

# NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE

**Delivering ecosystem science solutions to sustain  
thriving coastal communities and economies**

The National Oceanic and Atmospheric Administration (NOAA) formed the National Centers for Coastal Ocean Science (NCCOS) in 1999 as the focal point for NOAA's coastal ocean science efforts. We help NOAA meet its coastal stewardship and management responsibilities, and we provide coastal managers with the scientific information necessary to decide how best to protect environmental resources and public health, preserve valued habitats, and improve the way communities interact with coastal ecosystems.

## NCCOS SCIENCE PRIORITIES



NCCOS is a nationally recognized leader in **conducting ecosystem science for conservation and sustainable management** of the nation's oceans, coasts, and Great Lakes, including coral reefs, estuaries, and National Marine Sanctuaries and other marine protected areas.



We **develop and implement advanced observation technologies and ecological forecasts** that help coastal managers and emergency officials identify harmful algal blooms, hypoxia, and pathogens and reduce or eliminate their impacts on economies, public health, and marine resources.



We investigate how changes in sea levels, ocean chemistry, and temperature affect coastal ecosystems. Our timely and actionable scientific assessments, data, and tools **help coastal communities plan for and mitigate inundation and other climate-related risks**.



NCCOS works to **define, detect, and reduce threats to coastal ecosystems**. We provide the nation's longest running coastal pollution monitoring and assessment enterprise and respond to legislative mandates to address harmful algal blooms, hypoxia, chemical spills, marine disease agents, and marine debris.



Regardless of where they live, Americans depend on the coast for food, economic security, and recreation. Our researchers **apply social, economic, and behavioral approaches** to develop ecosystem service valuations, vulnerability assessments, and human use mapping products that support thriving coastal communities.

## **Addressing the Climate Crisis by Informing and Advancing Clean Energy Projects**

NCCOS products continue to inform the Bureau of Ocean Energy Management's offshore wind energy siting decisions. This year, NCCOS built spatial [models](#) to identify optimum locations for offshore wind energy in the Gulf of Mexico. The models identified more than 730,000 acres that have the potential to power more than three million homes without disrupting fisheries and other ocean industries. Also, NCCOS and partners [published](#) the at-sea spatial distributions of 33 species of marine birds for the contiguous U.S. Pacific outer continental shelf to guide siting of wind farms that minimize negative impacts to their populations. These products are helping advance the President's clean energy goal of deploying 30 gigawatts of offshore wind energy by 2030, while minimizing the wind industry's impacts on protected species, habitats, and commercial and recreational fisheries.



## **Aerial Drone-based System to Detect Marine Debris and Expedite Clean Up**

NCCOS and partners are developing an aerial drone-based, machine-learning [system to detect and identify marine debris along the coast](#). This year, the team used beaches near Corpus Christi, Texas, to evaluate a polarimetric camera for potential installation on a drone to improve debris detection. Polarized light reflected from human-made objects often differs from natural objects. Next, the team trained a machine-learning computer program to find and classify the debris in the imagery collected. Once fully operational, data collected by the system will be used to make maps that show where marine debris is concentrated along the coast to guide rapid response and removal efforts. The researchers will provide NOAA Marine Debris Program staff with training in the use of the new system.

## **Improving Harmful Algal Bloom Monitoring and Management to Protect the Public**

NCCOS [awarded \\$12.4M this year](#) for harmful algal bloom (HAB) research projects in U.S. coastal and Great Lakes waters. HABs threaten human and animal health, seafood supplies, and local economies. Beach and fishery closures, reductions in tourism, and medical interventions result in the loss of millions of dollars per outbreak. New projects will investigate the effectiveness of clay dispersal as a technology to control algal blooms in Southwest Florida; enhance the freshwater HAB toxin detection capabilities of autonomous underwater vehicles operating in Lake Erie; and optimize an early warning system to support mitigation of shellfish-killing HAB toxins in the Pacific Northwest.



## **Social Vulnerability Assessment Supports Sea Level Rise Planning in Puget Sound**

Coastal communities are increasingly vulnerable to the effects of climate change, such as sea level rise and coastal erosion. To support sea level rise planning in the Puget Sound region of Washington, NCCOS scientists and partners identified social vulnerability at the zip code level by analyzing 36 socioeconomic variables, including age, income, and housing occupancy. Full study results are available in a [technical report](#) online. Local planners, such as the Puget Sound Partnership, will use the social vulnerability indices provided in the report to better protect, plan for, and manage sea level rise impacts within their communities.



## NCCOS Tools and Data Help U.S. Aquaculture Industry Expand

A new web-based mapping tool available to oyster growers and managers in Long Island Sound allows users to see how much *Vibrio* bacteria growth they might encounter when harvesting oysters. *Vibrio* occurs naturally in U.S. coastal waters, and some species can be harmful to human health. The [Vibrio Harvest Calculator](#) can help users make safer oyster harvest decisions. Also, for the first time since 2010, U.S. producers in Massachusetts and Washington are eligible to export live, raw, and processed bivalve shellfish to the European Union. A [NOAA-funded study](#) supported this resumption of trade by providing data about algal toxins in U.S. shellfish to establish equivalent public health protections for both U.S. and E.U. food safety control systems.

## Contamination Assessments to Protect People and Natural Resources

In American Samoa, NCCOS measured contamination in Fagatele Bay (pronounced Fong-a-teh-leh), which is part of the territory's National Marine Sanctuary and hosts some of the most pristine coral reefs in the U.S. The [findings](#) suggest that the water quality of the system is relatively good. Sanctuary managers can use these data to ensure that water quality in the bay does not degrade over time. In the Great Lakes, NCCOS developed a [model](#) to predict contamination along the coast based on patterns of humans in the landscape. The results will help prioritize areas for contaminant testing. Based on environmental contamination originally [reported](#) by NCCOS, the U.S. Environmental Protection Agency added a site in Guánica, Puerto Rico, to its National Priorities List of hazardous waste sites in the U.S. (the Superfund program). Listed sites are prioritized for cleanup funding and enforcement actions.



## Research Highlights Impacts of COVID-19 on Small-scale Fishers and Fish Dealers

NCCOS and NOAA partners surveyed small-scale fishers and fish dealers in Puerto Rico and the U.S. Virgin Islands in August 2020 and found that the COVID-19 pandemic had a negative impact on their livelihoods. Survey results are summarized in a new [publication](#), along with other recent regional socioeconomic findings. Revenue losses are attributed to multiple, pandemic-related factors, including: new restrictions, lack of charter clients, and loss of fish buyers. The new publication also shows that U.S. Caribbean residents believe that local coral reefs provide an array of ecosystem services that sustain the region's seafood- and tourism-driven economy.

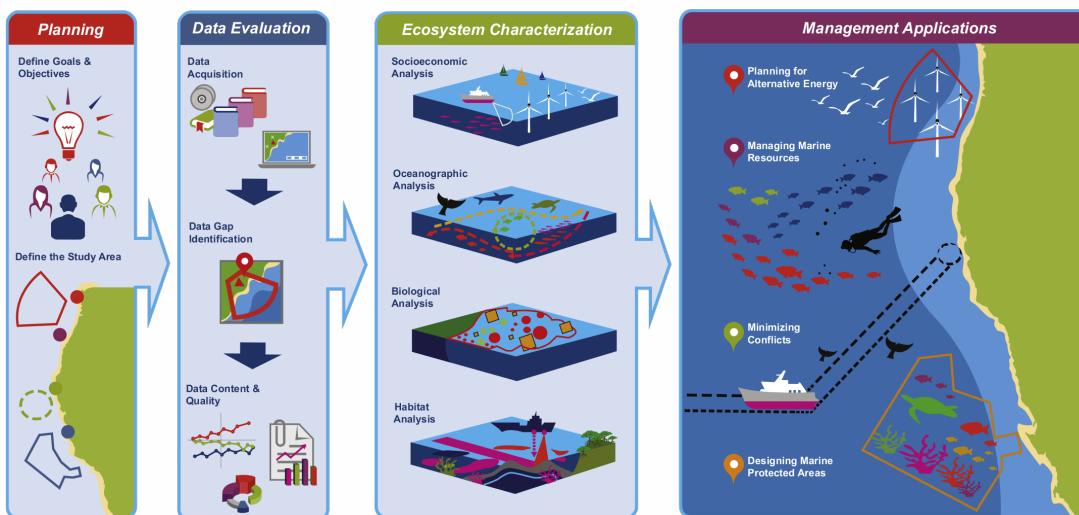
## Identified Endangered Rice's Whales' Habitat Requirements to Support Recovery Efforts

The NOAA RESTORE Science Program, administered by NCCOS, continues to transform penalty funds from the *Deepwater Horizon* oil spill into findings and products that support better management of the Gulf of Mexico. One [project](#) identified the habitat requirements of Rice's whales, a species unique to the gulf. Scientists estimate the oil spill caused mortalities and reproductive failures that shrunk the population by 22 percent. With only 50 or so individuals in existence, there is great urgency to learn more about this critically endangered whale. Project results will be used to inform and improve the recovery, management, and protection of Rice's whales.

## BIOGEOGRAPHY TEAM CELEBRATES MORE THAN 25 YEARS

NCCOS's Biogeography Team studies marine species, the geographic distribution of their habitats, and the relationships between these organisms, their environment, and human communities. Using sonar, remotely operated underwater vehicles, and Geographic Information Systems, the team creates species and habitat distribution maps that inform many marine spatial planning efforts in U.S. waters, including safe navigation, siting offshore aquaculture and renewable energy facilities, and protecting critical habitat for fish, coral, and marine mammals.

**Over 100 biogeographic assessments completed!**



SOURCE: Caldow et al. 2015. [Biogeographic assessments: A framework for information synthesis in marine spatial planning](#). *Marine Policy*. 51:423–432.

## NCCOS FACILITIES



**NCCOS Program Office and Headquarters, Silver Spring, MD** – Serving as NCCOS headquarters and program office, the Silver Spring location houses administrative functions and scientists who address marine spatial ecology and stressor, impacts, and mitigation. NCCOS appropriations are received from the National Ocean Service “Coastal Science, Assessment, Response and Restoration” and “Competitive Research” budget PPAs.



**Cooperative Oxford Laboratory, Oxford, MD** – The lab is a partnership among NOAA, the Maryland Department of Natural Resources, and the U.S. Coast Guard. Scientists at the lab research, and develop strategies to secure, the health of fish, shellfish, and other aquatic life in Chesapeake Bay and along the Atlantic Coast.



**NOAA Hollings Marine Laboratory, Charleston, SC** – This lab provides innovative and high quality research in areas such as harmful algal bloom toxin detection and reference materials, coral health and disease, contaminant fate and effects, and deep coral ecology.



**NOAA Beaufort Laboratory, Beaufort, NC** – Opened in 1899, this facility is the second oldest federal marine laboratory in the nation and focuses on coral reefs, harmful algal blooms, seafloor mapping, aquaculture siting and impacts, and salt marsh ecology.



**Kasitsna Bay Laboratory, Seldovia, AK** – NCCOS partners with the University of Alaska Fairbanks on lab operations and research. The facility includes a 1,400-square-foot, running seawater lab to research coastal impacts of climate change, ocean acidification, harmful algal blooms, and monitoring of nearshore biodiversity. The lab also serves as a testbed for underwater technology in high-latitude coastal ecosystems and under rugged conditions.