# NCCOS

NATIONAL CENTERS FOR
COASTAL OCEAN SCIENCE

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## 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.

**Advancing Clean Energy Projects
to Address the Climate Crisis**

Drawing on results of a spatial suitability model developed in partnership with NCCOS, this year the Bureau of Ocean Energy Management (BOEM) designated wind energy areas off the coast of Oregon and in the Gulf of Maine totaling more than two million acres and proposed auctions for portions of these areas. The sales proposed have the potential to generate more than 18 gigawatts of offshore wind energy, enough to power more than six million homes. The NCCOS–BOEM model analyzed these offshore waters to find areas that have the least conflict with other ocean uses and the lowest environmental impact. NCCOS mapping products in these and other regions are helping advance the President's clean energy goals, while minimizing the wind industry's impacts on protected species, habitats, and commercial and recreational fishing.

**Expanding Marine Aquaculture Along the U.S. West Coast**

As ocean-based industries continue to expand, so too does the need for careful planning to manage multiple ocean uses effectively. Using a series of geospatial analyses, a new study from NCCOS researchers and partners identified areas within and around the busy port of San Diego, California, that are environmentally suitable for aquaculture and could be used without disruption to other ocean-based industries, such as shipping and wind energy. The project demonstrates how coastal managers can use marine spatial planning to balance economic development with environmental sustainability. As the aquaculture industry continues to grow along the U.S. West Coast, the work also provides insights that can be applied to sites beyond the study area.

**Safeguarding the Public from Harmful Algal Blooms**

NCCOS completed the first algal cyst sampling mission in the Gulf of Alaska. By measuring these dormant cysts in the seafloor, the team now has a better understanding of where and when harmful algal blooms (HABs) will occur. Ultimately, the project aims to produce a yearly forecast to help officials manage the risks of algal toxins and ensure safe seafood harvests in the region. NOAA and its partners also provide HAB forecasts for Lake Erie, the Gulf of Maine, and the Gulf of Mexico. In Florida, the red tide respiratory irritation forecast developed by NCCOS is now available on the Beaches App for mobile devices, making it easier for the public to identify which Florida beaches have low risk of respiratory irritation during red tides.
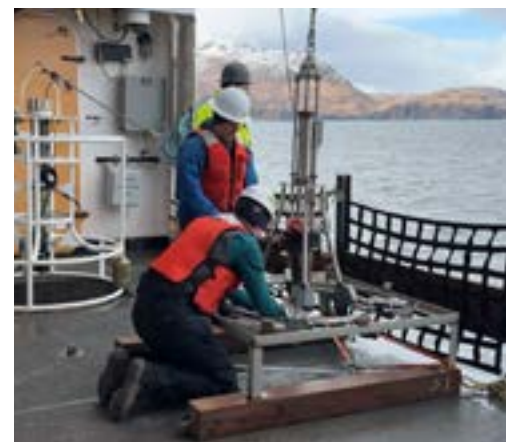
**Protecting the Public from Harmful Chemicals**

NCCOS scientists patented a technology that destroys potentially harmful per- and polyfluoroalkyl substances (PFAS) in drinking water. PFAS are manufactured chemicals that have been used in industry and consumer products since the 1940s, and, because PFAS are widely used and decompose slowly, they are found throughout the environment. The researchers are now working to make the new technology, which uses ozone-laden nanobubbles and ultraviolet light to break PFAS bonds, available to municipal water treatment facilities. Also this year, NOAA's Mussel Watch Program included contaminants of emerging concern—such as pharmaceuticals, flame retardants, and personal care products—in shellfish surveys of the Gulf of Mexico and the West Coast. The expanded monitoring aims to fill critical data gaps for natural resource managers striving to make informed decisions about land-based sources of pollution.

**Applying Nature-Based Solutions to Help Coastal Communities Adapt to Climate Change**

In 2024, the USS *North Carolina* Battleship Memorial began work to address nuisance flooding at the memorial. Located along the Cape Fear River in North Carolina, the memorial has experienced a 7,021% increase in tidal flooding since the battleship came to the site in 1961. NCCOS is helping guide the restoration project, which will convert two acres of overflow parking to intertidal wetland and use excavated material from the conversion to raise the elevation of the remaining parking area. The project is part of a larger NCCOS effort to analyze and predict roadway flooding, assess potential damage, and propose nature-based solutions to address flooding. USS *North Carolina* is the highest decorated American battleship of World War II and has received over 13 million visitors from around the world since coming to Wilmington in 1961.

**Improving Roadway Resilience to Coastal Flooding**

Pavements are highly susceptible to water infiltration during floods, resulting in damage and shortened life spans for roads. Understanding and quantifying this saturation is essential for road management. In response, NCCOS-funded researchers developed a model that predicts the extent and duration of saturation for pavements during flood events. The tool incorporates different pavements, soil subgrades, groundwater levels, and flooding scenarios. The model's capacity to determine peak saturation and restoration times can help identify optimal times to reopen submerged roadways and identify the materials and designs that best withstand inundation. The project is part of an NCCOS partnership with the U.S. Department of Transportation that is working to find ways to maximize coastal road resilience under changing climate conditions.



**Supporting Coral Reef Restoration and Management**

NCCOS and partners developed a model that predicts which locations along the Florida reef tract are most conducive to the survival of nursery-reared Elkhorn coral. The species has been listed as threatened under the Endangered Species Act since 2006, with population decline due primarily to thermal stress and disease. Model results will help inform larger NOAA initiatives, such as the *Mission: Iconic Reefs* project, which aims to restore nearly three million square feet of the Florida reef tract by 2040. Also in 2024, NCCOS identified areas around Guam and the Northern Mariana Islands most in need of seafloor mapping to support shallow-water coral reef management. The data, available in a new publication, will help coral managers efficiently allocate limited mapping resources in the region.

**NOAA Awards $17.2 Million for Natural Resource Management in Gulf of Mexico**

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. This year the program awarded $17.2 million to 32 organizations working across 10 projects to conduct research that will be used by natural resource managers in the region. The awards represent NOAA's commitment to providing officials with the best available science to decide how to balance rapidly changing economic, environmental, and social pressures in the Gulf. Project goals include developing tools and data to protect fisheries, improve oil spill response, and guide restoration of barrier islands, to name a few.

# NCCOS AND NOAA BEAUFORT LAB CELEBRATE BIG ANNIVERSARIES



NOAA NCCOS
25 Years Serving Coastal Communities
NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE – EST. 1999



THE BEAUFORT LAB
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1899-2024

## 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.