NCCOS | NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE

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 Offshore Wind Energy Projects**
Drawing on results of a spatial suitability model developed in partnership with NCCOS, the Bureau of Ocean Energy Management (BOEM) this year designated two Wind Energy Areas in the Gulf of Mexico with the potential to produce enough renewable energy to power nearly three million homes. The NCCOS–BOEM model analyzed the entire Gulf of Mexico to find these roughly 683,000 acres that have the least conflict with other ocean uses and the lowest environmental impact. BOEM is now developing a notice for commercial leasing of the areas. NCCOS mapping products in the Gulf of Mexico and other regions 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 fishing.

Contamination Monitoring Supports Clean Up and Restoration Efforts in Puerto Rico
An NCCOS study that detected environmental contamination at the Ochoa Fertilizer Company's site in Guánica, Puerto Rico, ultimately led the U.S. Environmental Protection Agency (EPA) to add the site to its National Priority List for hazardous waste clean up. In 2023, EPA reached an agreement with the corporation that owns the land to remove contaminated soil from the site. Also in 2023, NCCOS and partners began a program to monitor land-based sources of pollution that threaten coral ecosystems around Puerto Rico's Culebra Island. Excess nutrients and sediments from unpaved roads, failing wastewater treatment systems, and coastal development have taken their toll on these coral ecosystems, and NOAA and other organizations have taken actions in recent years to address the problem. The monitoring program will help determine whether these corrective actions are succeeding.

**Improving Harmful Algal Bloom Monitoring and
Management to Protect the Public**
NCCOS awarded $16.1M this year for harmful algal bloom (HAB) research and monitoring in U.S. coastal waters. Also, NCCOS staff trained over 40 environmental tribal personnel from Southeast Alaska in HAB sampling and identification. Trainees will use the new knowledge to help the region reduce the threats of eating shellfish tainted with algal toxins. In Washington, NCCOS-funded researchers estimated economic impacts from HAB-related cancellations of razor clamming, an activity that can generate as much as $40 million annually statewide. NOAA's Pacific NW HAB Forecast, funded in part by NCCOS, provides shellfish managers with early warnings of HABs, enabling adaptive strategies that can help mitigate economic losses.

Story Map Highlights Maritime Heritage Missions in Great Lakes
In 2021, NCCOS and partners used the latest survey technologies to explore underwater cultural heritage in the Great Lakes. This year NCCOS and NOAA's Office of National Marine Sanctuaries developed a Story Map that shares results from the missions. Story Maps use maps, text, and multimedia to present interactive narratives that provide immediate geographic context to any project. The Great Lakes extend over a thousand miles into the heart of North America, supporting a shipping network that uses routes and ports established over two centuries. There are an estimated 6,000 shipwrecks across the five Great Lakes, tangible reminders of the people whose ingenuity, entrepreneurial spirit, and hard work helped build the nation.

Los Angeles County Uses NCCOS-funded Flood Risk Study for Stormwater Planning

At the end of 2022, the chair of the Los Angeles County Board of Supervisors referenced findings from an NCCOS-funded study in a motion directing the county to assess its stormwater infrastructure and address inequities in the system. The motion was immediately and unanimously adopted. The study that prompted the motion was published in October 2022 and used innovative, flood-risk modeling to identify the severity and extent of flooding faced by Los Angeles County residents within a new, refined flood zone. Notably, the effort identified flood risk far greater than previous, federally defined floodplains. When combined with socioeconomic information, results showed disproportionate risk to disadvantaged communities, highlighting stark racial and economic inequalities.

Aerial Drone Guidelines for Marsh Monitoring Published

NCCOS and partners published guidance on using aerial drones to detect changes in vegetated wetlands. Based on lessons learned in the field, the publication provides entry-level users with best practices for image collection and analysis to create high-quality, two- and three-dimensional mapping products. Historically, researchers have used satellite imagery for large-scale, spatial and temporal analyses of marshes. However, researchers often do not control the image collection schedule, making it challenging to acquire images for the same season, cloud cover, and tidal stage, which can strongly influence or prevent interpretation. Further, satellite imagery rarely has sufficient resolution to detect change at scales that are important to marsh managers. Drones offer a low-cost, flexible way to obtain the accurate, high-resolution images needed to detect wetland changes over both long (sea level rise) and short (after a hurricane) time scales.

Researchers Transfer Threatened Coral Larvae from Florida Reefs to Culture Facility

NCCOS scientists successfully transferred and settled fertilized elkhorn and mountainous star coral larvae — species listed as threatened under the Endangered Species Act — from reefs in the Florida Keys to NOAA's Hollings Marine Lab in South Carolina. The larvae are continuing their development in the lab's coral culture facility. Data from the study will allow coral restoration practitioners to better harness assisted coral reproduction for reef recovery and help scientists and managers better understand environmental threats to the early life stages of Caribbean corals. The work supports NOAA's larger *Mission: Iconic Reefs* project, which aims to restore nearly three million square feet of the Florida Reef Tract over the next 20 years.

First Gulf Ecosystem Initiative Awards Announced

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 announced the first awards for its Gulf Ecosystem Initiative to support synthesis research. For the next two years, two working groups will analyze how offshore wind development and severe weather events are likely to impact Gulf fisheries. Findings will help guide fisheries management in the context of the Gulf's soon-to-boom offshore wind industry and growing vulnerability to climate change. Gulf of Mexico fisheries provide more than 40 percent of our nation's domestic seafood supply.

NCCOS

NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE

NCCOS CELEBRATES 20 YEARS OF HABITAT MAPPING IN U.S. CARIBBEAN

NCCOS's Biogeography Team studies marine species, the geographic distribution of their habitats, and the relationships between these organisms, their environment, and human communities. In 2023, the team marked its 20th and final year of seafloor habitat mapping missions in Puerto Rico and the U.S. Virgin Islands to fill in data gaps identified by natural resource managers in the region. Using sonar, remotely operated underwater vehicles, and Geographic Information Systems, the team collected data that helped characterize the diversity, distribution, and condition of shallow-water and mesophotic (100–985 feet deep) coral ecosystems, as well as their associated fish communities.

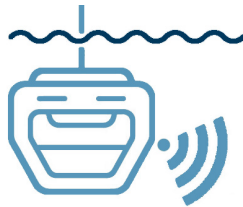Over the 20-year lifespan of the project, the team completed:

21
Mapping Missions

224
Total Days at Sea

878
ROV/Camera Dives

1,729
Square Nautical Miles Mapped

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.