

# Addressing Challenges in Biodiversity



The **Census of Marine Life (CoML)** is a growing global network of researchers in more than 50 nations engaged in a ten-year initiative to assess and explain the diversity, distribution and abundance of life in the oceans - past, present and future. The reports from CoML will identify what is known, unknown, and unknowable about global marine biodiversity.

## THE RESEARCH PROGRAM

The research components of the Census of Marine Life are designed to address the following questions:

### WHAT LIVED IN THE OCEANS? History of Marine Animal Populations

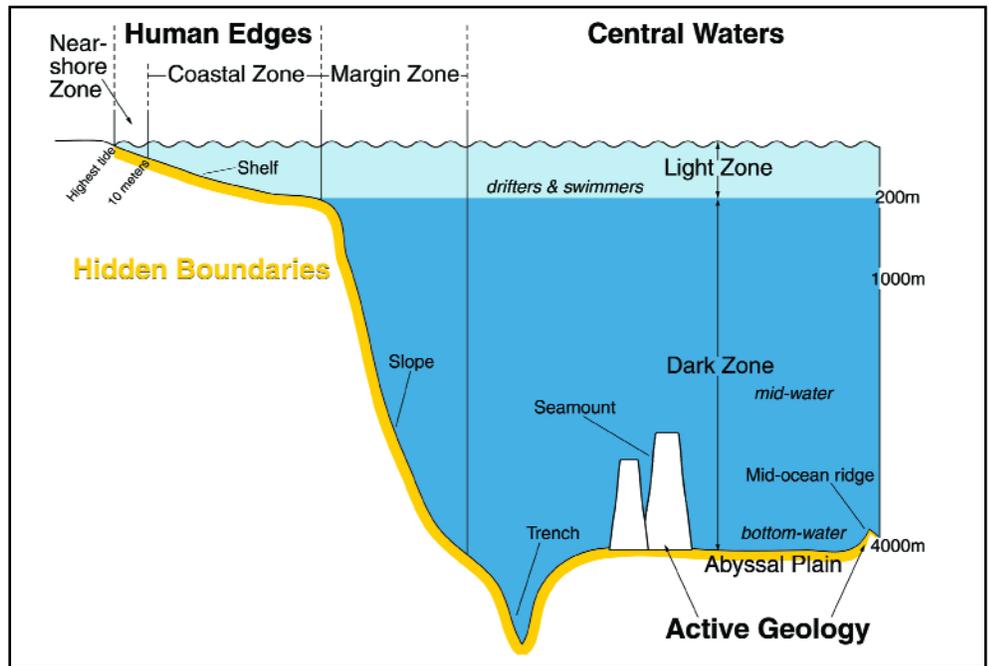
The History of Marine Animal Populations (HMAP) is a unique, interdisciplinary project drawing on historical and environmental archives that reflect the status of marine animal populations over the last several centuries. This project will clarify the dynamic interplay of anthropogenic and natural factors in the evolution of marine ecosystems, extending time series about changing animal populations and improving predictive capacity of mathematical models of economics and oceanography as well as biology. There are currently twelve HMAP case studies worldwide, focusing on ecological impacts of large-scale harvesting, long-term change in stock abundance and the role of marine resources in historical development. HMAP is coordinated by three centers at Southern Denmark University, the University of Hull (UK), and the University of New Hampshire (USA).

### WHAT LIVES IN THE OCEANS NOW? Ocean Realm Field Projects

To assess present marine life and prepare for explaining its changing diversity, distribution, and abundance on a global scale, CoML divides all the world oceans into six *realms* and subsidiaries - *zones* - with similar challenges requiring similar technologies. In each realm, one or more projects will demonstrate technologies and develop and promote an efficient standardized approach to exploration to ensure results exploit the opportunity to visualize global patterns and thus test global hypotheses. Initially, all projects are at least regional in scope and expanding globally. The current field projects and their distribution are described on the back. In addition to those listed, project concepts are under development on specific habitats and organisms: the poles; seamounts; coral reef communities; margins, canyons and trenches; plankton, and microbes.

### WHAT WILL LIVE IN THE OCEANS? Future of Marine Animal Populations

The Future of Marine Animal Populations (FMAP) is the modeling component of the CoML. This project will apply mathematical models to integrate and analyze biogeographic data in order to characterize, interpret and predict changes in biodiversity. FMAP is coordinated by three centers at Dalhousie University (Canada), Marine Research Institute of Iceland, and Ocean Research Institute of the University of Tokyo (Japan).



This idealized cross-section of an ocean basin illustrates the realms and zones of the world oceans, as defined by the Census of Marine Life. Realms not depicted here are Ice Oceans (the poles) and the Microscopic Ocean, which is omnipresent in all realms throughout the oceans.

## ACCESS TO INFORMATION Ocean Biogeographic Information System

An important goal of the CoML is to establish a functioning, standardized information management system for marine species to ensure that the information it collects is available to all interested parties. OBIS will provide an accessible information system based on international standards, that will be maintained long after the program is completed.

The OBIS Portal ([www.iobis.org](http://www.iobis.org)) links a federation of marine databases around the world to provide an Internet accessible, dynamic interface for comparing species level, geo-referenced biodiversity data in relation to ocean habitats. The Portal offers data searches, downloads and visualization tools. The Portal is currently housed at Rutgers University (USA).

Initial funding for OBIS was US\$3.7 million for eight demonstration projects involving 63 institutions in 15 countries. This funding came through the U.S. National Oceanographic Partnership Program (NOPP). As OBIS grows, new member databases are linked and new tools developed and enhanced. In addition to the growing global federation, all information collected through the Census of Marine Life field projects, HMAP and FMAP will be available online for scientists and the general public.

OBIS is the marine component of the Global Biodiversity Information Facility.

## OUTREACH & EDUCATION

For the Census of Marine Life to succeed, its discoveries and information must be widely shared and accessible. Each component and field project commits to develop a range of education and outreach initiatives to familiarize stakeholders and the public with the societal importance and findings of the research. Some current outreach and education initiatives include news features, websites, documentary videos, museum and aquaria exhibits, and research experiences for teachers, students, artists and the media.

## ORGANIZATION

The Census of Marine Life is managed by an international Scientific Steering Committee (SSC) and a Secretariat. The overall program has evolved through cooperation with marine scientists and funding agencies from around the world. National and Regional Implementation Committees are forming to focus local efforts, evaluate field project technologies and become integrated with the global CoML. The Scientific Steering Committee, the Implementation Committees, and the Secretariat continue to develop and implement a detailed plan for research in biodiversity with the collaboration of the ocean science community, the participation of many nations and organizations, and the cooperation of all people who care about life in the oceans.

# OCEAN REALM FIELD PROJECTS

The seven Ocean Realm Field Projects described below are the initial in a growing suite of field projects to explore a variety of innovative approaches to study marine biodiversity on a global-scale.

## Pacific Ocean Shelf Tracking (POST)

Realm: Human Edges  
Zone: Coastal

David Welch, Fisheries & Oceans, Canada and George Boehlert, Oregon State University, USA. A test of a moored telemetry system to monitor animal distributions along the continental shelf into the open ocean.

## Biogeography of Chemosynthetic Ecosystems (ChEss)

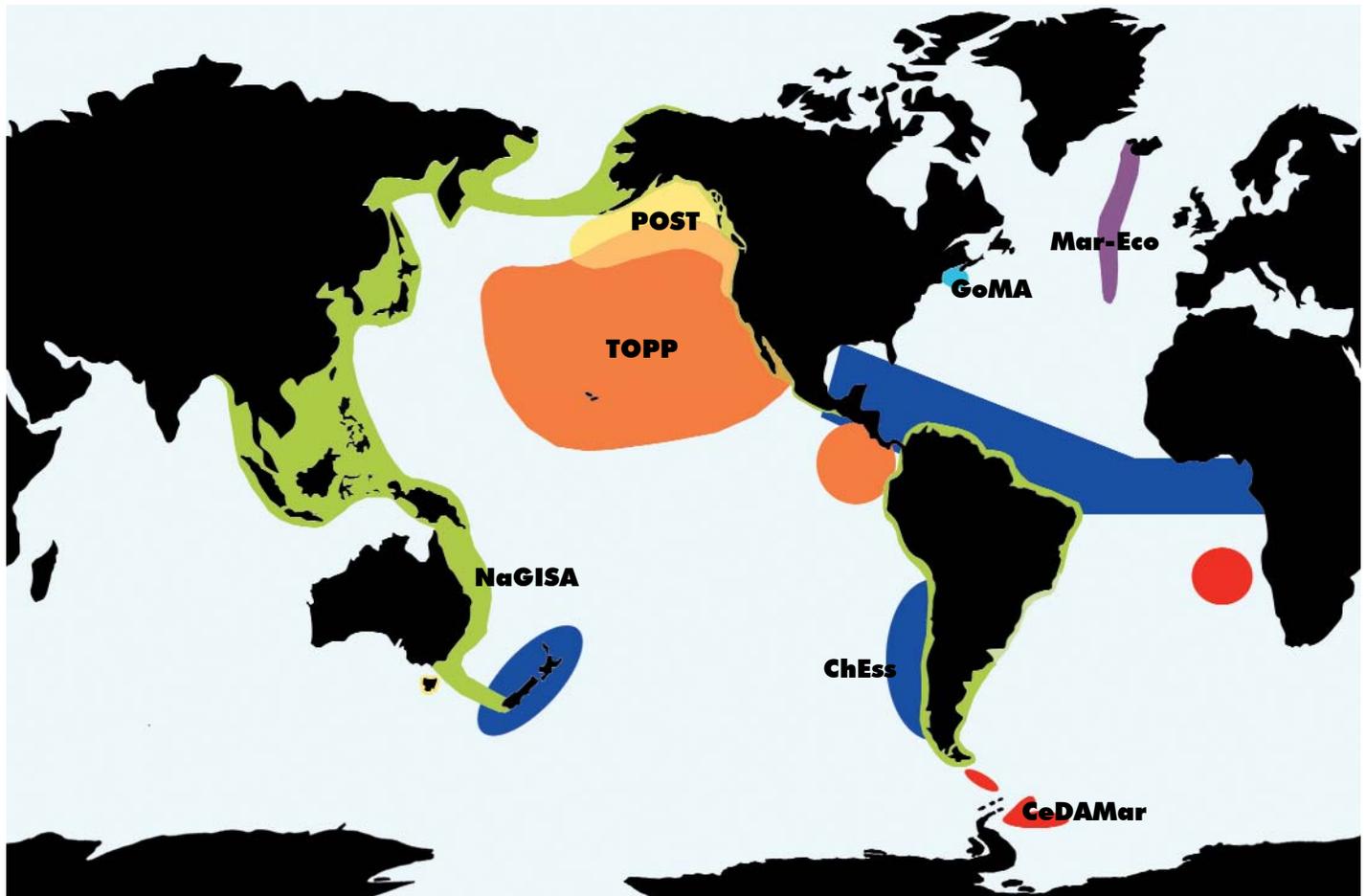
Realm: Active Geology

Paul Tyler, Southampton Oceanographic Centre, UK. A global comparison of chemosynthetic ecosystems including deep-sea vents, cold seeps, whale falls and wood debris. This project will also involve refinement of plume-tracking technologies.

## Patterns and Processes of Ecosystems in the Northern Mid-Atlantic (MAR-ECO)

Realm: Central Waters  
Zone: Dark Zone

Odd Aksel Bergstad, Institute of Marine Research, Norway. An integrated survey of poorly known biota of a mid-ocean ridge area.



## Natural Geography In Shore Areas (NaGISA)

Realm: Human Edges  
Zone: Nearshore

Yoshihisa Shirayama, Kyoto University, Japan. Standardized benthic and pelagic sampling from the intertidal zone to 20 m depth along latitudinal and longitudinal gradients. This project will focus on capacity-building in developing countries.

## Tagging of Pacific Pelagics (TOPP)

Realm: Central Waters  
Zone: Light Zone

Barbara A. Block, Stanford University, USA. A multi-trophic level study of large pelagic fauna using satellite telemetry tags to determine the distribution of these animals in relation to physical oceanographic features.

## Gulf of Maine Area Program (GoMA)

Realm: Human Edges  
Zone: Coastal

Evan Richert and Lewis Incze, University of Southern Maine, USA. A synoptic benthic and pelagic survey of a well-studied area using new technologies.

## Census of Diversity of Abyssal Marine Life (CeDAMar)

Realm: Hidden Boundaries  
Zone: Abyssal Plains

Pedro Martinez Arbizu, Centre for Marine Biodiversity Research, Senckenberg University, Germany. A survey of benthic life in the deep abyssal plains of the world oceans.

**FOR MORE INFORMATION  
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