Marine biodiversity is one of the least understood areas of the oceans, which cover 70 percent of Earth’s surface and encompass more than 90 percent of its biosphere. In 2001, according to the United Nations Atlas of the Oceans, over half the world’s population lived within 200 km of a coastline. The rate of population growth and demand for food from the marine environment in coastal areas is accelerating and is exacerbated by over-fishing and climate change. Increased carbon dioxide in the atmosphere is leading to global warming and increased acidity of the ocean, both of which directly affect marine life. Marine microbes such as bacteria and viruses are abundant, but little is known even about the number of such species in the ocean. Despite years of research, even the feeding, breeding, and migration patterns of many commercially valuable marine species remain a mystery.

The Census of Marine Life (CoML) is a growing global network of researchers in more than 80 nations engaged in an initiative to assess and explain the diversity, distribution, and abundance of marine life in the oceans—past, present and future. CoML uses field projects, new technology, an online data system, studies of historical data and models of trends and future projections to understand the world of marine biodiversity. In 2010, CoML will release the first comprehensive global report on what is known, unknown and potentially unknowable about biodiversity in the world oceans.

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Photos:
Male elephant seal with satellite tag. Dan Costa, UC Santa Cruz
Marine microbes resembling a “night sky.” Jed Fuhrman, University of Southern California
Hippopодiус sp. Russ Hopcroft, University of Alaska Fairbanks
Clione beneath Arctic ice. Elisabeth Calvert, Hidden Ocean 2005 Expedition, NOAA Ocean Exploration
Tuna. Monterey Bay Aquarium
Clubtip finger coral, Florida Keys National Marine Sanctuary, NOAA
The Census of Marine Life (CoML) is the first international program to systematically study the global ocean from a biological standpoint. It is providing information, technologies and approaches critical for:

- Understanding environmental factors affecting human health and well-being
- Understanding, assessing, predicting, mitigating, and adapting to climate variability and change
- Improving weather information and forecasting (via animal oceanographers)
- Improving the management and protection of coastal and marine ecosystems
- Understanding, monitoring and conserving biodiversity

These are all key goals of the Global Earth Observing System of Systems (GEOSS), a global, comprehensive, coordinated system of instruments to observe the Earth and transform the data they collect into vital information for society. CoML is working with the broader ocean community to contribute information to GEOSS about Earth’s largest habitat.

CoML technologies and systems, such as the Ocean Biogeographic Information System (OBIS), can help address environmental and human health concerns, including fisheries and ecosystem management, monitoring of endangered species and protection of biodiversity, identification of invasive species, prediction of harmful algal blooms and discovery of microbial species that may pose threats to human health or possibly even alleviate societal concerns for medicine or energy. CoML has also demonstrated that tagged animals can serve as tireless deep-diving oceanographers, collecting vast amounts of data needed to better understand and predict climate and weather. The movements of these animals in relation to oceanographic conditions can provide insight into ecosystem change that may result from climate related changes in the ocean. The technologies and approaches to surveying marine biodiversity demonstrated by CoML can be replicated globally and implemented in monitoring programs and ocean and coastal observation systems.

It is important to note that the long-term viability of measurements is at risk today since virtually all ocean monitoring networks, like CoML, are only funded as research projects. Filling the gaps and long-term continuity will depend on long-term support within an operational GEOSS framework.