Overview of US Census of Marine Life

The United States Census of Marine Life was established in 2002 in consultation with the National Academies of Sciences, the National Research Council, the National Oceanic and Atmospheric Administration (NOAA) and the international Scientific Steering Committee (SSC) of the Census of Marine Life (CoML). The US component of the CoML, led by a National Committee (USNC), seeks to build broad US community support to establish CoML as a sustained national research and monitoring program for marine and coastal biodiversity in support of its mission.

The mission of the US CoML is to serve as an unbiased source of sound scientific information to support the needs of the nation by assessing and explaining the changing diversity, distribution, and abundance of marine species, as well as the functional role of marine biodiversity in the US and its territories and commonwealths, in the past, present, and future.

The USNC works with Congress, federal agencies, the academic community, and private sector partners to establish a long-term, sustained program on marine biodiversity. The goals are to:

- establish research and exploration programs that provide genetic-, species-, and community-level information;
- improve tools and technologies for studying the ocean and monitoring and projecting ecosystem change; and
- develop educational information to create an ocean literate society, influence ocean policy development, and foster wise use of US resources.

CENSUS
OF MARINE LIFE
UNITED STATES

US Program Office
US Census of Marine Life Program
Consortium for Oceanographic Research and Education
1201 New York Avenue, NW
Suite 420
Washington, DC 20005
USA
Phone: +1 (202) 332-0063
Fax: +1 (202) 332-9751
Email: coml@coreocean.org
Website: www.CoML.us

For the Current US National Committee Membership:
http://www.coml.us/?anchor=coml_us_leadership

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Program Framework

Research and Exploration

☛ Assess biodiversity and better understand its functional roles in maintaining ecosystems.

☛ Foster the development, adaptation, and application of biosensor technologies that identify the abundance, distribution, movement, and diversity of marine species.

☛ Improve public understanding of ocean exploration as a driver of discovery, technology, and scientific collaboration.

Tools and Technologies for Monitoring and Projecting Ecosystem Change

☛ Establish and maintain a marine biodiversity data management system that is geo- and time-referenced and interoperable with ocean observing systems.

☛ Develop improved tools to apply marine species data to marine biodiversity research.

☛ Use historical records, baseline information, and predictive models to explain long-term and future changes in marine ecosystems through retrospective analyses.

Educational Information

☛ Increase public awareness about the oceans by incorporating marine biodiversity information into formal and informal education.

☛ Engage the scientific community to advance ocean literacy.

☛ Disseminate information on marine species to support resource management and policy development.

Relationship to the Global Program

US activities under the Census of Marine Life are part of a broad global initiative that engages more than 1700 scientists and ocean professionals from 73 countries. The common mission is to assess and explain the abundance, distribution, and diversity of marine species. This global effort, coordinated by an international Scientific Steering Committee, is implemented by national and regional committees, like the USNC. The USNC helps the overall Census to identify national and regional priorities, build partnerships, explore sources of funding, and promote the CoML to local audiences.

Scientific Application

Census of Marine Life scientists are exploring the oceans, making new discoveries, generating information critical to improving our understanding of the oceans and making it available to decision-makers so they can manage and conserve living marine resources for future generations. Seventeen international projects approach marine biodiversity research from three principal perspectives:

What lived in the oceans?

What lives in the oceans?

What will live in the oceans?

What lived in the oceans?

History of Marine Animal Populations (HMAP)
Census researchers use historical records to construct the history of marine animal populations since human predation became important. For example, historical records of cod catch in New England showed that mid 19th century fishing technologies increased fishing pressure on cod, causing a lower average weight, reduced fecundity, and ultimately, changes in community structure.

What lives in the oceans?

Ocean Realm Field Projects collect and use marine diversity data. Some examples are:

Pacific Ocean Shelf Tracking (POST)
Acoustic tags implanted in salmon allow receivers on the ocean floor to record animal movements from Washington State along the coast of British Columbia to Southeast Alaska. This project compares mortality in rivers and the ocean, survival of wild versus farm-raised salmon, and survival among watersheds.

Tagging of Pacific Pelagics (TOPP)
Twenty-two open-ocean species in the North Pacific have been fitted with compact electronic tags. The resulting information has revealed critical habitat areas, migratory corridors, and animal responses to environmental conditions. One Bluefin tuna crossed the Pacific three times during one year, highlighting the limitations of existing management zones.

Gulf of Maine Area Project (GoMA)
This project integrates biological, physical, chemical and geological data from the Gulf of Maine in a dynamic atlas. This atlas allows researchers and resource managers to explore how groundfish fisheries relate to the presence of prey, temperature, currents, and sea floor topography, and to use this information to manage the Gulf of Maine ecosystem.

Arctic Ocean Diversity Project (ArcOD)
In 2005, Census of Marine Life researchers, on a NOAA exploration cruise to the Arctic Ocean's Canada Basin, discovered at least 12 new species of marine life and found another 15 species well outside their previously known ranges. These expeditions help researchers monitor and predict the impacts of global change and decreasing polar ice on the ecosystem.

Biogeography of Deep-Sea Chemosynthetic Ecosystems (ChEss)
Hydrothermal vent communities around the globe continue to offer large and small additions to the book of life—a new species of clam found in 2004 draws life from methane hydrate.

Gulf of Mexico Biodiversity Project (GoMx)
A comprehensive, all-taxa inventory of the entire Gulf of Mexico, including US, Mexican, and Cuban waters, will be a first for study and management of this large marine ecosystem.

What will live in the oceans?

The Future of Marine Animal Populations (FMAP)
FMAP focuses on mathematical modeling to forecast how human and natural influences will alter ocean life in the future. FMAP prioritizes changes driven by the fishing industry and climate change—both of which alter marine ecosystems.

Ocean Biogeographic Information System (OBIS)

As national, regional, and international projects gather existing or new datasets to answer these questions, they are assembled into OBIS, the CoML data management infrastructure. OBIS maps species occurrences over space and time. Coupled with other components of the Integrated Ocean Observing System, its contents will become a powerful tool for resource management and policy development.

The Future of the Census of Marine Life

It is imperative that we understand the ocean's rich marine biodiversity and how it may be affected by human activities. This will require a sustained national program beyond the initial ten years, supported by substantial increases in public investment. With lasting financial support, the US program of the Census of Marine Life can continue to explore new and provocative marine ecosystems, explain the dynamic role of species over space and time, and provide information useful to resource management, policy development, and ocean education.