

**UNITED STATES MISSION TO THE UNITED NATIONS  
NEW YORK**

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The United States Mission to the United Nations presents its compliments to the Office of Legal Affairs, Division of Ocean Affairs and Law of the Sea and in reference to LOS/SGR/2017, for delegations to submit their contributions on action undertaken to address the effects of climate change related impacts on the ocean, the United States Mission has the honor to submit the attached document that provides such information.

The United States Mission avails itself of this opportunity to renew to the United Nations the assurances of its highest consideration.

Enclosure

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**DIPLOMATIC NOTE**

## **United States' Submission to the Office of Legal Affairs of the United Nations regarding Actions to Address Climate Change-Related Impacts on the Ocean**

This submission is in response to document LOS/SGR/2017 which provided States the opportunity to submit a contribution outlining, inter alia: action undertaken to address the effects of climate change on the oceans, in particular, with regard to:

- (i) collection of relevant scientific data;
- (ii) awareness-raising;
- (iii) fostering climate resilient sustainable development of oceans and seas;
- (iv) development of ocean-based mitigation measures and adaptation policies and strategies; and
- (v) capacity-building, partnerships and financing mechanisms for the implementation of such action.

### **Summary**

The United States welcomes the focus on “the effects of climate change on oceans” at the 2017 UN Informal Consultative Process on Oceans and the Law of the Sea.

The United States has taken and catalyzed significant, concrete actions at the national, regional, and global levels to address and raise awareness of climate-related impacts on the ocean.

To advance the collection of relevant scientific data, the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information produce authoritative climate datasets and products that support informed decision making and aid in the understanding of coastal and ocean conditions and their impact on the environment, economies, and societies. NOAA and the National Aeronautics and Space Administration (NASA) use satellites to improve understanding of sea level, salinity, ocean circulation, ocean carbon cycle dynamics, sea ice, and other key variables. Further, the United States is developing a robust national ocean acidification monitoring system and plays a leading role in the development and operation of the Global Ocean Acidification Observing Network (GOA-ON), an integrated, international research effort linked with other international research programs.

To raise awareness of and spur concrete actions to deal with the impacts of climate change on the ocean and other threats to ocean health, the United States initiated the Our Ocean conferences. Participants at the first three Our Ocean conferences in the United States and Chile pledged more than \$9.2 billion to protect the ocean. The European Union, Indonesia, and Norway will host Our Ocean conferences in 2017, 2018, and 2019, respectively.

The United States fosters climate resilient sustainable development of oceans and coastal communities through, for example, capacity building programs in the Pacific Islands to prepare for and help mitigate the negative impacts of climate change. In 2016, the United States pledged nearly \$40 million to such efforts.

In order to develop ocean-based mitigation measures and adaptation policies and strategies, the United States incorporates considerations about the changing climate into management strategies. Most U.S. coastal states have developed strategies for addressing flooding, shoreline erosion, and coastal storms.

The United States conducts capacity-building programs and enters into partnerships and financing mechanisms to implement many of these actions, such as a public private partnership began in 2015 to build capacity for ocean acidification monitoring efforts in developing countries. The United States also leads Pier2Peer, a scientific mentorship program supporting the expansion of ocean acidification observing capacity through the GOA-ON.

## **Introduction**

1. Our ocean plays a key role in regulating the Earth's weather and climate.
2. The ocean has absorbed about 30% of carbon dioxide released into the atmosphere since the beginning of the industrial revolution. This has helped limit the increase in atmospheric carbon dioxide concentrations, but at a high price – ocean waters are 26% more acidic than in pre-industrial times. This increased acidity weakens the ability of sea creatures to build their shells and of corals to build their skeletons.
3. The ocean has also absorbed over 90% of the additional heat in the Earth system since the 1970s. This has helped limit global average temperature rise, but again at a high price. Ocean waters are warmer, which affects the distribution of marine species and the health of marine ecosystems, while also contributing to sea level rise. Sea ice and glaciers are melting around the world, exacerbating sea level rise. By the end of the 21st century, sea levels are projected to rise one to four feet, affecting the lives and livelihoods of coastal communities.
4. The pace of these changes is quickening, making it difficult for marine life and coastal communities to adapt. Coral reefs and polar ecosystems are especially vulnerable. We already see differences in the ranges, activities, and populations of many marine species in response to climate change.
5. The impacts of these changes are already clear – fishermen working harder in search of a catch, coastal communities awash at high tide, coral bleaching around the world. Compounding existing challenges including habitat destruction, pollution, and invasive species, climate change-related ocean acidification, ocean warming, and sea level rise threaten economic livelihoods, food sources, the biodiversity of the ocean, the integrity of coastal areas, tourism, recreation, and the cultures of coastal communities.
6. The United States is thus pleased that the eighteenth meeting of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea is focusing on this increasingly important suite of issues. The United States is committed to action at the national, regional, and global levels to address climate change and other effects of carbon emissions on the ocean, such as

ocean acidification, through research, raising awareness, supporting mitigation and adaptation efforts, and building capacity.

7. A number of the actions and activities undertaken by the United States at national, regional, and global levels to combat the effects of climate change on the ocean are outlined below. This list is not meant to be comprehensive; rather, it provides an overview and examples of the United States' work in this field.

### **United States' Actions to Address the Effects of Climate Change on the Ocean**

#### ***(i) Collection of relevant scientific data***

8. The United States National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) manages the world's largest collection of publicly available oceanographic data (<https://www.ncei.noaa.gov/>). Its authoritative climate datasets and products support informed decision making and aid in the understanding of coastal and ocean conditions and their impact on the environment, economies, and societies around the world. The NCEI World Ocean Database (WOD) is the world's largest freely available historical oceanographic profile database whose data allows scientists to assess past and present change and predict future change both in the ocean and in other sectors of the earth's climate system.
9. NOAA Coral Reef Watch's decision support system for coral reef management in a changing climate delivers actionable environmental intelligence to managers, scientists, and other stakeholders around the world. Coral Reef Watch helps resource managers identify areas vulnerable or resilient to bleaching and other climate change impacts (including coral disease) and prioritize resources to enhance resilience and bleaching response efforts (<https://coralreefwatch.noaa.gov/satellite/index.php>).
10. NOAA's North Pacific Climate Regimes and Ecosystem Productivity project (NPCREP; <http://www.pmel.noaa.gov/foci/NPCREP/>) collects information on ocean conditions from a network of buoys and ship surveys in the North Pacific and Bering Sea ecosystems. This information, combined with research and modeling conducted to understand and predict environmental and ecosystem interactions, is being used by fishery managers to help guide fishery catch levels in a changing climate.
11. NOAA's Fisheries Service developed a methodology to assess climate vulnerability of marine fish stocks and is using it to assess the climate vulnerability of marine and coastal fish stocks in all U.S. marine regions. In 2016, NOAA Fisheries completed the Northeast Fish Species Climate Vulnerability Assessment. Additional assessments will be completed in 2017 for fish stocks in the Bering Sea and along the West Coast of the United States, and assessments for the Pacific Islands and the Southeast United States will be launched in 2017. Information on Fish Stock Climate Vulnerability Assessments can be found at: <http://www.st.nmfs.noaa.gov/ecosystems/climate/tools/assessing-vulnerability-of->

fish-stocks. NOAA's Fisheries Service is beginning to add information on climate vulnerability of fishing communities using information on fish stock climate vulnerability as the NOAA Fisheries regional fish stock climate vulnerability assessments in each region are completed. Information on the fishing community social indicator system can be found at:  
<https://www.st.nmfs.noaa.gov/humandimensions/social-indicators/index>.

12. The United States, in partnership with the Centre National d'Etudes Spatiales (CNES) and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), operates Jason-2 and Jason-3, the third and fourth satellites in a series designed to maintain long-term satellite altimetry observations of global sea surface height that began in 1992. Over the long term, Jason-3 will help us to track global and regional sea level rise, an increasing threat to the resilience of coastal communities and to the health of our environment (<https://www.star.nesdis.noaa.gov/sod/lisa/SeaLevelRise/>).
13. The NOAA Satellite Oceanography and Climatology Division Sea Ice Science Team works to obtain precise measurements of key sea ice variables including ice-edge location, ice extent, thickness, and drift rates, so as to determine inter-annual variability in the ice cover and to understand the nature of such changes. These measurements are currently used to support the improvement of seasonal-to-decadal model predictions of the Arctic system, through data assimilation, model validation, and the improvement of physical parameterizations in numerical climate models (<https://www.star.nesdis.noaa.gov/sod/lisa/SeaIce/>).
14. In 2016, the United States National Aeronautics and Space Administration (NASA) announced several projects to advance research on climate change and the ocean. The Plankton, Aerosol, Cloud ocean Ecosystem (PACE) global ocean satellite system, due to launch in 2022/23, will monitor the health of our ocean ecosystems and improve our understanding of the carbon cycle dynamics in the ocean and atmosphere (<https://pace.gsfc.nasa.gov/>). The Surface Water and Ocean Topography (SWOT) satellite, due to launch in 2020, will improve our understanding of ocean circulation and climate and is in partnership with the French space agency CNES, as well as a collaboration with Canada and the United Kingdom (<http://swot.jpl.nasa.gov/>). The SMAP satellite, launched in early 2015, is now routinely producing sea surface salinity observations, which can reveal important information about changes in Earth's water cycle, ocean circulation, and climate (<http://smap.jpl.nasa.gov/>). In addition, NASA launched Earth Venture Suborbital projects: the Coral Reef Airborne Laboratory (CORAL; <http://airbornescience.jpl.nasa.gov/campaign/coral>) will produce the first comprehensive assessment of reef conditions in the Great Barrier Reef, the Mariana Islands, Palau, and the Main Hawaiian Islands; the North Atlantic Aerosols and Marine Ecosystems Study (NAAMES; <https://naames.larc.nasa.gov/>) will resolve key processes controlling marine ecosystems and their influences on atmospheric aerosols; and the Oceans Melting Greenland (OMG; <https://omg.jpl.nasa.gov/portal/>) project will investigate the role of ocean warming on glacier retreat in Greenland and the interplay with global sea level rise.

15. The U.S. Global Change Research Program (USGCRP) aims to enhance understanding of global change, including the effects of climate change on the ocean. The program's main activities include improving our knowledge of Earth's past and present climate variability and change; improving our understanding of natural and human forces of climate change; improving our capability to model and predict future conditions and impacts; assessing the nation's vulnerability to current and anticipated impacts of climate change; and improving the nation's ability to respond to climate change by providing climate information and decision support tools that are useful to policymakers and the general public (<http://www.globalchange.gov/>).
16. The United States is also working towards the development of a robust national ocean acidification monitoring system. In addition, it has played a leading role in the development and operation of the Global Ocean Acidification Observing Network (GOA-ON), an integrated, international research effort closely linked with other international research programs (<http://www.goa-on.org/>).
17. To identify biological response endpoints that are most sensitive to coastal acidification, the U.S. Environmental Protection Agency (EPA) collaborates with universities on laboratory studies to predict ecological effects of ocean acidification on shellfish populations, incubation studies of estuarine phytoplankton response to CO<sub>2</sub> enrichment, mesocosm studies to quantify the role of estuarine macrophytes in moderating acidification, and field studies of nutrients and carbonate chemistry. Additionally, EPA has current projects to explore the effects of pH in combination with other stressors on laboratory-held corals to examine their effects on coral growth and calcification, as well as larval settlement. To project relative vulnerability of near-shore coastal species to climate change at regional scales, a trait-based risk framework is being developed. These biotic and climatic data are synthesized via the Coastal Biodiversity Risk Analysis Tool (<http://www.cbrat.org/>).
18. The U.S. EPA is developing bio-economic models for valuing marine ecosystem services and assessing economic impacts from acidification. These models have several components: climate models to estimate future ocean conditions with respect to temperature and acidification, population models to predict how changes to the ocean will affect productivity of shellfish farms and wild harvests of shellfish, and economic models to predict changes to market prices, shellfish sales, and estimates of wages and jobs supported by the shellfish industry.

***(ii) Awareness-raising***

19. The Our Ocean conferences have become a significant platform to spur concrete actions to deal with the threats our ocean faces, including climate-related impacts on the ocean. The third conference, hosted by the United States in September 2016, focused on the key ocean issues of marine protected areas, sustainable fisheries, marine pollution, and climate change-related impacts on the ocean and aimed to inspire and empower a new generation of leaders, entrepreneurs, scientists, and civil society to identify solutions and commit to action to protect and conserve our ocean ([www.OurOcean2016.org](http://www.OurOcean2016.org)). The United States and other participants announced new commitments to protect the ocean valued at over \$5.24 billion and pledged to safeguard almost



four million square kilometers of the ocean. This brings the total amount pledged at all three conferences, hosted by the United States and Chile, to \$9.2 billion and 9.9 million square kilometers, an area the size of the United States. These conferences have been a key part of U.S. efforts to raise the profile of climate change's effects on the ocean and to generate tangible commitments to combat the issue. Future Our Ocean conferences will be hosted by the European Union in 2017, Indonesia in 2018, and Norway in 2019.

20. NOAA's PolarWatch Initiative will facilitate ready access to fit-for-purpose ocean satellite data and data products for government, public, commercial, and academic users to support their high priority applications, services, and operations for the benefit of national socio-economic requirements. This service is essential given the rapid changes occurring within these regions due to climate change and other anthropogenic impacts and uses (<http://polarwatch.noaa.gov/>).
21. The U.S. EPA's Climate Ready Estuaries program assesses climate change vulnerabilities, develops and implements adaptation strategies, and engages and educates stakeholders in the United States. The program's website contains resources addressing how much the sea has risen, how much it might rise, and what the impacts might be, as well as resources for overall climate change adaptation planning, including adaptation options and planning frameworks (<https://www.epa.gov/cre>).
22. The United States has developed regional networks that synthesize and disseminate ocean acidification information in an effort to better inform stakeholders of the issue and solicit critical data and information needs that can guide strategic science investments in coming years. A number of federal agencies conduct activities focused on ocean acidification education, outreach, and public engagement (<http://oceanacidification.noaa.gov/EngagementActivities/USRegionalNetworks.aspx>).
23. NOAA Research's Climate Program Office spearheads [Climate.gov](https://climate.gov/) and the Climate Resilience toolkit efforts (<https://toolkit.climate.gov/>), which are being used nation-wide by planners and decision-makers to help prepare their communities for the effects of climate change. These websites also serve as excellent educational tools for communicating the impacts of climate change.
24. NOAA's Fisheries Service co-sponsored the 2016 international "Species on the Move" symposium to advance understanding and response to climate-related shifts in the distribution of marine and terrestrial species worldwide. In 2018, NOAA and partners will sponsor the 4th International Symposium on the Effects of Climate Change on the World's Oceans to be held in Washington, D.C. June 4-8, 2018 (<http://www.pices.int/2018-climate-change>).

***(iii) Fostering climate resilient sustainable development of oceans and seas***

25. At the 2016 Pacific Island Conference of Leaders, the United States announced a package of nearly \$40 million in new programming to enhance resilience to climate change and advance clean energy development by building regional, national, and local capacity in the Pacific Islands to prepare for

and help mitigate the negative impacts of climate change. This complements previous commitments of nearly \$60 million made since 2010.

26. NOAA is working with the Group on Earth Observations Oceans and Society Blue Planet Initiative (GEO Blue Planet) on multiple programs, including hosting/sponsoring the 3<sup>rd</sup> Blue Planet Symposium planned for June 2017 in the Washington, D.C. area. Further, NOAA is co-hosting the Secretariat of GEO Blue Planet, along with Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO), and the Secretariat's Scientific Coordinator will be based at NOAA. Blue Planet, which works to advance and exploit synergies among the many ocean and coastal observational programs, is developing pilot projects that will build capacity for monitoring and managing climate change globally with a focus on developing countries (<http://geoblueplanet.com/>).

***(iv) Development of ocean-based mitigation measures and adaptation policies and strategies***

27. The United States has begun to incorporate considerations about the changing climate into existing management strategies. New five-year strategies for addressing flooding, shoreline erosion, and coastal storms have been developed by most U.S. coastal states under their Coastal Zone Management Act programs. Many of these plans explicitly take into account future climate scenarios as part of their adaptation initiatives. The North Pacific Fishery Management Council and NOAA have declared a moratorium on most commercial fisheries in the U.S. Arctic pending sufficient understanding of the changing productivity of these fishing grounds as they become increasingly ice-free. Marine protected areas in the National Marine Sanctuary (NMS) System are preparing climate impact reports and climate adaptation action plans under their Climate Smart Sanctuary Initiative.
28. U.S. EPA scientists are exploring concepts and indicators to better understand and quantify the vulnerability and recoverability of coastal communities to severe or chronic climate events. Indicators under consideration incorporate social, governance, risk, and economic factors that could be affected by climate events. The indicators are intended to be used in a screening index to inform communities of their vulnerabilities and opportunities, allowing them to prepare for a more sustainable future.

***(v) Capacity-building, partnerships and financing mechanisms for the implementation of such action***

29. To combat ocean acidification, the United States has formed public private partnerships with several foundations to build capacity for ocean acidification monitoring efforts in developing countries. The United States also leads Pier2Peer, a scientific mentorship program supporting the expansion of ocean acidification observing capacity through the Global Ocean Acidification Observing Network. Pier2Peer employs an adaptive and self-driven approach to capacity development with guiding principles to focus on user needs at the local, national, and international level and to foster inter-regional and global collaboration ([http://www.goa-on.org/3rdWorkshop/GOA-ON\\_Pier2Peer\\_Mentorship\\_Program.pdf](http://www.goa-on.org/3rdWorkshop/GOA-ON_Pier2Peer_Mentorship_Program.pdf)).



30. The United States has made significant contributions each year since 2012 through the International Atomic Energy Agency's Peaceful Uses Initiative to the Ocean Acidification International Coordination Center, which communicates, promotes, and facilitates global efforts on ocean acidification science research (<https://www.iaea.org/ocean-acidification/page.php?page=2181>).
  
31. In September 2016, the United States announced that it would join the International Partnership for Blue Carbon, which seeks to protect and conserve coastal blue carbon ecosystems for climate change mitigation and adaptation. This partnership provides a forum for countries and organizations to benefit from the experience and expertise of the global community and develop an enabling environment for high quality, locally-relevant approaches to protecting and restoring blue carbon ecosystems including mangroves, tidal marshes, and seagrasses (<http://bluecarbonpartnership.org/>).