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HEARING ON

THE OCEAN-BASED CLIMATE SOLUTIONS ACT OF 2021

BEFORE THE

COMMITTEE ON NATURAL RESOURCES
U.S. HOUSE OF REPRESENTATIVES

JUNE 22, 2021

Chairman Grijalva, Ranking Member Westerman, and Members of the Committee, thank you for the opportunity to testify today on the “*Ocean-Based Climate Solutions Act of 2021*.” NOAA appreciates the Committee’s strong commitment to addressing climate impacts to our ocean and coasts and to sustaining their health and resilience for this and future generations. Today, my testimony will focus on key NOAA priorities that align with and complement provisions of this legislation. We look forward to continued collaboration with the Committee throughout the legislative process.

It is fitting that this hearing is being held during the month of June as President Biden recently designated June 2021 as National Ocean Month, in continuance of one of our nation’s modern traditions. The world’s ocean is critical to our Nation and to life on Earth. The ocean powers our economy, provides food for billions of people, supplies 50 percent of the world’s oxygen, offers recreational opportunities for us to enjoy, and regulates weather patterns and our global climate system. Likewise, our coastal habitats and ecosystems provide essential protection from coastal hazards for large population centers and are home to many commercially and recreationally important marine species. While human activities are impacting the ocean environment, resulting in ocean warming, rising sea levels, and ocean acidification, the ocean environment and the associated ocean economy also present critical opportunities to strengthen our efforts to mitigate and adapt to the impacts of climate change.

NOAA’s science and services are the bedrock of efforts to understand these changes and to enhance resilience and efficient operations of many sectors of the economy, including ports,

shipping, transportation, agriculture, seafood and fishing, and ocean-based tourism and recreation. In 2018, our ocean and coastal economies contributed \$397 billion or 45 percent of the U.S. GDP.¹ Investing in climate-resilient, reliable coastal infrastructure — including modern ports and waterways — that can withstand the impacts of rising seas and powerful storms will keep our economy competitive in the global marketplace while safeguarding our communities and their livelihoods. Conserving and restoring coastal wetlands and habitats will improve the resilience of coastal communities, support climate mitigation efforts, and help restore nursery areas that are important to our essential commerce and recreational fisheries and other marine wildlife.

NOAA’s Priority Initiatives Align with the *Ocean-Based Climate Solutions Act*

NOAA’s mission is science, service, and stewardship. Our reach goes from the surface of the sun to the depths of the ocean floor as we work to keep the public informed of the changing environment. NOAA manages fisheries, coastal habitats and species, and protected areas around the Nation and administers key authorities, such as the Coastal Zone Management Act and others, based on the best scientific information available. The broad portfolio of environmental science, tools, and services that NOAA provides are crucial to carrying out our mission and to ensuring that future generations can enjoy the benefits of healthy ocean and coastal communities, economies, and ecosystems. NOAA’s capabilities to observe, monitor, and predict changes in our oceans and along our coasts are more important than ever given the unprecedented rate with which those changes are occurring.

At this critical time in our planet’s history, many of NOAA’s ocean and coastal priorities are aligned with the goals of the *Ocean-Based Climate Solutions Act of 2021* and can be summarized in the following categories:

1. Improving the resilience of critical infrastructure and services;
2. Mobilizing the next generation of workers to equitably advance climate solutions;
3. Improving environmental and community resilience; and
4. Scaling up climate science and services, innovation, and research & development.

While this is not an exhaustive list, these four categories highlight some of NOAA’s priority ocean and coastal activities to address climate change.

1) Improving the resilience of critical infrastructure and services

The science is clear. The impacts of climate change are happening now and are projected to worsen over the coming decades, not only here in the United States but around the world. Coastal communities and critical infrastructure are particularly vulnerable and are already

¹ <https://coast.noaa.gov/digitalcoast/data/coastaleconomy.html>

experiencing adverse impacts. These impacts include changes in the intensity, duration, and frequency of certain extreme-weather events, as well as sea level rise and coastal flooding, which are increasingly threatening lives, homes, and the natural environment. We must safeguard investments in infrastructure, bringing to bear NOAA's essential observation and prediction capabilities to help others assess and plan for climate risks in both the near and long term.

NOAA plays an increasingly important role in understanding our changing coastal environment and strengthening and protecting coastal infrastructure and economies.

National Coastal Resilience Data and Services

Improved understanding of coastal flood risk, sea level rise, changing Great Lakes water levels, and land subsidence is an urgent national priority due to their significant negative environmental, economic, and social impacts. The scope of this challenge requires a long-term, whole-of-government commitment, with NOAA science and service delivery at its center. NOAA's long-standing observational infrastructure, such as the National Water Level Observation Network (NWLON), the National Bathymetric Source, and the National Spatial Reference System, represent foundational national assets, that undergird the ability of public and private sector partners to monitor, model, predict, and warn communities about climate-related impacts. This information is already enabling city and community planners to revise building codes and land use plans on decadal and longer timescales. For example, with more flooding expected in the future, NOAA's foundational and climate data have the potential to play an increasing role in helping our nation decide how and where to build.

This legislation would authorize NOAA to build on these services and develop a comprehensive suite of data, products, and services, which would produce and maintain timely, authoritative observations, predictions, and maps to allow coastal communities to understand and plan for floods and other risks. NOAA's science and services are central to our nation's ability to make climate-informed decisions, both when it comes to weather- and climate-ready infrastructure and safeguarding and investing in more vulnerable communities. We are working to assess and eliminate any inequalities that exist in the coastal flooding products and services available to users due to regional gaps in data coverage. For example, in remote or rural communities in particular, the distance between water level or vertical land motion observations, modeling, and analysis can exceed 200 miles. NOAA's FY 2022 Budget Request lays the framework for success in service delivery equity moving forward.

Furthermore, we have an historic opportunity to make significant investments in our nation's infrastructure as we prepare for coastal change; however, that will require more than just pouring concrete. For example, the capacity and efficiency of our Nation's seaports must be sustained and enhanced given their major role in supporting our economic livelihood and the global competitiveness of U.S. goods, generating \$5.4 trillion in economic activity, and supporting the

employment of more than 31 million people. NOAA's integrated suite of timely and accurate information, products, and services enhance understanding of our ports and waterways, their connections to our coastal communities and intermodal transportation networks, and their vulnerability to current and future weather and climate hazards.

Regional Ocean Partnerships and U.S. IOOS Regional Associations

NOAA's mission could not be fully carried out without our long-standing and trusted local and regional partnerships. The *Ocean-Based Climate Solutions Act 2021* authorizes the establishment of new Regional Ocean Partnerships on request from the governor of a coastal state. Regional Ocean Partnerships are state-driven, voluntary forums that identify shared priorities and take action on a diversity of ocean, coastal and Great Lakes issues. These long-standing interstate partnerships are also an effective means of fostering interagency coordination, data-informed ocean and coastal management, and thoughtful engagement with regional constituents. For example, NOAA is the federal co-chair of the Northeast Regional Ocean Council (NROC), a 15-year old federal-state partnership that addresses challenges at a regional scale around ecosystem health, coastal hazards, and infrastructure. Through NROC, NOAA has established a 10-year credible ocean management forum trusted by both regulators and ocean users, who use data on the robust Northeast Ocean Data Portal to inform decision-making. The Council continues to learn and improve in real time by sharing best practices and hosting informative webinars on topics such as regional offshore wind transmission and coastal resilience.

NOAA administers other critical programs, including the U.S. Integrated Ocean Observing System (IOOS) and its 11 Regional Associations (RAs), which provide ocean observations, data management, regional knowledge and technological expertise, and outreach and engagement to advance the development of products that meet regional and local stakeholder needs. Since 2019, NOAA has supported joint ROP and RA collaborative efforts to enhance our collective capacity for sharing and integrating Federal and non-Federal data into public-facing data portals to better inform regional coastal, ocean, and Great Lakes decision-making.

2) Mobilizing the next generation of workers to advance climate solutions

There are numerous provisions of the *Ocean-Based Climate Solutions Act of 2021* that prioritize ensuring that communities of color, low-income communities, tribal communities, and other underserved communities have the tools and resources they need to both effectively mitigate and adapt to effects of climate change. As described in our FY 2022 Budget Request, NOAA is investing in our internal capacity to better respond to the needs of vulnerable populations, assessing key services to identify and address barriers to access for all Americans, funding targeted investments in historically underserved communities, and enhancing NOAA's capabilities, such as our award-winning Weather and Climate Toolkit and the Sea Level Rise Viewer. With NOAA staff living and working throughout the United States, NOAA is well

positioned to efficiently and effectively deliver our products and services and to actively solicit feedback about needed improvements. NOAA is aware that underserved communities are especially vulnerable to weather, water and climate events, with large disasters causing poverty rates to increase. NOAA also provides education, training, and hands-on research opportunities to individuals from traditionally underrepresented minority communities through internship programs like the José E. Serrano Educational Partnership Program with Minority Serving Institutions. Their research has significantly contributed to the understanding of communities as they prepare for and adapt to climate change as well as better respond to severe weather events.

Through programs such as National Sea Grant, National Estuarine Research Reserve System, Coastal Zone Management Program, Coral Reef Conservation Program, GulfCorps, EarthCorps, and Vet Corps, NOAA will continue to empower local communities and mobilize the next generation of workers to advance climate solutions through grants, fellowships, training, and short-term employment opportunities. These efforts will support natural infrastructure projects, such as wetland and coral reef restoration, which curb storm impacts, reduce flooding, absorb excess carbon dioxide, and provide essential fish and wildlife habitat, while also supporting tourism, recreation, and other economic benefits.

3) Improving environmental and community resilience

We know that addressing climate change is crucial for the environment, people, and economy. We have long-standing, distributed programs across NOAA that deliver services like habitat restoration, research, and community engagement as a part of our core activities. We note that a number of provisions in the *Ocean-Based Climate Solutions Act of 2021* would aim to tackle climate change by supporting adaptation for industry and for communities and by promoting sustainable job opportunities. Similarly, our FY 2022 Budget Request proposes significant investments in NOAA programs that connect scientists and local decision makers around climate resilience, such as the Regional Integrated Sciences and Assessments Program, as well as efforts to restore coastal habitats and protect communities, such as the National Coastal Resilience Fund.

Healthy coastal habitats, such as mangroves, salt marshes, and seagrass beds benefit natural and human communities through protections from storms, providing fishing and tourism opportunities, capturing carbon, among other benefits. Restoration of these habitats creates an average of 15 jobs per \$1 million invested² and require a diverse set of skills that directly and indirectly employ a wide variety of people, including construction workers, engineers, fishermen, ecologists, project managers, veterans, and heavy equipment operators. As an example of NOAA's work in this area, NOAA's Restoration Center has successfully executed a

² <https://repository.library.noaa.gov/view/noaa/15030>

Shovel-Ready Restoration Grant Program similar to what is described in the *Ocean-Based Climate Solutions Act of 2021*.

Coastal Zone Management Act

NOAA appreciates the continued interest in the Coastal Zone Management Act. Our state coastal zone managers provide frontline leadership in protecting, restoring, and responsibly managing the diverse resources along our coasts. NOAA recognizes that Indigenous communities face unique coastal challenges, including those related to climate change and the conservation of natural, cultural, and historical resources and sacred sites.

Conserving Resilient Living Marine Resources

At the heart of NOAA's stewardship mission is species and place-based conservation, authorized by multiple statutes. Like other aspects of NOAA's mission, however, our changing climate and other pressures facing our ocean and coasts will require NOAA to adapt our programs and services. For example, NOAA is currently developing a process that will seek input from ocean and coastal stakeholders on how to implement and measure additional place-based conservation, particularly in light of climate change. NOAA proposes utilizing our National Marine Sanctuary System and the National Estuarine Research Reserve System to enhance conservation of our nation's ocean and coasts. Indeed, NOAA is advancing the designation of new national marine sanctuaries while also considering initiating the designation process for nominated sites in the inventory. In addition, NOAA is collaborating with states and territories on potential new National Estuarine Research Reserve designations. If approved, they would join a network of coastal sites managed in partnership with coastal states and local partners for the protection and research of essential estuarine systems.

NOAA's National Marine Sanctuary System and our National Estuarine Research Reserves System conserve and protect habitats and resources that enhance the resilience of and make positive economic contributions to the coastal communities that they serve. Diverse activities within national marine sanctuaries, such as commercial fishing, research, education, recreation and tourism support billions of dollars in output within local sanctuary economies. Similarly, pilot studies at three national estuarine research reserves have demonstrated that these sites contribute to local economies by supporting jobs; through visitor spending, partnerships, and stakeholder engagement; and investments in reserve staff salaries, facility maintenance, and operations. Each of these contributions has ripple effects that lead to greater economic impacts.

The *Ocean-Based Climate Solutions Act of 2021* requires NOAA to update the NOAA Marine Protected Areas Inventory, and authorizes NOAA to maintain a baseline assessment of how much ocean and Great Lakes waters in the United States are currently protected, conserved, and restored. As a complement to our traditional place-based conservation programs, NOAA recognizes the important contributions of regional fishery management councils and their

conservation and management measures under the Magnuson-Stevens Fishery Conservation and Management Act and is committed to investing in ecosystem-based management of species through the U.S. Marine Biodiversity Observation Network to advance biological observing, modeling, and other innovative tools to inform adaptation strategies.

Ensuring More Resilient Fisheries and Protected Resources

Changing climate and oceans affect nearly every aspect of our mission, from fisheries management and aquaculture, to conservation of important protected resources and vital habitats. To address these growing impacts, NOAA is gathering and integrating information on climate and ecosystem changes into its resource management decisions. For example, with respect to fisheries management, NOAA is implementing a NOAA Fisheries Climate Science Strategy, Regional Climate Action Plans, and an Ecosystem-based Fisheries Management Road Map. In partnership with the regional fishery management councils, interstate fishery commissions, and states, we are taking steps to help fisheries and protected species prepare for and respond to changing climate and ocean conditions by ensuring well-managed fish stocks with a sustainable biomass and stock structure; producing regional ecosystem status reports to track and provide early warnings of climate and ecosystem changes in each region; using climate vulnerability assessments of major fish stocks, habitat and protected species to better understand their vulnerability and support management actions; and using scenario planning and other tools to identify effective fishery management strategies and protected species recovery actions under current and future conditions. NOAA is also reviewing input from fishermen, regional ocean councils, regional fishery management councils, scientists, and other stakeholders on how to make fisheries and protected resources more resilient to climate change, including changes in management and conservation measures, and improvements in science, monitoring, and cooperative research. NOAA will consider these stakeholder recommendations in future policy, guidance or management, affecting programs discussed in this testimony.

Through proactive partnerships with industries and other stakeholders, NOAA has led the advancement of new methods for reducing negative human impacts on protected species and places. These advancements may also have the added benefit of reducing the carbon footprint of marine industries. For example, partnerships with the shipping industry have spurred a new field of innovation in that sector, and are now poised to study vessel design and operation methods that can both reduce greenhouse gas emissions and reduce underwater noise in places that matter to the marine animals and protected areas in our trust. In recognition of the transboundary nature of both the species we manage and maritime transport operations, NOAA will seek to build on past collaborations, with our interagency partners, through international forums such as the UN's International Maritime Organization and the Arctic Council.

4) Scaling up climate science and services, innovation, and R&D

NOAA's climate science and services contribute greatly to the United States leadership in climate science, clean energy technology, and clean energy jobs. NOAA has long-standing research and technology programs, with an emphasis on research-to-operations, providing the foundation for smart policy and decision making in a changing world.

NOAA develops and runs world class research and operational weather, hydrologic, ocean, Great Lakes, climate, and Earth System Modeling systems. These and other physical science research and development capabilities and programs at NOAA Laboratories, Cooperative Institutes and Centers—as well as access to partners like the IOOS Regional Associations, academia, and other research groups through NOAA grants programs—provide a solid foundation for much-needed research, regional/local application development, and numerical, statistical, and hybrid modeling improvements to advance understanding of coastal flood risk, including sea level rise. This applied research, and the expertise in transitioning research into operations, directly enhances the operational products and decision-support services that NOAA and our partners provide to help communities adapt to and mitigate the impacts of a changing climate.

NOAA will continue to provide climate data, tools, and services to Federal agencies, state and local governments, tribes, and the commercial sector. However, to ensure that our services continuously reflect the most current understanding of our changing climate, it is imperative that NOAA dedicates more research towards understanding and projecting coastal inundation from rising seas, high lake levels, heavier precipitation, and more frequent extreme weather events and incorporate this knowledge into the next-generation modeling systems and tool development. NOAA's goal, as reflected in our FY 2022 Budget Request, is to scale up efforts to research the climate system and inform solutions to the climate crisis through investments in research, observations and forecasting, restoration and resilience. This includes support for ecologically sound offshore wind development and equitable services through multiple programs that touch everyday lives.

Offshore Wind

Offshore wind development is rapidly expanding in the United States, particularly in the Northeast, Mid-Atlantic, and West Coast, and there is renewed interest along the Gulf of Mexico as well. This is a relatively new use of our marine waters and will require continued and substantial scientific and regulatory review to balance energy production with protecting marine resources, fisheries production, Department of Defense testing and training that supports national security requirements, and NOAA sensors, like radar, that are sensitive to wind turbine interference.

In this vein, the *Ocean-Based Climate Solutions Act of 2021* describes the importance of increasing electricity production from offshore wind while addressing key issues such as increasing funding for scientific research and developing strategies to protect wildlife and be compatible with other ocean uses. Working in partnership with other key federal agencies,

NOAA's science and stewardship missions will be critical to helping our nation fully utilize our ocean as a producer of offshore wind energy in a way that is environmentally and scientifically sound. As reflected in NOAA's FY 2022 Budget Request, NOAA's expertise and capabilities will have to keep pace with this growing industry and will require investing in several key areas to appropriately engage in Federal interagency planning, siting, and environmental review and permitting of offshore energy projects to responsibly evaluate, monitor, and minimize impacts on our trust resources and constituencies.

Blue Carbon

The Ocean-Based Climate Solution Act of 2021 highlights the contributions coastal ecosystems can make to climate mitigation and adaptation efforts and authorizes a Blue Carbon Program in NOAA to advance understanding, conservation and restoration of these ecosystems for their climate services. This program would build on NOAA's existing pioneering research on blue carbon, with the primary focus on carbon sequestration and storage in coastal habitats (e.g., coastal wetlands, including seagrasses, salt marshes, and mangroves). These habitats have been a focus of NOAA research, restoration and conservation for many years because of their importance in providing essential fish habitat, wildlife habitat, storm and erosion protection, and water quality improvements; and align with the climate-oriented activities described in the *Ocean-Based Climate Solutions Act of 2021*. NOAA's coastal blue carbon activities are a collaborative effort across the agency and with other Federal agencies. Other initiatives that Primary topics include greenhouse gas inventory and accounting; habitat restoration and protection; research, monitoring and mapping; the management of coastal blue carbon in National Estuarine Research Reserves, national marine sanctuaries, and the coastal zone; technical assistance and outreach; and international cooperation and capacity building. NOAA can also support Advanced Research Projects Agency-Climate (ARPA-C) through its observations, monitoring and advanced climate research. A better understanding of coastal and deep seabed blue carbon habitats and their role in climate change mitigation will assist NOAA and other partners and stakeholders to better manage and maintain these ecosystems and provide multiple, critical benefits to communities and species.

Ocean Acidification and Harmful Algal Blooms

The *Ocean-Based Climate Solutions Act of 2021* also describes activities to address ocean acidification and harmful algal blooms (HABs). As the lead federal agency for both ocean acidification and HABs, NOAA is committed to identifying knowledge gaps and potential adaptation strategies needed to address the increasing severity of both ocean acidification and HABs being driven by climate change.

Climate change is one of the drivers of the increasing frequency, toxicity, and duration of harmful algal blooms. Warmer waters, changes in salinity and carbon dioxide levels, sea level rise, and coastal upwelling are creating conditions in which HABs thrive. Toxic blooms threaten

human and marine mammal health, drinking water, tourism, and commercial and recreational fisheries. Some blooms kill fish and shellfish directly, causing millions in losses to the aquaculture industry. NOAA is the lead federal agency for marine HABs and shares jurisdiction for the Great Lakes with the Environmental Protection Agency. NOAA's role is understanding, detecting, monitoring, and forecasting HABs, and in helping communities with decision-making related to their prevention, control, and mitigation. NOAA's HAB programs are national in scope but targeted to different regional needs.

Through our research, forecast, monitoring, and response activities, NOAA provides actionable information about HABs to decision-makers responsible for water treatment, aquaculture, public health, tourism, and coastal resource management. NOAA provides funding and technical training to state and local partners to build HAB monitoring capacity, and most HAB observing networks are a collaboration between NOAA and non-NOAA partners. NOAA and our partners provide long-term operational HAB forecasts for Lake Erie, Florida, and Texas that support public drinking water managers, and the fishing and tourism industry sectors. Additionally, NOAA runs HAB forecasts in several other regions of the country, including California, the Pacific Northwest, and the Gulf of Maine, that have not yet been operationalized (i.e., they provide a sustained service while remaining in research mode).

Additionally, NOAA is the lead federal agency for understanding the impacts of coastal and ocean acidification and chairs the Interagency Working Group on Ocean Acidification. NOAA's efforts are led by the Ocean Acidification Program (OAP) in partnership with the Integrated Ocean Observing System (IOOS) and the IOOS Regional Associations, and others. The OAP seeks to better prepare society to respond to changing ocean conditions by expanding our understanding of ocean acidification, a fundamental change in the ocean's chemistry caused by absorbing carbon dioxide. OAP created and continues to partner extensively with the regional coastal acidification networks to understand and work to mitigate the impacts of acidification at the local level, where it is felt most severely. We have also created the Ocean Acidification Information Exchange³ portal that makes data and tools on coastal and ocean acidification available to partners to assist them in understanding and preparing for this dramatic element of a changing climate. OAP also partners with the National Sea Grant College Program to provide heavily impacted stakeholders, such as the aquaculture industry, with adaptation techniques for acidification and a changing climate broadly. Finally, OAP is working with the National Centers for Coastal Ocean Science on ongoing research to fill knowledge gaps in the linkages between acidification and HABs, identify potential research products, and stakeholder needs.

Ocean-Based Climate Solutions Act of 2021

³ oainfoexchange.org

The *Ocean-Based Climate Solutions Act of 2021* is a broad bill aimed at addressing many challenges facing ocean and coastal wildlife and habitats as well as coastal communities and economies. As such, the bill has substantial implications for NOAA's mission and operations. With the exception of the provisions that the U.S. Fish and Wildlife Service addresses in its statement, the Administration has not taken a position on this bill. We are happy to provide technical suggestions on the bill as needed.

Conclusion

NOAA is proud to continue to lead the world in ocean science, serve the nation's coastal communities and industries, and ensure responsible stewardship of our ocean and coastal resources. With our expertise and unique capabilities, NOAA can help our nation better understand our changing planet and make better decisions to prepare for, adapt to, and tackle the climate crisis. Together, we can meet the moment. Thank you and your staff for your work to support NOAA's mission.