

COASTWATCH

Center for Coastal Studies
Provincetown, Massachusetts

2023 • Vol. 45

Includes 2022
Financial Report





Letter from the Executive Director

Dear Friends,

With so much going on at the Center for Coastal Studies, it's not easy to paint a comprehensive picture of what our dedicated team does.

On any given day, you might find CCS staff members carrying out research at sea, disentangling marine animals, conducting an aerial survey to observe whales, working in the field along our coastline, collecting marine debris on our beaches, guiding nature walks, and working with students in local schools to inspire the next generation of conservationists.

Meanwhile, our base of operations, the Hiebert Marine Laboratory, is a beehive of activity. One day this fall, upon arriving at the office, I found a dozen members of the Marine Debris and Plastics Program's volunteer "Beach Brigade" spread out in Larkin Hall, busily sorting and tallying huge piles of trash gathered at a recent beach sweep.

Later, I joined David Mattila and Scott Landry from our Marine Animal Entanglement Response (MAER) team to welcome four colleagues visiting from Brazil. They were here to receive training in disentanglement techniques in order to launch a disentanglement program back in Brazil.

Lisa Sette of the Seal Research Program and Christy Hudak of the Right Whale Ecology Program were huddled over coffee, preparing a grant application to fund an emerging area of research involving environmental DNA, or eDNA, which can provide critical data about marine biodiversity.

I found Jenn McFarland, our Volunteer Coordinator and Retail Manager, unpacking CCS hats and T-shirts in preparation for the Harwich Cranberry Festival and Wellfleet OysterFest as part of our ongoing efforts to connect with the community and reach new audiences.

Stormy Mayo, CCS co-founder and a tireless advocate for protection of critically-endangered right whales, was being interviewed by a South Korean TV crew. Nearby, staff in the Development Department were glued to their computers, planning our annual Homeport Gala at the Wequassett Resort.

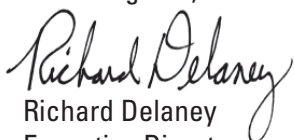
Downstairs, the Cape Cod Bay Monitoring Program team was, as always, analyzing water samples from around the region, while across the hall, our new genetics lab was being installed.

And that's just skimming the surface. I encourage you to explore this edition of *Coastwatch* to gain a deeper understanding of the work we do.

Finally, I invite you to visit us at the Hiebert Marine Lab in Provincetown, meet our dedicated staff, and view our exhibit featuring the humpback whale named *Spinnaker*.

Your support is invaluable, and without it, none of this would be possible.

Warm regards,


Richard Delaney
Executive Director

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Entanglement Response



The Center's MAER team disentangles the humpback whale *Pinball*, August 12, 2023. CCS Images, NOAA Permit 24359



Marine Animal Entanglement Response

On the morning of August 12th, the Marine Animal Entanglement Response (MAER) hotline received a call about an entangled humpback whale off the coast of Gloucester. As the team made its way north from Provincetown, they came across another humpback, known as *Ravine*, and her calf feeding on Stellwagen Bank. The team stopped briefly to document the calf, which they had disentangled the month before. Wounds from the entanglement were still raw but healing.

Off Gloucester, the team found the entangled whale, a mother named *Pinball*. After a difficult disentangling, *Pinball* was freed, and the team watched her and her calf swim offshore together. During the return trip to Provincetown, the team received two more reports of entangled humpback whales, both carrying monofilament line.

The day highlighted the need to make more progress on entanglement prevention. The MAER team contributes to this effort by carefully gathering information about entanglements during the dangerous and difficult work of disentangling. When this is combined with information from collaborators up and down the coast, it creates a clearer image of the breadth and scope of the entanglement problem for our local whale species. This information is also shared internationally, showing clearly that entanglement is not solely a local issue; it's a global one.

As in prior years, the MAER team continued to collaborate with colleagues and institutions locally and abroad. This included conducting training sessions for colleagues from Brazil, Canada, Italy and Kenya, and providing custom-made tools for responders along many different coasts.

In September, the MAER team learned that the entanglement response team from West Maui lost its entire cache of disentangling tools in the devastating fires in Lahaina. With help from supporters, the MAER team was able to donate a new set of tools so they can be ready for their upcoming season.

The team also continued its long-term collaboration with the International Whaling Commission, which formed the Global Whale Entanglement Response Network (GWERN) in 2011. Since that time, the GWERN has worked with entanglement responders in over 40 countries, highlighting the international nature of the entanglement problem, and again, the need to find meaningful solutions.

Humpback Whale Research



A humpback whale breaches in American Samoa.

NMFS ESA-MMPA Permit 25754

Long-term Studies Reap Prestigious Rewards

CCS scientists co-authored three scientific papers in the top journals *Science* and *Nature Aging* in 2023. The most recent one was rooted in a three-decade collaboration between the Humpback Whale Studies Program and adjunct scientists, Drs. Per Palsbøll and Martine Bérubé at the University of Groningen. In “*Wild pedigrees inform mutation rates and historic abundance in baleen whales*,” the team analyzed skin samples from related individuals, including humpback whales that the Center has studied for over four decades in the Gulf of Maine. Ph.D. student Marcos Suárez-Menéndez used techniques rarely applied to wild animals to detect genetic mutations in trios of parents and their offspring. This allowed estimates of mutation rates to be derived directly from wild populations instead of the fossil record.

Many aspects of science depend on estimates of mutation rates, previously thought to be relatively low in large animals like whales. For example, it had long been thought that large-

bodied animals must have fundamentally lower mutation rates; otherwise the substantially greater number of cells in their large bodies should result in a much greater cancer risk. However, the opposite appears to be the case. In another example, a prior genetic study using lower mutation rates incorrectly suggested that significantly more humpback whales were killed in North Atlantic whaling than previously thought.

The new findings, published in *Science*, suggest that mutation rates of baleen whales are not particularly low after all, but rather similar to humans, apes and dolphins. This reinforces the importance of investigating other mechanisms that lower cancer rates in whales, perhaps contributing to future treatments for humans. It also informs whale research and conservation by placing the number of humpback whales killed in commercial whaling much closer to expectations from whaling records. This is critical information for understanding their recovery status today.

Read more.

Most marine mammal populations in the US North Atlantic are vulnerable to climate change. Read the study co-authored by CCS here:



Humpback Whale Research Resumes in American Samoa

CCS resumed research in American Samoa in 2023, for the first time since the COVID-19 pandemic. Since 2003, members of the Humpback Whale Studies Program have traveled there in September-October to study the humpback whales that breed in the South Pacific. CCS works with the American Samoa Department of Marine and Wildlife Resources to document these whales at the end of their breeding season, before they start their migration down to Antarctica. American Samoa can be a challenging area for fieldwork due to its strong trade winds, exposure to a vast expanse of ocean, and frequent squalls. However, the photo-identification data and genetic samples collected in the field are necessary to understand the population structure of humpback whales in the South Pacific and their exchange among different breeding and feeding grounds.

CCS Helps Broaden Participation in Marine Mammal Science

CCS collaborated with Whale and Dolphin Conservation to produce an early education program to address racial and socio-economic barriers to nature. *Whale ID* is an inclusive 4th-grade educational program that teaches children in under-resourced communities about whales and their critical marine habitats. Diverse classrooms learn about whale ecology and participate in the humpback whale naming tradition led by CCS.

Students from two Brockton, MA schools took the Whale ID course and used their learning to name eight Gulf of Maine humpback whales. The program helped them to understand that whales matter to their lives and to see themselves as future professionals in research or conservation. Additionally, the whale names, and the story behind them, will continue to raise public awareness for decades through whale watching-based education off New England.

The program was possible through the financial support of the Dorr Foundation and the help of Friends and Mentors (Brockton, MA).



CCS staff partners with the American Samoa Department of Marine and Wildlife Resources.

Right Whale Research

Cape Cod Bay Attracts North Atlantic Right Whale Mothers and Their Calves

Research conducted in 2023 by the Center's Right Whale Ecology Program (RWEP) reinforced the importance of Cape Cod Bay as a habitat for the North Atlantic right whale. Despite the decreasing population, estimated at just 350 individuals, the presence of North Atlantic right whales in Cape Cod Bay is increasing. The bay appears to be not just a place for feeding and socializing, but an important nursery.

It now appears that mothers and their calves arrive in Cape Cod Bay earlier in the year and in greater numbers than in the past. Of the 11 right whales with newborn calves observed in the southeast United States during the last calving season, 10 were later sighted in Cape Cod Bay by CCS field teams.

Early whaling decimated the right whale population, and it has never recovered. Protection is driven by the grim arithmetic of extinction: the number of new calves minus mortalities. If the difference is negative, then the population is declining, which is the case. That's why Cape Cod Bay may play a vital role in the recovery of the North Atlantic right whale. In this tiny bay, mothers feed and nurse their young after making a winter trip of 1,000 miles along the storm-tossed Atlantic coast from their birthing grounds off Florida and Georgia.

Unfortunately, out of the entire population, fewer than 70 females are capable of reproduction. Additionally, there are some older females who, despite being of age, have never given birth.

From December 2022 through May 2023, the CCS aerial team flew 34 systematic surveys to document the distribution and behavior of right whales in the region and capture photo documentation for individual identification and health assessment. The team sighted right whales during the first field day of the season on December 21st, and new right whales continued to be observed in Cape Cod Bay through late April as they migrated north.

By May, the team had flown 7,937 nautical miles of track line, analyzed over 27,500 photographs and identified 199 right whale individuals, representing approximately 58% of the total population. The 'busiest' day last season was April 9th, when the team recorded 85 individual right whales.

Clearly, right whales are demonstrating a preference for Cape Cod Bay, though the reason is unclear. While it's possible that the bay's food resources are improving, or that feeding grounds elsewhere are

deteriorating, one thing is clear in this era of climate change: the seasonal abundance of microscopic food for right whales in Cape Cod Bay is a primary driver of the changes we observe.

Historically, the places where right whales gather have shifted as foraging patterns change. Right whales used to congregate in the Bay of Fundy but are now seen there only rarely, having shifted north to the Gulf of St. Lawrence. Similarly, an area east of Nantucket was a hotspot in the 1980s, but not so anymore. While Cape Cod Bay appears to be a relatively stable food source, that could change, and we anticipate that climate change will alter the dynamic conditions of the bay, affecting the food supply.

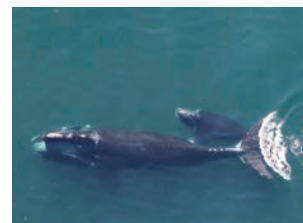
During the 2023 field season, researchers aboard R/V *Shearwater* sought to describe the characteristics of the Cape Cod Bay ecosystem in order to better understand the role that the bay plays in the lives of the last of the right whales of the North Atlantic. Throughout the season, CCS field scientists recorded oceanographic data, photo-documented individual right whales, collected zooplankton samples to monitor the right whales' food source, collected eDNA samples in the vicinity of right whales, and coordinated between right whale observations and satellite surveillance. In total, researchers aboard R/V *Shearwater* spent 111 hours at sea on 24 research cruises and collected 262 zooplankton samples and 62 eDNA samples.

The excellent and dynamic cooperation the Center has with the MA Division of Marine Fisheries (DMF) continued in 2023. Right whale conservation efforts in Cape Cod Bay are more stringent than those of anywhere else along the East Coast, with the implementation of strict rules governing boat speed and the deployment of fixed fishing gear during right whale season. Our cooperative work with DMF has undoubtedly saved whales.

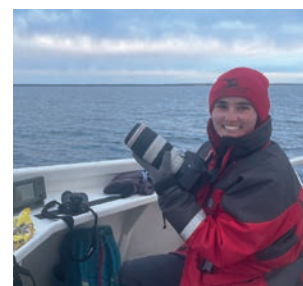
April 24, 2023 was the first Massachusetts Right Whale Day! The RWEP hosted public presentations to raise awareness about these critically endangered animals and the issues threatening their survival.

The CCS RWEP plans to conduct an expanded 2024 field season. The aerial survey team commenced surveys off southern New England in October 2023, keeping an eye out for the arrival of right whales to Cape Cod Bay.

EgNo 4340 "Pilgrim" with her 2023 calf. Photographed from R/V Shearwater, March 27, 2023. NOAA Permit 25740-01



EgNo 1701 "Aphrodite" and her 2023 calf, April 9, 2023. NOAA Permit 25740-01



RWEP right whale observer intern Molly Tucker aboard R/V Shearwater.



RWEP 2023 Aerial Survey Team: William Carome, Ryan Schosberg, Brigid McKenna, Amy James.



2023 RWEP habitat research intern Sasha Milsky collecting zooplankton samples aboard R/V Shearwater.

Marine Fisheries Research

Marine Fisheries Forges Partnerships with Local Communities

The Center's Marine Fisheries Research Program is growing in response to the increasing need from the community for scientific data collected in collaboration with fishermen and shellfish farmers. The first few months of 2023 saw Program Director Owen Nichols travel to a number of regional conferences to build new partnerships between local communities, the Center, and scientists and students with expertise from other institutions.

Ongoing collaborations and partnerships continue to provide new data with which to understand the effects of climate change on fish and shellfish habitat. The Center and Provincetown fishermen participate in the eMOLT (Environmental Monitors On Lobster Traps/Large Trawlers) project, led by the Gulf of Maine Lobster Foundation and NOAA Fisheries, collecting vital data on bottom water temperature around Cape Cod. The Center is working to incorporate local fishermen's observations and questions into ongoing studies of hypoxia in Cape Cod Bay led by the MA Division of Marine Fisheries (DMF), the Woods Hole Oceanographic Institution, and the CCS Water Quality Monitoring program. While oceanographic data and the resulting models are key to understanding the causes of low oxygen in the bay, a naturalist's approach to observing the system and its biology and ecology is critical to understanding the effects of hypoxia on lobsters, crabs, and other organisms.

Education is a key component of the Marine Fisheries Research Program's work. Program staff engage with Cape Cod students from elementary to high school in the field and the classroom, as well as with undergraduate students at universities along the East Coast, often teaching in partnership with fishermen on land or on board their boats. All of these projects require many hands. In addition to the many community partners, volunteers, and AmeriCorps service members who have assisted in the past, the Fisheries Program hired Molly Tucker as its first part-time research assistant this year, a position that became full-time in November. Molly joined CCS as an intern in the Right Whale Ecology Program in January, and also worked as a field assistant in the Land-Sea Interaction Program. Welcome Molly!



Owen Nichols presents a poster, "A Laboratory at Land's End: Community-Based Shellfish Research at the Center for Coastal Studies," showcasing the Center's growing research capability, at the National Shellfisheries Association's annual meeting in Baltimore, Maryland.



Researchers Study Green Crabs in Nauset Harbor

Working with shellfish farmers and University of New Hampshire Ph.D. student Kelsey Meyer, CCS researchers sampled green crabs from several sites in Nauset Harbor to obtain stomach contents for DNA diet analysis of this invasive species, which will help the Center better understand the green crabs' impact on shellfish habitat and harvest. Developing an understanding of the ecological role of green crabs in different habitats will inform efforts to develop control or harvest strategies targeting the species.

AmeriCorps Cape Cod Year 24 service member Fred Stumbo sampling green crabs in Nauset Harbor.

Marine Fisheries Research

Local Meetings Lead to Oyster, Lobster Research

Oyster farmers face a number of challenges due to changing environmental conditions and their effect on growth and abundance of pests like boring sponges and invasive tunicates. Boring sponges inhabit the oysters' shells, eating away the structure and forcing the oyster to divert energy from growth to repairing its shell, while also rendering the oysters unsuitable for most markets. In partnership with shellfish farmers in Mashpee and Wellfleet as well as experts at Cape Cod Cooperative Extension and Georgia Southern University, CCS researchers have begun a study of boring sponges, working to determine which species are prevalent and when they reproduce, which will inform growers' attempts to control sponge outbreaks on their farms.

The sponge study originated from questions posed by shellfish farmers during a town Shellfish Advisory Board meeting. Like international conferences, local meetings are great opportunities for collaboration. At this spring's Massachusetts Lobstermen's Association annual weekend, Outer Cape lobstermen attended seminars and heard presentations by the DMF and the Commercial Fisheries Research Foundation (CFRF), and subsequently engaged CCS Marine Fisheries Research Program Director Owen Nichols in some lively discussions involving staff from all three organizations. Several data gaps in the understanding of lobster stock structure around Cape Cod were identified. Over the spring and summer, collaborative projects began, allowing fishermen to collect data that can fill these gaps and feed into the fisheries management process.

In coordination with DMF and the University of Maine's Lobster Institute, benthic collectors for sampling postlarval lobsters were placed in southern Cape Cod Bay by a commercial fishing vessel. These collectors create a miniature artificial reef of sorts, mimicking ideal habitat for lobsters to 'settle' out of the plankton in their first year of life. When the collectors are recovered this fall, the lobsters and other organisms within will be counted and measured. Additionally, temperature and dissolved oxygen data, recorded by sensors, will be downloaded. This will provide information on the bay's suitability for lobster settlement and contribute data to the American Lobster Settlement Index, a collaborative effort extending from Rhode Island to Canada.

Meanwhile, lobstermen fishing along the eastern shore of Cape Cod, or the 'Outer Cape,' have begun participating in CFRF's Lobster and Jonah Crab Study Fleet, with logistical support from CCS. Fishermen are utilizing electronic logbooks and employing modified traps to gather comprehensive demographic data on lobster populations along the Outer Cape, which they can then provide to resource managers.



AmeriCorps Year 23 service member Maddy Oerth documenting recovered marine debris, including lost lobster traps.

Center Joins with MBL to Study Squid Eggs

Another new project in 2023 was the development of an acoustic method to detect and quantify longfin squid eggs on the seafloor. Researchers from the Seafloor Mapping and Marine Fisheries Research Programs are working in concert with the Marine Biological Laboratory (MBL) to collect high-resolution sonar and underwater video data in areas where the MBL's research vessel is collecting squid egg masses. These data will allow verification of targets identified as squid eggs by the sonar operators. The ability to identify and map the locations of squid eggs will allow us to learn more about squid spawning habitat and begin to develop an index of future squid biomass based on egg abundance.

Program Examines Impact of Marine Debris on Fisheries

Collaboration between local fishermen and the Marine Fisheries Research and Marine Debris and Plastics Programs continues to contribute to the scientific understanding of marine debris impacts on the environment. Data collected on board fishing vessels engaged in debris recovery were analyzed by CCS Seascape Ecologist Bryan Legare in order to develop a method for aging recovered lobster traps based on the composition of organisms that colonize the lost gear. Results of this study have been published in an article in the journal *Aquatic Conservation*, co-authored by Owen Nichols and Laura Ludwig.

Seal Research



Gray seal haul-out in June 2023 at Long Point, Cape Cod National Seashore. UAS Image, CCS, NOAA Permit 18786-06.

Surveying for Entanglement

Building on long-term monitoring of gray seal entanglements, the Center's Seal Program, in conjunction with the Northeast Fisheries Science Center and the International Fund for Animal Welfare, is conducting simultaneous boat-based and unmanned aerial (drone) surveys to observe haul-out sites in Southeastern Massachusetts. The goal of the project is to quantify and characterize gray seal entanglements, and determine if drone imagery can improve our ability to detect and describe entanglements in both gray and harbor seal populations in the region.

Beach Cleanups in Sensitive Areas

In 2021, the Center's Seal Research and Marine Debris and Plastics Programs initiated a collaborative effort in sensitive areas within the Cape Cod National Seashore where wildlife and marine debris coexist. The aim is to reduce the potential for marine debris entanglement by conducting a series of beach cleanups prior to the seasonal establishment of shorebird nests and gray seal haul-outs in spring. Marine debris such as packing straps and plastic throwing rings are commonly observed on gray seals around Cape Cod.

Observations from the cleanups are shared with NOAA's Marine Debris Program, the U.S. Fish and Wildlife Service, and the Cape Cod National Seashore in a regional effort to track the impact of marine debris on coastal areas and wildlife. Seabirds and shorebirds like piping plovers, least terns, and double-crested cormorants, which often nest adjacent to seal haul-outs, also benefit from these targeted cleanups. This collaborative program, combined with outreach and education, is geared toward raising awareness of the extent and impact of marine debris on wildlife.



Gray seal with a green plastic throwing ring neck entanglement. CCS, NOAA Permit 17670.



Algal coats on gray seals hauled out at Wood End, Cape Cod National Seashore. CCS, NEFSC Permit 26939.

Seal Populations & Climate Change

According to the Gulf of Maine Research Institute, the surface of the Gulf of Maine is warming faster than 97% of the world's oceans. As the ecosystem experiences intensifying storms and sea level rise, seal species that rely on the nearshore ecosystem will be directly affected. The CCS Seal Program is dedicated to monitoring gray seals in Southeastern Massachusetts and tracking changes in their distribution and health as well as other impacts possibly caused by climate change.

The Center has over a decade of experience tracking these impacts, including the seasonal increase in algal coats on gray seals. Working with collaborators, Seal Research Program Manager Lisa Sette is investigating the underlying issues that appear to be causing the phenomenon.

Monitoring Seal Health

The Seal Research Program is also working with virologist Wendy Puryear at the Runstadler Lab at Tufts University, who is currently investigating the presence and spread of avian flu, phocine distemper and SARS-Cov-2 in wild animal populations. Sette and her team collect scat samples inside the Cape Cod National Seashore, which are then sent to Tufts for analysis.



Tufts University M.S. student Nicole St. Clair Knoblock collecting samples at a tidal shoal inside of Nauset Beach, Cape Cod National Seashore. CCS, NOAA Permit 21719.



Double-crested cormorant with packing strap in nest. Photo taken by CCS at Provincetown Harbor Breakwater.

Shark Ecology Research

A Banner Year for Shark Research

The Shark Ecology Program had a banner year of outreach, science, and support in 2023. The program started with a splash on January 1st, when 250 people braved the cold for the yearly Polar Bear Plunge. This annual dunk in Provincetown Harbor to celebrate the new year has become a Provincetown tradition as well as an important fundraiser for the Shark Ecology Program. The event raised more than \$17,000 this year. Stay tuned for information about joining us in 2024!

In the spring, Shark Ecology Program Manager Bryan Legare expanded his collaboration with Beyond the Reef in the British Virgin Islands. Legare is participating in shark tagging activities throughout the territory, and, with the support of private donors and the Bonnell Cove Foundation, is studying the spatial ecology of juvenile sharks in the area. During his time in BVI, Legare also gave presentations to local school children and the general public, and met with local managers to discuss the future of shark research in the region.

Back on the Cape, the program continued ongoing efforts to understand how white sharks use shallow waters. This summer, arrays of acoustic receivers were deployed in the shallow waters off Nauset Beach in Orleans and Chatham and Head of the Meadow in Truro to track the fine-scale movements of tagged sharks. This year, for the first time since 2008, changes in the nearshore geomorphology at Head of the Meadow beach prevented the annual formation of the sandbars that gray seals, the favored prey of white sharks, use as haul-outs. This, in turn, dramatically reduced the presence of seals in the area. The ramifications of these changes in seafloor topography and the food resource on the movement of tagged sharks through the area have yet to be determined, but analysis of data recovered from the acoustic receivers will help understand those impacts.

In 2023, research conducted by the CCS Seal Research and Shark Ecology Programs was featured on PBS NewsHour as well as in documentaries released by two major TV networks: National Geographic's 'Return of the White Shark,' which uses spectacular imagery to explore the reasons behind the increasing numbers of white sharks in Cape Cod waters, and HBO's 'After the Bite,' examining how a Cape Cod community adapts to a rebounding coastal ecosystem utilized by both humans and white sharks.



Bryan Legare, Shark Ecology Program Manager, with a lemon shark in the British Virgin Islands.



Program Manager Bryan Legare deploys acoustic receivers to track the fine-scale movements of tagged sharks.



The turbidity of the water in the Gulf of Maine, evident in this underwater image of a white shark, is a factor in the animals' behavior.

Marine Debris & Plastics

Beach Brigade Volunteers Make It Possible

The CCS Marine Debris and Plastics Program (MD&PP) is operated by a staff of one but benefits from the might of many. Over the past decade, 420 community members have joined the Beach Brigade, and in the last year over 180 of them have taken part in myriad program opportunities, assisting with everything from shoreline cleanups, trash tallies, and data entry or analyses, to washing aquarium tanks for debris displays, designing field guides, or hauling trailers full of trash. As with many other programs at CCS, support from volunteers makes every aspect of the Marine Debris & Plastics Program possible.

CCS Collaborates with Fishermen

The core of the MD&PP is a collaboration with commercial fishermen to remove, document and responsibly dispose of abandoned, lost or discarded fishing gear, and to identify disposal options for gear that has reached the end of its working life. With support from NOAA Marine Debris Program and the Bilezikian Family Foundation, the annual Cape Cod Bay ghost gear removal project worked out of Provincetown this year, removing over 200 lobster traps and a total of 7.3 tons of debris. Much of the recovered debris was repurposed, reused or returned to the rightful owner when possible. Together with the fishermen contracted to conduct the grappling work, the Center partners closely with the Provincetown DPW and MA Environmental Police and MA Division of Marine Fisheries for this project.

Marine Debris is a Resource for Artists

Artists who work with marine debris have found the Center's "debris mall" behind the marine lab to be very useful for their craft. Cindy Pease Roe outfitted "Mama Shug" with plastic trash we collected from the National Seashore, sorted and stored for just such a use. Other artists have used rope, netting, balloons, straws and other debris to create chairs, jellyfish, ornate wall hangings, and lanyards. There seems to be no shortage of beauty that comes from the debris we collect, and yet the art tells of how pervasive plastic trash is in our environment.



The Beach Brigade removed over 800 lbs of debris during May Day in the Rip Rap.



Mike Rego, lobsterman, surveys recovered rope on the deck of F/V Miss Lilly.



(L) Marine debris art by Jackie Kilroe Ranney. (R) "Mama Shug" is a life-sized white shark sculpture. Artist Cindy Pease Roe used trash collected at CCS beach cleanups to create the installation at Herring Cove Beach in Provincetown.

Marine Debris & Plastics

CCS Engages in a Wide Range of Collaborations

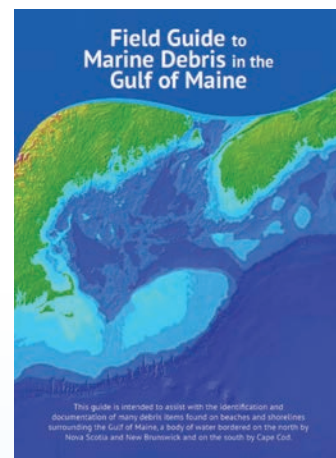
The MD&PP works with collaborators in Maine, New Hampshire, Rhode Island, Massachusetts, Nova Scotia and New Brunswick on shared issues such as shoreline debris and fishing gear removal and recycling.

With help from a remarkable graduate student volunteer, Mica Weld, and support from a regional grant from the NOAA Marine Debris Program, the MD&PP developed "A Field Guide to Marine Debris in the Gulf of Maine." The guide, featuring photos from regional partners, will assist with identifying the trash items found along our shores. It will be available online and in book form soon.

A week-long residency on Cuttyhunk Island in April benefited from two dozen volunteers. These included artists, students, teachers, a NOAA program manager, a cook, several oystermen, and colleagues from other organizations, all of whom gathered lobster gear and other debris from around the island's perimeter, then sorted and counted it all. Nearly 16,000 pounds of debris were recycled, repurposed, or incinerated. The project was supported by a Southeast New England Program Watershed Implementation Grant, funded by the U.S. Environmental Protection Agency through a collaboration with Restore America's Estuaries.

Collaborations occasionally consist of just showing up (or presenting). Laura Ludwig, Director of the Marine Debris and Plastics Program, attended an OceansWide event at the Explorer's Club in NYC in February, attended fishing industry conferences in March, and volunteered with the Rozalia Project in Maine over the summer to assist with island cleanups and data collection. In Wellfleet, Chatham, Cuttyhunk, and Newburyport, as well as virtually, Laura presented on the MD&PP's many activities.

Thanks to the largest single grant ever received by the Center via the Inflation Reduction Act through the NOAA Marine Debris Program, the Marine Debris & Plastics Program recently created the New England Gear Extraction and Response (GEAR) Team. This group of six regional partners will focus on removal and recycling of abandoned, lost, discarded or end-of-life fishing gear. The grant will increase the MD&PP staff by 100%, expand the program's reach in Massachusetts, formalize previously opportunistic relationships, and collectively remove, document and responsibly dispose of over 1,700 tons of derelict gear. We are excited to be working with such capable partners on this important issue for the next three years.



Volunteers break up and remove one of many massive piles of derelict lobster traps on Cuttyhunk.

Beach cleanups in the region will be aided by this field guide.



Water Quality Monitoring



A serene view of Stage Harbor, Chatham. Photo by Agnes Mittermayr

Citizen Scientists & Partnerships Make It Possible

Thanks to numerous partnerships and collaborations, the Water Quality Monitoring Program has successfully completed another year, sampling at over 120 stations. This year we welcomed three new citizen scientists to our monitoring team at our Pilgrim Lake, Boat Meadow and Little Namskaket locations. We had a total of 19 citizen scientist volunteers sampling at 16 different locations from Plymouth to Provincetown. Partnerships with Waquoit Bay National Estuarine Research Reserve, Friends of Bass River, the Town of Harwich, Dennis Conservation Land Trust, Barnstable Clean Water Coalition, and Popponesset Water Stewardship Alliance continue to lead to the successful monitoring of the waters of Cape Cod Bay and Nantucket Sound.

Freshwater Initiative Monitors Ponds across Cape Cod

In 2023 the Center for Coastal Studies was contracted by the Association to Preserve Cape Cod to conduct lab work for the Cape Cod Pond Monitoring Program. This initiative, steered by Barnstable County and the Cape Cod Commission, aims to monitor water quality across a network of 50 ponds throughout the Cape. It forms a crucial component of the Cape Cod Freshwater Initiative, which collaborates with local entities to formulate and implement science-driven strategies for the conservation and rejuvenation of the region's freshwater ecosystems.

The monitoring schedule runs from April to October, with each pond undergoing seven rounds of sampling. The goal of this endeavor is to empower Cape Cod communities with the knowledge to enhance pond stewardship and to shape effective pond management and protection tactics.

CCS Monitors Cape Cod Bay for Hypoxia

Hypoxia, or low levels of dissolved oxygen, has been recorded in several areas of Cape Cod Bay this past year. Likely caused by a complex mix of factors including algal blooms and warming waters, hypoxia has led to lobster die-offs in the recent past, and may have contributed to reduced lobster catches in 2023. Lobsters are particularly vulnerable to hypoxia, but may also be the “canary in the coal mine.”

The Center for Coastal Studies continues to monitor oxygen levels in the bay in collaboration with Woods Hole Oceanographic Institution and the Division of Marine Fisheries.

Water quality monitoring in Cape Cod Bay can shed light on recent occurrences of hypoxia, which can lead to die-offs of vulnerable species such as lobsters.



Marine Education & Outreach



CCS Education Beach Tent.



Summer staff: Jesse Mechling, Cate Brown, Camille Smokelin, Caroline Meyer and Cayla Ossen-Gutnick.



Family Week Fun with Whales program at the Hiebert Marine Lab.

Educational Outreach Sees Peak Participation

The CCS Marine Education Department continued to grow in 2023, with the number of events, school visits, and participants exceeding those of the pre-COVID era.

Marine Education Director Jesse Mechling finally returned to Outer Cape classrooms after a hiatus of more than two years, conducting programs at Provincetown, Eastham, Eddy, and Orleans Elementary Schools, Nauset Middle School, and the Cape Cod Lighthouse Charter School. The in-school program, now in its 14th year, offers a combination of traditional classroom teaching and hands-on fieldwork over a series of 6 – 10 lessons. Fifth and 6th grade students focus on water quality, and 7th grade students at Nauset Middle School were introduced to a new CCS curriculum, piloted at a Martha's Vineyard middle school in 2022, called "Storm Tide Pathways."

The Storm Tide Pathways curriculum is based on specific flooding predictions made by the Center's Geology Department that allow coastal communities to develop strategies to increase resilience to sea level rise and increasingly frequent and severe storms. Students navigate through the Center's Storm Tide Pathways website (stormtides.org) to explore where flooding will occur in their own communities in various scenarios.

Students studying water quality bring instruments into the field to measure temperature, salinity, pH, turbidity, and oxygen to learn about the connection between water quality and healthy marine ecosystems. Jesse says that the idea is for kids to get a sense that we live in a place that's pretty amazing. For many, it's their first introduction into real marine science, and it can spark an interest that lasts a lifetime.

Education takes place in many forms, and in many locations. In April, Jesse participated as an invited expert in Sea Education Association's Right Whale Symposium, sailing aboard the *SSV Corwith Cramer* from Charleston, SC to New York City. During the cruise, participants learned about threats to the dwindling North Atlantic right whale population and efforts to develop and implement solutions.

Weekly whale walks along the windswept Provincetown beaches resumed in March and April, with some of the best views of right whales from shore in years. Summer was packed with a busy schedule of educational events and activities including weekly guided seal walks in Truro, and the popular children's programs, "Get to the Bottom of It" and "Junior Rescuer." At the CCS beach tent, a pop-up educational outpost on three area beaches in Provincetown and Truro, our dedicated education team chatted with nearly 800 locals and visitors about whales, seals, sharks and other marine life. Back in downtown Provincetown, visitation at CCS Sea Space Marine Discovery Center in Whalers Wharf was back to pre-pandemic numbers, with just under 3,000 visitors during the high season. Other summer activities included our annual Whale Week, a celebration of the sea that kicks off with the Trails for Whales 5K; the always popular Whale Camp for Kids; and special Family Week programs.

The continued success of the Marine Education Department's summer programming was made possible by this year's wonderful summer interns - Caroline Meyer, Cayla Ossen-Gutnick, Camille Smokelin - and summer staff member Cate Brown, aka The Four C's.

Research in Duck Harbor Informs Herring River Restoration Project

The Land-Sea Interaction Program had a full summer of fieldwork, with Program Director Katie Castagno, Ph.D., and Field Assistant Molly Tucker busy doing research in Wellfleet's Duck Harbor.

In early 2021, astronomically high tides breached the dune at Duck Harbor Beach and continued to overwash nearly every month, producing a three-acre washover fan. Salt water from these frequent events killed approximately 120 acres of trees in the low-lying area behind the washover fan.

This past spring, the National Park Service mulched most of the trees to encourage the flow of salt water and the establishment of salt marsh vegetation. So far, the restoration project is a success. Marsh vegetation is already starting to grow throughout the mulched area.

Katie and Molly conducted research throughout the cleared area to understand how the system has changed over the last several centuries. They took sediment cores (aided by a trusty sledgehammer) and used ground-penetrating radar to look deep under the surface to determine when the system evolved in its many forms as a forest, a marsh, and an open harbor.

As part of the Herring River floodplain, Duck Harbor is, in many ways, a natural analogue for the Herring River Restoration Project, which aims to return approximately 1,000 acres of salt marsh, diminished since the 1909 installation of a dike at Chequessett Neck Road Bridge, to its natural state. Lessons learned as the Duck Harbor system transitions to a salt marsh ecosystem can be directly applied to the greater Herring River system as construction finishes and restoration begins in the next few years.



Katie (left) and Molly use a vibracore, courtesy of Northeastern University's Marine Science Center. The vibracore uses a generator and a repurposed concrete mixer to vibrate an aluminum tube into the ground, allowing them to retrieve more than six feet of relatively undisturbed sediment and bring it back to the lab for analysis.



Katie (left) and Molly use a sledgehammer to pound a peat corer into the ground at Duck Harbor. The peat corer allows them to retrieve 50cm cores of sediment and bring them back to the lab for analysis.

CCS Participates in International Effort to Protect Seagrass

Throughout the Commonwealth, particularly on Cape Cod, there is a concerning decline in eelgrass beds. Agnes Mittermayr, Ph.D., a marine ecologist with the Center for Coastal Studies, brings 15 years of eelgrass research experience to the forefront of understanding this trend. She is leading efforts to understand the shifts in these crucial habitats and devise methods for their conservation and restoration.

Seagrasses, flowering underwater plants, are found on every continent except Antarctica. Despite covering just 0.2% of the ocean floor, they account for 25% of the world's fisheries production and sequester more than 10% of the ocean's carbon, making them a valuable ally in the fight against climate change.

Referred to as the "forgotten ecosystem," in much of the world there are little or no data on this critical yet imperiled ecosystem. For seagrass conservation to be effective, it's imperative to understand where seagrasses exist, how they are changing, and what impacts, both human and

environmental, control their fate.

At low tide throughout the year, Marine Geology staff and volunteers measure the eelgrass coverage and density in Pleasant Bay, Wellfleet's Duck Harbor, and Provincetown's East End. They look for signs of disease, grazing, and the presence of epiphytes, which are plants that live on other plants. They also collect data relating to water quality, examining factors such as turbidity and temperature.

Eelgrass plays a critical role as an essential habitat for numerous fish and shellfish species, acting much like a nursery for young marine life, and serves as a hub of biodiversity. It also contributes to coastal stabilization through its root system and aids in environmental health by absorbing excess nutrients from the water, thereby sequestering carbon in the sediment.

Since 2001, seagrass ecosystems have been monitored and documented through a program called SeagrassNet. It's a global effort that includes 126 sites in 33 countries.

Starting this fall, CCS has taken on the honor and responsibility of hosting seagrass samples from around the globe in hopes of preserving them for future generations of climate researchers.

Update on Barnstable Harbor Benthic Habitat Mapping Project

The Friends of Barnstable Harbor recently published the final report for its Benthic Habitat Mapping Project, with research conducted by the Center for Coastal Studies. Projects like this proceed in stages: researchers first map the seafloor, getting a “lay of the land,” then examine the organisms that inhabit the seafloor, and finally study the sea life that swims above it.

Sorting and analyzing samples taken from the seafloor is a labor-intensive process. Center volunteers, known as “pickers,” carefully sort the samples. Center researchers then identify each individual organism under a microscope. Analysis of random sediment grabs have so far found 40,267 animals belonging to 91 species. These include worms, snails, clams and arthropods. The objective is to determine which variables – depth, type of sediment, presence of vegetation, and so on – drive species diversity in the study area.

The mapping project establishes baseline data, which allows researchers and policy makers to better understand changes caused by storm damage, ocean warming and other factors. To date, the Center has mapped Barnstable Harbor, Pleasant Bay, Nauset Marsh, East Harbor, Wellfleet Harbor, and a small portion of Nantucket Harbor. In the coming year, we look forward to conducting benthic mapping in new locations, and to revisiting sites that have already been studied to see what changes, if any, have occurred.

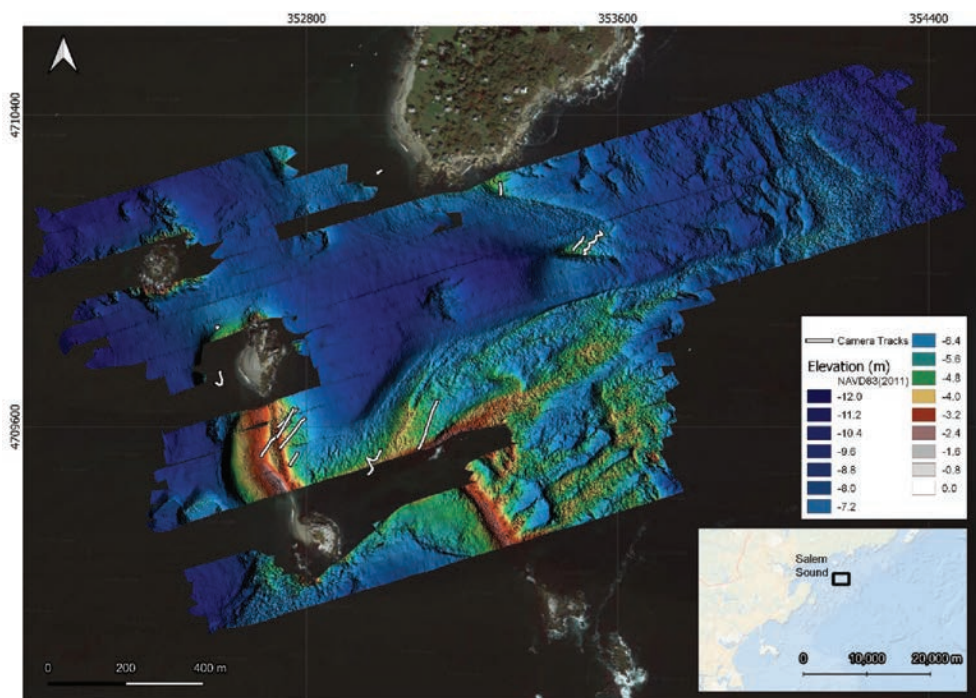
Satellite Data Reveals Impact of Climate Change on New England's Kelp Forests

The Center’s Seafloor Mapping Program is partnering with researchers from the University of Massachusetts Boston, NASA’s Goddard Space Flight Center, and the Woods Hole Oceanographic Institution to better understand New England’s kelp forests.

Recent studies have documented a concerning decline in kelp populations, which is suspected to be linked to ocean warming and climate-induced shifts. This important coastal aquatic plant life, mostly made up of large brown seaweed, represents a complex and ecologically significant ecosystem in the shallow subtidal areas. Because they are underwater, studying how kelp forests change and move over time presents unique challenges and requires innovative research techniques.

Recent advancements in remote sensing technology have emerged as a pivotal tool for addressing this challenge. Hyperspectral and multispectral imagery, used to capture images across multiple wavelengths, can penetrate the depths, detecting kelp and submerged vegetation down to approximately eight meters of water. However, it is necessary to validate these findings due to the difficulty of accurately identifying and measuring underwater vegetation.

The Center is playing a key role in linking the coarse-scale detection of kelp beds in NASA’s satellite data with the fine-scale measurements made by scuba divers in the field. Pedro dos Santos, the Assistant Director of the Center’s Seafloor Mapping Program, is leading a team that conducts sonar surveys from specially-equipped CCS research vessels. These ongoing surveys have taken place at multiple locations within the Gulf of Maine off the coasts of Massachusetts, New Hampshire and Maine.



Bathymetric surface near Gooseberry Island off the coast of Westport, Massachusetts. The small white lines are video transects collected by divers.

CGRASS Program Helps Cape Towns Confront a Changing Climate

With an emphasis on applied science, the Coastal Geographic Research and Applied Sciences Program (CGRASS) aims to develop and visualize multidisciplinary coastal geographic and geospatial data. These data aid local municipalities, managers, and the public in understanding the dynamic processes of the coastal zone. A central focus of CGRASS is utilization of physical and human coastal geographic data, compiled by CCS and other scientists, to document and quantify historical and current coastal change. This information is currently being used to develop regional, system-based estimates of future shoreline conditions. Such forecasts are invaluable to coastal managers and communities as they confront the pressing challenges and threats associated with a changing climate, rising sea levels, and intensifying coastal storms.

Over the past year, the CGRASS Program has continued to lead two multi-phase coastal resiliency grants awarded by the Massachusetts Office of Coastal Zone Management. These grants assist several coastal communities in developing intermunicipal or regional strategies for managing their Cape Cod Bay shorelines. The Four-Towns grant, consisting of Eastham, Wellfleet, Truro, and Provincetown, began in 2019, while the Three-Towns grant, encompassing Dennis, Brewster, and Orleans, began in 2022. Recognizing that coastal systems transcend municipal boundaries, the projects have been organized around the concept of littoral cells, natural coastal compartments that contain a complete cycle of sedimentation, including sources, transport paths, and sinks. This approach aims to foster and implement a consistent management framework that works with natural systems to promote long-term resiliency.

Still in its initial stages, work on the Three-Towns project has focused on compiling and assessing existing data to pinpoint gaps and identify needs for future development. The Four-Town Outer Cape project is actively pursuing objectives identified in prior grant phases. Recognizing that sand is critical to the sustainability of healthy coastal systems, CCS is working with town team members and public works departments. Their joint efforts aim to evaluate the feasibility of a Regional Sand Management Program. Such a program would maximize the towns' capacities to work with the natural processes and drivers of coastal change for regional sediment management and annual beach nourishment activities.

Samantha Jo McFarland, Assistant Program Director and Senior Geospatial Analyst, has been collaborating with the town team members. Her focus is on developing science-based regional data to support proactive planning and management of competing uses of the coastal zone. An exciting centerpiece of the Four-Towns initiative is Samantha Jo's development of an intermunicipal management tool. This tool, hosted on a public web platform, is designed for both town staff and the general public. It will facilitate the acquisition and distribution of regional data, and promote transparent collaboration between the town partnership and other organizations. Both projects are expected to continue in subsequent phases as the project team identifies additional needs.

Low tide in Provincetown Harbor. Photo by Agnes Mittermayr



Staff Updates

Welcome Aboard!

This past year saw the arrival of a number of new staff members. In March, we welcomed Nat Doane as our new Facilities Manager. A native Cape Codder and avid outdoorsman, Nat is also an accomplished ceramics artist and former instructor at the Cape Cod Museum of Art.

Jon Carreiro joined the Development Department in May as our new Development Assistant. A native of Provincetown, Jon is a recent graduate of Stonehill College where he studied business administration and communications.

In August, we welcomed Douglas Karlson as our new Director of Communications. Doug has extensive experience in communications and journalism on the Cape, as well as environmental issues concerning the ocean.

Ashley Millan Ambert is the newest member of the Center's Right Whale Ecology Program, joining us in September. Ashley will be working closely with Amy James and other program staff to learn the finer points of aerial scheduling and surveys as the Flight Coordinator.

Vania Rivera, a Ph.D. student, joined us in October. She's working with Jooke Robbins and the Humpback Whale Studies Program to set up our new genetics lab. Vania's laboratory technician expertise will be put to good use as she catalogs and builds the lab.

Molly Tucker began work as an intern in the Right Whale Ecology Program in January, and also worked as a field assistant in the Land-Sea Interaction Program. In November, they became a full-time research assistant in the Marine Fisheries Program.

Finally, Annie Bartlett, currently in Alaska, will take to the skies as an observer with the Right Whale Ecology Program when she arrives in December, joining the aerial surveillance team to conduct right whale surveys from the air.

Diversity, Equity, and Inclusion (DEI) Committee Update

In 2023, the staff-led Center for Coastal Studies' Diversity, Equity, and Inclusion (DEI) Committee continued to evaluate needs and priorities. Understanding that DEI is vital for the organization's reach, effectiveness, and ethical integrity, the committee aims to integrate these principles across all activities, from research to community engagement, enhancing CCS's significance in a diverse society.

During the year, the committee began the process of drafting a land acknowledgment statement, made public the organization's official statement on DEI, and distributed an anonymous survey to staff to gauge DEI perceptions. This feedback is foundational as we strive to align with our dedication to community involvement and broadening access to marine science and conservation.

Moving forward, our DEI committee is set to emphasize an inclusive workplace culture and refine hiring and internship processes. A key initiative is the Hiebert Memorial Internship in 2024, designed to provide opportunities to students from historically marginalized communities, heralding our commitment to equitable internship experiences.

CCS STAFF, 2023

Richard Delaney, Executive Director

ADMINISTRATION

Jon Carreiro, Development Assistant
Valerie Daniels, Human Resources Manager
Nathaniel Doane, Facilities Manager
Kathy Howes, Database Manager
Beau Jackett, IT Specialist
Doug Karlson, Director of Communications, Marketing & Outreach
Karen Langfield, Controller
Cathrine Macort, Director of Administration & Operations
Jenn McFarland, Volunteer Coordinator & Retail Manager
Mary Moore, Donor Relations Assistant
Sue Nickerson, Director of Development
Kathy Shorr, Development Officer
Laura Stinson, Assistant Director of Development

MARINE EDUCATION

Jesse Mechling, Director

WATER QUALITY MONITORING PROGRAM

Amy Costa, Ph.D., Director
Jenn Burkhardt, Research Assistant
Anna Terrenzi, Laboratory Technician
Troy Wood, Research Assistant

HUMPBACK WHALE STUDIES PROGRAM

Jooke Robbins, Ph.D., Senior Scientist
Paulette Durazo, Research Assistant
Emily Kelly, Research Assistant
Vania Rivera, Research Associate
Jenn Tackaberry, Research Associate

LAND - SEA INTERACTION PROGRAM

Katie Castagno, Ph.D., Director
Graham Giese, Ph.D., Scientist Emeritus
Patrick Barger, Research Assistant

SEAFLOOR MAPPING PROGRAM

Mark Borrelli, Ph.D., Director
Pedro dos Santos, Assistant Director, Hydrologist
Bryan McCormack, Research Assistant
Agnes Mittermayr, Ph.D., Marine Ecologist
Dan Solazzo, Remote Sensing Specialist

COASTAL GEOGRAPHIC RESEARCH AND APPLIED SCIENCES PROGRAM (CGRASS)

Steve Mague, Director
Samantha Jo McFarland, Assistant Director

RIGHT WHALE ECOLOGY PROGRAM

Charles "Stormy" Mayo, Ph.D., Director
Christy Hudak, Research Associate
Amy James, Research Associate, Aerial Observer
Annie Bartlett, Aerial Observer
Brigid McKenna, Research Associate, Data/Photo Manager
Ashley Millan Ambert, Flight Coordinator, Aerial Observer
Ryan Schosberg, Research Assistant, Data/Photo Manager

SHARK ECOLOGY RESEARCH PROGRAM

Bryan Legare, Program Manager

SEAL RESEARCH PROGRAM

Lisa Sette, Program Manager

MARINE FISHERIES RESEARCH PROGRAM

Owen Nichols, Director
Molly Tucker, Research Assistant

MARINE ANIMAL ENTANGLEMENT RESPONSE

Scott Landry, Director
Bob Lynch, Rescue Operations Manager
Paulette Durazo, Rescue Assistant
Doug Sandilands, Rescue Assistant
Jennifer Tackaberry, Rescue Assistant
David Mattila, Coordinator, Global Whale Entanglement Response Network

MARINE DEBRIS AND PLASTICS PROGRAM

Laura Ludwig, Program Director

MARINE OPERATIONS

Ted Lucas, Marine Operations Manager
Marc Costa, Captain

ADJUNCT SCIENTISTS

Martine Bérubé, Ph.D.
Robert Brock, Ph.D.
Salvatore Cerchio, Ph.D.
Christopher W. Clark, Ph.D.
Stephen DeVincent, DVM
Benjamin Giese, Ph.D.
Alyssa Novak, Ph.D.
Per Palsbøll, Ph.D.
Mason Weinrich
Moncrieff Cochran, Ph.D., Adjunct Educator

Volunteers



Beach Brigade volunteers.



*CCS
volunteers
Eric Cordes
and Debi
Zilberman*



Volunteer Kim Barboe at the CCS kiosk on MacMillan Pier.

Volunteers Make the Difference!

The Center for Coastal Studies couldn't achieve its mission without the help of our volunteers who assist with water quality monitoring, scientific research, and outreach. They are led by Jennifer McFarland, CCS Volunteer Coordinator and Kiosk Manager. This past year we benefited from the help of 45 generous friends, who served as docents and kiosk outreach volunteers. From April through August they put in nearly 1,000 hours!

Our volunteers staff our kiosk on MacMillan Pier, selling CCS merchandise, which helps us gain exposure and also generates revenue, as well as acting as docents for the Spinnaker exhibit at the Hiebert Marine Laboratory. For the first time, we're setting up a holiday shop in the Center's Sea Space Discovery Center in Whalers Wharf this year. We've added many popular new items to our physical and online stores this year, and sales have been robust.

This past year the Center for Coastal Studies also participated in numerous public events, such as the Provincetown Year Rounders Festival, Wellfleet Oysterfest, and the Harwich Cranberry Fest, to name just a few.

We're grateful to our dedicated volunteers who make it all possible!

Lin Allgeier	Mike Chute	Inez Giles	Edward Maheigan	George Rogers
Gregg Almquist	Doug & Annemette	Sue Girard-Irwin	Mattie Mailer	Crystal Santos
Laurie Appleby	Cliggott-Perl	Beth Goldstein	Genevieve Martin	Brian Schneider
Dawn Arnold	Carol Colao	Don & Annemarie Gould	Susan McCarthy	Fran Adams & Robert Ross
Rebecca Arnold	Carolyn Collins	Linda Olson Graham	Bill McElroy	Lynda Simeone
Jenifer Augur	Pamela Cooley	Scott & Heather Grenon	James Mckowen	Lorraine Smith
Krasi Banova	Nicole Corbett	Josh Groves	Nancy McLane	Jan Spence
Kim Barboe	Eric Cordes	Judith Hadley	Nancyann Meads	Nicole St. Clair Knobloch
Rick Bishop	Elise Cozzi	Kelly Hathaway	Debra Messier Nagengast	Elise A. Stiller
Christine, Brian, & Sam Black	Anne Cramer	Katherine Helmer	John Muggeridge	Regina Stoker
Sherry Brec	Zenas Crocker	Quinn Henderson	Sean Mullen	Betty & Dave Straznitskas
Barbara Brennessel	Michele D'Amato	Connie Hinds	Hannah Nigro	Raddi Summers
Jen & Natalie Brown	Anthony Daley	Myrna Johnston	Ellen O'Connell	Sarah Thornington
Jennifer Brown	Michelle DaSilva	Laura Jonasse	Emily O'Connell	Denise Traver
Judy Bullard	George Davis	Sarah Kasack-Rixey	Maeve O'Donovan	Stephanie Vevers
Jully Bureau-Seybert	Lizzy Day	Marjorie Kehne	Madeleine Oerth	Wyatt Vida
Lee Burns	Mary DeAngelis	Pat King	Constance Old	Edward Weiss
Kathy Burroughs	Tyrese Dennis	Roni King	Susan Packard	Jonathan Wibberley
Lori Burroughs	Sherri DiReda	Hilary Klein	Rachel Peters	Gordon Winkler
Dave Butterfield	Mark Dubois & Leslie Starr	Stacey Klimkosky	Ken Peterson	Katherine & Mike Winkler
Luke Cadrin	Emsaki	Jeff Knudsen	Mary & Dana Peterson	Amy Wolff
Patrick Canney	Kevin Fay	John Kornbluh	Nicholas Picariello	Mary Zarba
Zoe Carlberg	Paul Finn	Heather Korostoff-Murray	Leo Plansky	Debi Zilberman
Kevin Cassidy	Dennis Fitzkee	Peter Kosewski	Zygmunt Plater	Thomas Zoutis
Karen Castagno	David Flattery	Mark Labresh	Horatio Potter	
Haley Cedarholm	Larry Franke	Jennifer Landon	Peter Pratt	
Sandy Chaet	David Fryxell	Sandy Longley	Anne Puzzo	
Megan Chiango	Amaya Giannini	Sandy Lundy	Jackie Kilroe Ranney	
		Mariana Luz	Heather Rockwell	

Fundraising & Development



Development efforts at the Center for Coastal Studies have been on a robust track in 2023, thanks to the involvement and support of our generous and committed donors. Several events highlighted the summer, including parties at private homes, a luncheon at the Land's End Inn in Provincetown, and our annual Sunset Whale Watches.

Spinnaker and Mayo-Giese Founders Societies

CCS is pleased and honored to have the support of the esteemed members of both our Spinnaker Society, celebrating our highest-level donors, and the Mayo-Giese Founders Society, recognizing those who have named CCS in their estate plan. These societies are vital to the long-term success of the Center's programs, and we are very grateful for the participation of these special groups of supporters.

In 2023, over 240 donors participated as Spinnaker Society members, and the number of participants in the Mayo-Giese Founders Society rose to 46. Special events for these groups included a gathering at the Wellfleet Preservation Hall, exclusive updates with CCS researchers, and a field outing with CCS scientists to the Geology Department's Wave Station in Truro.

Sunset Whale Watches

CCS continued the popular tradition of our Sunset Whale Watches this year with exclusive cruises, generously provided by the Dolphin Fleet, for Center supporters and members. The 2023 whale watching season was phenomenal, and the CCS Sunset Whale Watch trips were no exception. We were delighted to see a number of humpback whale mother calf/pairs, and we were fortunate to enjoy wonderful weather and beautiful sunsets. Our sincere thanks to the Fleet and their expert naturalists!

Homeport 2023

The Homeport Gala, our annual major fundraising event, was another record-breaking success this year. Held at the spectacular Wequassett Resort overlooking Pleasant Bay on a warm fall evening in early October, the event attracted 200 guests and raised over \$250,000. This year's Homeport honoree was CCS co-founder and Director of the Right Whale Ecology Program, Dr. Charles "Stormy" Mayo. We thank all who participated in making this year's Gala such a fun and memorable evening!

Hiebert Fellowship Expansion

The Ruth Hiebert Memorial Fellowship was established to further women in science in honor of the late Ruth Hiebert, a local philanthropist and friend of the Center for Coastal Studies. Ruth's passion for science, the natural world, education, and her community were well known on the Cape and beyond. Nearly two decades after its inception, the Hiebert Fellowship is expanding its impact and reach through a diversity-oriented, collaborative internship program for students from historically-marginalized communities. The intern will gain practical, hands-on experience and mentoring in the field of their choice and be advised by a committee of CCS scientists. The new Hiebert Memorial Internship represents a crucial step in the Center's ongoing efforts to make career and learning opportunities in marine science available to everyone.

Spinnaker Society & Founders Society

Mayo-Giese Founders Society & Spinnaker Society

The Mayo-Giese Founders Society, named in honor of CCS founders Barbara Shuler Mayo, Stormy Mayo, and Graham Giese, pays tribute to supporters who have included CCS in their estate planning. The Spinnaker Society recognizes and celebrates donors who make annual gifts of \$2,500 or more. Both Societies are critical to the year-to-year as well as the long-term success of the Center for Coastal Studies. We are deeply grateful to members of both these special groups. Thank you!

Mayo-Giese Founders Society

Joyce Albro-Laverty
Richard G. Allgaier &
Janice Coleman
Nicholas Athanassiou &
Jeanne McNett
Robin Austin
Katharine E. Bachman
Marilyn & Steve Bornemeier
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Susan Goranson
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Edward & Lorraine Rengers
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Nancy G. Scott
Jim Sexton
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Barbara Sutherland
Jeremy J. Taylor
Beth F. Volker
John & Nancy Watters
Janet E. Young

Spinnaker Society

Anonymous (6)
Frances Adams & Rob Ross
Animal Welfare Institute
Chris W. & Eleanor C. Armstrong
Arthur L. & Elaine V. Johnson
Foundation
Nicholas Athanassiou &
Jeanne McNett
Marjorie Austin

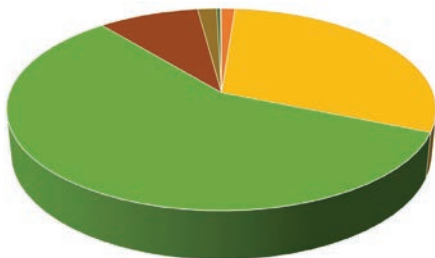
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Dr. Stephen DeVincent
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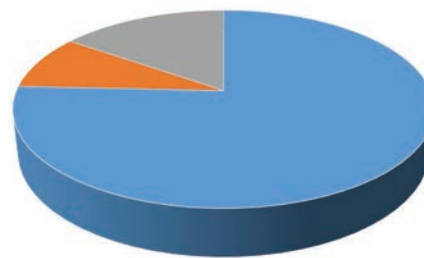
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Operating Revenue 2022

- Membership
- Contributions
- Grants & Contracts
- Events
- Merchandise & Tool Sales
- Other earned income
- Other revenues



Operating Expenses 2022

- Program Services
- General and Administrative
- Fundraising

OPERATING REVENUES

	<u>2022</u>	<u>2021</u>
Membership	65,820	64,923
Contributions	1,664,960	1,665,732
Grants & contracts	3,207,708	3,099,082
Events	489,804	351,910
Merchandise & tool sales	93,146	73,883
Other earned income	17,148	12,019
Other revenues	5,904	3,730
Total	\$5,544,490	\$5,271,279

OPERATING EXPENSES

	<u>2022</u>	<u>2021</u>
Program Services	4,274,923	3,689,518
General and Administrative	506,120	441,330
Fundraising	863,437	704,526
Total	\$5,644,480	\$4,835,374
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Net	(\$99,990)	\$435,905

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