Fostering the New Blue Economy

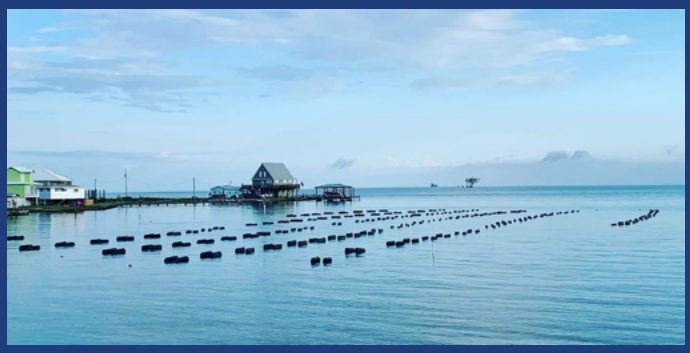
Charting a Course for a Sustainable Future

NESDIS plays a pivotal role in advancing our nation's New Blue Economy by collecting and providing data, technology, and insights to unlock the full potential of our coasts, oceans, and the Great Lakes. Operating Earth-observing satellite missions in orbit and data information systems on the ground, NESDIS data informs agencies, businesses, coastal communities, and other stakeholders to guide decisions and actions that have a far-reaching impact on our sustainable future.

What is the New Blue Economy?

The Blue Economy describes the sustainable, equitable, and socially inclusive use of ocean and Great Lakes resources to benefit economies, livelihoods, and ocean ecosystem health. These include resources such as fisheries, renewable energy, tourism, and the preservation of marine ecosystems. The Blue Economy offers enormous potential for economic growth, job creation, and environmental conservation.

The New Blue Economy takes this concept a step further, looking to the sea for big-data and information. NOAA plays a crucial role in collecting, developing, and sharing ocean and coastal data. As a public service agency, NOAA is in a unique position to lead and accelerate the early development of the New Blue Economy by transforming how ocean data is applied across various industries. NOAA is dedicated to collecting the most reliable ocean data for building connections between healthy ocean ecosystems, economic benefits, and prosperous, resilient coastal communities.



Critical to the New Blue Economy are operations like this oyster aquaculture facility near the mouth of Mobile Bay, Alabama, in the Gulf of Mexico adjacent to vacation housing. In the background, gas platforms are being used for energy production. Credit: Navy Cove Oysters in Fort Morgan, Alabama

Ocean Monitoring and Climate Studies

NESDIS's satellites and sensors monitor ocean temperatures, sea-level rise, the progression of climate change, and more. Coastal communities and marine industries depend on information from our satellites to prepare for immediate events like storms and flooding, but also to make informed decisions on long-term strategies and plans for adapting to environmental changes.

For example, certain environmental conditions encourage the growth of Harmful Algal Blooms (HABs), which can be toxic and disrupt seafood supplies, threaten human health, and impact economies. NOAA NESDIS collaborates with various partner agencies around the world to provide scientists with satellite data that helps them to better understand ways of reducing harmful impacts of HABs.

For example, NOAA's National Centers for Coastal Ocean Science's (NCCOS) Algal Bloom Monitoring System utilizes data from the Visible Infrared Imaging Radiometer Suite (VIIRS) onboard NOAA's JPSS polar-orbiting satellites along with data from sensors onboard other NASA, European Space Agency, and EUMETSAT satellites.

This system provides real-time information on bloom intensity in both freshwater and marine areas, helping managers and researchers make informed decisions about water sampling, municipal drinking water systems, and other water-dependent activities. Public health officials also use the information to prepare for potential impacts of HABs.

NCCOS forecasts HABs using data and other inputs from the Sentinel missions—a constellation of European Space Agency and joint missions that share information with NOAA.

For anybody who loves a fresh-shucked oyster, rest assured that NESDIS satellites are the "sentinels in the sky" watching for events like a red tide—a HAB caused by Karenia brevis algae—which threatens both wild and cultivated oyster harvests. This is especially important as oyster landings in the north-central Gulf of Mexico continue to decline, and the seafood industry looks to oyster aquaculture to help bridge the gap in oyster production.

NOAA's National Centers for Environmental Information's (NCEI) Harmful Algal BloomS Observing System (HABSOS) receives HAB observations from monitoring agencies operated by states along the Gulf of Mexico. These observations are on a publicly accessible map almost instantly. Oyster farmers in the Gulf use these maps and data to adjust their harvest plans, helping them cover the cost of bloom-related closures. The public can also find HABSOS records of these observations dating back to 1953, available within the NCEI archive.

Fisheries Management

Without healthy oceans, we would not have sustainable fisheries and aquaculture—which provide a large supply of seafood. NESDIS collects data on sea surface temperatures, ocean currents, and plankton distribution, all information that fishery managers depend on to determine fishing quotas and protect endangered species.

A handful of young oyster spat ready to be stocked in underwater cages at an aquaculture facility. Credit: Navy Cove Oysters in Fort Morgan, Alabama.

NOAA Fisheries oversees 163 endangered and threatened marine species around the globe, but changing climate and oceans greatly affect not only the nation's marine life, ecosystems but also the human communities that rely on them.

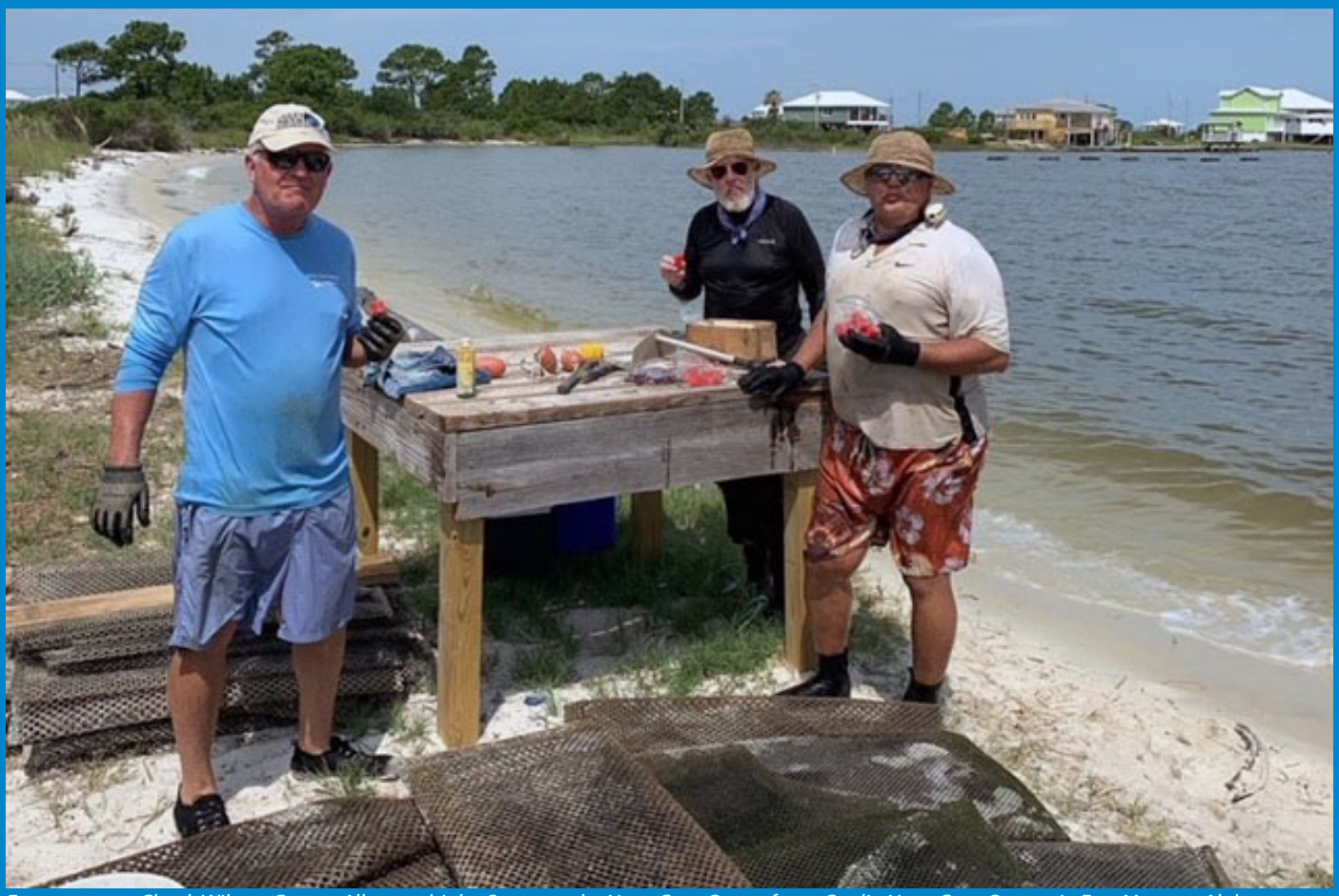
Warming oceans, rising sea levels, increased floods and droughts, and ocean acidification are changing how we manage fisheries and protect habitats. Climate change threatens 1.7 million jobs and $253 billion in annual economic activity supported by fisheries in the United States. Coastal habitats also offer crucial services, including nurseries for fish, protection for people from storms, and support for protected species. NESDIS satellite information is helping people, communities and industries prepare for changing oceans and sustain the nation's valuable marine resources, fisheries, and coastal communities.

HABSOS Helps Manage Oyster Harvest

Dr. Chuck Wilson, Chief Science Officer of the Gulf of Mexico Research Initiative and contributor to the Gulf of Mexico Alliance co-owns the Navy Cove Oyster farm in Fort Morgan, Alabama He and his team have utilized HABSOS as a decision tool for harvest management when red tide blooms approach their farm, such as a particularly large one during the fall of 2018.

"HABSOS is a major addition to our water quality forecasting abilities," Dr. Wilson said. "When we see a HAB moving west along the Northern Gulf coast, it gives us an opportunity to harvest extra oysters in advance of a health department closure. This allows us to continue to meet market demand while our waters are closed."

Dr. Wilson also explained that knowledge about a HAB approaching their area allows his team to minimize stress on the oysters. "For example, when we know a bloom is approaching, we stop doing things like drying and grading oysters which can be stressful to them. When oysters experience too much stress it can affect their growth and even cause mortality."

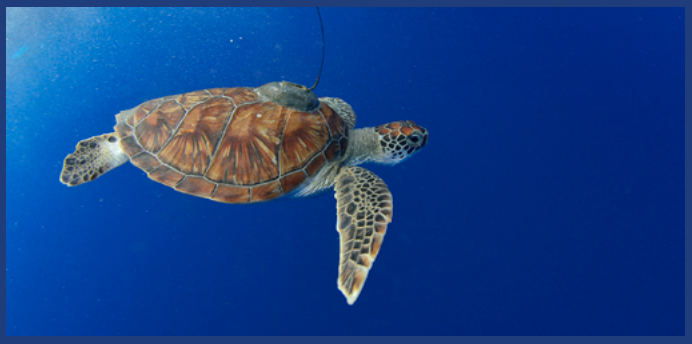


Farm partners Chuck Wilson, George Allen, and John Supan at the Navy Cove Oyster farm. Credit: Navy Cove Oysters in Fort Morgan, Alabama.

NOAA's latest Argos DCS contribution was launched on Oct. 7, 2022: an Argos-4 payload provided by the French Space Agency (CNES) is hosted onboard the General Atomics' GAzelle satellite.

Innovation in satellite and instrument technology is providing new and improved means of tracking crucial environmental conditions and marine ecosystems. The only satellite capable of tracking very small surface transmitters on Earth is the Argos Data Collection System, which monitors and studies marine species. In a partnership with France's Space Agency, Centre National D'Etudes Spatiales (CNES), dating to the 1970's, NOAA/NESDIS currently contributes four of the nine active polar-orbiting satellites with Argos instruments onboard.

In 2024, CNES and its subsidiary companies, Collecte Localisation Satellites (CLS) and Kinéis, plan to launch 25 small-sats, enhancing the Argos program and significantly improving marine animal tracking capabilities.



An Argos tracker attached to a sea turtle. Credit: Collecte Localisation Satellites (CLS)

Ecosystem Conservation

Under the ocean's surface, but within reach of sunlight, thrive vast meadows of seagrass. More than 70 species of these aquatic plants are found on every continent except Antarctica, and while often confused with seaweed, are the only flowering plants living in the oceans.

Seagrass meadows are one of the most productive ecosystems in the world, providing important food sources and habitats for a diverse community of wildlife—from tiny invertebrates to large fish, crabs, turtles, marine mammals, and birds. In fact, some species of fish and shellfish are only found in seagrass meadows. Additionally, seagrass plants filter water, produce oxygen, and control erosion while acting as vital carbon sinks, storing carbon captured from the atmosphere. Thus, if properly managed, they could help rein in global carbon dioxide emissions responsible for climate change.

While we know the value of seagrass meadows, we are still understanding the extent of their reach on the globe—estimates vary from 150,000 to more than 4.3 million square kilometers.

Without precise information on seagrass coverage and density, efforts to manage human impacts, coastal development, and climate change adaptation are more challenging to implement. Traditional field observations are expensive and time-consuming, and legacy satellites haven't had the resolution needed to distinguish seagrasses from other underwater features.

However, thanks to recent advances in sensor technology, we now have sharper satellite imagery that can capture detailed views of coastal areas, mapping features as small as two meters. Working with partners in the Philippines and Indonesia, NESDIS is creating the first-ever large-scale maps of seagrass coverage and density along their coasts.

The Tropical Indo-Pacific global seagrass bioregion has the largest difference between expected and mapped seagrass areas. The NESDIS information on seagrass coverage and density will help our partners in the Philippines and Indonesia develop sustainable management plans. The NESDIS information will also refine global carbon budgets, giving a better understanding of blue carbon–carbon captured by the world's oceans and coastal areas. Without high-resolution satellite data, mapping the extent and density of these seagrass beds would be too difficult, hindering crucial management efforts.

The Future of Our Oceans

These are just a few examples of the work NESDIS conducts to preserve the future of our oceans and the New Blue Economy. By promoting a healthy and thriving New Blue Economy, NESDIS contributes to economic prosperity, and addresses challenges such as climate change, overfishing, and coastal erosion. NESDIS initiatives empower decision-makers, researchers, and local communities to make informed choices that protect the environment while promoting economic development.

However, as our planet's climate changes, it's crucial for NOAA's environmental monitoring capabilities to evolve. Building on the legacies of the current geostationary GOES and polar-orbiting JPSS satellite missions, NOAA is currently developing the next generation of satellites that will take over for its current fleet as they near the end of their operational lifespans. Geostationary Extended Observations (GeoXO), NOAA's next series of geostationary satellites, and Near Earth Orbit Network (NEON), NOAA's next series of polar-orbiting satellites, will include enhanced imaging and new capabilities that will help monitor the health of our oceans.

For example, NOAA plans to include a new Ocean Color (OCX) instrument as part of the GeoXO satellite system. This tool will monitor various aspects of the ocean, such as its biology, chemistry, and ecology, and will offer more frequent and detailed information than current monitoring methods. OCX, positioned in geostationary orbit, will provide updates at least every three hours, a significant improvement over the once-per-day updates from current sensors in low-Earth orbit. This frequent, high-resolution data will enable NOAA to provide more accurate and timely forecasts and guidance to various agencies and industries, including ecological forecasters, marine resource managers, health departments, as well as the commerce, recreation, and tourism sectors.

NEON will launch small to medium-sized satellites with Earth-observing instruments more frequently. A resilient constellation of low earth orbiting satellites, which can be deployed quickly, will enhance our weather forecasting, disaster management, and understanding of the effects of global climate change.

By ensuring the responsible management of marine resources, these advancements pave the way for a sustainable future for generations to come.