



WELCOME TO WOODS HOLE

A world center for marine, biomedical,
and environmental science

Welcome to Woods Hole

Woods Hole, a village in the Town of Falmouth on the southwestern corner of Cape Cod, is a world center for marine, biomedical, and environmental science. Its reputation in these fields may seem out of proportion to its small size, yet, in addition to several smaller enterprises and labs, Woods Hole contains two large private organizations (the Marine Biological Laboratory and the Woods Hole Oceanographic Institution) and two federal government facilities (the National Marine Fisheries Service and the U.S. Geological Survey).

Together, these larger institutions occupy some 170 buildings, operate a dozen research vessels and collecting boats, employ more than 1,500 year-round people, and offer instruction to approximately 500 students. Woods Hole Oceanographic Institution outgrew its space in the village in the 1960s and expanded to the Quissett Campus, located a mile and a half to the northeast, where U.S. Geological Survey laboratories are also located.

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 temporary 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. At about the same time, the Fish Commission acquired *Albatross*, a 234-foot steamer and the first American ship to be designed and built as a research vessel.

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. For almost 90 years MBL was solely a summer institution, but since the 1970s it has housed a number of major year-round programs.

The Woods Hole Oceanographic Institution (WHOI), a private nonprofit research organization originally funded

by the Rockefeller Foundation, struck off in a somewhat different direction. It was incorporated in 1930 to study all branches of oceanography. Since much of the research was planned for the deep sea, the research vessel *Atlantis* was built and used from 1931 to 1964. In its first decade, WHOI was primarily a summer institution. During World War II it changed to a year-round operation to gather oceanographic information for anti-submarine warfare, amphibious landings, and other operations. After the war, WHOI continued to work with the government, and at present 80 percent of its annual budget is supported by federal grants and contracts.

In the 1960s, the Fisheries and MBL replaced old wooden buildings with a new aquarium and modern laboratories; WHOI expanded its research programs and facilities and established a graduate education program in concert with Massachusetts Institute of Technology (MIT). 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 Woods Hole Research Center in 1985.



NEFSC Photo Archives

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



MBL Collection

MBL botany class students during an 1895 specimen collection trip.



The National Marine Fisheries Service (NMFS) 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 resources 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.

Created by Congress in 1871 as a summer sampling station, the laboratory is the world's 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 two research vessels, the 209-foot *Henry B. Bigelow* and the 160-foot *Delaware II*.

The Laboratory employs about 175 natural and social scientists, technicians, and administrators. It also houses the Woods Hole Science Aquarium, which annually receives more than 150,000 visitors, including several thousand students on science field trips.

The Laboratory further serves as headquarters for NMFS's Northeast Fisheries Science Center, which coordinates research not only at the Woods Hole Laboratory, but also at five other laboratories in the Northeast (Narraganset, RI; Milford, CT; Highlands, NJ; Washington, DC; and Orono, ME). Scientists at these other locations conduct research on ecosystem health, aquaculture, habitat conservation, biodiversity, and endangered or protected marine life in the waters of the Northeast continental shelf.



Photos courtesy of National Marine Fisheries Service

Left: Woods Hole Science Aquarium welcomed a new resident, Lu-Seal. See page 14 for hours and location.

Top right: A monkfish caught during a research survey conducted aboard a commercial fishing vessel.

Below right: An endangered North Atlantic right whale sighted during a NOAA Fisheries whale research flight. NOAA operates the stranding and response network that disentangles whales.

The Marine Biological Laboratory (MBL) is an independent, non-profit institution dedicated to creative research and advanced training in the biological, biomedical, and environmental sciences. The oldest private marine laboratory in the Americas, the MBL is synonymous with biological discovery.

The MBL has a staff of 275 year-round scientists and support staff. They conduct research on ecosystems and how humans impact them to help resource managers make sound decisions. They explore how cells work and divide to understand human health issues. They probe genetic relationships among living organisms and identify human genes of biomedical importance. They study, maintain, and cultivate aquatic organisms essential to modern biological, biomedical, and ecological research. And they are key to the Encyclopedia of Life project, an unprecedented effort to create a Web page for all 1.8 million named species on Earth.

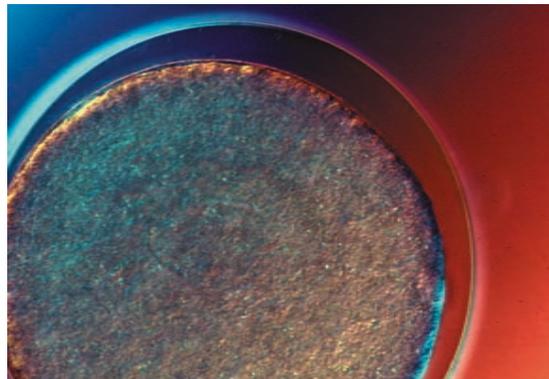
Each summer an additional 1,400 scientists and students from around the world gather at the MBL to conduct research, collaborate across scientific disciplines, and learn from one another. Many study local marine organisms, such as clams and squid, which are excellent models for understanding basic, life-sustaining biological

processes they share with humans.

To date, more than 50 Nobel Laureates have taught, taken courses, or conducted research at the MBL. Many other MBL affiliates are members of honorific societies, including the National Academy of Sciences and the American Academy of Arts and Sciences. In the words of author/physician Lewis Thomas, “The MBL stands as the uniquely national center for biology in the country.”

MBL education programs, including advanced-level summer discovery courses and shorter techniques-oriented courses, are known throughout the life sciences for kick-starting research careers. The MBL Semester in Environmental Sciences Program for undergraduates and the Brown-MBL Graduate Program for Biological and Environmental Sciences are other signature offerings.

The MBL also serves as a primary source of scientific information to the Woods Hole community through the MBLWHOI Library, which holds more than 300,000 bound journals and books and provides access to 4,000 electronic journals and scientific databases. Together these resources cover the biological literature of the last 300 years.



All photos this page: MBL Collection

Left: The MBLWHOI library, located in the Lillie building, contains one of the world's most complete collections of biological, ecological, and oceanographic literature.

Top right: MBL scientists study cells of marine organisms to learn more about biological processes common to all living things, including humans.

Bottom right: Scientists and students from around the world come to MBL to conduct basic biological, biomedical, and environmental research.



Founded 1930

The Woods Hole Oceanographic Institution (WHOI) is a private, nonprofit research and higher education facility dedicated to the study of all aspects of marine science and engineering and to the education of marine researchers. Established in 1930, it is the largest independent oceanographic research institution in the U.S., with staff and students numbering about 1,000. The Institution is organized into five departments, four interdisciplinary institutes—ocean life, coastal ocean, ocean and climate change, deep ocean exploration—and a marine policy center. Its shore-based facilities are located in the village of Woods Hole and on the nearby Quissett Campus. The bulk of the Institution's funding comes from peer-reviewed grants and contracts from the National Science Foundation and other government agencies, augmented by foundations and private donations.

In an interdisciplinary atmosphere that nurtures discovery, WHOI scientists, engineers, and students collaborate to explore the frontiers of knowledge about planet Earth. They develop theories, test ideas, build seagoing instruments and vehicles, and collect data in diverse marine environments. Working in all the world's oceans, their broad research agenda includes: geological activity deep within the earth; plant, animal, and microbial

populations and their interactions in the ocean; coastal erosion; ocean circulation; ocean pollution; and global climate change.

Ships operated by WHOI carry research scientists throughout the world's oceans. The WHOI fleet includes three large research vessels *Atlantis*, *Knorr*, and *Oceanus*, coastal craft including *Tioga*, the deep-diving human-occupied submersible *Alvin*, the tethered, remotely-operated vehicle (ROV) *Jason*, autonomous underwater vehicles (AUVs) such as the *Sentry* and *SeaBED*, and the hybrid ROV-AUV *Nereus*.

WHOI offers graduate and post-graduate studies in virtually all areas of marine science. There are several fellowship and traineeship programs, and graduate degrees are awarded through a joint program with the Massachusetts Institute of Technology (MIT) or by the Institution itself. WHOI also offers other outreach programs and informal public education through its Ocean Science Exhibit Center (see pages 14 and 15) and summer tours. The Institution has a volunteer program and a membership program, WHOI Associates.



Craig Dickson, WHOI



Dan Fornari, WHOI



Tom Kleinigist, WHOI

Left: The research vessel *Atlantis* is owned by the U.S. Navy and operated by WHOI for the oceanographic community. It is one of the most sophisticated research vessels afloat, and it is specifically outfitted for launching and servicing *Alvin*.

Top right: The three-person submersible *Alvin* is recovered aboard research vessel *Atlantis* in the Pacific Ocean.

Bottom right: A small whale is scanned in the CT facility. Marine mammal research has been ongoing since the 1930s.



**Woods Hole
Science Center
Established 1962**

Earth scientists at the U.S. Geological Survey's Woods Hole Coastal and Marine Science Center explore and study the geology, chemistry, and physics of marine and lacustrine environments in the United States and around the world. Established in 1962, the field office has grown from a handful of researchers exploring the offshore continental margin to a team of about 100, studying many of society's pressing issues, such as climate change, coastal erosion, marine pollution, resource extraction, and habitat degradation. The USGS research facility is located on the Quissett Campus of the Woods Hole Oceanographic Institution.

The Woods Hole team's research focuses on five general themes: coastal and shelf geology, sediment transport, environmental geoscience, energy and tectonics, and information science. A long-term goal is to develop predictive capabilities for geologic processes and to provide the basic geologic framework of U.S. coastal and offshore areas. The results of these studies are released to the public as reports, maps, journal articles, books, atlases, websites, and seminar contributions. Much of the data and information are accessible online through the USGS Web site.

The USGS Woods Hole Coastal and Marine Science

Center has specialized capabilities in oceanographic research, including sediment transport instrumentation, an integrated seafloor mapping facility, geochemistry laboratory facilities, the coastal and lake research vessel *Rafael*, a gas-hydrates testing laboratory, and an advanced autonomous surface vehicle for shallow-water geophysical studies (IRIS).

USGS research is used to increase basic understanding of earth processes, to help develop government policy, and to aid managers in their stewardship and regulatory functions. The USGS in Woods Hole collaborates with other research institutions within the Woods Hole scientific community, the nation, and the world. USGS marine research also involves collaboration with states and other government agencies such as the Environmental Protection Agency, the Army Corps of Engineers, the departments of Commerce, Energy, Defense, and State, and other bureaus within the Department of the Interior.

Publications by the Woods Hole team provide scientific information of national and international importance to the research community, federal and state agencies, as well as the general public. Additional information is available via the USGS Web site at www.usgs.gov.



Top left: Onshore and offshore groundwater sampling. Geochemists study the flux of groundwater and nutrients across the land-sea interface.

Top middle: The autonomous surface vessel IRIS.

Top right: Gas hydrate researchers sampling a deep-sea sediment core from the Gulf of Mexico. Gas hydrates are being studied for their potential as a methane resource in both permafrost and deepwater marine settings.



Clockwise from top left: Sandy Baldwin, USGS; Tom O'Brien, USGS; Bill Winters, USGS; Dann Blackwood, USGS

Bottom: USGS Woods Hole Coastal and Marine Science Center, Quissett Campus.



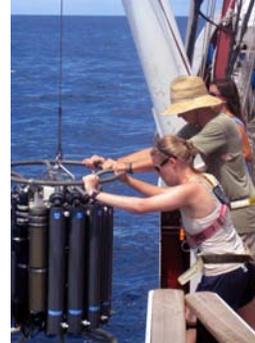
Relocated to
Woods Hole
in 1975

For nearly 40 years and more than one million nautical miles, Sea Education Association (SEA) has been a leader in marine education, teaching students about the world's oceans through a fully accredited off-campus study program. SEA Semester®, developed in direct collaboration and affiliation with Boston University, combines elements of oceanography, maritime history and culture, environmental studies, public policy, and nautical science. Each SEA Semester program combines academic work on campus in Woods Hole with fieldwork at sea aboard one of SEA's two sailing research vessels. It is the only program in the world that brings students from all disciplines to the deep ocean, under sail, to study the science and culture of the sea. SEA Semester is also the basis for SEA's other educational offerings which include summer high school programs, partnership in the MIT/WHOI graduate program, and programs for teachers.

SEA is the only ocean education organization that utilizes custom designed and built sail training vessels. The SSV *Corwith Cramer* and the SSV *Robert C. Seamans*, 134-foot brigantines, 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. The SSV *Corwith Cramer* sails the waters of the North Atlantic and the Caribbean Sea, while the SSV *Robert C. Seamans* sails the waters of the Northern and Tropical Pacific.

SEA is dedicated to the exploration, understanding, and stewardship of the oceans, and to the study of humanity's relationship with the oceans.



SEA Semester students
deploying a water sampling
carousel.

The SSV *Robert C.
Seamans* under full
sail.



The Woods Hole Research Center, founded in 1985 by noted ecologist George M. Woodwell, is an independent, non-profit institute focused on environmental science, education, and public policy. With a staff of nearly 60 scientists, research assistants, policy experts, and others, Center programs explore how to best conserve and sustain the Earth's vegetation, soils, water, and climate. The Center has projects throughout the world, including the Amazon, the Arctic, Africa, Russia, and North America, and works in collaboration with partners ranging from local non-governmental and educational organizations to governments and the United Nations.

The Center's Gilman Ordway Campus is located at 149 Woods Hole Road where the George M. Woodwell Building serves as a model for 21st century construction in its use of energy, water, and environmentally friendly building materials. The campus operates without any onsite combustion of fossil fuels, the primary contributor to global warming, and features a portfolio of renewable and alternative energy technologies, including a photovoltaic array and a 100kW wind turbine. The Woodwell Building was recognized by the American Institute of Architects (AIA) as one of the top ten green buildings in the U.S. in 2004 and earned a first place in the

Northeast Sustainable Energy Association 2004 Green Building Awards. The Center's website features real-time information on the building's energy performance. To learn more, please visit www.whrc.org.



Left: The Commons and the main staircase of WHRC's Woodwell Building interior.

Right: The "green" George M. Woodwell Building of the Woods Hole Research Center was completed in 2003. The 100kW wind turbine was erected in 2009.



Top photo by Judy Watts Wilson. Bottom photo by Diane Quaid, WHRC



Contact Information

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

Marine Biological Laboratory

Main Phone: 508-548-3705
Associates: 508-289-7281
Communications Office:
508-289-7423
Robert W. Pierce Visitors Center/
Gift Shop: 508-289-7230
Call for hours
7 MBL Street
Woods Hole, MA 02543
www.mbl.edu

National Marine Fisheries Service

Main phone: 508-495-2000
Aquarium: 508-495-2001 (Free adm.)
Mid-June to mid-September:
Tues.-Sat. 11am-4 pm
Rest of year: Mon.-Fri. 11am-4 pm
166 Water Street
Woods Hole, MA 02543
www.nefsc.nmfs.gov

United States Geological Survey

Main Phone: 508-548-8700
Crawford and Gosnold Laboratories
384 Woods Hole Road
Woods Hole, MA 02543
woodshole.er.usgs.gov

Sea Education Association

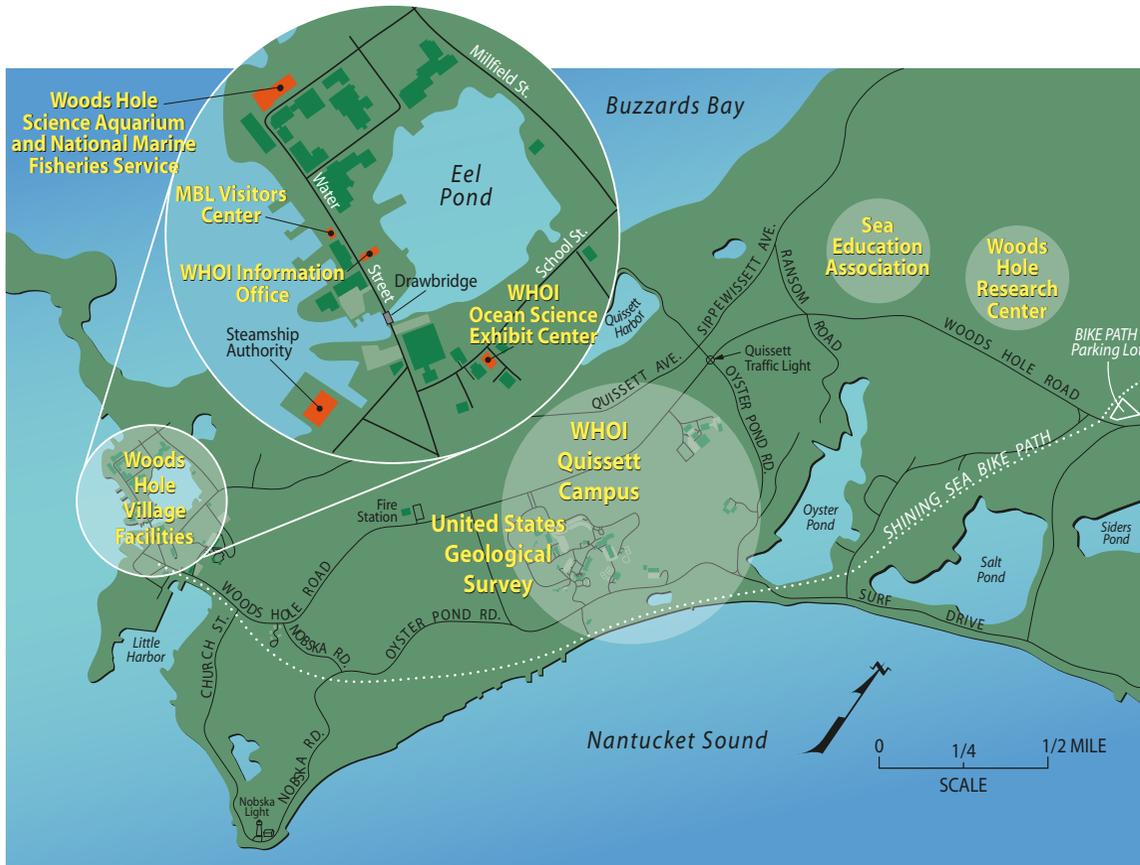
Main Phone: 508-540-3954
Admissions: 800-552-3633 ext. 770
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Mailing address: P.O. Box 6
Woods Hole, MA 02543
www.sea.edu

Woods Hole Oceanographic Institution

Main Phone: 508-457-2000
Associates Program: 508-289-4895
Academic Programs Office: 508-289-2200
Ocean Science Exhibit Center: 508-289-2663
Memorial Day to Labor Day:
Mon.-Sat. 10am-4:30pm
Off-Season: Call for hours
Human Resources: 508-289-2253
Information Office: 508-289-2252
Media Relations Office: 508-289-3340
Mailing address: 266 Woods Hole Road
Woods Hole, MA 02543
www.whoi.edu

Woods Hole Research Center

Main Phone: 508-540-9900
149 Woods Hole Road
Falmouth, MA 02540
www.whrc.org



Map by Jayne Doucette, WHOI Graphic Services

Woods Hole at a Glance

Marine Biological Laboratory (MBL)

www.mbl.edu

508-548-3705

MBL is a private, nonprofit international center devoted to basic research and education in biology, biomedicine, and environmental science.

National Marine Fisheries Service (NMFS)

www.nefsc.noaa.gov

508-495-2000

NMFS is the federal agency with stewardship responsibility for our nation's living marine resources. The Woods Hole Laboratory serves as headquarters for the Northeast Fisheries Science Center of the NMFS.

Sea Education Association (SEA)

www.sea.edu

508-540-3954

SEA offers programs for college and high school students and teachers primarily through classroom and at-sea experience aboard a traditional sailing vessel.

United States Geological Survey (USGS)

woodshole.er.usgs.gov

508-548-8700

The USGS Woods Hole Science Center, a federal government agency, conducts geoscience research on the Atlantic continental margin, in the Great Lakes, and in coastal regions around the nation.

Woods Hole Oceanographic Institution (WHOI)

www.whoi.edu

508-457-2000

WHOI conducts research around the world in oceanography and ocean engineering and is the largest private, nonprofit marine research and higher education organization in the U.S.

Woods Hole Research Center (WHRC)

www.whrc.org

508-540-9900

The Woods Hole Research Center addresses global environmental problems related to climate change, land-use changes in tropical and boreal forests, and the health of the planet.