



WELCOME to WOODS HOLE

*A world center for marine,
biomedical, and environmental
scientific exploration*

Welcome to Woods Hole

A HISTORY OF THE SCIENTIFIC COMMUNITY

The village of Woods Hole was settled more than 300 years ago and for two centuries remained primarily a farming and fishing community. Then in 1871 the United States Commission of Fish and Fisheries (precursor of the National Marine Fisheries Service) was established, and its first director, Spencer Fullerton Baird, set up a seasonal collecting station in Woods Hole to study marine animals. Attracted by the abundance of fauna and unpolluted waters, he established a permanent laboratory in the village in 1875. Soon, visiting scientists were studying local marine plants and animals, and a hatchery was organized to stock rivers with shad, salmon, and other fish.

In 1888, a second institution, the Marine Biological

Laboratory (MBL), was established across the street. Its founders believed that some of the essential processes of life, such as cell division, nerve and muscle activity, and development, might be studied more easily in simple marine forms than in higher animals. Consequently, both teaching and research were begun in cellular biology, embryology, and biomedical fields as well as in marine biology in general.

Woods Hole Oceanographic Institution (WHOI), a private nonprofit research organization originally funded by the Rockefeller Foundation, was incorporated in 1930 to study all branches of oceanography. During World War II, WHOI gathered oceanographic information for anti-submarine warfare, amphibious landings, and other operations. Since then, WHOI has continued to work with the government, with 80% of its annual budget supported by federal grants and contracts, primarily the National Science Foundation.

In the 1960s, a fourth institution, the U.S. Geological Survey, headquartered its new branch of Atlantic Marine Geology here to investigate the geology and geophysics of the Atlantic, Gulf of Mexico, and Caribbean. The Sea Education Association joined the community in 1975, and Woodwell Climate Research Center was founded as Woods Hole Research Center in 1985.

Water Street, early 1900s. Candle House at right dates to Woods Hole's whaling days (1828-1864). Fisheries building is at left in background.



NEFSC Photo Archives

Map of Woods Hole





FOUNDED 1871

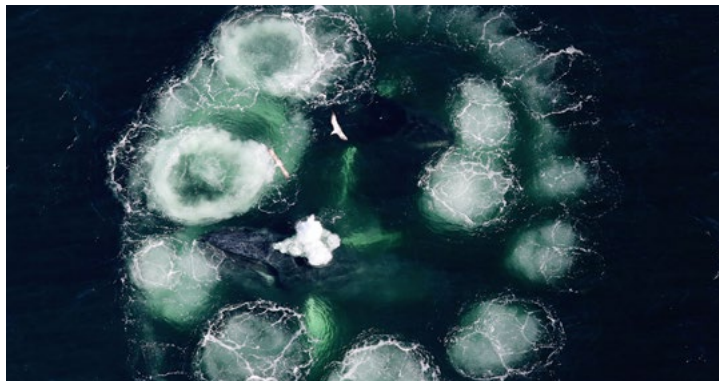
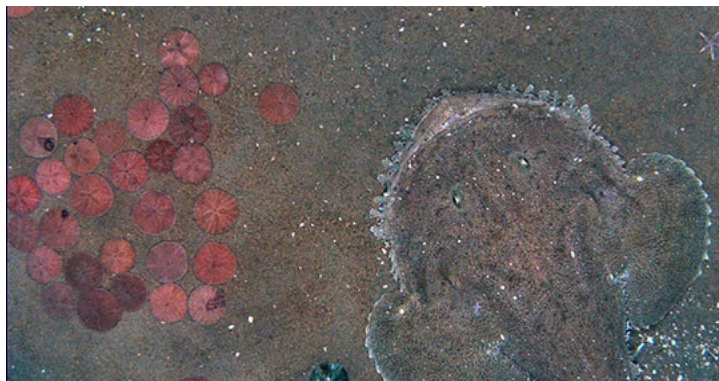
NOAA Fisheries is the federal agency with stewardship responsibility for our nation's living marine resources. The agency's Woods Hole Laboratory conducts research on fisheries resources and the fishermen who harvest them, and on marine mammals and other protected life in the Northwest Atlantic Ocean. Information derived from this research is primarily used by those who make management decisions about these resources and their habitats.

The laboratory is the nation's first and oldest facility specifically dedicated to marine fisheries research. It became a year-round institution in 1875 and is currently part of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. Laboratory scientists are primarily interested in three broad areas of research—resource assessment, ecosystem monitoring, and socioeconomics. Resource assessment scientists determine the distribution, size, and productivity of marine fish, shellfish, and marine mammal populations, as well as the effects of fishing and other human activities on those populations. Ecosystem monitoring scientists investigate the role that natural or nonhuman factors (such as climate change and food web dynamics) play in marine populations and the overall ecosystem. Socioeconomic scientists study the

social, economic, and cultural effects of fisheries and marine mammal management on coastal communities in the New England and Mid-Atlantic states. Fieldwork by laboratory scientists is supported by several research surveys that monitor the overall distribution and abundance of marine life in the northeast region from the Gulf of Maine to Cape Hatteras, NC.

The laboratory employs about 175 natural and social scientists, technicians, and administrators. It also houses the Nation's first aquarium—the Woods Hole Science Aquarium, which annually receives more than 80,000 visitors, including several thousand students on science field trips.

The Woods Hole Laboratory is one of several facilities of the Northeast Fisheries Science Center, which include a fisheries observer training center in Falmouth, MA and additional labs in Rhode Island, Connecticut, New Jersey, and Maine. Combined, the research conducted at all of the Northeast Fisheries Science Center facilities promotes recovery and long-term sustainability of marine life in the region, supports both wild and cultured seafood harvests, helps sustain coastal communities, and generates economic opportunities and benefits from the use of these resources.



Left: Lu-Seal, Woods Hole Science Aquarium's resident marine mammal. See back cover for hours and location.

Top right: A monkfish and sea scallops on the ocean's bottom. Image taken by a towed camera during a research cruise.

Below right: Two humpback whales make a net of bubbles to trap prey, photographed during a NOAA Fisheries whale research flight. Image taken under MMPA research permit#17355.

Photos courtesy of National Marine Fisheries Service



FOUNDED 1888

The Marine Biological Laboratory (MBL) is a world-renowned center for biological discovery and training that is notably affiliated with 60 Nobel Prize winners. The MBL is dedicated to exploring fundamental biology, understanding biodiversity and the environment, and informing the human condition through research and education.

The MBL has a long history of convening the world's most accomplished scientists and advancing collaborations that have led to critical breakthroughs in our understanding of biology. Since 1888, the MBL has hosted thousands of researchers and students from all over the world. For this reason, the lab strives to maintain a welcoming environment where diverse perspectives and experiences lay the foundation for scientific inquiry and discovery.

Research at the MBL is conducted by full-time faculty as well as hundreds of the world's leading scientists who are attracted by the MBL's unique resources and strengths. Their work spans biological scales from molecules and cells to ecosystems. Specific focus areas include:

- new discoveries emerging from the study of new research organisms, encompassing studies in cell biology, regenerative biology, neuroscience, sensory physiology, and comparative evolution and genomics;
- the study of microbiomes and microbial

diversity and ecology in a variety of ocean, organismal, and terrestrial habitats;

- innovation in imaging and computation, illuminating cellular function and previously unknown biology; and
- adaptation and resilience of environmental systems and organisms in the face of global change.

The MBL draws early-career scientists to Nobel Laureates, and students from high school to postdoctoral levels. Central to the MBL's identity are its 20+ advanced, discovery-based research courses. The focus of these world-famous, graduate-level courses ranges from physiology, embryology, neurobiology, and microbiology to imaging and computation integrated with biological research.

The MBL offers research-based educational programs for undergraduates from the University of Chicago and many other institutions, including a Semester in Environmental Science, quarter-long courses, and mentored research internships. Its new high-school program emphasizes immersive, discovery-based learning. In addition to its formal training programs, dozens of workshops, training courses, and conferences are hosted at the MBL—accommodating more than 2,500 international participants annually.

The MBL is a private, nonprofit institution and an affiliate of the University of Chicago.



MBL Collection



Tom Kleindinst



MBL Collection

Left: The MBL has a long history of research in ecosystems science and global change, and carries out studies on ecological change and its impact in a number of locations, from coastal oceans to the Arctic.

Top right: Marine organisms, with their many unique characteristics and traits, represent the next frontier of basic biological discovery.

Bottom right: MBL scientists investigate diverse areas of fundamental biology to explore the origins, diversity, and nature of life on a changing planet, and to inform the human condition.



FOUNDED 1930

Woods Hole Oceanographic Institution (WHOI) is an independent, non-profit organization established in 1930 and located on Cape Cod, Massachusetts. It combines state-of-the-art ocean science and engineering with world-class marine operations to drive understanding about our ocean and its connections to life on Earth and to communicate this knowledge for our planet and our future.

WHOI boasts a storied history of exploration, innovation, and discovery. The discoveries made by WHOI's scientists and engineers have led to improvements in our environment, commerce, health, and national security. Notable achievements include:

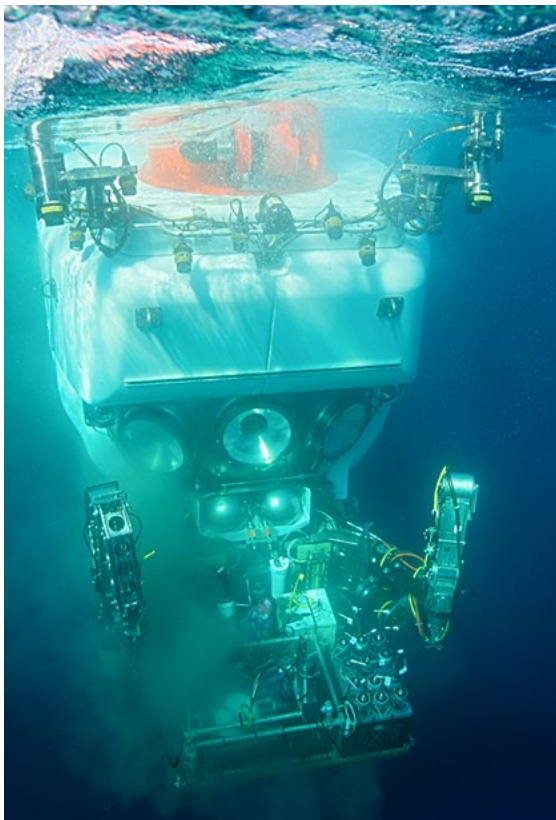
- Discovery of the first known active hydrothermal vent in 1977
- Location the of the wreck of *Titanic* in 1985
- Providing scientific responses to the 2010 Deepwater Horizon oil spill and 2011 Fukushima Daiichi nuclear power plant disaster in Japan
- Launching a new mission to explore and understand one of Earth's last frontiers: the ocean twilight zone.

Today, WHOI has more than 1,000 scientists, engineers, students, and support staff and operates a fleet of research vessels and vehicles including two large ships (R/V *Neil Armstrong* and R/V *Atlantis*), a smaller coastal research vessel

(R/V *Tioga*), and dozens of underwater vehicles, including the iconic human-occupied submersible *Alvin*. WHOI also plays a leading role in ocean observation and operates the most extensive suite of ocean data-gathering platforms in the world.

Through its higher education programs, including the prestigious MIT-WHOI Joint doctoral degree program, WHOI is training the next generation of ocean leaders, scientists, and engineers by providing unparalleled resources and the opportunity to learn from some of the best minds in ocean science.

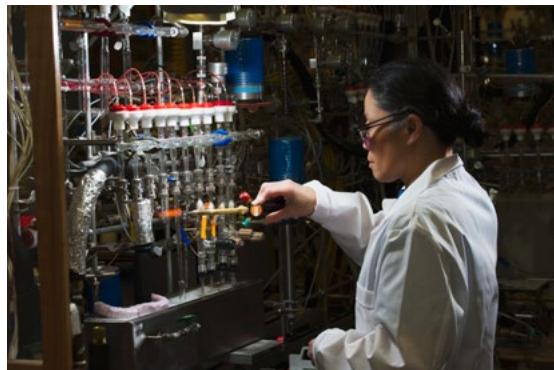
WHOI researchers are leading more than 800 concurrent projects around the globe, tackling some of the most challenging and important problems of our time. From climate change and ocean pollution to sustainable food and energy production, WHOI researchers are pushing the boundaries of knowledge to inform people and policies for a healthier planet.



Chris Linder, WHOI



Bay Aerial, WHOI



Tom Kleindinst, WHOI

Left: Human Occupied Vehicle (HOV) *Alvin* enables in-situ data collection and observation by two scientists to depths reaching 4,500 meters.

Top right: In 2015, WHOI's newest research vessel the R/V *Neil Armstrong* makes its inaugural voyage.

Bottom right: A research assistant working in the National Ocean Sciences Accelerator Mass Spectrometry Facility (NOSAMS). NOSAMS provides analyses of carbon 14 to determine the age of carbon-bearing materials up to about 60,000 years old.



**WOODS HOLE
SCIENCE
CENTER
ESTABLISHED
1962**

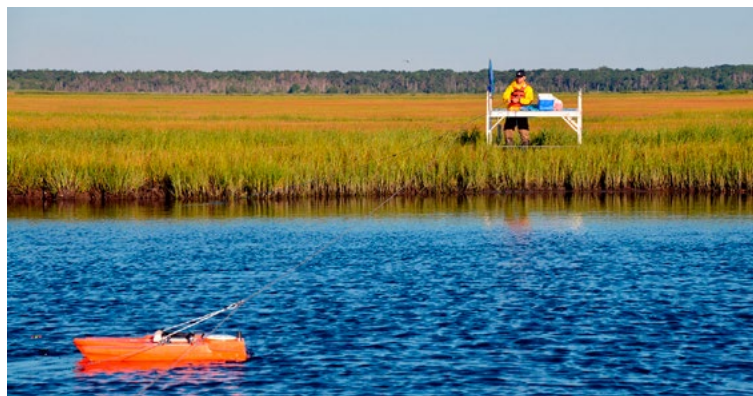
The preservation and health of the Nation's coastal and marine environments depend on well-informed management of risks posed by natural hazards and on the conservation and sustainable use of natural resources. Scientists at the U.S. Geological Survey (USGS) Woods Hole Coastal and Marine Science Center conduct research to describe and understand the physical, biological, and chemical processes that shape these environments. The center's expertise and capabilities respond directly to the needs of resource managers, decision makers, and the public across the Nation's coastal and submerged lands to promote safer, more productive coastal communities and improved stewardship of natural resources.

The center, located on the Quissett Campus of the Woods Hole Oceanographic Institution, is one of three research facilities serving the mission of the USGS Coastal and Marine Hazards and Resources Program (CMHRP). Established in 1962, the CMHRP is the primary Federal program for marine geology and physical science research and is responsible for the Nation's entire coastal and marine landscape. The office has grown from a handful of researchers exploring the Atlantic continental margin, to a team of about 100 studying many of society's most pressing topics, such as climate change, sea-level rise, erosion, blue

carbon, habitat degradation, and natural disasters (e.g., hurricanes, underwater earthquakes, and tsunamis).

The center has expertise and an international reputation in marine geology and geophysics, oceanography, environmental geochemistry, energy, geohazards, and informatics. Scientists conduct mapping, modeling, and data analysis to better understand the past, present, and future states of coastal and marine systems and resources. To accomplish this work, the center has many specialized capabilities, including high-resolution seafloor and subbottom mapping systems, aerial drones, geochemistry and sediment laboratories, a gas hydrates pressure core analysis laboratory, high-performance computing resources, an advanced autonomous surface vehicle for shallow-water geophysical studies, and small-boat coastal and lake research vessels. Staff continually develop innovative equipment to fulfill science needs and further increase research efficiency.

Data collected by USGS scientists are managed and maintained at the center to ensure they are readily available to stakeholders in a variety of formats and online systems. To learn more about the center and access USGS data, knowledge, and tools, visit the website: www.usgs.gov/centers/whcmcs



Left: USGS scientist conducting an elevation survey at Head of the Meadow Beach, Cape Cod National Seashore in Massachusetts.

Top: USGS scientist measuring water and sediment movement at Forsythe National Wildlife Refuge, New Jersey.



Bottom: USGS researchers before deploying the subbottom profiler the Cape Cod Bay Seafloor Mapping Survey in 2019.

Sea Education Association

www.sea.edu



**RELOCATED
TO
WOODS HOLE
IN 1975**

Students work
as crewmembers
aboard SEA's
brigantines

Sea Education Association (SEA) is an internationally recognized leader in ocean education. Since 1971, SEA has equipped more than 10,000 college, gap year, and high school students with the tools to become environmentally literate leaders prepared to address the defining issue of the twenty-first century: the human impact on the environment. SEA also offers collaborative programs with other institutions including Stanford University, the Wharton School at the University of Pennsylvania, Mystic Seaport Museum, as well as the graduate MIT / WHOI Joint Program.

SEA's Boston University accredited undergraduate study abroad program is the leading off-campus Environmental Studies program focused on the ocean. While the academic focus varies, each program offers an interconnected suite of courses designed to explore a

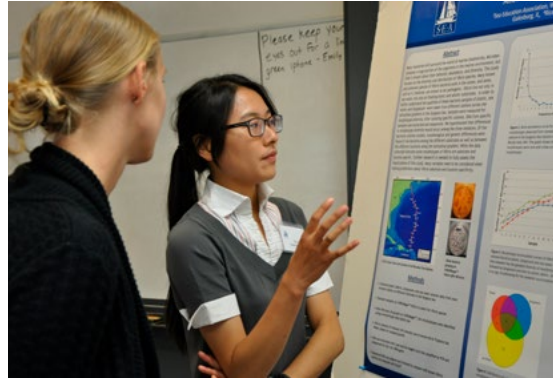
specific ocean-related theme using a cross-disciplinary approach. Students enrolled in SEA's study abroad program are motivated undergraduates of all majors who are passionate about learning, inspired to tackle and address real-world problems, and eager to become part of an unparalleled living and learning community.

The program combines classroom study on the SEA campus in Woods Hole with a sailing research expedition in the Atlantic, Pacific or Caribbean. This unique shore-to-sea approach allows students to take what they have learned in the classroom and test it against their observations in the field, sailing as scientists and crew aboard one of SEA's two custom-equipped tall ship research vessels.

The SSV *Corwith Cramer* and the SSV *Robert C. Seamans* are both inspected and certified by the U.S. Coast Guard as Sailing School Vessels (SSV). They are maintained and staffed to the highest standards, and meet or exceed the Coast Guard safety requirements for their class.

In 2016, SEA was honored with the **National Science Board's Public Service Award** for its role in promoting the public understanding of science and engineering. In 2018, the National Maritime Historical Society presented Sea Education Association with the **Walter Cronkite Award for Excellence in Maritime Education**.





Top left: Shipboard lab

Top right: Student poster presentations.

Bottom right: Class on the quarterdeck

Bottom left: SSV *Robert C. Seamans*, SEA's Pacific sailing research vessel





**FOUNDED AS
WOODS HOLE
RESEARCH
CENTER
IN 1985**

Woodwell Climate Research Center advances scientific discoveries and just, effective strategies to address the climate emergency. Originally founded as the Woods Hole Research Center in 1985, our world-leading research and outreach helps individuals, communities, corporations, and nations understand the realities of climate change, recognize the impact it is having everywhere on our planet, and embrace the urgent action needed to safeguard the future of life on Earth.

Woodwell Climate holds an important place in the history of the environmental movement. In 1979, founder Dr. George M. Woodwell was one of the first scientists to testify before the US Congress about the dangers of climate change. Our scientists helped to launch the United Nations Framework Convention on Climate Change in 1992. In 2007, multiple Woodwell Climate scientists shared the Nobel Prize awarded to the Intergovernmental Panel on Climate Change. And two Woodwell Climate presidents, Dr. Philip B. Duffy and Dr. John P. Holdren, have served in White House science advisory positions.

For 35 years, we have investigated how human activities are affecting the flow of carbon and water—key climate factors—through the world’s most consequential ecosystems, including the Arctic and the Amazon. Our scientists are experts in combining field data with

large-scale satellite monitoring and computer modeling to generate insights that scale from local to global. We work with partners, stakeholders, and government officials in more than 20 countries across six continents, engaging throughout the research process to ensure that our discoveries can be integrated into real-world decision-making. This approach shaped the first guidelines for corporate disclosure of physical climate risk (2018) and informed critical Brazilian legislation to protect 30 million acres of Amazon forest (2019).

While we work all over the world, our main campus is located in Falmouth, Massachusetts, on the traditional and sacred land of the Wampanoag people who still occupy the land, and whose history, language, traditional ways of life, and culture continue to influence this vibrant community. Our Gilman Ordway Campus encompasses 8 acres of land and two buildings that were designed to use sustainable materials, natural light, and renewable energy. Solar panels and a 100kW wind turbine located on site provide most of the Center’s power needs.



Top left: Gilman Ordway Campus: George M. Woodwell Building.

Top right: Researchers investigate changing rainforest ecology at Tanguro Ranch field station, Brazil.

Bottom: Scientists study effects of fire at Yukon Delta National Wildlife Refuge (Alaska).



© Chris Linder

Woods Hole at a Glance

The Woods Hole Science Aquarium at NOAA Fisheries, Marine Biological Laboratory's Robert W. Pierce Exhibit Center, and Woods Hole Oceanographic Institution's Ocean Science Discovery Center and Visitor's Center are open to the public.

MARINE BIOLOGICAL LABORATORY

Main Phone: 508-548-3705

Human Resources: 508-289-7422

Robert W. Pierce Visitors Center/ Gift Shop

Open May – October

mbl.edu/visit

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mbl.edu

UNITED STATES GEOLOGICAL SURVEY

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MARINE SCIENCE CENTER

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Crawford and Gosnold Laboratories

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Hole, MA 02543

www.usgs.gov/centers/whcmssc

NOAA FISHERIES

Main phone: 508-495-2000

Aquarium: 508-495-2001

Open year round:

Tues.-Sat. 11am-4 pm

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Ocean Science Discovery Center & Store:

508-289-2663

Memorial Day to Labor Day:

Mon.-Sun. 11am-5pm

Off-Season: Call for hours

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