

TURNING THE TIDE FOR OCEAN
CLIMATE ACTION: UNLEASHING THE
CLIMATE BENEFITS OF OUR BLUE PLANET

HEARING
BEFORE THE
SELECT COMMITTEE ON THE
CLIMATE CRISIS
HOUSE OF REPRESENTATIVES
ONE HUNDRED SEVENTEENTH CONGRESS

SECOND SESSION

HEARING HELD
JUNE 9, 2022

Serial No. 117-18



www.govinfo.gov
Printed for the use of the Select Committee on the Climate Crisis

U.S. GOVERNMENT PUBLISHING OFFICE

48-321

WASHINGTON : 2022

SELECT COMMITTEE ON THE CLIMATE CRISIS

ONE HUNDRED SEVENTEENTH CONGRESS

KATHY CASTOR, Florida, *Chair*

SUZANNE BONAMICI, Oregon

JULIA BROWNLEY, California

JARED HUFFMAN, California

A. DONALD McEACHIN, Virginia

MIKE LEVIN, California

SEAN CASTEN, Illinois

JOE NEGUSE, Colorado

VERONICA ESCOBAR, Texas

GARRET GRAVES, Louisiana,

Ranking Member

GARY PALMER, Alabama

BUDDY CARTER, Georgia

CAROL MILLER, West Virginia

KELLY ARMSTRONG, North Dakota

DAN CRENSHAW, Texas

ANTHONY GONZALEZ, Ohio

ANA UNRUH COHEN, *Majority Staff Director*

SARAH JORGENSEN, *Minority Staff Director*

climatecrisis.house.gov

CONTENTS

STATEMENTS OF MEMBERS OF CONGRESS

	Page
Hon. Kathy Castor, a Representative in Congress from the State of Florida, and Chair, Select Committee on the Climate Crisis:	
Opening Statement	1
Prepared Statement	3
Hon. Garret Graves, a Representative in Congress from the State of Louisiana, and Ranking Member, Select Committee on the Climate Crisis:	
Opening Statement	4

WITNESSES

The Honorable Dr. Richard W. Spinrad, Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator, National Oceanic and Atmospheric Administration	
Oral Statement	6
Prepared Statement	8
The Honorable Monica Medina, Assistant Secretary of State, Bureau of Oceans and International Environmental and Scientific Affairs, U.S. Department of State	
Oral Statement	15
Prepared Statement	17

SUBMISSIONS FOR THE RECORD

Report from the National Energy Technology Laboratory, "Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States: 2019 Update," submitted for the record by Mr. Graves	39
Table from the U.S. Energy Information Association's <i>International Energy Outlook 2021</i> , "Table A6. World natural gas consumption by region, Reference case," submitted for the record by Mr. Graves	40
Table from the U.S. Energy Information Association's <i>International Energy Outlook 2021</i> , "Table A6. World natural gas consumption by region, High Economic Growth case," submitted for the record by Mr. Graves	40
A letter to President Biden from 118 organizations and businesses supporting the development of an U.S. Ocean-Climate Action Plan, dated October 15, 2021, submitted for the record by Ms. Castor	46

APPENDIX

Questions for the Record from Hon. Kathy Castor to Hon. Dr. Richard Spinrad	47
Questions for the Record from Hon. Kathy Castor to Hon. Monica Medina	48

**TURNING THE TIDE FOR OCEAN
CLIMATE ACTION: UNLEASHING THE
CLIMATE BENEFITS OF OUR BLUE PLANET**

THURSDAY, JUNE 9, 2022

HOUSE OF REPRESENTATIVES,
SELECT COMMITTEE ON THE CLIMATE CRISIS,
Washington, DC.

The committee met, pursuant to call, at 9:04 a.m., in Room 210, Cannon House Office Building, Hon. Kathy Castor [chairwoman of the committee] presiding.

Present: Representatives Castor, Bonamici, Brownley, Huffman, Levin, Casten, Graves, Palmer, Carter, Miller, Crenshaw, and Gonzalez.

Ms. CASTOR. And the committee will come to order.

Good morning, everyone.

Without objection, the Chair is authorized to declare a recess of the committee at any time.

As a reminder, members participating in a hearing remotely should be visible on camera throughout the hearing. For members participating in person, masks are optional, as per the Office of the Attending Physician.

As with in-person meetings, members are responsible for controlling their own microphones. Members can be muted by staff only to avoid inadvertent background noise.

As a reminder, statements, documents, or motions must be submitted to the electronic repository, to SCCC.repository@mail.house.gov.

Finally, members or witnesses experiencing technical problems should inform committee staff immediately.

Okay. Now that that is out of the way, good morning. Welcome to the Select Committee on the Climate Crisis hearing, Turning the Tide for Ocean Climate Action: Unleashing the Climate Benefits of Our Blue Planet.

And before we get going, I want to acknowledge that there are students in the room, the SCUBAnauts—the SCUBAnauts International. As we'll hear about during the hearing, marine science and observations are the cornerstone of ensuring a safe, healthy, and sustainable planet and the ocean. These SCUBAnauts are ready—are already getting a start in becoming the next generation of scientists and policymakers and maybe even a future NOAA Administrator. So welcome to our SCUBAnauts today.

And I will recognize myself for a 5-minute opening statement.

Happy Ocean Month and Capitol Hill Ocean Week. As we celebrate the progress that we have made to sustainably manage our

ocean, our coasts, our marine ecosystems. We must also look at additional policies and investments needed to conserve and restore them. And I am worried. We know climate change is impacting our ocean, leading to increases in water temperature, rising sea levels, acidification, deoxygenation, and changes in circulation. And the climate crisis is an ocean crisis, which means the oceans must be part of our national climate strategy, and we must invest in the ocean-based climate solutions.

The ocean plays a critical role in our global climate. It helps regulate temperatures, it absorbs excess heat, it supports countless ecosystems. It also supports millions of jobs. We know this in Florida, in the Tampa Bay area, including over 500,000 jobs in Florida alone. But the ocean is stressed out. It has absorbed between 20 and 30 percent of all human-caused carbon pollution since the 1980s. And it has absorbed more than 90 percent of excess heat since 1970.

That is why it is crucial that we conserve seagrasses, mangroves, and other coastal habitats, which sequester more carbon per area than any terrestrial habitat. It is crucial that we protect our coral reefs, which can mitigate the impacts of intense hurricanes, rising sea levels, and storm surge in places like Florida. And it is crucial that we conserve open ocean and deep-sea ecosystems, which may also be able to sequester carbon according to emerging research.

But we cannot stop there. Ocean climate action is also about harnessing offshore wind energy and emerging technologies, like wave and tidal power. These clean energy sources can help secure America's energy independence, while reducing our dependence on costly fossil fuels, and it can help us meet our climate targets.

According to research by the High Level Panel for a Sustainable Ocean Economy, ocean-based climate solutions can help reduce heat-trapping pollution by nearly 4 billion tons per year by 2030, and 11 billion tons per year by 2050. That is more than the equivalent of shutting down every coal-fire power plant around the world.

So as we unleash this potential, we must also be proactive about restoring and conserving our ocean areas. That means investing in low-cost, big-impact solutions, like safeguarding marine and coastal habitats through well-implemented marine protected areas.

According to a recent study in *Science*, climate-fueled ocean warming could kill off one-third of all marine animals over the next 300 years. And according to a separate study, climate change could lead to 10 percent of fish species becoming extinct this century. These serious losses would harm coastal economies, and we are already seeing some of these impacts in Florida. Just last year, a record number of manatees died, many from starvation, as man-made pollution killed off much of the seagrass that manatees feed on. And in Tampa Bay, red tide killed more than 600 tons of marine life and fish last summer, leaving a rotten smell that took over parts of our coast.

But the good news is that we can mitigate these harms. And when it comes to ocean climate action, the Biden-Harris administration has hit the ground running. President Biden made the ocean a central part of his early Executive Order on Climate, increasing American coordination with international partners, and pledging to protect at least 30 percent of our waters by 2030. He

also tasked the Ocean Policy Committee with drafting a National Ocean Climate Action Plan. And he is committed to produce 30 gigawatts of offshore wind energy by 2030.

We have also done our part in Congress. Through President Biden’s Bipartisan Infrastructure Law, we invested over \$490 million to restore ecosystems and prevent flood damage in coastal communities; another \$150 million to better gather data along our coast, the Great Lakes, and the ocean; and \$490 million to improve NOAA’s flood mapping, forecasting, and water modeling. Through our government funding legislation that we do every year, we also invested \$33 million for NOAA’s Coral Reef Program, and \$16 million for its Ocean Acidification Program, as well as \$21.5 million to address harmful algal blooms. Finally, the House did pass \$6 billion in reconciliation investments for coastal and marine habitat restoration, and we urge our Senate colleagues to include those investments as they finalize the reconciliation legislation.

So it is time to turn the tide for ocean climate action, and I look forward to today’s discussion.

I know my partner here, the Ranking Member, Representative Graves, agrees about the importance of our ocean resources, and I am happy to recognize him for 5 minutes.

[The statement of Ms. Castor follows:]

Opening Statement of Chair Kathy Castor
Hearing on “Turning the Tide for Ocean Climate Action:
Unleashing the Climate Benefits of Our Blue Planet”

June 9, 2022

As prepared for delivery

Happy National Ocean Month and Capitol Hill Ocean Week. As we celebrate the progress we’ve made to sustainably manage our ocean, our coasts, and our marine ecosystems, we must also look at additional policies and investments needed to conserve and restore them. I’m worried. We know climate change is impacting our ocean, leading to increases in water temperature, rising sea levels, acidification, deoxygenation, and changes in circulation. The climate crisis is an ocean crisis. Which means the ocean must be part of our national climate strategy—and we must invest in ocean-based climate solutions.

The ocean plays a crucial role in our global climate. It helps regulate temperatures, absorbs excess heat, and supports countless ecosystems. It also supports millions of jobs, including over 500,000 jobs in Florida alone. But the ocean is stressed out. It has absorbed between 20 and 30% of all human-caused carbon pollution since the 1980s. And it has absorbed more than 90% of excess heat since 1970. That’s why it’s crucial that we conserve sea grasses, mangroves, and other coastal habitats, which sequester more carbon per area than any terrestrial habitat. It’s crucial that we protect our coral reefs, which can mitigate the impacts of intense hurricanes, rising sea levels, and storm surge in places like Florida. And it’s crucial we conserve open ocean and deep-sea ecosystems, which may also be able to sequester carbon, according to emerging research.

We cannot stop there. Ocean climate action is also about harnessing offshore wind energy and emerging technologies, like wave and tidal power. These clean energy sources can help secure America’s energy independence, while reducing our dependence on costly fossil fuels. And they can help us meet our climate targets. According to research by the High Level Panel for a Sustainable Ocean Economy, ocean-based climate solutions can help reduce heat-trapping pollution by nearly 4 billion tonnes per year by 2030—and 11 billion tonnes per year by 2050. That’s more than the equivalent of shutting down every coal-fired power plant around the world.

As we unleash this potential, we must be proactive about restoring and conserving our ocean areas. That means investing in low-cost, big-impact solutions, like safeguarding marine and coastal habitats through well-implemented Marine Protected Areas. According to a recent study in Science, climate-fueled ocean warming could kill off one-third of all marine animals over the next 300 years. And according to

a separate study, climate change could lead to 10% of fish species becoming extinct this century. These serious losses would harm coastal economies. And we're already seeing some of these impacts in Florida. Just last year, a record number of manatees died—many from starvation—as man-made pollution killed off much of the seagrass that manatees feed on. And in Tampa Bay, red tide killed more than 600 tons of marine life and fish last summer, leaving a rotten smell that took over parts of our coast.

The good news is we can mitigate these harms. And when it comes to ocean climate action, the Biden-Harris Administration has hit the ground running. President Biden made the ocean a central part of his early executive order on climate, increasing American coordination with international partners and pledging to protect at least 30% of our waters by 2030. He also tasked the Ocean Policy Committee with drafting a national Ocean Climate Action Plan, and he's committed to produce 30 Gigawatts of offshore wind energy by 2030.

We've also done our part in Congress. Through President Biden's Bipartisan Infrastructure Law, we invested over \$490 million to restore ecosystems and prevent flood damage in coastal communities; \$150 million to better gather data along our coasts, Great Lakes, and ocean; and \$490 million to improve NOAA's flood mapping, forecasting, and water modeling. Through our government funding legislation, we also invested \$33 million for NOAA's Coral Reef Program and \$16 million for its Ocean Acidification Program, as well as \$21.5 million to address harmful algal blooms. Finally, the House passed \$6 billion in reconciliation investments for coastal and marine habitat restoration, and we urge our Senate colleagues to include those investments as they finalize their reconciliation legislation.

It's time to turn the tide for ocean climate action. I look forward to today's discussion.

Mr. GRAVES. Thank you, Madam Chair. Thanks for being here today and hosting the hearing.

And I want to thank y'all for being here. And let me explain why. This issue on climate has been this issue that has just been really political and really volatile now for a number of years. And the thing is, is that if we don't get it right, you are going to be the ones that inherit the problems, right? You are. You are going to be the ones that deal with our irresponsible actions, our politicizing something that should just be fact and science-based. And so we have got to get it right.

And what is especially concerning is the area that I represent, South Louisiana. We have one of the—some of the fastest subsidence rates in the world—or sinking rates in the world. We have some of the most gradual slopes. And so every inch of relative sea rise causes a pretty extraordinary impact. And just to put things in perspective—and I know Secretary Medina knows this well—we have lost about 2,000 square miles of our coast. That is like taking the State of Rhode Island and just wiping it off the map entirely.

But what has happened with this issue is it has just become this big political thing. We have people out there saying all these things that are completely untrue, that are causing people to create false narratives and then act on them. And so let me give you a few examples.

So, number one, you have people out there that are touting things like Paris Climate Accords and saying that these things are going to end up being the saving grace. Well, I will give you a little factoid. Under Paris Climate Accords, emissions for the globe are actually going to go up, not down. They are going to go up.

And, specifically, I want to call out one country, and I know Secretary Medina is going to talk about this, but China. The country of China right now, if I remember this right, they are emitting more than the United States, European Union, South Korea, and Japan, I think, combined. And under their commitment to the

Paris Accords, they get to increase another 50 percent between now and 2030. Fifty percent.

So think for just a minute, in the United States, we can be leading the world. We can be leading the world in reducing emissions, in reducing emissions, but the reality is the environment is agnostic as to which country—which country reduces emissions the most. It happens—what matters is whether we have a net downward trajectory. And the reality is that for every 1 ton of emissions the U.S. has reduced, China has actually gone up by 4. For every 1 ton we have reduced, China has increased by 4.

If we are going to extract any lessons learned from what has happened with Russia's aggression in the Ukraine, it needs to be the fact that you have leaders like Vladimir Putin, and Xi in China, and Kim in North Korea, and Iran, and leaders around the world, they don't care about international norms. They don't care about standards or rules. They don't care. They are going to do whatever they want. And they are never going to do things that undermine their economic best interest. They are not.

And so for us to go out and pursue it—as the Chair mentioned—costly fossil fuels. Well, you know, I remind you, gasoline prices have gone up over a hundred percent over the past year and a half. Natural gas prices have gone up over 300 percent over the last year and a half. The Biden administration has made it very clear that we are going to have an increased demand for fossil fuels. We are going to have an increased demand for natural gas. We are going to have an increased demand for gasoline, for oil.

The Chair is exactly right, we are going to need absolutely every energy source, the ones that she has mentioned. We are going to need solar and wind, we are going to need wave and geothermal, we are going to hydro, we are going to need nuclear. We are going to need all of it. Because according to the Biden administration, there is going to be a 50 percent increase in global energy demand. Fifty percent. And so we are going to need every energy source we can.

The Biden administration has also said that developing countries are going to need up to an 80 percent increase in natural gas. So if we are going—the globe is, the globe, developing countries. So if we need an 80 percent increase in natural gas, why in the world would we not get it from the place that has it the cleanest, the cleanest in the world? You know what that is? That is the United States. In fact, it is in our offshore.

So we can continue going down these pathways that make no sense, that aren't based in science, that aren't based in data, that continue the trajectory of this administration, that is actually seeing emissions go up, not down. I will tell you a secret. Under the previous administration, emissions went down 2.5 percent a year. Under this administration, they have gone up 6.3 percent in 1 year. Okay? So we can deal with facts or we can create false narratives and then pursue solutions based on things that are completely untrue. And if we continue doing that, guess whose problem it becomes? Yours.

So I am looking forward to this panel today. My daughter and I went fishing in the Gulf of Mexico this weekend. She nailed an 18-pound red snapper, a 30—well, almost 30-pound gag grouper, a

good lane snapper. I mean, she was nailing them. We love fishing. We love the Gulf of Mexico and those resources. We must protect them, but we have got to make sure that we are using rational science.

And I want to thank this committee's first government witnesses ever for coming since our existence. We appreciate you being here.

Ms. CASTOR. Okay. Now, I want to welcome our witnesses. Today we will hear from two Biden administration officials on the importance of ocean-based solutions in addressing the climate crisis. And they are not the first government witnesses to appear here, just to make sure the record is clear on that.

Dr. Richard Spinrad is the Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator. Dr. Spinrad is responsible for the strategic direction and oversight of NOAA, including its mission to understand and predict changes in climate, weather, ocean, and coast, as well as helping conserve and manage coastal and marine ecosystems and resources. He previously served as NOAA's Chief Scientist under President Obama, and led NOAA's Office of Oceanic and Atmospheric Research and the National Ocean Service. Welcome.

And Ms. Monica Medina is the Assistant Secretary of State for Oceans and International Environment and Scientific Affairs. Assistant Secretary Medina and her team provide leadership to conserve and protect the global environment and the ocean. Prior to this role, Assistant Secretary Medina was an Adjunct Professor at Georgetown University's School of Foreign Service, a former Principal Deputy Under Secretary of Commerce for Oceans and Atmosphere and General Counsel of NOAA, and a Special Assistant to the Secretary of Defense. Welcome.

We are so excited to have you both here. And, without objection, the witnesses' opening statements will be made part of the record.

With that, Dr. Spinrad, you are recognized for 5 minutes to provide your testimony.

**STATEMENTS OF THE HONORABLE DR. RICHARD W. SPINRAD,
UNDER SECRETARY OF COMMERCE FOR OCEANS AND
ATMOSPHERE AND NOAA ADMINISTRATOR, NATIONAL
OCEANIC AND ATMOSPHERIC ADMINISTRATION; AND THE
HONORABLE MONICA MEDINA, ASSISTANT SECRETARY OF
STATE, BUREAU OF OCEANS AND INTERNATIONAL ENVI-
RONMENTAL AND SCIENTIFIC AFFAIRS, U.S. DEPARTMENT
OF STATE**

STATEMENT OF THE HONORABLE DR. RICHARD W. SPINRAD

Dr. SPINRAD. Thank you, Chair Castor, Ranking Member Graves, members of the Select Committee. I really appreciate the opportunity to testify on NOAA's work to turn the tide for ocean climate action. And I am pleased to join you during National Ocean Month and Capitol Hill Ocean Week, a time when we all join together to focus on the importance of our oceans and Great Lakes, and the communities that rely on them, something that we at NOAA do every day.

I am also excited to be teaming up again with my former NOAA colleague, Assistant Secretary of State, Monica Medina, on these

critical issues. Now more than ever, it is crucial that we are united in confronting these challenges on both the domestic and the global fronts.

The oceans play a fundamental role in supporting life on our planet, effecting everything from the air we breathe and the food we eat, to weather and climate patterns. Our well-being is intrinsically linked to the health of the oceans. NOAA's mission to support healthy oceans requires observations, research, modeling, prediction, and science-based stewardship of ocean resources.

As the Federal authoritative source on climate information, NOAA is working to build a climate-ready nation by 2030. This means a nation that loses fewer lives and incurs less damage when extreme weather strikes. Using NOAA's data, products, and services, our nation will improve its collective understanding of climate change, both to mitigate its impacts and help ensure we are resilient in the face of the climate threats we cannot avoid. With our stakeholders, other Federal agencies, the private sector, philanthropy, academia, and the international community, we are focusing on actions on addressing the climate risks of extreme heat, drought, fire, flooding, sea level rise, and other extreme events, all serious realities that you and your constituents experience every day.

NOAA is here to help. Through the Department of Commerce's Climate Action Plan, the departmental order on addressing the climate crisis, and NOAA's own Climate Council, we are working diligently to address these concerns and integrate them into planning and policies to instill meaningful change.

But we are not just providing data to scientists and industry. To truly prepare our nation to be climate ready, we know that it is critical to engage early, often, and meaningfully with the rural, Tribal, marginalized, and historically underserved and vulnerable communities that need the most help to build resilience against climate change.

To expand our reach, NOAA is forging partnerships with entities like the American Medical Association, the American Bar Association, the National Association of Realtors. We are engaging through our Climate and Equity Roundtables, as well as our private sector climate listening sessions, to make sure we are meeting the needs and the codeveloping smart, sustainable principals for the public-private partnerships necessary to deliver climate services.

We are working in all of the United States, including with Native communities, to provide them with the products and services that they need. We want to ensure all decision makers are empowered to take action and make science-based decisions in the face of climate change. NOAA is actively working to remove barriers and expand equitable access to our tools, resources, and services to those on the front lines. We are funding climate and equity pilot projects, codeveloped with communities based on feedback received during these roundtables.

The Bipartisan Infrastructure Law—thank you—provides NOAA with nearly \$3 billion, two-thirds of which is focused on coastal resilience and habitat restoration. And NOAA's Fiscal Year 2023 President's budget request includes nearly \$200 million in new climate research, tools, and services.

There is a significant increase in demand for climate services across all regions and sectors, and these investments will not only help expand and improve NOAA's service delivery to build a climate-ready nation, but also prove and provide new and long-lasting economic opportunities to all communities.

As NOAA works to address the impacts of climate change, we are also leading the administration priorities to map 30 percent of our coasts and oceans, protect 30 percent of our land and water, and deploy 30 gigawatts of offshore wind by 2030.

NOAA has a memorandum of understanding with the Bureau of Ocean Energy Management, which will prepare us to reach our offshore wind goals and minimize the impacts on ecosystems. We are also expanding our network of marine and estuarine protected areas, enhancing our resilience, sequestering carbon, and protecting biodiversity.

In May, NOAA's Mauna Loa Atmospheric Baseline Observatory recorded carbon dioxide levels not seen on this planet for over 4 million years. The last time CO₂ levels were this high, sea levels were high enough to drown most of the world's modern, major cities.

The time to act on climate change is now, and NOAA will continue to lead the way in understanding and taking action to address the climate crisis and build a climate-ready nation. We look forward to continuing to work alongside our Federal partners, including the Department of State, to do so.

Thank you for the opportunity to testify today, and I do look forward to your questions. Thank you.

[The statement of Dr. Spinrad follows:]

Written Testimony of Dr. Richard Spinrad

**Under Secretary of Commerce for Oceans and Atmosphere and
National Oceanic and Atmospheric Administration Administrator**

**Hearing on "Turning the Tide for Ocean Climate Action:
Unleashing the Climate Benefits of Our Blue Planet"**

Before the House Select Committee on the Climate Crisis

June 9, 2022

INTRODUCTION

Chairwoman Castor, Ranking Member Graves, and Members of the Select Committee, thank you for the opportunity to testify today regarding the National Oceanic and Atmospheric Administration's (NOAA) work on our ocean and climate. I am pleased to join you during National Ocean Month and Capitol Hill Ocean Week; a time when Congress focuses on the importance of our ocean and Great Lakes and discusses how we can protect them and the communities that rely on them—something we at NOAA do every day.

The Department of Commerce's Climate Action Plan¹ and Department Administrative Order 216-22² aim to incorporate climate considerations into Department policies and planning and to foster and enhance the resilience of vulnerable communities against the key climate risks of extreme heat, drought, wildfires, flooding, coastal inundation and impacts to fisheries. At NOAA, we seek to build a climate ready nation, with the goal of a thriving nation whose prosperity, health, safety, and continued growth benefit from and depend upon a shared understanding of, and collective action to reduce, the impacts of climate change. NOAA received almost \$3

¹ <https://www.sustainability.gov/pdfs/doc-2021-cap.pdf>

² <https://www.commerce.gov/news/press-releases/2022/04/secretary-raimondo-establishes-commerce-climate-council-directs>

billion in Infrastructure Investment and Jobs Act funding that will support the ocean, climate, and communities. This funding will restore coastal habitats and ecological features that protect coastal communities from flooding and coastal storms and work towards infrastructure that is climate smart, climate ready, and climate resilient.

OCEAN AND CLIMATE

The ocean plays a critical role in supporting life on our planet, affecting everything from the air we breathe and the food we eat, to weather and climate patterns. Our well-being is tied to the health of the ocean, and supporting a healthy ocean is a key part of NOAA's mission that requires observations, data processing, research, advanced modeling, analysis, prediction, assessments, and science-based stewardship of ocean resources. Ocean health is essential for the safety and economic well-being of our Nation. NOAA works closely with other federal agencies in exploring, mapping, and understanding our ocean and its relationship to the atmosphere and climate as well as managing its living marine resources that help sustain the many people, businesses, and communities that depend on them.

The Earth is an ocean planet, and every sector of society is affected by the ocean, either directly or indirectly. Coastal and global ocean observations and associated research are foundational to characterizing ocean and environmental changes over time. These efforts are key to improvements in weather, climate, marine, and ocean forecasts, especially for high impact events such as hurricanes, floods, terrestrial and marine heat waves, drought, and El Niño, as well as sea level rise, ocean acidification, and ocean oxygen loss.

Climate change is impacting our ocean in myriad ways. The complex interactions between greenhouse gas emissions and changes in ocean storage of heat and carbon dictate climate impacts, such as melting of sea ice, ocean deoxygenation, ocean acidification, sea level rise, coastal flooding, and changes in the distribution and abundance of marine organisms. We are already seeing these impacts: fifteen of the lowest minimum extents of sea ice in the Arctic have occurred in the last 15 years³ and we are losing approximately 350,000 km² of sea ice per decade.⁴

These climate impacts threaten the numerous valuable ecosystem services provided by the ocean, such as absorbing carbon and heat from the atmosphere and mitigating some of the damaging effects of climate change. In total, more than 90%⁵ of the excess heat in the Earth's system caused by human-induced accumulation of greenhouse gasses in our atmosphere is stored in the ocean. If that heat was converted into energy, it would be equivalent to a Category 5 hurricane occurring every second for 30 years. Even one of the least understood environments on the planet, the layer of cold ocean water where sunlight doesn't reach, known as the twilight zone, provides critical ecosystem services, by supporting ocean food webs and commercial fisheries. The deep ocean zone also plays an important role in storing carbon in its sediments.

Ocean Observations Inform Decision Making

The ocean and coasts compose 80 percent of the Earth's surface, and NOAA's geostationary and polar-orbiting satellites are constantly observing and taking measurements in this vast area, providing daily global measurements of ocean color and sea surface temperature. In addition, NOAA uses data from NASA, USGS, and international partners to support many of our ocean and coastal applications. These data are available in near real-time to users through the National Centers on Environmental Information (NCEI), NOAA CoastWatch, and the U.S. Integrated Ocean Observing System (IOOS).

NOAA's ocean observation enterprise collects data on past and present conditions of ocean ecosystems, from ocean temperature and other physical parameters to biological conditions like the distribution and abundance of living marine resources. This information provides the foundation for understanding and predicting future changes. The United States, guided by NOAA, leads the world in observing our ocean, accounting for over half of the observations of the global ocean that exists today.

³ *Executive Order on Tackling the Climate Crisis at Home and Abroad* <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/>

⁴ <https://www.ncdc.noaa.gov/snow-and-ice/extent/>

⁵ <https://www.climate.gov/news-features/understanding-climate/climate-change-ocean-heat-content>

These ocean observations contribute to a number of the goals laid out in the Executive Order on Tackling the Climate Crisis at Home and Abroad.⁶ Our global and coastal weather and climate prediction, combined with measurements of the marine environment from NOAA's fleet of ships and aircraft, ground observations, and satellites, enables informed decision making across a wide range of stakeholders, including resource managers and policy makers. As our ocean observations improve and expand, so do the opportunities to ensure safety, enhance commerce, sustain fisheries, generate renewable energy such as efficiently harnessing offshore wind, wave and tide and current energy, and understand our changing climate.

NOAA is working to collect and provide partners with finer-scale data on ocean and coastal regions that is critical to predicting the frequency, severity, and location of environmental changes, such as marine heat waves and sea level rise. We are also improving simulations of ocean interactions with the atmosphere, land, and ice to advance short term forecasts and subseasonal, seasonal, and decadal predictions and assessments. By advancing both short and longer term projections of ocean conditions, we will be able to provide living marine resource managers and stakeholders with early warnings and the best management strategies for resilience and adaptation to changing ocean conditions. Additionally, as we obtain improved representation of ocean topography and the ocean's interactions with the earth system, we can improve simulation of ocean circulation and thus anticipate future rates of heat and carbon uptake. Finally, we are advancing our ecological forecasts in order to provide earlier warnings of events such as coral bleaching and harmful algal blooms, which can wreak havoc on coastal systems, human health, and regional economies.

Changing Ocean

Ocean warming is causing ocean deoxygenation and leading to changes in the distributions of marine organisms. In addition to altering organisms' distribution, low oxygen events can disrupt habitat support functions, impair living shoreline protections such as oyster reefs, and undermine nutrient cycling, carbon sequestration, recreational fishing activities and more.⁷ NOAA's National Centers for Coastal Ocean Science (NCCOS) has funded the research and development of hypoxia (low oxygen area) forecasts in the Gulf of Mexico since 1990 and in the Chesapeake Bay since 2005. This information provides important information to interagency management bodies like the Chesapeake Bay Program and the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force.

As carbon dioxide levels in the atmosphere increase, so too does the amount of carbon dioxide absorbed by the ocean. The ocean absorbs about 25% of global carbon dioxide emissions. This absorption leads to significant changes in seawater chemistry, leading to ocean acidification. This is a threat to food security, economies, and culture because of its effects on a broad range of marine life including protected species of corals, harvestable species like crabs and sea scallop, and mussels, and oysters that are cultivated in aquaculture systems. The NOAA-supported Regional Coastal Acidification Networks provide an open forum for the review of the latest science on ocean acidification and its biological, economic, and cultural effects with a focus on identifying knowledge gaps. These networks are building stronger connections between scientists, decision makers, fishermen, Tribes, and other stakeholders to identify regional priorities and information needs for ocean acidification.

Ocean acidification may also promote growth of toxic phytoplankton species that form harmful algal blooms (HABs) and increase the amount of toxins in surface waters. HABs can produce toxins or cause other harmful effects that damage ecosystems, disrupt our seafood supply, impact economies, and threaten human health. Marine and fresh waters of the United States are increasingly impacted by HABs with blooms reported in every state, leading to annual economic losses of millions of dollars.⁸ NOAA is researching HABs and the impact of ocean acidification along our coasts, including in the Great Lakes and Alaska, and is now providing short (once or twice weekly) and longer-term, seasonal forecasts for these events so health officials, environmental managers, water treatment facility operators, and seafood and tourism industries can proactively prepare.

Three of NOAA's programs—Sea Grant, NCCOS, and the National Environmental Satellite, Data, and Information Service (NESDIS) through the NOAA Coast Watch Program—have partnered to create a HAB Liaison position to work with federal partners and communities to better serve decision-makers through the development

⁶ <https://repository.library.noaa.gov/view/noaa/34474>

⁷ <https://doi.org/10.1038/nclimate2595>

⁸ Sanseverino, Isabella, et al. "Algal bloom and its economic impact." *European Commission, Joint Research Centre Institute for Environment and Sustainability* (2016).

of new data-driven communication tools. The NCCOS and IOOS also support the HAB Observing Network. Finally, we are one of three co-chairs of the Interagency Working Group on Harmful Algal Bloom and Hypoxia Research Control Act, in which we work across 17 Federal agencies and with stakeholders to develop action plans and assess HAB events. Investments in HABs research represents a coordinated effort across NOAA and the federal government to advance our nation's ability to observe, monitor, forecast, and manage blooms that are being exacerbated by climate change.

Ocean and the Economy

Changing ocean conditions are affecting Americans whose livelihoods depend on the sea, such as fishermen. Marine fisheries and seafood industries supported more than \$255 billion in economic activity and 1.8 million jobs in 2019.⁹ Environmental changes are creating significant challenges for fishing industries and coastal businesses by influencing the location of fish stocks, the productivity of fish stocks, and the fishing industry's interactions with bycatch, protected species, and other ocean users. To reduce impacts, increase resilience, and take advantage of new opportunities, NOAA Fisheries is improving science, and implementing adaptable management approaches. For example, scientists from across NOAA are working together to improve ocean forecasts and projections relevant to marine fisheries management. NOAA's Climate Ecosystems and Fisheries Initiative (CEFI) is a cross-NOAA effort to build the end-to-end operational modeling and decision support system needed to help living marine resource managers, stakeholders, and resource-dependent communities identify best strategies for resilience and adaptation to changing marine ecosystems. NOAA's FY 23 budget request includes \$20 million to begin building the CEFI system. In partnership with the Regional Fishery Management Councils, Fishery Commissions, states, Tribes, academia and others, we are taking steps to help fisheries prepare for and respond to changing climate and ocean conditions.

Ocean-related segments of the U.S. economy—the blue economy—were worth nearly \$373 billion GDP in 2018.¹⁰ Our ocean is now experiencing a rise in economic importance, which has strategic implications. A strong blue economy depends on healthy ocean, coastal, and Great Lakes resources. The science and management to conserve and sustainably use these resources is at the heart of NOAA's mission.

As Administrator, supporting sustainable economic development by advancing the New Blue Economy is one of my main priorities. The New Blue Economy leverages data, information, and knowledge about our ocean to address societal needs and create economic innovation and opportunities. The New Blue Economy is an economy founded on emerging capabilities for acquiring data and developing information and knowledge that supports economic growth. NOAA is helping our Nation respond to changing conditions with a New Blue Economy fueled by ocean information and American ingenuity, while protecting ocean and human health and ensuring social equity. This economy has the potential to create new jobs, foster innovation, and help to fight the climate crisis by spurring sustainable economic growth that is informed by the best-available climate and ocean data.

To help build out the New Blue Economy, we aim to increase funding for coastal mapping and improve our understanding of the impacts a changing climate has on our ocean, coastal, and Great Lakes resources. Today, there is a need and desire to observe and understand our ocean for near-term benefit, but we must also take actions that will preserve this resource for future generations.

OCEAN AND CLIMATE SOLUTIONS

Though we have been researching the ocean for hundreds of years, we have only recently come to understand its role in maintaining planetary stability. As the climate changes, the ocean is also changing and warming. According to a recent study by NOAA researchers, the likelihood of a hurricane developing into a Category 3 hurricane or stronger, with sustained winds greater than 110 miles an hour, is increasing by about 8 percent per decade.¹¹ At NOAA, we are working to provide the information needed to prepare for, respond to, and recover from extreme events and generate lasting solutions to society's needs, while sustaining and promoting the services the ocean provides.

The ocean connects us, feeds us, sustains us, and offers solutions to climate change. These solutions include renewable ocean energy, carbon-neutral shipping,

⁹National Marine Fisheries Service. 2022. Fisheries Economics of the United States, 2019. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS-F/SPO-229, 236 p.

<https://www.fisheries.noaa.gov/resource/document/fisheries-economics-united-states-report-2019>

¹⁰<https://oceanservice.noaa.gov/annualreport/2020/ocm.html#gdp>,

<https://coast.noaa.gov/data/digitalcoast/pdf/econ-report.pdf>

¹¹<https://www.pnas.org/doi/full/10.1073/pnas.1920849117>

and blue carbon ecosystems like mangroves, salt marshes, and seagrass beds. There is a growing interest in understanding how ocean solutions can help facilitate the removal and sequestration of carbon dioxide from the atmosphere, and there's increasing demand for NOAA and its federal partners to verify the approaches being proposed by private industry.¹² Tackling the climate crisis is one of my three main priorities as Administrator, and we must take action now to accomplish it. NOAA, with its observations, products, services, Tribal consultation, stakeholder engagement, and stewardship responsibilities, is working to help decision makers at every level build resilience to climate change.

Offshore Wind

NOAA is working closely with other Federal agencies including the Department of Energy to mitigate climate change and achieve the Administration's goal to deploy 30 gigawatts of offshore wind energy by 2030, while protecting biodiversity and promoting co-ocean use. NOAA advances the Administration's wind energy priorities through science, modeling, and products that inform decisions for offshore wind energy planning and development. NOAA Fisheries also works with the Bureau of Ocean Energy Management (BOEM) and offshore wind developers to minimize the negative impacts of offshore wind projects on endangered or threatened species, marine mammals, fisheries, marine habitats, fishing communities, and NOAA's scientific enterprise.

As the demand for offshore wind grows, so does NOAA Fisheries' associated regulatory workload, demand for data and marine planning, and the need for scientific surveys and monitoring to understand impacts to trust resources and U.S. fisheries. We are looking to increase capacity and continue to build expertise to keep pace with the growth of offshore wind development off our coasts. The NOAA 2023 Budget includes an increase of \$45 million to support our increasing work in this area.

Enhancing Ocean Science for Solutions

At NOAA, we are collecting data 24/7 from a robust network of weather radars, satellites, fixed and drifting buoys, aircraft, ships, and uncrewed systems. Our National Centers for Environmental Information hosts the authoritative archives of climate and historical weather data and information. NOAA also makes ocean and coastal specific space-based data available through the NOAA CoastWatch and the nation-wide IOOS system. We conduct research, create products, tools, and educational resources, and we disseminate forecasts, warnings, climate predictions and projections, and maps. We know that all of this must be continuously informed, updated, and improved upon to understand and predict our ocean and climate, forecast the weather, and inform the public.

We are investing in our observations and modeling capabilities, in the translation of data and knowledge into actionable information for decision-makers, and in the New Blue Economy. Our FY 2023 budget request includes investments to improve climate-related ocean and coastal observations and to deliver user-informed data, tools, and services to local communities—including Tribes and underserved communities in line with the Administration's Justice 40 initiative—to help them better prepare for and respond to the impacts of climate change. Additionally, the Infrastructure Investment and Jobs Act (IIJA), signed by President Biden on November 15, 2021, provides a \$2.96 billion dollar investment for NOAA over the next 5 years. NOAA will use these new resources to work towards infrastructure that is climate smart, climate ready, and climate resilient to prepare communities for the on the ground impacts of increasingly intense precipitation, hurricanes, flooding, drought, extreme heat, and fire weather events. IIJA funds will be used to recapitalize and modernize the global ocean and Great Lakes observing system assets and improve quality products, services, and capabilities at NOAA, Department of Defense, and forecast centers around the world.

We are advancing our regional ocean and Earth System models to deliver robust forecasts and projections of acute and chronic ocean conditions over varied spatial and temporal scales to ensure climate-ready management of living resources, and enhance both climate and weather predictions. NOAA's FY 2023 budget request includes \$20 million for the CEFI program, which will build the end-to-end operational modeling and decision support system needed to help decision-makers identify best strategies for resilience and adaptation to changing marine ecosystems. A great example of our work in this sphere can be seen in the NOAA co-led production of an interagency Sea Level Rise Technical Report with projections through 2150 for all U.S. coastal waters. The findings were unequivocal: sea level along the U.S. coastline is projected to rise, on average, 10–12 inches in the next 30 years (2020–

¹² <https://nap.nationalacademies.org/read/26278/chapter/1>

2050). Sea level rise will create a profound shift in coastal flooding over the next 30 years by causing tide and storm surge heights to increase and reach further inland. There will be more damaging coastal flooding that will reach further inland. Whether or not we curb emissions now and into the future will have a major impact on the rate of sea level rise that occurs.

Over 127 million people in the United States live in coastal counties,¹³ which face a number of threats spanning from increasing storm intensity to coastal inundation and sea level rise. These growing coastal risks threaten aging infrastructure, disrupt food and water supplies, and make it difficult to plan for natural disaster response and recovery. There is an increasing need for accessible and geographically comprehensive ocean data and information for decision-making in these rapidly changing communities. We are investing in environmental literacy programs and working with communities on resilience. We have supported the creation of tools such as the Office of Coastal Management's Sea Level Rise Viewer, the Homeowner's Handbooks and the Resilience Indices promulgated by several Sea Grant programs, and the National Integrated Drought Information System's Drought Early Warning System products.

Not all communities are experiencing these hazards in the same way. Communities of color, already under strain due to legacy and current environmental injustices as well as impacts of the COVID-19 pandemic, are disproportionately impacted by climate change.¹⁴ As Administrator, one of my main priorities is improving equity and environmental justice in our service delivery, and to that end, we are improving and creating new tools that address the need to mitigate the compounded threats presented by climate change and injustice. During the first year of this Administration, we held a series of Climate and Equity Roundtables across the country with the goal of understanding what communities need from NOAA to build resilience to climate hazards they face. For example, NOAA's Climate Program Office and the National Integrated Heat Health Information System (NIHHIS) are working together with CAPA Strategies LLC to provide science support for citizen science, community based campaigns to map the hottest parts of communities through the NIHHIS-CAPA Urban Heat Island Mapping Campaign program. The 2022 campaign will map heat inequities of 14 communities across the country this summer, and two international cities. We are now funding Climate and Equity pilot projects, co-developed with these communities, in response to the feedback received during the Roundtables. This is one example of NOAA's work on the Justice 40 initiative, increasing equity in our services and working directly with the most underserved communities to understand and co-create responses to needs that they identify.

In January 2022, NOAA also participated in interagency Tribal consultations on subsistence fishing in Alaska. Subsistence fishing is an important way of life in Alaska and we look forward to continuing our conversation with Alaska Native leaders and finding new ways to partner with and address climate change impacts on the Alaska Yukon-Kuskokwim region.

Blue Carbon and Nature-Based Solutions

To counter the threat of climate change, we are also investing in understanding, protecting, and restoring coastal blue carbon ecosystems such as seagrasses, mangroves, and salt marshes. These ecosystems offer multiple co-benefits for adaptation, mitigation, and ecosystem services such as providing fish habitat and supporting recreational and commercial fisheries. Coastal blue carbon habitats have been shown to sequester up to ten times as much carbon per equivalent area as tropical forests,¹⁵ making them some of the most efficient natural carbon sinks in the world. However, they cover a relatively small portion (<1%) of the Earth's surface. In the United States, it is estimated that coastal blue carbon habitats sequester a net quantity of 4.8 million metric tons (MMT) of carbon dioxide annually, which represents less than 0.1% of the total annual U.S. carbon dioxide emissions of 5,000 MMT/year.¹⁶ Some countries already include blue carbon ecosystems in

¹³ Economics and Demographics [https://coast.noaa.gov/states/fast-facts/economics-and-demographics.html#:~:text=Coastal%20counties%20of%20the%20U.S.,land%20mass%20\(excluding%20Alaska\).](https://coast.noaa.gov/states/fast-facts/economics-and-demographics.html#:~:text=Coastal%20counties%20of%20the%20U.S.,land%20mass%20(excluding%20Alaska).)

¹⁴ United Nations COVID-19 Response <https://www.un.org/en/un-coronavirus-communications-team/un-working-ensure-vulnerable-groups-not-left-behind-covid-19>

¹⁵ Mcleod, Elizabeth, et al. "A Blueprint for Blue Carbon: Toward an Improved Understanding of the Role of Vegetated Coastal Habitats in Sequestering CO₂." *Frontiers in Ecology and the Environment*, vol. 9, no. 10, 2011, pp. 552-560., <https://doi.org/10.1890/110004>.

¹⁶ U.S. EPA's *Inventories of Greenhouse Gas Emissions and Sinks: 1990-2019* (Chapter 6 Land Use, Land-Use Change, and Forestry).

their Nationally Determined Contributions as mitigation and/or adaptation measures, offering the potential for a common language and a suite of approaches to international monitoring and evaluation of methods. For countries with large areas of blue carbon habitat, such as the U.S., conservation and restoration can offer an efficient means to offset greenhouse gas (GHG) emissions, and provide a pathway for climate finance.

The Biden-Harris Administration's *Conserving and Restoring America the Beautiful* report outlines specific goals and principles to address climate change, the disappearance of nature (both natural areas and biodiversity), and inequitable access to the outdoors. One specific recommendation in the report is to expand the National Marine Sanctuary System and the National Estuarine Research Reserve System as a valuable existing tool to meet those goals. These protected areas provide a long-term legal and management framework for conservation and restoration of blue carbon habitats, as well as serve as focal points for research, education, and community engagement. In addition to expanding the systems and their funding, we are working with our partners to pioneer methods for quantifying coastal blue carbon within the network of coastal sites. Our actions aim to ensure that carbon will continue to be sequestered and stored carbon will not be released by trawling, mining, or oil and gas extraction.

We also support the integration of coastal wetlands data in our national Inventory of U.S. Greenhouse Gas Emissions and Sinks, produced by the Environmental Protection Agency (EPA), and provide technical support for individual states that are actively working to include blue carbon ecosystems within their own greenhouse gas inventories. This experience has positioned NOAA to share this foundational information nationally and internationally through capacity building activities, including a recently established partnership between NOAA and the U.S. Department of State. Through this new *Blue Carbon Inventory (BCI) Project*, NOAA is working with partners to provide technical guidance to countries as they strive to include coastal wetlands in their own greenhouse gas inventories and reflect the value of these ecosystems in their coastal planning and management. Through these partnerships, NOAA is helping to enhance the sustainable management of coastal habitats, and the realization of their multiple benefits for adaptation, mitigation, and ecosystem services. We are also investigating the efficacy and tradeoffs of carbon dioxide removal technologies and how NOAA's mission, products, and services can help catalyze the work of our federal, nonprofit, and private partners already underway.

We are funding nature-based and climate adaptive infrastructure projects, such as our floating pier in Alaska, that provide resilience for communities, as well as numerous ancillary co-benefits. In 2022, IIJA provides \$200 million for NOAA coastal grant programs, including to restore coastal habitats and ecological features that protect coastal communities from flooding and coastal storms as well as assess and remove marine debris.

NOAA is playing a critical role in the development of a report to the National Climate Task Force identifying key opportunities for greater deployment of nature-based solutions across the federal government, including through potential policy, guidance, and program changes as outlined in President Biden's Executive Order on Strengthening the Nation's Forests, Communities, and Local Economies. We know that there are proven ways that nature can help. Protecting coastal communities from storms, waves, flooding, and erosion can also protect biodiversity and provide ecosystem services that support livelihoods, culture, food security, water quality, recreation, and tourism. Through this report, NOAA will identify ways that more support can be given to these effective solutions.

The many observations, products, and services that NOAA continues to expand and improve upon are complemented by our invaluable work on place-based engagement, service delivery, and the co-creation of knowledge. Not only does NOAA continue to expand its ocean and climate information, we also strive to empower communities to make informed decisions using the best available science, including Traditional Ecological Knowledge and Indigenous Knowledge (TEK/IK), and support tools. Ensuring that NOAA's products and services continue to address the needs of our nation, and are iteratively refined in collaboration with our diverse stakeholders and our government-to-government relationship with Tribes, is key to sustaining our mission and building our New Blue Economy from the ground up.

International Engagement

In addition to NOAA's domestic climate science, service and stewardship mandate, our mission and climate engagement extends beyond the political boundaries of the United States to many of the countries and communities that depend on the ocean. For decades, NOAA has provided a broad range of tools and information to our international partners to reduce disaster risk; build resilience to/in a changing cli-

mate; support decision-making to better prepare for and adapt to weather, water and climate extreme events; and understand the ecosystem impacts of climate change such as coral bleaching, ocean acidification, and shifting resource populations such as fish stocks.

NOAA's interest in international climate information systems extends from providing accessible and timely climate data to its application for management, decision-making and adaptation purposes. NOAA collects and makes available an extensive array of space-based and in situ Earth observation data and information that are essential for climate scientists and decision makers around the world. Additionally, NOAA participates in, and often leads, international data sharing arrangements that ensure these streams of information are global in scope and availability. NOAA provides expertise and leadership to climate assessments such as the annual State of the Climate report and Intergovernmental Panel on Climate Change as well leadership at multilateral organizations related to weather, water and climate, such as the World Meteorological Organization.

NOAA's applied climate information systems efforts includes work with the Local 2030 Islands Network, a global network of islands focused on climate resilience and sustainability. NOAA provides climate data and additional support to islands for building Communities of Practice and Data Dashboards related to resilience. NOAA also supports the Weather Ready Nations Program, which enhances the linkages between the National Meteorological and Hydrological Services (NMHS) and disaster managers and planners. This work highlights NOAA's vested interest in providing accurate and useful climate data and products while also supporting the development of in-country climate information systems capabilities. These and other efforts underpin NOAA's engagement as one of the five core implementing agencies for the President's Emergency Plan for Adaptation and Resilience, or PREPARE. Through this plan, NOAA will enhance its support for developing countries and communities in vulnerable situations around the world as they adapt to and manage the impacts of climate change.

CONCLUSION

NOAA's work to assess, understand, and predict the ocean and its role in climate and share this knowledge, as well as its efforts to build resilience and mitigate climate change, is critical to the people in the United States and around the world. NOAA, as an authoritative source of climate information, is working with other federal agencies, state and local government leaders, Indigenous communities, private businesses, international partners, and the public, so that together we can bolster adaptation and boost resilience to the impacts of climate change and build a climate ready nation.

Ms. CASTOR. Thank you very much.

Next, Assistant Secretary Medina, welcome. You are recognized for 5 minutes to provide your testimony.

STATEMENT OF THE HONORABLE MONICA MEDINA

Ms. MEDINA. Thank you, Chairwoman Castor, Ranking Member Graves, and members of the committee. Thank you for the opportunity to testify on this important issue of protecting the ocean and on its significance in the climate crisis.

Thank you especially for the timing of this hearing. Yesterday was World Ocean Day, a day that is celebrated around the world. And here in the U.S., it is Capitol Hill Ocean Week. It is a perfect time to have this conversation.

My name is Monica Medina, and I am the Assistant Secretary for Oceans and International Environmental and Scientific Affairs at the State Department. Our Bureau leads U.S. efforts to conserve and protect the global environment, including the ocean, for the prosperity, peace, health, and security of this and future generations, like the ones who are sitting over there.

I too am worried about the ocean and the climate impacts on it. The statistics you shared are daunting and deserve our attention in government, even as we deal with all the other crises in front of us. The ocean bares the brunt of climate change with tremen-

dous implications for the U.S.' economic interests and global security. Communities are already being strained by the effects of climate change on our ocean, including food shortages, severe storms, coastal inundation, growing dead zones, and escalating conflicts around shifting or dwindling ocean resources. Climate change is happening today and exacerbating every other challenge we face.

Leaders I have talked to around the world want to work with the U.S. to address climate challenges. These are existential threats. And though they seem localized, the ripple effects are felt worldwide, from food shortages to mass migrations. And these countries are being aggressively wooed by our competitors. But our competitors do not offer these countries the sustainable solutions they need.

By contrast, the United States is deploying our expertise from across the government to build the capacity of our international partners to deal with the climate challenges they face. And I want to thank Congress for the funding that you have provided for the work that we are doing. We must work with our allies to build a more secure, climate-resilient world. We are the partner of choice for the impacted nations, and the more we help them, the stronger we will be as a nation.

In my testimony today, I would like to highlight three ways in which the United States is working globally to combat the ocean climate crisis and the implications of that work for our security.

First, we can help other countries see what is coming. The United States is a global leader in climate forecasting and observing, as Dr. Spinrad has so well explained. We support capacity-building efforts around the world to help other countries improve their ocean observing systems and to support scientists in the collection of globally shared data that is critical for our weather forecasts and models.

This data—this vast data collection effort, undertaken largely through the work of my colleague at NOAA, has informed the development of climate and ocean models that are helping to better predict and prepare for how we deal with the changing climate and how that impacts communities both here, at home, and around the globe.

Second, we can help those countries prepare based on that information. The United States has enormous technical capacity and expertise to apply those forecasts to assist other countries. Sharing this expertise can strengthen our alliances and help build a better world.

Supporting international partners as they adapt and build resilience will be critical for promoting security and stability at home and abroad. The President's Emergency Plan for Adaptation and Resilience, or PREPARE, seeks to help more than 500 million people in developing countries adapt to and manage the impacts of severe storms, droughts, and sea level rise.

We are also working to protect the health and productivity of marine ecosystems by taking action to promote maritime security and stop illegal fishing. And we plan to increase our collaboration with our Atlantic and Pacific neighbors to solve common challenges and seize opportunities to develop sustainable blue economies.

The third we can do is help with the solutions that prevent the climate crisis' worst impacts from happening. The United States is taking an active role in galvanizing these ocean-based climate solutions. These include protecting and restoring coastal ecosystems, expanding offshore and renewable energy, and decarbonizing the shipping sector, to name a few.

In sum, the steps we take today to address and adapt to climate change are critical to American security and global stability for generations to come. This is the year to turn the tide on oceans, to tackle these challenges, and make investments needed to ensure that our oceans are central to solving the climate crisis.

From the Our Ocean Conference that we co-hosted with Palau in April, the upcoming U.N. Ocean Conference, to the Convention on Biological Diversity Meeting, to COP27 in Egypt, this year, the United States has many opportunities to position ourselves as a global leader on ocean climate issues to support our partners as they seek sustainable solutions to ocean challenges, and to pursue the bold steps we need to stop the decline of our oceans.

This is our chance to work together with our partners around the world to build a future for our children and grandchildren that is in harmony with the ocean and free from conflict. And if we act now, we can achieve a healthy ocean that will continue to meet their needs for the foreseeable future, which is surely the future we would like to see.

Thank you very much, and I look forward to your questions.
[The statement of Ms. Medina follows:]

Written Testimony of Monica Medina
Assistant Secretary for
The Bureau of Oceans and International Environmental and
Scientific Affairs, U.S. Department of State

Before the House Select Committee on the Climate Crisis

June 9, 2022

Chairwoman Castor, Ranking Member Graves, and members of the Committee, thank you for the opportunity to testify today, during National Ocean Month and the day after World Ocean Day, on the importance of protecting our ocean and its significance in the climate crisis. My name is Monica Medina, and I am the Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs at the Department of State. Our Bureau leads U.S. efforts to conserve and protect the global environment, including the ocean, for the prosperity, peace, health, and security of this and future generations. This mandate has never been more vital, and our work has never been more urgent, as the effects of climate change cause significant harm to communities around the world.

The ocean, in particular, bears the brunt of climate change, with tremendous implications for U.S. economic interests and global security. It absorbs approximately 25% of global carbon dioxide emissions and more than 90% of the excess heat trapped in the Earth system. This influences the most basic natural functions, like our weather and the changing seasons. Sea level rise, ocean warming, and ocean acidification already are destabilizing economies, ecosystems, communities, and cultures.

We need only to look at the world today to see that communities are already being strained by the effects of climate change on our ocean—including food shortages, drought, severe storms, coastal inundation, growing ocean dead zones, and escalating conflicts around shifting or dwindling ocean resources. At the State Department, we often hear from colleagues in the developing world about the impact that climate change is having on their economies and communities. I want to make clear that they do not see climate change as some future horror story. Climate change

is happening today and exacerbating every other challenge we face—from overcoming COVID-19 to food and energy shortages.

Leaders I have talked to around the world want to work with the U.S. to address their current climate challenges. They worry about fresh water sources disappearing or becoming undrinkable, damages they cannot afford caused by more powerful storms, and where their food is going to come from. Some even worry whether the land on which they have lived for generations will remain above water as sea level rises. These are existential threats, and though they seem localized, the ripple effects are felt worldwide, from food shortages to mass migrations. These are not theoretical future problems—this is now. And we will see even more terrible disruptions from climate change in the future.

I also want to stress that these countries—many of which are struggling to recover from both climate and COVID shocks—are being aggressively wooed by our competitors. The People’s Republic of China (PRC) is seeking to enlist developing countries in its Belt and Road Initiative, offering to build power plants, aquaculture facilities, transit systems, and ports. They are offering to help these countries build climate resilience. But our competitors do not offer these countries the sustainable solutions they need to thrive in a warming world. It is not offering them the technical know-how to achieve a climate resilient, sustainable ocean-based economy, or “blue economy,” or the capacity to understand the impacts that a changing ocean may have on their food systems, water, and health. By contrast, the United States is deploying our expertise to build the capacity of our international partners and allies to do all these things. And we can—and must—do more to help our friends and allies prosper amid a changing ocean and to build a more secure, climate-resilient world. We are the partner of choice for these nations—and the more we can work with them, the stronger we will be as a nation both at home and abroad.

The ocean also offers sustainable solutions to the climate crisis, many of which the United States is pioneering and wants to share. For example, we are advancing renewable offshore wind energy and decarbonization of the shipping sector. We are rallying countries, ports, and other actors in the shipping value chain behind our vision to create green shipping corridors: maritime routes that showcase low- and zero-emission lifecycle fuels and technologies with the ambition to achieve zero greenhouse gas emissions across all aspects of the corridor.

And through the Infrastructure and Jobs Investment Act, passed by Congress and signed by President Biden last fall, we are allocating billions of dollars to support coastal restoration and resilience in the face of climate change. In places like the Gulf Coast, where communities are already seeing the devastating effects of climate change, these funds are implementing proven nature-based solutions, restoring eroded wetlands that are critical protectors in the face of storms as well as key carbon sinks. In tackling these ocean issues, our national strengths in environmental science, maritime domain awareness, and technology are a tremendous strategic advantage. They give our nation an edge in an increasingly competitive world.

In my testimony today, I would like to highlight three ways in which the United States has the capacity to combat the ocean-climate crisis and the implications of how we deploy that capacity for our security. First, the United States is a global leader in climate forecasting and observing. Second, we possess unparalleled technical expertise in climate resilience strategies. And third, we are—and can continue to be—a global leader in understanding and implementing ocean-based climate solutions.

The United States enjoys unmatched climate forecasting and ocean observing capabilities. The data provided by our wide network of ocean sensors, including buoys, satellites, and ship-based observing systems help us understand and prepare for the impacts of climate change on our ocean and coasts. These capabilities will be critical to achieving the goals of the UN Decade of Ocean Science, which seeks to deliver the science we need for the ocean we want and is an opportunity to demonstrate our commitment to fulfilling the UN Sustainable Development Goals. The Ocean Decade is a critical framework for identifying and aligning resources toward ocean science that can address the pressing challenges of our time.

And those challenges are indeed pressing. We know that increasing volatility in the Earth’s climate system, coupled with ocean warming, is leading to more frequent and more extreme storms. In 2021, weather and climate disasters cost the United States \$148 billion, according to NOAA’s National Centers for Environmental Information. Globally, losses were over \$300 billion, according to the 2021 Weather, Climate and Catastrophe Insight report by Aon, a professional services firm. And 2021 was the seventh consecutive year in which ten or more billion-dollar disaster events occurred in the United States.

These storms have far-reaching consequences for safety and security. In addition to being an acute threat to the safety of coastal communities, hurricanes result in

the decimation of coastal infrastructure, military installations, and key institutions like hospitals, schools, and roadways. The response to hurricanes also requires a massive effort across agencies, shifting focus from other security concerns.

Sea level rise, due to melting ice sheets and glaciers and the expansion of seawater as it warms, is another key stressor that ultimately increases international instability. Rising seas are an existential threat for low-lying island countries and coastal communities. About forty percent of the global population lives in coastal areas threatened by rising sea level and storm surges. Around the world, sea level rise is likely to result in population displacement, shrinking maritime zones, and threats to human health, as it increases the incidence of waterborne diseases and threatens access to water for drinking, sanitation, and hygiene.

One way we are helping to combat these threats is by expanding international ocean observing systems that collect key ocean-climate data. The United States partners with other countries in using Earth observing technology to understand and respond to climate change impacts on the ocean. For example, Sentinel-6-Michael Freilich is a U.S.-Europe joint satellite mission launched in November 2020 to measure sea levels at a global scale with millimeter-level accuracy. This U.S.-European partnership of developing satellite radar altimeters to measure global sea levels goes back to 1992.

We also support capacity building efforts around the world to help other countries improve their ocean observing systems, and support scientists in the collection of globally shared data. Each year, the Department of State facilitates international marine scientific research, processing 20 to 30 applications for foreign scientists conducting marine scientific research in waters under U.S. jurisdiction and supporting U.S. scientists in conducting 300 to 400 cruises in waters under foreign jurisdiction. The data collected during these cruises include measures of key ocean metrics like temperature, salinity, oxygen, and pH, as well as studies of biodiversity, marine geology, fisheries, corals, and so much more. Supporting the collection and sharing of such data across academic and government institutions is crucial to building a global understanding of our changing ocean. These exchanges also help ensure that data are transparent and accessible, in line with our democratic values.

This vast data collection effort—undertaken largely through the work of our colleagues at NOAA—has informed the development of climate and ocean models that are helping the United States and our allies better predict and prepare for how a changing climate will impact coastal communities.

We are also using ocean observing data—from satellites, buoys, and more—to anticipate health threats like cholera outbreaks, harmful algal blooms, and mosquito-borne diseases, which are increasing in incidence as the ocean warms. Our Bureau is working to link these datasets with those from health and demographic sources to protect public health, including through our cooperative agreement with the Pacific Islands Health Officers Association to develop a climate-based dengue fever early warning system. And we are taking similar steps to address climate-sensitive health risks in coastal communities with partners from the Arctic, Africa, and Southeast Asia.

Next, I'd like to highlight that the United States has enormous technical expertise in climate and ocean resilience. Sharing our expertise with our partners and allies can strengthen our alliances and help build a better world.

As the impacts from the climate crisis worsen, supporting international partners as they adapt and build resilience will be critical for promoting security and stability at home and abroad. According to the UN Environment Program, adaptation costs for developing countries are projected to be between \$140–300 billion annually by 2030. The need is great, and how the United States responds will have lasting implications on our diplomatic posture and the world's geopolitical landscape in general.

The President's Emergency Plan for Adaptation and Resilience, PREPARE, is a whole-of-government effort that seeks to help more than 500 million people in developing countries adapt to and manage the impacts of severe storms, droughts and sea level rise. PREPARE, jointly coordinated by the State Department and USAID, will help get early warning and climate information into the hands of those who need it; integrate and support adaptation in key sectors such as water, infrastructure, health and food security; and improve access to and mobilize finance, including from the private sector, for adaptation. PREPARE will also support locally-led adaptation that enables Indigenous peoples, vulnerable communities, and marginalized populations to meaningfully participate in and lead adaptation-related efforts.

President Biden announced his intention to work with Congress to provide \$3 billion in U.S.-supported funding included in the FY 2023 Request. We hope you will approve this funding. This committee and your congressional colleagues have a key

role to play in ensuring that we fund PREPARE in the coming budget cycles so that our U.S. resources can be used effectively and efficiently to strengthen U.S. leadership abroad.

What happens an ocean away has economic and security implications for our country. While it may seem abstract or distant from this hearing room today, ocean challenges across the globe will affect our economy, threaten our security, and impact our future. We must address these challenges, and I'd like to share with you now a few ways in which the State Department is already doing so.

First, I am proud to report that, working with Congress and subject to completion of domestic procedures, the United States intends to provide \$1 million to support the Ocean Risk and Resilience Action Alliance, and looks forward to participating in its work. The Alliance's mission is to drive at least \$500 million of investment in ocean nature-based solutions.

We are also working to protect the health and productivity of marine ecosystems. Seafood, among the most traded of all commodities, offers a lifeline out of poverty and a source of healthy protein for billions in developing economies. But many fish stocks around the world are under threat from climate change and other stressors on the marine environment. Warming ocean temperatures and related changes to ecosystems are affecting the distribution and abundance of living marine resources, with the potential to undermine the food security of vulnerable communities and exacerbate social and political conflict.

As the ocean changes and fish stocks with it, sustainable fisheries management—including the data and tools to anticipate and adapt to the impacts of climate change on fish stocks—will be key to ensuring future resilience and food security. The threat is especially acute in the developing world and in the tropics, where people consume two to four times more fish than in other regions.

Overfishing, illegal, unreported, and unregulated (IUU) fishing, and other harmful fishing practices are compounding stressors on dwindling fish stocks that are already under pressure due to climate change. IUU fishing creates market distortions that put law-abiding fishers at a disadvantage. And, it is often connected to a web of other security challenges and criminal activity, from forced labor to trade in illicit goods.

But critically, this is a challenge we have the tools and expertise to combat right now. By halting bad actors and destructive practices today, we are reducing the stress on fisheries in the future.

At the Our Ocean Conference in April 2022, the U.S. announced plans totaling nearly \$250 million to combat IUU fishing via policy initiatives, strengthened governance, on-the-water assets, technical assistance, and innovative forms of monitoring and traceability. We are helping partners and allies implement the Port State Measures Agreement, the first binding international agreement to specifically target IUU fishing. And with the Food and Agriculture Organization, we launched the Global Record of Fishing Vessels, Refrigerated Transport Vessels, and Supply Vessels, which, as the first (and only) global, publicly accessible database of fishing vessels, is an essential tool for increasing transparency and enabling States to verify the identity and history of fishing vessels seeking access to their waters and their ports. And we are seeking enforceable counter-IUU fishing provisions in our Free Trade Agreements.

Of course, securing the productivity of marine resources is about more than IUU fishing. It is also about creating transparent ocean governance and encouraging sustainable economic development opportunities for communities. During the World Leaders Summit at COP26 in Glasgow, the United States announced that we would join the High-Level Panel for a Sustainable Ocean Economy, known as the "Ocean Panel." This group of sixteen countries accounts for about 45% of the world's coastlines, 35% of the world's exclusive economic zones, 25% of the world's fisheries, and 20% of the world's shipping fleet. Ocean Panel members have committed to develop and be guided by Sustainable Ocean Plans within five years, with the aim of sustainably managing 100 percent of our ocean area under national jurisdiction. This group provides the United States with a new forum to promote marine conservation in areas of the world that are strategically important to the United States, in collaboration with likeminded allies and partners.

And, there is still more we can do.

The United States is both an Atlantic and a Pacific nation. We plan to increase our collaborations with our Atlantic and Pacific neighbors to help solve common challenges and seize opportunities to develop sustainable blue economies.

Atlantic nations face shared ocean challenges, including IUU fishing, lawlessness at sea, and climate change threats to coastal communities. Lives and livelihoods are at risk and overall economic development will lag if we fail to address these challenges. We will be better able to solve problems that affect us all by working to-

gether, based on shared principles, to preserve the Atlantic as a stable, sustainable resource for Atlantic nations.

We also see opportunity with our Atlantic neighbors. The blue economy is estimated to double from \$1.5 trillion in 2010 to \$3 trillion in 2030. Stronger partnerships across Atlantic countries can be a mechanism to share knowledge, spread best practices, and identify activities that will provide sustainable economic returns from the ocean now and preserve it as a resource for future generations.

We are also a Pacific nation, with strong cultural and historical ties to our neighbors throughout the Pacific region. We have a strong interest in a prosperous, secure, and free and open Pacific community. The Pacific Islands countries are amongst those most at risk from climate change, and some of the strongest global voices on the need to work collectively to combat the climate crisis. They are looking to the United States to lead the world on this issue.

Our neighbors in the Pacific depend heavily on healthy ocean ecosystems to support fisheries and tourism industries that drive their economies, which face continuing economic impacts from the pandemic. The United States seeks to partner with the Pacific Islands to help them strengthen their economies, increase their resilience to climate change and environmental threats, improve their security, and overcome barriers to accessing adequate financing for these solutions.

Similarly, countries in Central and South America are seeking our help in protecting their waters. Costa Rica, Colombia, Ecuador, and Panama are working together to strengthen the Eastern Tropical Marine Corridor (CMAR). This corridor supports critical fisheries for tuna and other valuable species and is an important swimway for blue whales, hammerhead sharks, leatherback sea turtles, and giant manta rays. Countering IUU fishing in the region could also help the U.S. combat narco-trafficking, with which it has become deeply intertwined.

We are also working globally to protect and enhance the resilience of valued marine ecosystems. Coral reefs annually provide over \$3.4 billion of economic benefits, including by supporting tourism and supporting fisheries, and close to \$94 million in avoided flood damage. NOAA Fisheries estimates that the coral reefs of the United States alone have a commercial value of over \$100 million. However, these critical elements of many healthy coastal ecosystems are existentially threatened by ocean acidification and increasing sea surface temperature. It is estimated that over the last 40 years, half of the world's coral reefs have disappeared, and the majority of those remaining could be gone by 2050. This year alone, warming waters resulted in coral bleaching in 91% of reefs surveyed along the Great Barrier Reef, marking the fourth large-scale coral bleaching event in the last seven years.

The United States remains at the forefront of coral reef conservation and is committed to advancing efforts to protect and restore coral reefs. To that end, the United States is a strong supporter of the International Coral Reef Initiative (ICRI). We currently serve as chair of ICRI and were among its founding partners. Established in 1995, ICRI is a unique public-private partnership of governments, international organizations, scientific entities, and non-governmental organizations committed to reversing the global degradation of coral reefs. The United States and ICRI have demonstrated a clear commitment to prioritizing coral reef conservation and restoration and to reversing the twin crises of climate change and biodiversity loss, with all the tools and assets we can assemble.

Finally, the United States is taking an active role in galvanizing ocean-based climate solutions globally.

Ocean-based climate solutions have the potential to provide up to 20% of the emissions reductions needed to keep the 1.5-degree goal within reach. These solutions include protecting and restoring coastal ecosystems, expanding offshore renewable energy, and decarbonizing the shipping sector. Scaling up these efforts at home takes effective steps to combat the climate crisis, and supporting other countries in doing the same helps them build critical technical capacity.

As the co-hosts of the Our Ocean Conference in Palau in April 2022, the United States showcased our leadership in advancing ocean-based climate solutions. For example, the United States collaborated with Denmark and the Marshall Islands to more than double the number of countries participating in the Declaration on Zero Emission Shipping by 2050, which we worked together to launch at COP26. These new participants include shipping powerhouse Cyprus as well as several small island states: Palau, Tuvalu, and Vanuatu. This initiative and others represent key steps towards decarbonizing the global shipping sector, which currently has an emissions trajectory that is incompatible with the goals of the Paris Agreement.

We are also growing capacity at home and abroad for offshore renewable energy. At the Our Ocean Conference, we highlighted our goal to deploy 30 gigawatts of offshore wind by 2030 and announced technical assistance, subject to domestic procedures, and other required resources to advance climate goals and create good jobs.

We also spurred countries including the UK, Norway, Belgium, and Sri Lanka to make their own offshore renewable energy announcements at the conference, which will add approximately 30 gigawatts of capacity.

Lastly, the United States is committed to conserving at least 30% of our land and waters by 2030, because we know that conservation of natural spaces is key to both adapting to and mitigating climate change and its effect on the ocean. Just this year, we have established a new national marine sanctuary in Lake Michigan, Wisconsin and a new national estuarine research reserve in Connecticut.

And we are supporting other countries as they take steps to conserve their own ocean resources. At the Our Ocean Conference, we announced a new global Ocean Conservation Pledge, encouraging countries to commit to conserve, protect, or restore at least 30 percent of waters under their national jurisdictions by 2030. We are also working with partners globally to finalize an ambitious and effective agreement for the conservation and sustainable use of high seas biodiversity that would create, for the first time, a coordinated and cross-sectoral approach to establishing high seas marine protected areas and help us achieve our goal of conserving 30 percent of the global ocean by 2030.

Taking these steps to advance ocean-based climate solutions in the United States and support other nations with the resources to do the same is key to security worldwide. These mitigation and adaptation initiatives reduce the risk of future global instability as a result of the climate crisis and help us protect marine resources for generations to come.

In sum, the threats we face at the ocean-climate nexus are daunting, and the scale of our response must be equal to the size of our challenges. The ocean is a global system, essential to the well-being of all life on our planet. The steps we take today to address and adapt to climate change and its impacts such as sea level rise, extreme weather, and food insecurity are critical to American security and stability for generations to come. This is the year to turn the tide on oceans—to tackle the challenges and make the investments needed to ensure that oceans are central to solving the climate crisis.

From the Our Ocean Conference, which generated over \$16 billion in ocean commitments, to the upcoming UN Ocean Conference, G7 Ministerial, Convention on Biological Diversity meeting, and COP27, the United States has many opportunities this year to position ourselves as a global leader on ocean-climate issues, support our partners abroad as they seek sustainable solutions to ocean challenges, and pursue bold steps needed to reverse the decline of our ocean. We must continue this pace of urgent action and maintain this momentum. This is our chance to work together with our partners around the world to build a future for our children and grandchildren that is in harmony with the ocean and free from climate conflict. If we act now, we can achieve a healthy ocean that will continue to meet their needs—surely a future we all wish to see.

Ms. CASTOR. Thank you very much.

I will recognize myself first for 5 minutes to start the questioning.

You know, we are very fortunate to have an administration like the Biden-Harris Administration that is bringing every tool to the table to help protect our oceans. So let's talk about some of the tools that you have.

You talked a little bit about the Bipartisan Infrastructure Law that will provide significant resources to help keep our oceans resilient. There are different resources all across America. So would you go into a little more depth on the tools, your priorities out of those new Bipartisan Infrastructure Law investments, and then, just yesterday, you announced an Ocean Climate Action Plan. How do those interact together, to the Administrator, to help protect our oceans and allow us to become more resilient?

Dr. SPINRAD. Thank you, Chair Castor. There is a lot going on. I appreciate your comment about the role of the Biden-Harris Administration. On a little bit of a sidebar, I came out of retirement to take this job because I was so compelled by some of what I was hearing about what this administration wanted do in moving forward. And I was also very much encouraged when I saw action up

here on the Hill, especially as it manifested in the Bipartisan Infrastructure Law, focused on these specific issues.

So what kinds of tools? Well, obviously, in the Bipartisan Infrastructure Law, we see, in NOAA's case, close to \$1.4 billion dedicated to coastal resilience, which is a direct application of resources to adaptation, to what we know is already happening. So while we can mitigate and we can start addressing decarbonizing and renewables, we know sea level rise, ocean acidification are happening right now. What do we do about that?

So we will be issuing funding opportunity announcements for competitive bids around the country for local communities, jurisdictions, Tribes, to invest those resources, to harden their coasts, to make their coasts more resilient through any number of actions. It is something we have done before, but we have never had these kinds of resources to build that sort of resilient coastal activity.

That is not enough. We also need to make sure that those scientific capabilities and the products of our science that come out of our labs and our work with academic researchers are made available to decision makers and local emergency managers, local community planners, Tribes. And so we were building mechanisms for dissemination of the data, whether it be through web portals or using our boots on the ground through Sea Grant, for example, to make sure information about what climate impacts will be can be shared with those communities.

And the last part is, part of the investment that we are seeing is going to go to the nuts and bolts, if you will, of being able to build better forecasts and better models. So high-performance computing, which allows us to actually zero in and provide improved seasonal outlooks. And that is not, obviously, limited to coastal applications. I had a discussion with a Member of Congress who is a fifth-generation farmer who wanted a better seasonal outlook of precipitation. So our ability to build better models with more high-performance computing is another aspect of that.

And with respect to the Action Plan that you alluded to, the Climate Action Plan, now, this is a team sport. NOAA has a leading role, as I indicated, but we work very closely with our colleagues in Department of Interior, Energy, NASA, National Science Foundation, State Department, obviously. And so through the auspices of climate policy, our office, as well as the Office of Science and Technology and Policy, we are making sure we all understand the coordination of our efforts and the plan, and also the leveraging and the complementary nature of what we do.

Ms. CASTOR. That is terrific. The resilience and adaptation, we have to do it. We have waited too long to decarbonize. But I am so worried about the oceans. And our—you know, my local economy in the Tampa Bay area in the State of Florida is directly tied to clean water. But with the highest concentrations of carbon pollution in the atmosphere, the stresses on marine life, the impact to corals, we have got to move to clean energy. I mean, it is more plain than ever. We cannot throw up our hands and say, oh, it is too hard, or other countries aren't doing their job. We are the world leader.

So can you talk about, maybe Assistant Secretary, what we are doing to help rally the global community to reduce carbon pollution

so we don't have to focus totally on pouring billions and billions and billions of dollars into resilience and adaptation, that we are really moving to the clean energy economy over time?

Ms. MEDINA. Of course, Chairwoman. The administration's policy on this is set by special envoy—Special Presidential Envoy Kerry, the global policy. And I work very closely with his office. We share a lot of staff members who actually work for both of us. They are working very hard on clean energy and on dealing with the major emitting countries and helping them to see the need to make this kind of transition that Ranking Member Graves talked about, the need for those countries to turn their energy systems around and to be more innovative, to rely more and more and more on renewable energy.

But in my work, I focus tremendously on nature-based solutions, and that is where the ocean comes in and where I think we can work much more closely with scientists and other nations to find those ocean solutions, whether it is wind energy—and we know the value of wind energy is only going up here in the U.S. We have seen how those wind energy leases are really taking off, and we know that there is tremendous potential. We could basically, you know—

Ms. CASTOR. I think we are going to talk more about it. I am over time with my question. So thank you. To be continued.

Ranking Member Graves, you are recognized for 5 minutes.

Oh, Mr. Gonzalez, good morning. You are recognized for 5 minutes.

Mr. GONZALEZ. Good morning. Thank you, Chairwoman Castor and Ranking Member Graves, for holding this hearing today, and to our witnesses for joining us and sharing your testimonies.

Secretary Medina, I am going to start with you. While marine litter and climate change have commonly been treated as two separate issues, there is a growing recognition of their interconnectedness. As I am sure you know, when plastics end up in the ocean and start breaking down, they release greenhouse gases, as well as affect the ability of organisms to grow, reproduce, and capture carbon.

Latest set of data from the World Bank indicates that 8 million tons of plastic are leaked into the ocean each year, which is the equivalent of dumping the contents of a garbage truck in the ocean, roughly, every minute. It seems obvious to all of us here that we need to take steps to incorporate more circular economy principles and take action to reduce waste we have currently built up in the ocean.

That being said, what efforts can lawmakers take to accelerate innovation in the recycling space and reduce plastic leaks into the ocean?

Ms. MEDINA. Thank you so much for this question. It is one I spend an awful lot of my time on. Plastic pollution is one of my priorities, not only because it ends up in the ocean, which is a terrible problem. In my data, I have a different fact, and it is even more alarming, 14 million tons ends up in the ocean. We could quibble. It is way too much.

Mr. GONZALEZ. Yeah. More than a million.

Ms. MEDINA. Yes. Way too much. We are drowning in plastic. We know we need to do something differently, which is why I am so pleased to say that the United States is playing a leading role in creating the new global agreement we need. And industry is actually right with us, along with the environmental community, to try to change the way the world deals with plastic pollution. This agreement that we have just decided to launch the negotiation of, hopefully, will be concluded in the next 2 years.

And we will, under this agreement, allow nations to create ambitious action plans of their own. No one-size-fits-all solutions. An island nation might need something different than a big country, big land-based country like ourselves. But if we work hard together to spur innovation from industry to drive that change, I am convinced that we can find the solutions that we need to actually stem this terrible scourge of plastic pollution, and we have to do it now.

We could always use more resources to do that, to try and help spur that innovation, to help smaller countries that don't have the capacity to do that work, but I think industry will have to play a huge role. And we are counting on them to do it, and I think they are ready to step up and help us.

Mr. GONZALEZ. Thank you. Switching gears a bit. In recent years, there has been a resurgence in interest in offshore wind, but despite the low carbon and economic benefits that offshore wind can bring, there are real concerns on long-term turbine performance, specifically the high operating costs and reduced economic lifetimes.

As Europe's experience with offshore wind has demonstrated, large turbine technologies suffer from reliability and maintenance issues, causing the amount of electricity generated to decline by almost half over 10 years. Unsurprisingly, the revenues and profitability of these facilities diminishes rapidly, leaving developers to abandon the projects before the term of their power purchase agreement.

Moreover, offshore wind means more demand for rare earth elements, which historically come from China. With increased demand likely triggering higher production costs, it is difficult to imagine a world in which ratepayers are left unharmed.

With the administration setting a goal of 30 gigawatts of offshore wind by 2030, can you provide some insight into how these concerns will be addressed and ratepayers will be protected?

Ms. MEDINA. This one is to me?

Mr. GONZALEZ. Yes.

Ms. MEDINA. So, Congressman, I am not the domestic energy expert. I am at the State Department, and energy isn't squarely in my remit. But I take the point that we need to continue to improve technologies, and wind is a big part of the solution. And we need offshore wind. We also need solar. We need all the renewable energies we can muster, and that is what will help ratepayers.

Mr. GONZALEZ. Well, let me ask you from an international perspective then. So put your international hat on. How do we protect ratepayers globally if we are going to move into an offshore wind world with these cost concerns?

Ms. MEDINA. I think we continue to improve the technology so that we can have renewable energy for ourselves, and we don't

have to worry about price spikes and perturbations caused by other countries.

Mr. GONZALEZ. Is it your belief that we can do this and, from a cost standpoint to consumers, there will be no harm?

Ms. MEDINA. I believe, just like President Biden, that when we the American people put our minds to something, we can get it done. If we can put a man—or a rover on Mars, I believe we can solve these challenges as well.

Mr. GONZALEZ. Thank you, and I yield back.

Ms. CASTOR. Next up, Representative Huffman, you are recognized for 5 minutes.

Mr. HUFFMAN. Thank you, Chair Castor.

And just a few words about my friend from Louisiana's opening remarks. I actually got my hopes up when I heard him describe these terrible impacts of the climate crisis that are coming. We know they are coming. We know what they are going to do to places like South Louisiana. And he then described the duty to future generations, which I found very heartening and encouraging, saying that we need to overcome politics and confront this crisis for the sake of preserving a livable planet for these guys.

Unfortunately, it went downhill pretty quickly from there. We started hearing the same old excuses, that China is a bigger emitter than us and, therefore, we can't focus on emissions until we get China in line. And that somehow our fossil fuels are cleaner than the Russians and the Saudis and, therefore, we ought to just crank it up and go out there and meet all of this global energy demand with our fossil fuels which are cleaner, which are really less bad than the really bad.

And, unfortunately, that is like saying never mind. To all of that good stuff about the climate crisis, to all of these nice words about your generation, folks, it is like saying never mind. We have got money to make. We have got oil to sell. And that is politics.

So if we are serious about overcoming politics and doing the right thing to preserve the planet for the younger generation, leading a global fossil fuel race to the bottom cannot be the answer.

Now, on this subject of our oceans—and, Chair Castor, I am so glad that we are focusing on this—I would like to start my questions on fisheries, which is something I have been working a lot on.

So, Dr. Spinrad, I will begin with you. I did a national listening tour because I have been working on legislation to reauthorize the Magnuson Act. Everywhere I went, every region of the country, I heard how climate change is already impacting fisheries, whether shifting stocks, or habitat changes, or acute disruptions like fisheries disasters. It is here and now, and yet our institutions were developed at a time when we weren't really thinking about any of that.

And some of the more commercially important fish species, in fact, are moving north to find cooler water. This creates all kinds of conflicts between regional councils, maybe between us and Canada, and Mexico in some cases. So it is a whole new world of fishery management that this climate crisis is presenting us with.

And I wondered if you could just speak broadly to what NOAA is doing so far to address these changes in fisheries management, and what resources do you need to meet the moment?

Dr. SPINRAD. Thank you, Congressman Huffman. This is a very serious issue and one where we are applying a lot of resources and a lot of attention to from a number of different perspectives. As a scientific agency, as an environmental intelligence agency, what we are trying to do is not dissimilar to the way our national security community looks at, is how will things change in the future and can we position ourselves to deal with that.

So we have an investment in what we call the Climate Ecosystems and Fisheries Initiative, which really asks, how are, for example, Alaskan pollock becoming Russian pollock? What is happening to the lobstering industry, and where are those lobsters going to go? What will change do to our best—in the context of our best knowledge. So just as we try to develop predictions in forecasts of atmospheric and weather phenomena, we are trying to do the same thing with all species in this initiative.

The other part of this, of course, is a redoubled effort to take advantage of the extraordinary traditional knowledge that we have around the country. Generations of fishers, generations of local communities have knowledge about the patterns that they have seen over the last few years. We are trying to, if you will, quantify that through a QA, QC, and those kind of data, to incorporate those in our predictive capabilities and codevelop the policies—

Mr. HUFFMAN. Great.

Dr. SPINRAD [continuing]. Associated with what will our fisheries community look like. And we need industry involved in this discussion as well. So we have been doing similar roundtables to yours.

I would add there is another angle on this as well, and that is, you know, we have established aquaculture opportunity areas.

Mr. HUFFMAN. Yeah.

Dr. SPINRAD. And we are looking at how might that—what is the art of the possible associated with really doing this in a sustainable, economically viable manner so we are developing the initial environmental impact statements associated with those, and, hopefully, that that is part of the solution as well.

Mr. HUFFMAN. I don't have much time left, but Assistant Secretary Medina, I would love to hear from you how you are working with other countries to manage essential fisheries in the face of the climate crisis.

Ms. MEDINA. Thank you, Congressman. There is a huge problem here. Twenty-three percent of fish stocks are predicted to shift from their historical migration roots and habitats by 2030. That is an awful lot of people whose food source is going to move somewhere else immediately, and that is a recipe for crisis and for conflict. So we are working with the Food and Agricultural Organization to increase technical assistance, to build climate-ready fisheries management. And, hopefully, with better forecasting of these kinds of shifts and migrations from agencies like NOAA, and with our partners at USAID, we can take those forecasts and aim our assistance right where we need it.

Mr. HUFFMAN. All right. Thanks. I yield back.

Ms. CASTOR. Next up, Rep. Palmer, you are recognized for 5 minutes.

Good morning, Representative Miller, you are recognized for 5 minutes.

Mrs. MILLER. Thank you, Madam Chair and Ranking Member Graves. And thank you both for being here today.

I represent West Virginia, which is a landlocked state. We all know that the world's oceans impact all of us, from natural challenges, changes in weather patterns, man-made circumstances, even our supply chain, and the difficulties we are having internationally because we are all affected by the oceans. That is why America, acting alone with few close allies, cannot tackle this challenge single-handedly.

Carbon emissions do not recognize borders or stay within their country of origin. The developing world has questioned why countries like the United States and Europe and China have been allowed to develop because of our vast use of natural resources and traditional energy, and why they have to remain in poverty to serve our interests. The quickest way to bring developing countries into modern economy is to allow them to utilize their own energy assets and to help scale the technologies to tackle the real problem, which is carbon emissions.

Vilifying natural resources or sources of energy like this administration has done constantly—excuse me, madam. Madam Chair? Excuse me?

Vilifying our natural sources of energy like this administration has done constantly will only breed resentment around the world on their stage, raising prices for consumers here at home, and leave American security at the whims of authoritarian foreign governments. We don't want to repeat the mistakes of our European allies who traded cheap energy from Putin in exchange for their security.

If our goal is to tackle the rise in sea levels, the way to do that is by lowering carbon emissions. And we should be researching and funding transformative technologies that curb emissions, while still using the sources of energy that provides the vast majority of our power. By scaling down these technologies here at home, we can further export it across the world, creating goodwill and a prosperous global economy in the shortest amount of time possible. Our government should be investing to ensure the continued clean use of all types of energy, and, yes, that does include coal, oil, and natural gas.

Madam Chair, I have been reading this book by Professor Koonin, who has served as Under Secretary for Science under the Obama administration. In it, he provides a robust discussion on the climate alarmism that has gripped our politics, our media, and our culture. And in the chapter on sea level rise, Mr. Koonin says, in summary, we don't know how much of the rise in global sea levels is due to human-caused warming and how much is a product of long-term natural cycles. So it is time to stop the alarmism and name-calling and bickering and come together to find a real solution.

Ms. Medina, as your testimony notes, the challenge of sea level rise and the challenges of adaptation in the developing world are something that we are all concerned about. Given that the U.S. is among the most environmentally efficient producers in the world, how important is it that we look to efficient producers to power the

globe which will then lead to greater energy security, lower global emissions, and greater environmental outcomes?

Ms. MEDINA. Thank you, Congresswoman, for that question. I think there is a lot in what you have said that we agree with. America cannot tackle this problem alone. We must lower carbon emissions, and we have to rapidly scale innovative technology. And what I think developing countries, particularly small island developing countries need, is the energy supply that will work for them. And so we go and we listen to countries, and we ask them what they want and what they need. And importing expensive oil and gas may not be the right solution for them. And so we look at programs that will meet their needs, that will address their demands for energy, but also their desire to be part of the climate solution.

What I hear over and over again from those countries is, let us help be part of the climate solution. Invest in ocean conservation in our big ocean areas, and let us help the rest of the world make up for the damage that it is causing.

Mrs. MILLER. Thank you. In your testimony, you also mentioned the role of our country is to serve as a partner to other nations. Could you expand on that and what you believe the administration sees as its role on partnering with other countries to ensure stable and consistent energy supply through all of the above strategy, especially given the energy crisis the whole world is facing today.

Ms. MEDINA. Congresswoman, thank you for that question. What I said in an earlier answer is that I am not the energy expert. There is another bureau within the State Department that governs energy policy. But what I can tell you about what we are doing to work cooperatively is rebuilding partnerships and allies with—alliances with countries all over the world. And I will just give one quick example.

Yesterday, at the Summit of the Americas, we signed an MOU with the governments of Costa Rica, Panama, Ecuador, and Colombia to save—help them conserve some of the most precious ocean spaces on the planet, the Galapagos Islands.

What could be more important? Our work is to help them become more able to conserve the resources that they have. And we are going to work together across the Federal Government with our Federal interagency partners to bring that kind of American expertise to help other countries work together to solve their ocean issues.

Mrs. MILLER. Thank you. Madam Chair, I yield back.

Ms. CASTOR. Representative Casten, you are recognized for 5 minutes.

Mr. CASTEN. Thank you, Madam Chair. Thanks to our speakers for coming here. And thanks to all the young folks who are here. I really appreciate you coming out here. And I hope you will continue to be active in this space.

You know, a number of years ago—well, 2 years ago, when the United States pulled out of the Paris Climate Accord, there were about a dozen of us who went over to Madrid to basically let the world know that, even though the United States Government, which was the only country that pulled out, that we were going to go and tell the world we are still in.

And I remember one of our European colleagues pulled us aside and said, we just want you to know that really bad things happen when the United States doesn't lead. That carried a lot of weight, obviously, with the history of Europe, but I hope you will keep that in mind as you think about your own futures. Because notwithstanding our Ranking Member's advice that we shouldn't act until China acts, it is important that the United States leads.

Dr. Spinrad, I want to chat with you a little bit about ocean modeling and methane. I am on the Science Committee. We just saw this report about the—how the oil and gas industry is not reporting all of the methane emissions that they are producing. And, of course, as we all are, I think, petrified about, you know, this 84× multiplier on global warming relative to CO₂, the global methane pledge that came out of the Glasgow meetings was a key part to making sure that we actually do keep 1.5 alive, as they say.

And we are focused a lot on the private sources of methane. But, you know, as I look at the geological history of the world, there is—as you know well, there is this Paleocene-Eocene border where there is some suggestion that maybe the warming of the upper surface of the ocean led to these huge burps of methane hydrates underneath. We have seen some releases. I believe Alaska, the University of Alaska, Fairbanks, saw some significant releases in the East Siberian Sea, if I have that right.

I am wondering if you can share to what degree you believe we have got a good model of the oceans to understand, as we are injecting this heat into the upper surface of the ocean, should we have concerns about intermixing, releasing some of those clathrates out? Do we need more research there? Help me understand how big a deal that is. Should we be concerned about it, and what we can do to mitigate some of the effects, if any.

Dr. SPINRAD. Yeah. Thank you, Congressman. I think that is a critical issue. And I was delighted, quite honestly, in Glasgow that this was elevated to an issue of global certain.

At NOAA, we look at it from a few perspectives. You have alluded to the modeling piece of it, but there is an equally important observational component. So talking about the Alaska release is just one piece we have recently conducted through our ocean exploration program. A number of studies off the East Coast of the United States where we have seen more events, more venting of methane than we had expected to see before.

It is not, right now, an inherently modelable phenomenon. We first need to understand, what are the sources? What are the sources, the natural sources of methane emitting in these undersea events? So our ocean exploration program is a critical component of that.

Once we have an understanding of the sorts of concentrations and the distribution of the vent sources, the methane sources, then we can build that component as one of the greenhouse gas elements into the forecasts for changes in temperature, the results of having that methane in the atmosphere. You are absolutely right, greater than 80 percent greenhouse gas impact. If you will, the silver lining, if there is one, is that it is a much, much more short-lived component in the greenhouse gas constituency.

So we do have the models. We can take the information. Once we have got the data from the observational capabilities, we can get a much better handle on what the downstream implications are for global warming.

Mr. CASTEN. Correct me if I am wrong, but if we release all those clathrates, I think we are also short-lived.

The last time you and I spoke, I think you had just released this report saying that the sea level rise on the Gulf Coast was going to be 2 feet by 2050, with high degree of certainty. Appropriate scientific qualifiers on that. And I sit in the Financial Services Committee, and a few weeks later we had Chairman Powell before us. And I shared your testimony with him. And I said, okay, so if I buy a home on the Gulf Coast of Louisiana today, that house is going to be underwater before the mortgage is paid off. And are we changing the way that Fannie and Freddie allocate risks accordingly? And his comment was, no, but we probably should.

I wonder if you could share to what degree you are working on an interagency basis to make sure that across all of our other agencies that are directly affected by what you are doing, and how can we help elevate that or make sure that we don't have to have any more of those conversations saying, yes, but we should.

Dr. SPINRAD. Yeah. Thank you, Congressman. That is a subject that is near and dear to my heart and one which I have undertaken some very specific actions on. At NOAA, I established NOAA Climate Council initially to coordinate our internal activities between the Fishery Service and the Weather Service and the Ocean Service. But we quickly realized there was an external facing role we could play. So I have begun serious dialogues with the Department of Treasury, Department of Transportation, Department of Energy, FAA, any number of those components of the Federal Government that have policy and operational responsibilities for economic security, for example.

We are also working with industry. The reinsurance and insurance industry is closely coupled. I will be talking to the reinsurance industry next week about these issues. So we are trying to work both the interagency piece by talking to Treasury and the other related departments, as well as the industry component. And, of course, we work with local communities.

Mr. CASTEN. Okay. I see I am out of time, and you have been gracious. Thank you. I would love to work with you more.

I yield back.

Dr. SPINRAD. Thank you.

Ms. CASTOR. Representative Palmer, you are recognized for 5 minutes.

Mr. PALMER. Thank you, Madam Chairman. I thank the witnesses.

I have a question, and I really want the young people here to answer this mentally anyway. But has the Sahara always been a desert? Dr. Spinrad.

Dr. SPINRAD. Gosh, I was going to ask the younger people. I think depending on how you define "always." Obviously, if we go back in geological—

Mr. PALMER. No, no. I am asking you, has it always been a desert? It either has or it hasn't.

Dr. SPINRAD. I am sure in geological time there was a period when it was not.

Mr. PALMER. How long ago was that?

Dr. SPINRAD. I don't know the answer to that.

Mr. PALMER. How about you?

Ms. MEDINA. I am not a scientist. I wouldn't hazard to guess.

Mr. PALMER. You are not a scientist?

Ms. MEDINA. No.

Mr. PALMER. Most of the people asking questions here aren't either.

The answer is the Sahara was a lush area, populated by the Nubian and Egyptian cultures. There was farming. There were lakes and rivers and streams, and it was only about 5,000 years ago. I mean, a literal blink in geologic time. It started becoming a desert somewhere between 10,000 and 12,000 years ago. Again, a literal blink in geologic time.

This is important for you to understand this, because there are decisions being made based on climate science. It is based on models that the vast majority of models are totally inaccurate. They have to manipulate the models to get to some of the conclusions that they draw. And as a result, your parents and you are paying \$6, \$7, \$8 a gallon for gas. You are going to be paying that for a gallon of milk, for a loaf of bread. We are experiencing the highest inflation we have seen in 40 years.

There are consequences for the decisions that are being made by my colleagues in Congress and by the Biden administration. And I understand that the climate is changing. And the reason I bring up the Sahara desert, because that is an example of climate change. And I know you won't know the answer if I asked you what caused that, but most scientists believe it is because the Earth changed its tilt on its axis. And as a result, the wind patterns changed, and over time, the Sahara became a desert.

Now, like I said, they are excavating Nubian and Egyptian settlements there. You have got the archaeological data to look at. And what I like to point out to people is, if the Nubians and the Egyptians had had the same desalinization technology and irrigation technology that Israel uses today, there would still be people living in the Sahara, farming and, you know, playing sports, driving cars. I know that drives my friends crazy, but—we need to be talking about adaptation and mitigation.

And, Chairman Castor, I am going to admit something. It is hard for me to do. But human activity actually has had an impact on tropical storms in the Atlantic. And it is a study from NOAA that indicates that the reduction of particulate air pollution in Europe and North America has contributed to an increase in the number of tropical cyclones in the North Atlantic. Isn't that interesting that we have cleaned up the air and it has resulted in more storms? So human activity does impact the climate.

But I know you brought these young people in here for a reason. I want you to understand that there is more to the story than you are getting. I highly recommend a book by Dr. Kirsten Peters, a Ph.D. from Harvard, a geologist; it is called "The Whole Story of Climate." And you need to understand this. And my colleague from—mentioned sea level rise and the potential of him buying a

home in Louisiana. Now, my colleague, Mr. Graves, would really encourage that.

But during the Eemian Period, you have got—we are right at the end of the Holocene Period or what is known as the Subatlantic Period. But during the Eemian Period, it was considerably warmer. And you look at the geologic evidence and you can see there are higher concentrations of CO₂, higher concentrations of methane, as you have pointed out. But during that period, the shoreline in Georgia and North Carolina was about 50 miles further inland and about 120 feet higher. Two-thirds of Alabama was underwater. All of Florida was underwater. Most of Louisiana was underwater. A huge portion of Texas, all the way up into Oklahoma and into the Midwest was underwater because the climate changed. It changed again. The sea levels receded.

There is a whole lot more to this than what you are being told. I highly encourage you to take the time to study this for yourself. Get the whole story.

I yield back.

Ms. CASTOR. Next up, Representative Brownley is here virtually. You are recognized for 5 minutes for your questions.

Ms. BROWNLEY. Thank you, Madam Chair. And thanks to the witnesses for being here today.

Administrator Spinrad, I have been working with Representative Carbajal and Senators Feinstein and Padilla to support the designation of the Chumash Heritage as a National Marine Sanctuary. The proposed sanctuary, which was initiated by the Chumash, is the home of really the most biologically diverse and ecologically productive regions in the world.

And so my question to you, if you could speak a little bit more to the work that you are doing around this, but even more importantly, how quickly are you addressing these expansions, and what are your goals around that?

Dr. SPINRAD. Thank you, Congresswoman. And I really appreciate your drawing attention to the issue of development of marine-protected areas. We were delighted, I was pleased, as one of my earliest acts as NOAA Administrator, to initiate the designation of the Chumash Sanctuary.

We have an inventory of these sanctuaries—or proposed sanctuaries. We added one yesterday to the inventory from Alaska. We also announced the initiation, a designation of another sanctuary in the Hudson Canyon yesterday.

So we are aggressively moving out the definition consistent with the America the Beautiful Initiative of the Biden-Harris administration to conserve 30 percent of our lands and waters by 2030.

The process is one which involves extensive engagement, as you well know, in the case of Chumash, with the local Tribes, local communities, local industries, to define what the terms are. Not all sanctuaries, not all marine-protected areas have the same terms of reference, if you will, or definitions of what activities can be conducted in those areas. So we have a portfolio, we have an inventory of these.

Part of the restriction, if you will, or controlling factor, or RIA stat, so to speak, is the resources that we have, the resources we get from Congress, so we thank Congress for your additional in-

vestments in sanctuary development, and also the people that we have that can process these.

But another important component is the dynamic of working with our agency partners, especially, for example, within the Department of Interior, the Bureau of Ocean Energy Management.

So when you look at all of those factors, over the course of several years, we will undergo a thorough analysis, public comment, and hopefully end up with the formal designation of the sanctuary in just a few years.

Ms. BROWNLEY. Thank you very much for that.

And, Secretary Medina, could you speak a little bit about what the international efforts are to support indigenous and local people who are working to protect their local environments?

Ms. MEDINA. Yes. Thank you for that question. It is one I very much appreciate because it is a big part of what we are doing at the State Department. We have been working hard with Tribal governments and indigenous peoples around the world to help lift up their efforts to adapt to climate change and to understand better the nature of the threat that they are up against.

We recognize that these people have often been ignored or have been marginalized in the conversation globally, and I am very pleased actually to have with me here the lead negotiator for the agreement, the Global Climate Agreement on Indigenous Peoples. And so we are working very hard to further their interests, both in our bilateral foreign policy efforts with USAID and also within the confines of the agreement itself.

Ms. BROWNLEY. Terrific. Thank you very much.

And, Dr. Spinrad, in terms of partnering with other agencies, as you mentioned earlier, I know a few weeks ago, the Department of Interior announced next steps and public comment on offshore wind lease sales in two regions offshore of California. Is NOAA involved in that process at all?

Dr. SPINRAD. Yes. Thank you for that. We work closely with our colleagues at the Bureau of Ocean Energy Management, which has the responsibility for those lease sales and those lease activities. In fact, I have signed a Memorandum of Understanding with BOEM Director Amanda Lefton, which includes any number of very specific activities regarding coordination of permitting, regarding coordination of release of information. And another interesting component is an agreement that we both have to exchange personnel so we can accelerate and optimize and make even better the processes that those who are bidding on the leases have to engage in.

So I am really excited about the progress we are making and what this will mean in terms of interest, certainly from the wind energy development, the energy development community in general.

Ms. BROWNLEY. Very good. I represent a port in my district, the Port of Hueneme, that is associated with Naval Base Ventura County, and I know they are very much interested in possibly participating as a hub for servicing wind turbines as this moves on.

So thank you for that, Madam Chair, and I yield back.

Ms. CASTOR. Perfect. Next up I will go to Representative Carter, who represents a beautiful coastal district in Georgia.

Rep. Carter, you are recognized for 5 minutes.

Mr. CARTER. Thank you, Madam Chair. And thank both of you for being here.

As Chairperson Castor just mentioned, I have the honor and privilege of representing the entire coast of Georgia, over a hundred miles of pristine coastline. I am very proud of it. And I want to thank you, I want to thank NOAA, because you have done some great work in providing data about our coast, and that is extremely important.

You know, I have always said, in order to deal with climate change, you got to do three things. You got to have adaptation, mitigation, and innovation, and they are very important. Particularly on the coast, adaptation and mitigation are extremely important.

Since 1980, the United States has spent \$1.75 trillion in recovery from 258 billion-dollar events that we have experienced. From 2014 to 2018, the United States saw an average of 13 billion-dollar disasters every year. Those are staggering numbers.

You know, there are a number, as I mentioned, a number of programs that NOAA has been involved with, including the Integrated Ocean Observing System, the Digital Coast Sea Level Rise Viewer, and reports from Coastal Resilience Grant Programs that allow communities to recover and repair from storms. And this has allowed Georgia to recover, and it has truly allowed us to adapt to the climate. Adaptation, one of the things that we need to do.

According to FEMA, no other coastal state besides Georgia has completed disaster recovery and redevelopment plans for every coastal county as we have.

So I would like to ask you, Mr. Spinrad, I would like to ask you this: As you can see, these have been truly beneficial programs and these efforts. How is NOAA ensuring that local communities, especially smaller ones, get this information, and what does NOAA do to help them act on this valuable information?

Dr. SPINRAD. Thank you, Congressman. I truly appreciate your recognition of the hard work that NOAA and our partners have undertaken, especially in the state that is home to one of our sanctuaries as well, and our attention to the issue of coastal resilience.

So your question really gets down to, no matter how good you do in terms of developing products and services, how are they being implemented, how are they getting out to the communities. We have recognized that that service delivery piece, if you will, of our responsibility is one of the most important aspects. So we have boots on the ground and capabilities like Sea Grant. We also are going to make extensive use of our service delivery mechanisms, like the weather forecast offices, more than we have in the past.

Mr. CARTER. Okay. All right. Well, thank you for your fine work.

Now, I want to get serious. How many hours in 2 days? You know the answer to that. Forty-eight?

Dr. SPINRAD. In 2 days? Forty-eight hours.

Mr. CARTER. Forty-eight hours. You know how many days of fishing for red snapper we get on the Atlantic Coast?

Dr. SPINRAD. Yeah. Two.

Mr. CARTER. How many?

Dr. SPINRAD. Less than that, yeah.

Mr. CARTER. Two days. We are going to get 2 days this year of fishing for red snapper.

Now, on the Gulf, I was just told that they went from Memorial Day to Labor Day last year, and then they reopened the season because they still had plenty of red snapper.

We get 2 days.

Let me ask you, do you know who holds the club record at The Savannah Yacht Club for the biggest red snapper caught?

Dr. SPINRAD. I do not, sir.

Mr. CARTER. Do you know that I have got plans for these 2 days elsewhere? Now I am not going to be able to defend my record. Two days. How can you justify 2 days for recreational fishing for red snapper?

Right now, the most recent South Atlantic red snapper stock assessment indicated that the stock has shown progress toward rebuilding. There is an independent, 30-month study that will help better understand the true stock of red snapper in the South Atlantic. This one is inspired by the Gulf of Mexico, as I just mentioned, by their great red snapper count, which discovered that there are three times as many red snappers as previously estimated in the Gulf.

What I want to ask you is, can you commit to NOAA using the results of this independent study to possibly inform management of the South Atlantic red snapper fishery?

Dr. SPINRAD. So, thank you, sir. And I can commit to using all the best scientific data that we have got, including the results of that assessment, the red snapper count, as we look to ensure the highest quality of the assessment of what the stocks are of red snapper.

Mr. CARTER. How did you come up with 2 days? I mean, if the wind is blowing, if it is raining, then we don't get anything. And you tell us the 2 days that we are going to get to fish. Two days. Forty-eight hours.

I hope that we can use this study, I hope that we can make an accurate assessment of what exists out there.

I went fishing in the Gulf of Mexico, and it happened—this was off in New Orleans, Port Fourchon, a couple of years ago. I had to throw back 44 red snapper. Now, granted, I am a pretty good fisherman, but at the same time—but at the same time, I had to throw back 44 red snapper. I just—I don't know what you all are doing and where you are coming up with this, but I hope that you will consider the recreational fisherman.

Thank you, and I yield back.

Dr. SPINRAD. Thank you, sir.

Ms. CASTOR. Next up, we will go to one of the leading advocates for ocean policy in the Congress, Representative Bonamici.

Ms. BONAMICI. Thank you, Madam Chair and Ranking Member Graves. Thank you to our witnesses.

Dr. Spinrad, it is great to see you, another Oregonian, in your position at NOAA, and thank you for being here today, as well as Secretary Medina.

Thank you to the students for being here today as well. I hope you are finding this an informative and thought-provoking experience to be here.

So I co-chair the House Oceans Caucus—oh, thank you. Wrong button—I co-chair the House Oceans Caucus and the House Estuaries Caucus. So I am deeply concerned about the climate crisis and how it is affecting our ocean, coastlines, and estuaries. Sea level rise, ocean acidification, hypoxic zones, harmful algal blooms are on the rise.

I am glad my colleague, Representative Miller, recognized that this affects not only people who represent coastlines like I do with the beautiful north coast of Oregon.

Last year, I reintroduced my bipartisan Blue Carbon for Our Planet Act to enhance the research, protection, and restoration of blue carbon ecosystems, which has the potential to sequester carbon but also to provide coastal resilience benefits.

So, Dr. Spinrad, in your testimony, you discussed how some countries are using blue carbon as a way of meeting their nationally determined contributions under the Paris climate accord.

What can NOAA do to help put the U.S. on the same path, and how can blue carbon mapping help?

Dr. SPINRAD. Thank you, Congresswoman. Good to see you as well.

Blue carbon is a fascinating subject, and I think to start the discussion, we need to point out that it is only recently that we have recognized the role that blue carbon can play, the role that algae and seaweed and a higher level—higher trophic levels can play in this.

So the first thing we are trying to do is the inventory, if you will, the assessment of exactly what does constitute blue carbon. And one of the things I am excited about is the initiative the White House announced just a couple of months ago about the Natural Capital Inventory to understand where is the carbon, how much of it is there.

NOAA will play a critical role. We are the environmental intelligence agency, so our efforts to assess and account for and also to predict the potential for the growth of blue carbon is going to be a major contribution that we make to that assessment.

Ms. BONAMICI. Excellent. Well, the idea for the bill came from a visit to the Hatfield Marine Science Center, where I know you have spent—

Dr. SPINRAD. Very good.

Ms. BONAMICI [continuing]. A significant amount of time. Dr. Spinrad, what efforts has NOAA undertaken to incorporate equity into decisionmaking? We know the data from NOAA and the Census Bureau indicates that vulnerable populations make up approximately 40 percent of coastal populations, and more than one-third of coastal communities are individuals from historically marginalized communities.

So how are you incorporating that data, making sure that marginalized communities share in economic benefit for the blue economy?

Dr. SPINRAD. Thank you, Congresswoman. We are doing a number of things. I would say in one word what we are doing is listening, primarily, engaging with communities that may not have had a voice in the dialogue in the past. So we conducted a series of eight climate and equity roundtables around the country, focused

on geography, but also focused on themes—flooding, drought, extreme heat—and heard what the concerns were.

And I would point out that these were not, if you will, your usual roundtables. We involved faith-based communities, we involved underrepresented, underserved, vulnerable communities.

And we are now taking the results of those roundtables and building pilots and engaging in delivering products and services, and also co-developing what the priorities will be for those particular projects.

Internally at NOAA I have brought on senior advisors in those roles, including an Advisor for Tribal Engagement. Happens to be another Oregonian, I would point out, a member of the Nez Perce Tribe with a Ph.D. in fisheries biology, to help us engage with Tribal communities.

We similarly have elevated a position for equity in everything we do. We are building a number of internal frameworks for equity and climate that we are using as the guide rails on how we prioritize our investments.

Ms. BONAMICI. Don't forget, environmental justice is a pillar throughout our Climate Action Plan.

Assistant Secretary Medina, you mentioned the work at the Summit of the Americas. Can you talk about how the U.S. can learn from efforts that other nations have taken to research, map, and conserve natural solutions like blue carbon?

Ms. MEDINA. Absolutely. Thank you, Congresswoman. I think it is crucial that we listen and learn from other nations. What I hear everywhere I go is gratitude that the U.S. is back, but what I convey back to countries when I talk to them is how much we have to learn from them.

And indigenous knowledge is an important way that we can learn from other communities, other parts of the conversation that haven't always been heard. And we have something called the Islands 2030 Network, where we aim to do just that, bring together island communities so that they can not only share knowledge among themselves but with us.

I think it is very important that we never go into these discussions believing we have all the answers. We have to be listening.

Ms. BONAMICI. Thank you. And because it is Ocean Week, Capitol Hill Ocean Week, I want to thank you also for your work on marine debris and particularly plastics, which we know are devastating to marine life and a problem that we absolutely need to tackle and can. So thank you for your work on that through NOAA.

And I am over time and yield back. Thank you.

Ms. CASTOR. Next, Representative Graves, you are recognized for 5 minutes.

Mr. GRAVES. Thank you, Madam Chair.

All right. So I started out by saying that sometimes people have trouble with being accurate, so watch this.

People up here aren't required to tell the truth. That is—ooh, I am going down.

People up here aren't required to tell the truth, but they can do whatever. They can say whatever. You all are, under the law, you all are.

Did I say at any point that the United States should not do anything until China does? Did I say that in my opening statement?

No, I didn't. I didn't. You know that. Yet it was interpreted that that is what I said.

Let's see. What was the other one? Did I—are you familiar with emissions related to U.S. energy production, specifically National Energy Technology Lab's assessment that was done in 2019, I think it was October, that found or compared U.S. emissions from natural gas delivered to Europe and Asia? Are you familiar with that? Ring any bells?

Dr. SPINRAD. I am familiar, but I couldn't cite the data.

Mr. GRAVES. Are you aware of just some rough comparison of emissions associated with U.S. energy delivered to Europe or other countries compared to, for example, Russian energy delivered, which one would have a lower emissions profile?

So National Energy—see, this is what happens. People make crap up. They just make it up. Didn't say anything that they just said, and then they sit there and legislate it.

So I am going to ask unanimous consent, Madam Chair, to submit for the record a report from the National Energy Technology Lab that has found that U.S. gas delivered to Russia—excuse me—delivered to Europe, as compared to Russian gas, Russian gas has a 41 percent higher emissions profile delivered to Europe. It has a 47 percent higher emissions profile delivered to Asia.

So I also, Madam Chair, would like—

Mr. HUFFMAN. Madam Chair, I don't object to this study that shows that we have the prettiest horse at the glue factory.

Ms. CASTOR. Without—

Mr. HUFFMAN. Let's put it in the record. We got the prettiest horse at the glue factory.

Ms. CASTOR. Without—thank you. Without objection.

[The information follows:]

Submission for the Record

Representative Garret Graves Select Committee on the Climate Crisis

June 9, 2022

ATTACHMENT: S. Roman-White, S. Rai, J. Littlefield, G. Cooney, T. J. Skone, "Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States: 2019 Update," National Energy Technology Laboratory, Pittsburgh, September 12, 2019.

The report is retained in committee files and available at:

<https://www.energy.gov/sites/prod/files/2019/09/f66/2019%20NETL%20LCA-GHG%20Report.pdf>

Mr. GRAVES. Madam Chair, I would like to submit and include in the record an analysis the Energy Outlook by the Department of Energy under the Biden administration that projects the global demand in natural gas growing between now and 2050. So—

Ms. CASTOR. Without objection.

[The information follows:]

Submissions for the Record
Representative Garret Graves
Select Committee on the Climate Crisis

June 9, 2022

ATTACHMENT: U.S. Energy Information Administration (EIA), *International Energy Outlook 2021*, October 2021, “Table A6. World natural gas consumption by region, Reference Case.”

This table is retained in committee files and available at:
https://www.eia.gov/outlooks/ieo/data/pdf/ref/A06_r.pdf

ATTACHMENT: U.S. Energy Information Administration (EIA), *International Energy Outlook 2021*, October 2021, “Table A6. World natural gas consumption by region, High Economic Growth Case.”

This table is retained in committee files and available at:
https://www.eia.gov/outlooks/ieo/data/pdf/hm/A06_hm.pdf

Mr. GRAVES. Thank you.

So once again, people sit up here and they say things that are just not true. And so then you wonder why, you wonder why we are in a situation where the right thing doesn't get done. You wonder why we are in a situation where people are out there proposing solutions in search of problems. You wonder why in the world our gasoline prices have more than doubled under this administration.

Here is why. Because people make crap up and then they go and legislate on it.

So I appreciate my friends, Mr. Huffman and Mr. Casten, being here, and I appreciate you all attempting to interpret my comments that are totally wrong.

I also heard Mr. Casten say that a home bought in South Louisiana would not survive a mortgage. I would invite you to come down to South Louisiana. I would love to host you if you want to come down.

Mr. CASTEN. Would the gentleman entertain a question?

Mr. GRAVES. Not right now.

I would love to host you down there.

Mr. Huffman, I appreciate you coming down.

That statement is just completely ignorant. It is completely ignorant.

Dr. Spinrad, I appreciate you being here. We sent you a letter together with about 70 Members of Congress, related to LOAs, related to seismic and offshore energy production.

NOAA has acknowledged—or NMFS, National Marine Fisheries Service, has acknowledged that their modeling was incorrect, it was spitting out impacts that were not verified, justified, or accurate.

It is holding up domestic energy production activities in the United States that directly is contrary to the statements that President Biden has made about the number of 9,000 APDs that have been approved in the United States.

Could you tell me your plan forward on ensuring that that is resolved so we can produce energy in the United States which results in lower emissions than production in other countries?

Dr. SPINRAD. Yeah. Thank you, sir. The short answer is that I am working very closely with Director Lefton over at Bureau of Ocean Energy Management to make sure that the interpretation of

how incidental take, which is where the data—the area of the data confusion is addressed, and we make sure that the interpretation of the incidental take data is applied appropriately in their activities from here forward, so—

Mr. GRAVES. Can you give me a timeline?

Dr. SPINRAD. Pardon me?

Mr. GRAVES. Can you give me a timeline?

Dr. SPINRAD. Not offhand. We can get back to you with the specifics of a timeline.

Mr. GRAVES. I would appreciate it if you could.

Dr. SPINRAD. Yes, sir.

Mr. GRAVES. Secretary Medina, I am going to ask you to fill in the blank. This is a quote by Fatih Birol, and I am sure I butchered that, but the Executive Director of the IEA, the International Energy Administration. This is a comment that he made toward the end of the Trump administration.

He said, quote, In the last 10 years, the emissions reduction in the “blank” has been the largest in the history of energy.

Do you know which country he was referring to?

Ms. MEDINA. Congressman Graves, you got me. I am not going to try and guess. I am not the energy expert within the State Department either, so I don't want to—

Mr. GRAVES. So I will fill it in. In the last 10 years, the emissions reduction in the United States—in the United States—has been the largest in the history of energy. United States' emissions reduction has actually been lower than the next seven emissions-reducing countries combined.

So, look, we can sit here and we can keep talking about how we are going to use pixie dust and all these things to power the nation's economy. Clearly, the strategy that has been implemented under this administration is impacting those who can least afford it the most. It has been a complete disaster. We are out there begging Iran, Saudi Arabia, and Venezuela to address our energy needs. This is a flawed strategy. It just doesn't work. It is not working for emissions, it is not working for affordability, and it is not working for energy security.

And this shouldn't be a partisan issue. Nothing about it should be partisan. Just ask people to be rational and tell the truth. That is the only way we are going to solve these problems.

I yield back.

Ms. CASTOR. Next we will go to Representative Levin. Welcome. You are recognized for 5 minutes.

Mr. LEVIN. Thank you, Chair Castor. And thanks to everybody for being here.

You know, I am also honored to represent a beautiful coastal district, California's 49th District. It has some of the world's leading climate scientists, and as the representative for that community, the very least that I can do is listen to them.

And one of the measures that has been really instrumental in my understanding of the climate crisis for my whole adult life is the Keeling Curve and the measure of CO₂ in the Earth's atmosphere, which I look at.

You can follow it on Twitter. That is done at the Scripps Institution of Oceanography right there in La Jolla. And just as of yester-

day, 421 parts per million of CO₂. That is a data point that is so indisputable.

The question that we all have is what we are going to do about it. And I intend to work with whoever will work with me across the aisle to try to get anything done that we can to reduce our greenhouse gas footprint, whether it is from the cars we drive, the buildings we build, or the type of electricity we are generating, the way we are growing food.

We have to do it all, and we have to do it now. The science demands we act and that we take bold measures that are actually going to be up to the task.

So, with that in mind, my district is also home to beautiful estuaries, so I want to bring up a piece of bipartisan legislation. I introduced something called the bipartisan Resilient Coast and Estuaries Act, which would reauthorize the Coastal and Estuarine Land Conservation Program, which was created to provide grants to state and local governments to purchase land to protect coastal systems and wetlands.

Congress stopped funding this program in 2013, and other Federal funding mechanisms ran out in 2017. So our bill would reauthorize this crucial program and add climate change mitigation as one of the program's goals.

Dr. Spinrad, can you talk about the role that protecting coastal ecosystems plays in combatting the effects of the climate crisis?

Dr. SPINRAD. Thank you, Congressman. And I appreciate you bringing to bear some of the information we are getting from NOAA's resources, including the Keeling Curve from the Mauna Loa Observatory.

I would just simply add, in my office I have vials from each of the observatories around the globe, including Barrow, Alaska, and the South Pole, and the trend is not limited to Mauna Loa.

So the role that coastal environments play in this regard is one that has, through recent scientific research, been demonstrated unequivocally, not just in terms of limiting activities, if you will, exploitative activities, extractive activities in many cases, but also serving as a key place for the development of blue carbon, as we discussed a little bit earlier, and, of course, as, if you will, nurseries for ensuring the biodiversity and the sustained growth of the ecosystem, which also contributes to the blue carbon inventory.

So these special places, in our case it is the National Marine Sanctuaries or the National Estuary and Research Reserves, are critical components not just of conserving 30 percent of our lands and waters, but also ensuring that we become more climate resilient.

Mr. LEVIN. Thank you for that. So our bipartisan bill would also strengthen the National Estuary and Research Reserve System by requiring NOAA to establish five new reserves and expanding research guidelines to include long-term data monitoring and modeling on the impacts of climate change.

How does the reserve system and the research done there help us measure the impacts of climate change on our nation's coastal communities?

Dr. SPINRAD. Thank you. One of the things—I used to run the NERRS program when I was the head of the National Ocean Serv-

ice, and I was particularly excited with the “R” that is associated with “research” in the National Estuary Research Reserve System, because protection of those environments is one thing, but using them as natural laboratories is really where we get the most bang for the buck.

So there are a limited set of natural laboratories that we can use to assess impacts of climate change. The NERRS system is really one of the jewels in the crown for that capability.

Mr. LEVIN. I want to turn for a moment to the blue economy. If done sustainably, aquaculture can create jobs in coastal communities and increase domestic seafood production. However, these industries are vulnerable to the effects of climate change as well.

How is NOAA supporting new, sustainable, ocean-based industries to spur sustainable economic growth, and how are we ensuring that these opportunities, like aquaculture, are being deployed in a way that is resilient to the impacts of climate change in the future?

Dr. SPINRAD. The buildout of the blue economy, and specifically what I call the new blue economy, is one of the pillars that I brought to the agency as a focal point for what we do.

I am convinced that the use of knowledge, data, and information from the ocean is the gold of the future. That is going to drive economic development, by some estimates, to the tune of an emerging \$100 billion industry in climate services to serve the needs of local communities. Building upon the fundamental products we will provide but doing something similar for climate, as was done with the commercial weather industry over the last 40 years, but for the full spectrum of ocean acidification, precipitation, sea level rise, all of the other phenomena.

Mr. LEVIN. Thank you very much. I am out of time, but I just want to encourage us all, let’s step away from politics, let’s just look at the science, and let’s act in a manner commensurate with what the science demands.

Thank you, and I will yield back.

Ms. CASTOR. Thank you.

Next up, Rep. Crenshaw, you are recognized for 5 minutes.

Mr. CRENSHAW. Thank you, Madam Chair. Thank you, Dr. Spinrad, for being here. Thank you, Assistant Secretary Medina.

I want to talk about cleanliness in our oceans. None of us want trash in our oceans. None of us want plastic in our oceans. None of us want these things in our oceans either. And these are passed out for the committee hearing. It says, more ocean, less plastic.

Is this better in the ocean than this? Is there any compelling reason why that might be the case?

Dr. SPINRAD. Assuming you are addressing the question to me?

Mr. CRENSHAW. Yeah. Yeah.

Dr. SPINRAD. I would argue, anything we are putting into the ocean that is manufactured is not good for the ocean.

Mr. CRENSHAW. I agree. If I throw this away right now, is there a good chance it will end up in the ocean?

Dr. SPINRAD. Yes.

Mr. CRENSHAW. Really? American trash is what is ending up in the ocean?

Dr. SPINRAD. Globally.

Mr. CRENSHAW. Really? Okay. So there is pretty good studies on this that would say that in the Pacific Ocean, trash, plastic specifically, the vast, vast majority of it, over 90 percent comes from Asia, African countries. Is that not true?

Dr. SPINRAD. I think the numbers do tend to show that sort of increase on the part of the Asian countries, but that doesn't mean that we are not contributing to part of that as well.

Mr. CRENSHAW. How much do we contribute?

Dr. SPINRAD. I don't have the answer off the top of my head.

Mr. CRENSHAW. It is like less than a percent, isn't it?

Dr. SPINRAD. I don't know.

Mr. CRENSHAW. It is. I mean, because walk me through that. So if I throw this in the trash can right now, how does that end up in the ocean and not in the landfill nearby?

Dr. SPINRAD. I can't give you the whole chain of how it goes from your—

Mr. CRENSHAW. But you said there is a good chance. You said that with some authority, that there is a good chance this ends up the ocean. How is that true?

I spent—I was a Navy SEAL in my prior career. I spent a lot of time in America's oceans. So how does this end up in the ocean so easily?

Dr. SPINRAD. Well, again, I can't give you the whole chain of events associated with how our trash gets in the ocean, but I can tell you that the data is there. You can look at what is in the ocean.

Mr. CRENSHAW. The data is there, that America is responsible for an incredibly small percent of any plastic in the ocean. Doesn't mean that is okay either. Look, we all want to diminish any kind of plastic waste in the ocean.

So maybe let's talk about advanced recycling. You know, in my district, actually, there is a company called Huntsman that does amazing advanced recycling, if they are allowed to. There is also legislation in the CLEAN Future Act that would practically prohibit any new recycling facilities that deal with plastics, any new production of plastic.

You know, and I wonder, is that really a—is that a good thing to do?

Dr. SPINRAD. To reduce the source of plastic—

Mr. CRENSHAW. From our trash.

Dr. SPINRAD [continuing]. That would end up in the ocean?

Mr. CRENSHAW. Does it end up—no, we already covered whether it ends up in the ocean or not. It clearly doesn't.

Dr. SPINRAD. No, but I am trying to understand the question.

Mr. CRENSHAW. No. Advanced recycling. Because you might do one thing, right, and maybe it has good intentions. You want to have less plastic production in the United States. But it also has the second and third order consequence of reducing or making it impossible to engage in advanced recycling techniques.

You know, what is the state of recycling in our country right now, considering we don't really export it to China the way we used to?

Dr. SPINRAD. I can't answer that. I am not an expert on recycling technologies.

Mr. CRENSHAW. Ms. Medina maybe—she looked like she wanted to answer.

Ms. MEDINA. I can add just a little bit of light to this. The first thing is that we do still export a tremendous amount of our refuse, our waste. And it is true that only 5 or 6 percent of U.S. plastic is recycled today, and that has gone down in the last year. It is going in the wrong direction, which is why we are working so hard on a global agreement to combat plastic pollution everywhere, all over the world. And we need a global solution to this because it is not really different from climate.

Plastic is everywhere. And if we can't stop having as much plastic in the system, we will never get it out of the system. We need different materials, we need better recycling, and the agreement will take on the full lifecycle of plastic.

And we are standing shoulder to shoulder with the industry on this, not just the retailers, but also the makers of the very products that we are trying to figure out how to curb the pollution of.

So I am pretty optimistic. It is going to take a lot. We are going to need a lot of innovation, we are going to need more plants that do that recycling. We are going to need to create an economy where that recycled bottle has value. This one too. This one has more value, which is why it is a little less likely—

Mr. CRENSHAW. I want to ask one more question. Your answer makes a lot of sense, and I appreciate you acknowledging that it is clearly a global problem that you have to deal with other countries on, especially the countries that are putting the vast, vast majority of waste into the ocean.

The next question was—it was mentioned earlier that you think sea levels will rise in the Gulf by 2 feet by 2050.

The obvious next question is, is there anything we can actually do to stop that? Because that question indicates what the solutions might be. If we stopped all carbon emissions globally right now, would that change that rise in sea level?

Dr. SPINRAD. The answer to your last question is that if we went to net zero tomorrow, we would still have to deal with sea level rise, ocean acidification, all those factors, that is the flywheel effect, as we call it, and that we are seeing in climate change. It is going to happen.

Mr. CRENSHAW. Right. It is going to happen, and it makes preparing for it and the infrastructure necessary to deal with it all the more important. And if I had more time I could go on a long tirade about cost and benefit and how we should spent that money, but I don't and I am out of time. Thank you so much.

Thank you, Madam Chair.

Mr. HUFFMAN. Madam Chair, could I ask a very quick point of inquiry? Because I am genuinely curious, and if I understood the gentleman correctly, I think he was suggesting that this may be a form of plastic bottle. I think—

Ms. CASTOR. You want to ask—I will let you ask.

Mr. HUFFMAN. I want to ask if you could clarify. I believe this is aluminum, and I believe it is truly recyclable, unlike the so-called recyclable plastic which we know is a joke. Can you just clarify what the heck this is, so that we all have a common set of facts?

Mr. CRENSHAW. In typical disingenuous form, I will answer your disingenuous question.

Mr. HUFFMAN. Well, no, I am asking—

Mr. CRENSHAW. Of course, I realize it is different, which is why I made the comparison.

Mr. HUFFMAN. Okay. Well, I think I misunderstood you then.

Mr. CRENSHAW. What I was asking was, is this—we pass these out, almost making the implication that these are better for the environment than this, but—and it says “ocean” on it, right?

So there is an implication here that this is better for the ocean than this one, which is why I asked that question, because, clearly, any trash in the ocean is the opposite of what we want, right?

Ms. CASTOR. Well, I look forward to the next hearing maybe when we can dive into this a little bit more.

But thank you so much for joining us on Capitol Hill Ocean Week, Dr. Spinrad and Secretary Medina. Thank you for your service to America. Thank you for all that you do to protect our ocean resources that are key to the economic vitality of communities across the country.

So, without objection, I would like to enter into the record an October 15, 2021, letter from 118 organizations and businesses supporting the development of the U.S. Ocean Climate Action Plan.

[The information follows:]

Submission for the Record

Representative Kathy Castor

Select Committee on the Climate Crisis

June 9, 2022

ATTACHMENT: Letter to President Biden from 118 organizations and businesses supporting the development of an U.S. Ocean-Climate Action Plan, October 15, 2021.

This letter is retained in committee files and available at:
<https://oceanconservancy.org/wp-content/uploads/2021/10/Final-Ocean-Climate-Action-Sign-On-Letter-to-Administration.pdf>

Ms. CASTOR. Without objection, members will have 10 business days within which to submit additional written questions for the witnesses. And I ask you to please respond as quickly as you are able.

And thank you to the SCUBAnauts for being in attendance today.

The hearing is adjourned.

[Whereupon, at 10:39 a.m., the committee was adjourned.]

**United States House of Representatives
Select Committee on the Climate Crisis**

Hearing on June 9, 2022

**“Turning the Tide for Ocean Climate Action:
Unleashing the Climate Benefits of Our Blue Planet”**

Questions for the Record

**The Honorable Dr. Richard W. Spinrad
Under Secretary of Commerce for Oceans and Atmosphere and
NOAA Administrator
National Oceanic and Atmospheric Administration**

THE HONORABLE KATHY CASTOR

1. Many of the critical ocean observations and science that the United States invests in are utilized to inform climate modelling. These models are vital tools to help scientists and policymakers understand complex systems and test potential solutions. Can you explain how climate models are developed and tested and evaluate the accuracy of U.S. climate models that are utilized to guide climate policy?

The span of NOAA’s modeling portfolio reflects the span of its unique world-class mission from the surface of the sun to the depths of the ocean. Climate models are based on well-documented physical processes to simulate the transfer of energy and materials through the climate system. Building and running a climate model is a complex process of using satellite and on the ground (in-situ) observations and scientific studies to identify and quantify Earth system processes, representing them with mathematical equations, setting variables to represent initial conditions and subsequent changes in climate forcing, and repeatedly solving the equations using supercomputers.

To develop the models, NOAA scientists use objective tools to determine which measurements are to be used in analyses. They apply rigorous quality control and quality assurance measures, which are subject to peer review in producing analyses and model-observations comparisons. Temperature and salinity measurements are used to calculate Ocean Heat Content (OHC), one of the most important climate variables.

Climate models can be tested using a process known as hindcasting. This process runs the model for a period of time in the past. The model results are then compared with observed climate and weather conditions to see how well they match. This testing allows scientists to check the accuracy of the models and, if needed, revise their equations. Science teams test and compare their model internal process calculations and overall outputs to observations and results from other models to improve the representation of the processes and interactions leading to climate states including variability and changes.

Climate models are further evaluated against other international models in the peer-reviewed literature and as part of the Intergovernmental Panel on Climate Change (IPCC), Sixth Assessment Report (AR6)¹ evaluation of climate models compared to observations. Independent assessments of NOAA’s climate models routinely report that they are among the best performing in the world.

NOAA remains committed to continuously improving models for future use. For example, with enhanced ocean model resolution, climate models can achieve excellent simulations of global weather and climate extremes. Increased observations and evaluation of surface climate and ocean heat content can improve key aspects of the overall model development. Each of these efforts to improve models includes dozens of comparisons with global satellite and in-situ observations. Further, historical model-predicted trends in high-impact events, such as droughts, floods, and wildfires, are compared against long-term trends observed in climate data records to provide confidence in future predictions.

To make the findings of climate models accessible to the public and decision-makers, we published the Sea Level Rise Technical Report earlier this year. The findings included in this multi-agency report were used to develop new information and

¹ <https://www.ipcc.ch/assessment-report/ar6/>

tools such as the interactive Sea Level Rise Viewer² and NOAA Sea Level Rise Portal,³ which offers tools, services, and educational materials.

One of the best examples of facilitating climate information is the U.S. Climate Resilience Toolkit⁴ (CRT), which was designed and developed to help decision-makers at all levels of government, businesses, community leaders, and managers of natural and built environments understand their climate-related risks; and to help them produce and implement a climate resilience plan. The site offers regional⁵ and topical⁶ information excerpted from the U.S. National Climate Assessment (and other authoritative sources), a compendium of free tools⁷ from across the Federal government, a library of real-world case studies,⁸ a mapping and graphing tool for exploring county-scale climate projections⁹ (the Climate Explorer), and a “Steps to Resilience”¹⁰ framework to help guide people through the process of producing and implementing a resilience plan.

NOAA’s climate models can help us understand how the climate could change in the future. NOAA produces actionable climate projections and helps inform societal decisions for today and tomorrow. There is a critical need for improved projections of how climate will change on regional scales through the next several decades. This period of time covers a rich decision space for city planning, urban and rural infrastructure, natural resource and energy management, emergency management, national security, finance and insurance, and numerous other policy areas for understanding carbon neutrality. These models and the information they provide for decision makers are key to helping meet the Administration’s climate goals.

Questions for the Record

The Honorable Monica Medina

Assistant Secretary of State

Bureau of Oceans and International Environmental and Scientific Affairs

U.S. Department of State

THE HONORABLE KATHY CASTOR

1. As we know, the ocean is a global system, making international cooperation toward addressing the ocean-climate nexus even more critical. Can you tell us about why it is important that the ocean is increasingly being included in international negotiations like the Paris Climate Agreement or the upcoming Convention on Biological Diversity meeting?

The ocean and climate crises are having a wide range of environmental, economic, and social impacts. These are global problems that require international cooperation and coordination to tackle their root causes. To address the threats facing the ocean, I believe we must engage the international community to identify concrete solutions and generate a combination of top-down and bottom-up approaches to implementation. Because the ocean is connected to climate change, biodiversity loss, and pollution, I believe it is also critical to work with the international community to break down silos. By collaborating across fora, we can achieve better integration and efficiency in the implementation of ocean and climate solutions.

2. How do ocean nature-based solutions support mitigation and adaptation to climate change, and what is the U.S. doing to advance these efforts globally? How do these compare to other mitigation and adaptation solutions?

Nature-based solutions, such as the conservation and restoration of “blue carbon” ecosystems, contribute to mitigation by sequestering excess carbon from the atmosphere. Ocean nature-based solutions also provide adaptation co-benefits to coastal communities by reducing storm impacts, preventing erosion, and providing habitat for valuable marine species. In April, the United States launched the Ocean Conservation Pledge to encourage countries to join us in a commitment to conserve, pro-

² <https://coast.noaa.gov/slr/>

³ <https://oceanservice.noaa.gov/hazards/sealevelrise/>

⁴ <https://toolkit.climate.gov/>

⁵ <https://toolkit.climate.gov/#regions>

⁶ <https://toolkit.climate.gov/#topics>

⁷ <https://toolkit.climate.gov/tools>

⁸ <https://toolkit.climate.gov/case-studies>

⁹ <https://crt-climate-explorer.nemac.org/>

¹⁰ <https://toolkit.climate.gov/#steps>

tect, and restore at least 30 percent of ocean waters under their jurisdictions by 2030. Nature-based solutions are also a key cross-cutting theme across the President's Emergency Plan for Adaptation and Resilience (PREPARE), the Administration's cornerstone international adaptation response.

3. How is climate change threatening U.S. security interests, and how can we better confront those escalating changes?

The most vulnerable people, often those caught in or displaced by conflict, so often suffer the most from the climate crisis. The linkages between migration, health security threats, food insecurity, conflict, and climate change are clear. Climate change can exacerbate conflict and political instability—and conflict can undermine efforts to address climate change's impacts. The U.S. government launched the President's Emergency Plan for Adaptation and Resilience as the cornerstone of the U.S. foreign policy response to address the increasingly devastating impacts of the global climate crisis, improve the ability of vulnerable communities around the world to confront them, and, as a result, bolster regional stability and national security.

4. The production and disposal of plastics, especially virgin single-use plastics, contributes to global emissions, while waste can end up in the ocean, where it further degrades, releasing emissions and threatening biodiversity. How is the U.S. collaborating with our partners abroad to address the damaging global effects of plastic pollution on the ocean?

The United States is combating plastic pollution—both domestically and internationally—by building recycling and waste management capacity, investing in innovative research and solutions, and engaging with our global partners in international environmental bodies, such as the UN Environment Assembly. Most recently, we joined other countries to launch negotiations on a global agreement on plastic pollution. By working closely with interagency colleagues, as well as the private sector and civil society stakeholders, OES is assisting other countries in improving and implementing best practices, expanding public awareness, developing innovative solutions, funding related projects, and highlighting U.S. technology and expertise.

