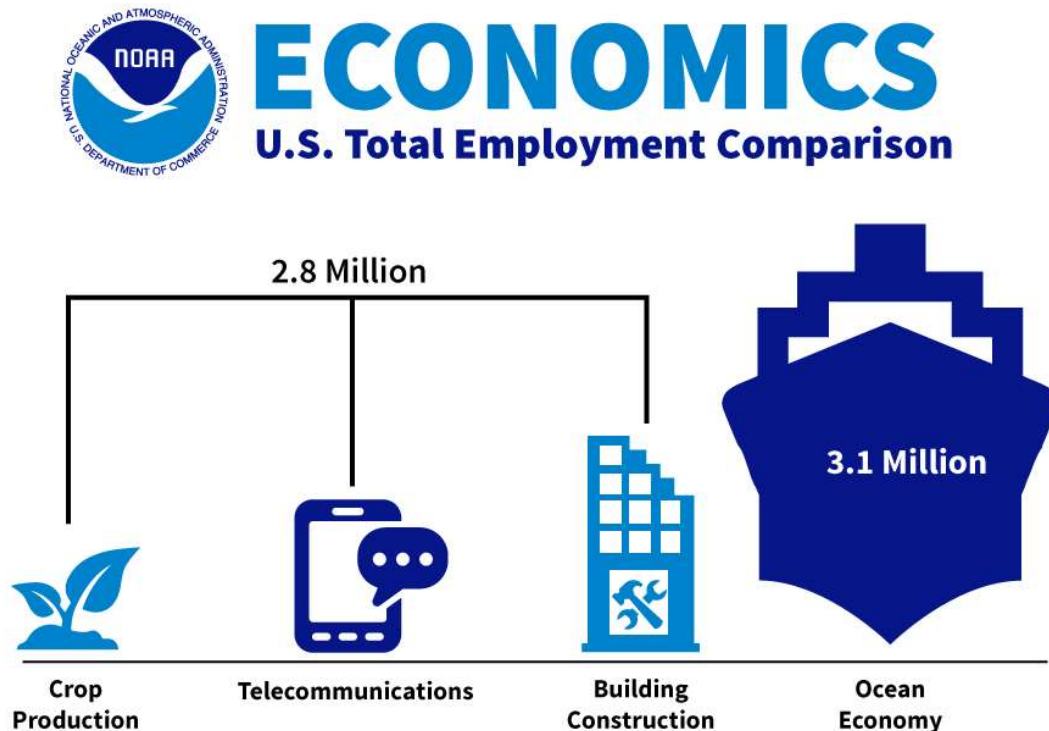


Figure 3: Image credit - NOAA Office for Coastal Management

NOAA is currently amid a 2-year process to develop the first ocean economy satellite account through a new program called Economics: National Ocean Watch (ENOW).⁹ This program will track statistics across six sectors of activity in the ocean economy, including living resources, marine construction, marine transportation, offshore mineral extraction, ship and boat building and tourism and recreation. While this effort will begin to provide some foundational accounting for the scope of the ocean economy, it still will fall short of analysis of the blue economy with its inherent sustainability component. And if we fail to measure sustainability in our blue economy today, we will inevitably fail to predict what it will be tomorrow.

Chronic underinvestment in ocean science and economics hampers our understanding

This lack of economic measure is critical, as we cannot manage what we do not understand, nor can we understand what we do not measure. This need for greater understanding extends beyond economics to the world of ocean science as well. A common trope in ocean circles is the truism that we have higher quality maps of the surface of Mars and the moon than we do of the ocean floor. This is largely because we can map celestial bodies without the pesky visual interference

⁹ National Oceanic and Atmospheric Administration, Office for Coastal Management, Digital Coast, "Economics: National Ocean Watch," undated. Available at: <https://coast.noaa.gov/digitalcoast/data/enow.html>

that seawater presents to imaging, but it is also telling that we have invested far more resources and effort into finding answers to the mysteries of our nearest celestial neighbors than we have in solving the riddles of our own deep ocean. This shortcoming is particularly notable in areas of the High Seas, the ocean beyond any one nation's jurisdiction. NOAA estimates that less than ten percent of the global ocean has been mapped using modern sonar technology, while in US waters, that number is closer to 35 percent.¹⁰

Even as our industrial activity expands into the most remote and unexplored regions of our ocean, we are spending exponentially more on space exploration than investigation of the undiscovered regions of our home planet. A 2013 analysis I conducted in my previous role as Director of Ocean Policy at the Center for American progress found that NASA's space exploration budget out-classed NOAA's ocean exploration budget by a mind-boggling ratio of roughly 150 dollars to one.¹¹ Twelve people have set foot on the surface of the moon while only three have traveled to the Challenger Deep at the bottom of the ocean's deepest point, the Mariana Trench. And while we have yet to find life or other resources in our interstellar exploration that could prove economically recoverable, our ocean continues to be a treasure trove of new life and remarkable discoveries. Some estimates are that our ocean could still hold millions of species that have never been seen or catalogued.

The species discovered in these regions are not just scientific curiosities. As they have in countless instances before, newly discovered marine organisms will provide us with new products, medicines, materials, or inspiration for technologies that could pay unimaginable dividends in any number of ways that benefit human wellbeing. They also may hold keys to greater understanding of the ocean's role in the carbon cycle or prove to be pivotal links in the ocean food web. This incredible marine genetic diversity can also provide an insurance policy against environmental disruption, as it offers pathways for evolution. And we need only imagine the great technological and biomedical benefits of understanding how life has adapted in millions of amazing ways to some of the harshest environments on planet Earth. The more we know about the interplay of life, the less likely we are to take yet another misstep and inadvertently disrupt important ecosystem services.

Meanwhile, we do know enough already to understand that human activities pose significant threats to the future health of the world's ocean, the U.S. exclusive economic zone, and our coastal regions. We must now take inventory of these threats before we can talk about our successes or consider opportunities to mitigate and minimize them.

¹⁰ National Oceanic and Atmospheric Administration, National Ocean Service, "How Much of the Ocean Have We Explored?" undated. Available at: <https://oceanservice.noaa.gov/facts/exploration.html>

¹¹ Conathan, Michael, "Rockets Top Submarines: Space Exploration Dollars Dwarf Ocean Spending," Center for American Progress, 18 June 2013. Available at: <https://www.americanprogress.org/issues/green/news/2013/06/18/66956/rockets-top-submarines-space-exploration-dollars-dwarf-ocean-spending/>

Threats to Ocean Health and the Blue Economy

There are numerous threats to ocean and coastal ecosystem health that impact our blue economy, but I will focus on the top priorities: climate change, offshore oil and gas development, overfishing and illegal, unregulated, and unreported fishing, and poorly planned aquaculture operations.

Climate change

We cannot have a conversation about the blue economy and the future of our ocean without addressing the existential environmental challenge of our time: global climate change. While a full accounting of the irrefutable science establishing the reality of a changing climate is beyond the scope of this testimony, we know that human-caused greenhouse gas emissions are fueling increases in extreme weather events, threatening coastal communities with sea-level rise and salt water intrusion, harming marine life with warming and acidifying waters, and bleaching coral reefs with alarming rapidity. To set the economic tone for what climate change could cost the U.S. economy in general, we can turn to the fourth National Climate Assessment that the Trump administration released in November 2018. This report suggested that climate change could reduce the overall economy by 10 percent by the end of this century,¹² including \$140 billion from the loss of recreational opportunities due to harm to coral reef ecosystems alone.¹³

In its summary on the implications for oceans and coasts, the report states in part:

Rising water temperatures, ocean acidification, retreating arctic sea ice, sea level rise, high-tide flooding, coastal erosion, higher storm surge, and heavier precipitation events threaten our oceans and coasts. These effects are projected to continue, putting ocean and marine species at risk, decreasing the productivity of certain fisheries, and threatening communities that rely on marine ecosystems for livelihoods and recreation, with particular impacts on fishing communities in Hawai'i and the U.S.-Affiliated Pacific Islands, the U.S. Caribbean, and the Gulf of Mexico. Lasting damage to coastal property and infrastructure driven by sea level rise and storm surge is expected to lead to financial losses for individuals, businesses, and communities, with the Atlantic and Gulf Coasts facing above-average risks. Impacts on coastal energy and transportation infrastructure driven by sea level rise and storm surge have the potential for cascading costs and disruptions across the country. Even if significant emissions reductions occur, many of the effects from sea level rise over this century—and particularly through mid-century—are already locked in due to historical emissions, and many communities are already dealing with the consequences.¹⁴

¹² Fourth National Climate Assessment, Volume II: Impacts, Risks, and Adaptation in the United States, undated. Available at: <https://nca2018.globalchange.gov/>

¹³ Fourth National Climate Assessment, Chapter 9: Oceans and Marine Resources. Undated. Available at: <https://nca2018.globalchange.gov/chapter/9/>

¹⁴ Fourth National Climate Assessment, Volume II: Impacts, Risks, and Adaptation in the United States, undated. Available at: <https://nca2018.globalchange.gov/>

The implications of documented changes in ocean ecosystems are already proving harmful. In 2012, for example, when the Gulf of Maine was hit with an “ocean heat wave.”¹⁵ As a result, lobsters migrated to inshore waters three weeks earlier than expected, leading to a supply glut as processors were not prepared to buy product in the volume that was available, and prices plummeted to their lowest level in 18 years.¹⁶

No region of the country is immune from these effects. From heat waves and drought to the hurricanes and unprecedented torrential rainfall events like the 60 inches of rain that fell on parts of Houston, Texas during Hurricane Harvey in 2017, the effects of our warming climate are wreaking havoc throughout our country and around the globe, and the economic impacts are already adding up. And this is only the beginning.

In the last five years, the frequency of extreme weather events causing over \$1 billion in damages has doubled. In 2018 alone, the U.S. was hit with 14 separate billion-dollar disasters, fueled by climate change, that took 247 lives and collectively inflicted \$91 billion in damages. Still, this figure is less than a third the cost of the prior year, when Hurricanes Harvey, Irma, and Maria combined to cause over \$300 billion in damages.¹⁷ The impacts are real, the causes are becoming clearer with every new study, and it is without question the number one threat to our blue economy.

Offshore oil & gas development

Of course, the ultimate source of carbon and other greenhouse gas emissions is the world’s thirst for fossil fuels. And in addition to carbon pollution, offshore oil and gas drilling also causes more direct impacts to ocean and coastal ecosystems from drilling, extraction, and transportation.

Thirty years ago this week, the oil tanker *Exxon Valdez* ran aground in Alaska’s Prince William Sound and dumped 11 million gallons of crude oil into what had been one of our most unsullied marine wildernesses. Though the direct costs of clean up and damages ran into the billions of dollars, the economic ramifications of that one incident are still being felt with toxic oil still spoiling areas of the Sound, and the region’s herring fishery has yet to return to commercial viability following what was at the time the largest oil spill in American history.

Of course, all records are made to be broken, and next year will mark the 10-year anniversary of the tragedy that unseated the Exxon Valdez for that infamous title, by gushing nearly 170 million gallons of crude from beneath the seabed into the Gulf of Mexico. I was serving as a Republican

¹⁵ Pershing, Andrew J., et al. “Fisheries Management in a Changing Climate: Lessons from the 2012 Ocean Heat Wave in the Northwest Atlantic,” *Oceanography*, 2 October 2015. Available at:

<https://tos.org/oceanography/article/fisheries-management-in-a-changing-climate-lessonsfrom-the-2012-ocean-heat-heat->

¹⁶ Trotter, Bill, “2012 Maine lobster catch increases by 18 percent, but price continues to decline,” *Bangor Daily News*, 4 January 2013. Available at: <https://bangordailynews.com/2013/01/04/news/hancock/2012-maine-lobster-landings-leap-18-percent-but-price-continues-to-decline/>

¹⁷ Dennis, Brady and Mooney, Chris, “Wildfires, hurricanes, and other extreme weather events cost the nation 247 lives, nearly \$100 billion in damages during 2018,” *The Washington Post*, 6 February 2019. Available at: https://www.washingtonpost.com/climate-environment/2019/02/06/wildfires-hurricanes-other-extreme-weather-cost-nation-lives-nearly-billion-damage-during/?utm_term=.840b8aacb120

Professional Staff member on this committee at the time of that disaster, and I toured the region with the US Coast Guard in the weeks after the explosion and sinking of the Deepwater Horizon drilling rig that cost 11 men their lives and started that gusher that spewed oil unchecked into the Gulf for 87 days.

Often, industrial activities in our ocean suffer from an “out of sight, out of mind” mentality: if we don’t see it, it must not have a negative effect. In this case, I saw the massive harm done by BP and Halliburton’s carelessness, and I will never forget the smell of oil burning on the ocean surface, images of sludge sloshing in the Louisiana marsh grasses, or the shrimp boats and other fishing vessels pressed into duty as impromptu skimmers in a futile attempt to clean up that unmitigated disaster.

These offshore oil and gas disasters harm commercial fisheries, aquaculture, tourism, recreational fishing, boating, and numerous other industries that, when carried out in a sustainable manner, contribute immensely to our blue economy and can foster economic wellbeing indefinitely. The irresponsible drilling and expansion of drilling into new areas for short term economic gain puts into our principle in a way that is unacceptable for long term wellbeing of our nation.

While offshore energy development is obviously important to some coastal regions, its harmful effect on other coastal industries must be accounted for. Furthermore, some coastal areas are proving the value of pivoting to offshore renewable energy development. In 2016, Rhode Island began producing electricity at the nation’s first offshore wind farm in state waters near Block Island. And Rhode Island and Massachusetts are now poised to follow suit with plans to build an 800-megawatt offshore wind farm south of Martha’s Vineyard. This project was approved following a lengthy negotiation with other stakeholders in the region, including the commercial fishing industry proving that these two uses of coastal space are not mutually exclusive.

Overfishing and illegal, unregulated, and unreported fishing

Thanks to the efforts of this committee and many others involved in the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act in 2006, the United States is now viewed as a world leader in fisheries sustainability. Under the auspices of this law, 44 stocks have been rebuilt and removed from the “overfished” list as of 2017, and overfishing was not occurring on 91% of U.S. fish stocks.¹⁸ We should be proud of this achievement and maintain the policies that have allowed us to take this leadership role.

Yet, overfishing is still occurring in other parts of the world, including in the EEZs of other nations with less stringent regulations and enforcement regimes, often due to limited capacity. NOAA estimates that roughly 90 percent of the seafood consumed in the U.S. is imported from other countries. That means if we want to support sustainable seafood, we must promote consumption of domestic product and strive to improve management among our trade partners. It

¹⁸ National Oceanic and Atmospheric Administration, National Marine Fisheries Service, “2017 Report to Congress on the Status of U.S. Fisheries,” undated. Available at: <https://www.fisheries.noaa.gov/national/2017-report-congress-status-us-fisheries>

will require a greater global investment in fisheries monitoring, research, and reporting in both the commercial and recreational sectors. It will also require an increased commitment by this nation and other great consumers of seafood to import only verified sustainable seafood from abroad. Doing so will ultimately pay dividends in the form of global fisheries that continue to provide economic returns and food security in perpetuity.

Overfishing also continues on the High Seas, an area where the U.S. can have significant influence. As individual nations have permitted overfishing in their exclusive economic zones leading to precipitous fish population declines, fishermen have been incentivized to travel further from shore and in many cases have moved into the High Seas. Here fisheries are managed by international agreement centered around Regional Fishery Management Organizations (RFMOs). These RFMOs must operate by consensus among countries whose delegations are often heavily influenced by their industries, and their science branches are often insufficiently funded to carry out the research necessary to set sustainable catch limits. The U.S. can play a constructive role in advocating for stronger science and stricter limits by RFMOs to prevent overfishing.

In addition, the economics of most High Seas fishing operations don't add up, pushing operators into illegal activity. To counter the increased cost of operating further from shore and still turn a profit, operators in some fisheries have taken advantage of the remote nature of what is effectively a lawless Wild West, far from any enforcement authority. The Food and Agriculture Organization of the United Nations estimates that illegal, unregulated, and unreported fishing activity affects "one in every five fish caught, with an annual cost of up to \$23 billion."¹⁹ And the illegal activity doesn't stop with fishing. Operations from several countries have recently been found to rely on forced labor (i.e., human slavery) and other egregious human rights abuses, including murder. These activities are often carried out on vessels that spend years on end at sea, out of sight or reach of regulators and law enforcement, providing no opportunity for escape or relief for enslaved workers. The vessels are resupplied by mother ships that take on the catch from these modern-day slave ships and mingle it with legally caught fish so that by the time the catch is brought in to shore it's impossible to tell the clean fish from the dirty. Fishing vessels provide easy vectors for human trafficking as well as trade in drugs, arms, and other illegal activity, particularly in the remote High Seas.

Adding economic insult to environmental injury and this ongoing abhorrent human rights tragedy, a 2018 report published in the journal *Science*, found that "54 percent of the present high seas fishing grounds would be unprofitable at current fishing rates" absent the abundant government subsidies that many fishing nations provide to their fleets operating on the High Seas. In effect, countries are paying their fishermen to put future generations out of business rather than investing in the research and knowledge that will allow this natural system to function and continue to provide benefits for generations to come.

¹⁹ Food and Agriculture Organization of the United Nations, "Growing Momentum to Close the Net on Illegal Fishing," 5 June 2018. Available at: <http://www.fao.org/news/story/en/item/1137863/icode/>

The World Trade Organization has promised to make progress on the issue of harmful fishing subsidies at their 2019 Ministerial Conference with an eye toward achieving a key target of the UN Sustainable Development Goal 14: on Life Below Water.²⁰ Making progress on subsidies would address a host of environmental and human rights issues that harm our blue economy, and U.S. fishermen's ability to fish sustainably in our own waters and beyond.

Poorly planned aquaculture operations

Aquaculture is often regarded as an opportunity to reduce pressure on wild capture fisheries, while continuing to provide healthy food to a growing world population with a relatively smaller carbon footprint than other forms of animal protein. However, all too often aquaculture operations are subject to lax oversight and poor regulation, particularly abroad, that inflict significant damage on ocean and coastal ecosystems and economies. Furthermore, because many farmed fish must subsist on a diet that includes wild-caught fish, it can exacerbate the overfishing problem rather than relieving the pressure on wild stocks.

For example, in 2017, as many as 263,000 Atlantic salmon escaped from net pens legally permitted to operate in Washington's Puget Sound. There is concern among some scientists that these fish, which are non-native to the Pacific, could weaken the Pacific northwest's robust wild, native populations, either by outcompeting native species for resources or by transmission of disease. Several of the fish that were recaptured and turned over to Washington Fish and Game officials have tested positive for an "exotic strain of piscine orthoebivirus," according to a report from the Seattle Times.²¹

Also of concern is the amount of wild capture fish that is required to feed farmed carnivorous fish such as salmon and shrimp. Rates of wild capture fish required to feed farmed fish are coming down in general due to the incorporation of additional plant-based and alternative feeds such as soy and algae. According to the international Marine Ingredients Organization also known as IFFO, the so-called "fish in/fish out" ratio is now down to 0.22 meaning it takes on average 0.22 kilograms of wild fish to produce 1 kilogram of farmed fish. However, as aquaculture production increases, the overall amount of wild fish required will necessarily increase.

The fish used in aquaculture feed are low economic value, high volume fish such as menhaden, or even species lower down on the food chain such as Antarctic krill. Yet when these creatures are removed from the ocean food web in massive quantities, the cascading effects of food scarcity on other ocean populations can be significant. As a result, in the Mid-Atlantic and New England, many commercial fishing groups have joined with environmental organizations in arguing for reduced catch limits on menhaden because they rightly fear that removing too many

²⁰ World Trade Organization, "Negotiations on Fisheries Subsidies," undated. Available at: https://www.wto.org/english/tratop_e/rulesneg_e/fish_e/fish_e.htm

²¹ Mapes, Linda V., "800,000 More Farmed Atlantic Salmon Coming to Puget Sound before industry's permits expire," *Seattle Times*, 29 August 2018. Available at: <https://www.seattletimes.com/seattle-news/environment/800000-more-farmed-atlantic-salmon-coming-to-puget-sound-before-industrys-permits-expire/>

of these so-called “forage fish” from the ecosystem will have negative long-term ramifications for their target species, including high-value tuna and swordfish, among others.

Aquaculture can help solve both our seafood trade deficit and our need to produce low-carbon intensive, healthy protein to feed a growing global population, but it must be sited, permitted, and carried out in a manner that does not inflict additional pressure on already stressed and damaged ocean ecosystems. Multi-trophic aquaculture, where farmers grow seaweed, shellfish, and finfish together can help mitigate impacts from fish farming, and actually include environmental benefits. Likewise, closed loop aquaculture, primarily of fish that subsist on a vegetarian diet, and which takes place in shoreside facilities where inputs and outputs can be controlled also presents an opportunity for aquaculture to be a net benefit.

Supporting a Healthy Ocean and a Robust Blue Economy

Even with these serious threats, the future for our blue economy can indeed be full of successes and opportunities, and America is poised to continue leading the world toward a future of healthy productivity for our ocean and coasts. While some recent decisions and actions by the current administration have halted progress we made earlier in this century, it’s not too late to reverse course and take the necessary steps to protect our nation’s and the world’s greatest natural asset. Here is an agenda that can help set the tone for a new era of ocean sustainability and strong growth of the blue economy.

Support strong United Nations action

Two days ago, the United Nations kicked off the second of four planned rounds of negotiations on a new treaty to manage biodiversity beyond national jurisdiction (BBNJ). Once completed, this new agreement, developed under the auspices of the United Nations Convention on the Law of the Sea (UNCLOS), will for the first time establish a mechanism for the international community to prioritize a holistic approach to the world’s deep and remote ocean ecosystems. It contains four major components: 1) creating a mechanism to establish, manage, and enforce marine protected areas on the High Seas; 2) set a process for conducting environmental impact assessments for High Seas activities; 3) develop a management regimen for marine genetic resources of the High Seas; and 4) create an agreement on technology transfer and intellectual property among developed and less developed countries.

The first step the United States can take to ensure a positive outcome from this process is to at long last ratify UNCLOS, the seminal, non-controversial international agreement that forms the foundation of international maritime law. However, recognizing that such action is unlikely given the current makeup of the U.S. Senate, short of full ratification, the U.S. delegation can still exert significant influence over the ongoing negotiations, and help ensure that the treaty includes strong protections against over-exploitation of marine resources, and establishes a clear path for the world to designate critical areas of the High Seas as fully- or highly-protected marine protected areas (MPA).

In addition to supporting completion and ratification of a robust BBNJ treaty, the U.S. should also support strong ocean protection across a range of international bodies and decisions they will make throughout 2020, a major year for international ocean action. By the end of this decade, international bodies will make major decisions on a suite of topics that will have lasting ramifications for our marine resources. These include working to ensure achievement of key targets in the UN's Sustainable Development Goal 14, "Life Below Water," contains several targets for the international community to meet by 2020, including protecting 10 percent of the ocean; ending harmful fishing subsidies such as those that promote fishing activity on the High Seas; and bringing an end to global overfishing.²² The U.S. delegation should support all international efforts to achieve these goals.

In addition, the International Seabed Authority (ISA) is in the process of revising its Mining Code²³ in a manner that could result in issuance of permits to extract minerals from fragile areas of the deep seabed that are filled with marine life. Many of these ecosystems have not yet been carefully studied and have never before been disturbed by human activity. Although the U.S. does not have a formal seat at the negotiating table due to our failure to ratify UNCLOS, American statements and indications that it does not support High Seas seabed mining would send a strong signal to negotiators. Specifically, the U.S. should adopt the position that the ISA should issue a moratorium on permits and regulations for the duration of the UN's Decade of Ocean Science that will kick off in 2021. Setting aside mining activities for this period will allow scientists to explore these areas, take stock of the yet undiscovered resources that exist there, and ensure that if mining is to proceed it will only move forward with a full understanding of the implications for the health of the deep ocean ecosystem and under a robust and precautionary management regime.

Establishment of Marine Protected Areas

In 2016, a group of scientists led by Bethan C. O'Leary published a comprehensive review of over 140 studies and found that "results consistently indicate" that protecting 30 to 40 percent of the ocean would be necessary "to protect biodiversity, preserve ecosystem services, and achieve socioeconomic priorities."²⁴

In recent years, several nations including Chile, the United Kingdom, Palau, the Cook Islands, and others have moved proactively to establish large marine protected areas (MPA) in their waters, affording varying degrees of protection to areas of the ocean comparable in size to entire countries. The U.S. briefly held the title of world's largest marine protected area following

²²United Nations Development Programme, Sustainable Development Goals, Goal 14: Life Below Water. Undated. Available at: <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-14-life-below-water.html>

²³ International Seabed Authority, "The Mining Code," undated. Available at: <https://www.isa.org.jm/mining-code>

²⁴ O'Leary, Bethan C., et al., "Effective Coverage Targets for Ocean Conservation," *Conservation Letters: a Journal for the Society of Conservation Biology*, 21 March 2016. Available at: <https://onlinelibrary.wiley.com/doi/full/10.1111/conl.12247>

President Obama's 2016 action to expand the Papahānaumokuākea Marine National Monument. The largest is currently the Cook Islands' Marae Moana area designated in 2017.²⁵

However, as with so many things, size is not always the most effective measure. Arguably the most critical factor to ensure MPAs achieve their intended goals of increasing ocean health is the level of protection they are afforded. And while Marae Moana includes 50 km no-take zones around 15 islands, the remainder of the area has only limited protections. Current estimates are that approximately 7 percent of the world's ocean has some level of protection, but less than 3 percent is either fully or strongly protected.²⁶

While we may yet be able to achieve the 10 percent by 2020 goal, these will likely not be fully or strongly protected MPAs. And getting to 30 percent or more by 2030 will certainly require a mechanism to safeguard critical areas of the High Seas. For this reason, one of our key goals at the Aspen High Seas Initiative is to work with scientists and research organizations to create data-sharing mechanisms that will enable us to identify the areas of the remote ocean that are most critically in need of protection. Simultaneously, we work to advance new and improved governance mechanisms, such as those proposed for the BBNJ treaty, to create mechanisms for the establishment and enforcement of strong High Seas MPAs.

Promoting sustainable, legal seafood at home and abroad

Thanks to the provisions included in the 2006 reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the U.S. is recognized as a global leader in ending overfishing and producing sustainable seafood. The model has proven so successful that major overhauls of management systems in the European Union, Indonesia, and most recently Japan have used the MSA as a model.

Key provisions of the MSA include a requirement for strict annual catch limits to be set in every U.S. fishery that cannot be set higher than the level recommended by each Regional Fishery Management Council's Science and Statistical Committee. With few exceptions, stocks found to be overfished must be rebuilt to sustainable levels within ten years. While the act is proving to be successful at meeting the arduous task of rebuilding our fish stocks, some of which had been subject to extended periods of overfishing, because the U.S. imports the vast majority of seafood it consumes, we must also work to incentivize other fish producing nations to adopt similarly strict standards.

While we of course have no jurisdiction over what happens in other countries' waters, we do have some control over market demand and individual consumer choice here at home. One powerful new tool is NOAA's Seafood Import Monitoring Program (SIMP) which was established in 2016 as a key measure to improve transparency and combat illegally harvested seafood entering the U.S. market. Blocking entry of illegal, unsustainable foreign seafood offers a more level playing field for our domestic fishermen who play by the rules, and it puts pressure

²⁵ International Union for the Conservation of Nature, "The Journey of Cook Islands: Marae Moana," 26 June 2018. Available at: <https://www.iucn.org/news/oceania/201806/journey-cook-islands-marae-moana>

²⁶ Sala, Enric, et al., "Assessing real progress towards effective ocean protection," *Marine Policy*, vol. 91, May 2018, pp 11-13. Available at: <https://www.sciencedirect.com/science/article/pii/S0308597X17307686>

on other countries to clean up their act if they wish to do business here. The committee should support the ongoing improvement and expansion of that program. Furthermore, ongoing efforts to educate American consumers about the benefits of buying American seafood for its environmental, health, and quality benefits can buoy the domestic fishing industry and ensuring consumers are choosing sustainably-harvested fish that happens to also have a smaller carbon footprint.

A United Nations treaty known as the Port States Agreement also provides a critical enforcement method against illegal fishing activity. Countries that have ratified this agreement, including the United States, have agreed to place stronger restrictions on foreign fishing vessels coming into their ports to offload fish, and if vessels are known to have been involved in illegal fishing, party states can refuse them entry to their ports. As additional countries ratify this agreement, and illegal fishing identification methods increase, the bad actors will be left with no markets into which they can sell their ill-gotten product.²⁷

Another important opportunity we are seizing to address unsustainable and illegal practices is our increasing ability to identify fishing vessels operating illegally on the High Seas and in remote areas of individual nations' EEZs, and provide information about them to governments who can hold those actors responsible. Satellite monitoring by organizations such as Global Fishing Watch are providing eyes in the sky that use data from satellite tracking systems, are even able to detect light from fishing operations at night, and combine that raw data with groundbreaking algorithms to identify potential illegal activity and even individual bad actors. We urge continued investment in these technologies and in multi-sectoral partnerships between government agencies, private industry, and not-for-profit organizations like Global Fishing Watch that are leading the charge.

Improving scientific research capacity, data-sharing, and technology

The one thing each of these proposed opportunities has in common is the need to rely on improvements in scientific research, data-sharing, and technology. Fortunately, we are living in a time when opportunities to gather data are increasing exponentially, as is our ability to process that data. A piece published by the World Economic Forum in August 2017 asserted boldly that “we have collected more data on our oceans in the past two years than in the history of the planet.”²⁸ A blog piece for Scientific American reported that NOAA's ocean sensors collect 20 million megabytes of data daily.²⁹

²⁷ The Pew Charitable Trusts, “The Port State Measures Agreement: From Intention to Implementation,” 12 April 2018. Available at: <https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2018/04/the-port-state-measures-agreement-from-intention-to-implementation>

²⁸ Degnarain, Nishan and Adler, Steve, “How data can heal our oceans,” World Economic Forum, 4 August 2017. Available at: <https://www.weforum.org/agenda/2017/08/how-data-can-heal-our-oceans/>

²⁹ Mulrennan, Matthew and Johnson, Ayana, “7 Award-Winning Apps Launch a Mobile Age for the Ocean Economy,” Scientific American, 16 February 2018. Available at: <https://blogs.scientificamerican.com/observations/7-award-winning-apps-launch-a-mobile-age-for-the-ocean-economy/>

While all the remote sensors, buoys, data tags, satellites, autonomous underwater and sea surface gliders observing, measuring, and reporting back their findings are giving us a better picture of how the infinitely intricate interactions between various aspects of the natural world might actually function, in order to truly unlock the secrets they provide will require not just a data gathering revolution, but a data *management* revolution. What good is your daily 20 terabytes of data if you have no way to sort it and understand what it means?

This is why organizations like the World Economic Forum's Centre for the 4th Industrial Revolution and XPRIZE are showing an interest in solving this ocean data management puzzle. They recognize that ensuring a fully functioning ocean system is fundamental not just to ocean life, and not just to ensuring we do all in our power to avoid the worst possible outcomes of the climate crisis, but to ensuring a viable future for humanity as our population continues to soar towards 9 billion.

Conclusion

With our increased knowledge and opportunity comes increased responsibility. When our predecessors made missteps with the natural world, they could at least fall back on ignorance as an excuse for the havoc they had unleashed. Few in Oklahoma in the 1930s could have predicted that uprooting prairie grasses for wheat fields would have led to the wholesale destruction of the Dust Bowl. While nuclear scientists in the 1950s surely understood that radioactive fallout wasn't exactly beneficial to remote Pacific atolls, they probably failed to fully appreciate the scope and permanence of their actions.

Today we do know. We know what we could not have known before. We know that the ocean is not too big to fail. If we turn away from science and ignore the warnings in order to carry on with our business as usual approach, chasing short-term economic gain at the expense of long-term environmental health, we will be dooming future generations.

Fortunately, we also have the means to avoid the worst of these possible outcomes. By tracking, measuring, understanding, and managing our ocean and blue economy, and making the hard decisions that may cost a little more today but promise a sustainable future for tomorrow we can overcome the challenges that lay before us. The critical life-support system that is the global ocean will support us as long as we take care of it and hold to this one fundamental principle: First do no harm.

Chairman Wicker, Ranking Member Cantwell, and members and staff of the committee, thank you once again for your invitation to testify here today, and I look forward to answering any questions you may have.