

**Science Advisory Board
Census of Marine Life Committee Report**

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What is the Census of Marine Life?

Census of Marine Life [CoML] is as a global network of researchers engaged in a ten-year initiative 2000-2010 to assess and explain the diversity, distribution, and abundance of marine life in the world's oceans - past, present and future. It covers all taxa from microbes to marine mammals and all ocean realms from nearshore to the abyss [See Appendix 1]. This scope is represented in the 19 projects that have evolved in the United States under CoML administration and coordination (Table 1). CoML was initiated with funding from the Alfred P. Sloan Foundation and leveraged funds from many U.S. agencies and international entities. It has involved researchers from public, private and academic sectors. The CoML projects world-wide include 2,000 researchers across 80 countries. This network has demonstrated the ability to work across agencies and institutions and disciplines. Administrative and coordination functions for the U.S. CoML are housed at the Consortium for Ocean Leadership in Washington, D.C.

Absent additional funding and support, CoML will conclude its first decade of programs in 2010. It can take credit for having made impressive discoveries, developed and tested new technologies for understanding life in the sea, and created public excitement about biodiversity in the sea. CoML is currently preparing a synthesis of these contributions for publication. It is actively seeking ways to extend the life of Census as an entity and with respect to individual projects.

Attesting to the success of the CoML **Time** magazine named it one of the top 10 scientific results in 2009, **Popular Science** ran a lead article on it as did the **Economist**. Literally thousands of mentions of its discoveries and programs can be found in publications around the word ranging from short popular sketches to detailed peer review publications. The prestigious Ocean Research and Resources Advisory Panel recommended the continuation of CoML in a memo to National the Ocean Research Leadership Council (NORLC) / Interagency Committee on Ocean Science and Resource Management Integration (ICOSRMI). [See Appendix 2]

Purpose and Origins of this Report

This report responds to a request from the CoML U.S. National Committee (USNC) to the SAB at its March 2008 meeting. The purpose of this report is to provide advice to NOAA on roles that NOAA might play in the continuation of Census of Marine Life

(CoML) program after the completion of its first decade in 2010. Specifically, the USNC request to the SAB is to “Explore the potential of NOAA as a home for CoML after 2010.”

In making its request the United States National Committee for CoML identified the following positive aspects of its experience for NOAA.

- It engages in a dialogue on marine biodiversity spanning regional, national and international levels;

- It provides a baseline for global biodiversity studies;

- It develops sampling protocols and new sensors and tools to track marine life;

- It identifies species using new genetic techniques; and

- It offers new biodiversity paradigms and forecasting tools.

These all match with various NOAA mandates or missions.

Initial SAB discussion of this request [SAB March 2008 Minutes] indicates both interest in continuing NOAA involvement in certain CoML efforts but also concern that marine biodiversity constitutes a set of issues is bigger than NOAA and that other agency partners must be engaged in the dialogue as to the future roles each should play relative to biodiversity research, monitoring and management needs. With respect to NOAA, the SAB observed that while other agencies were integrally involved and that biodiversity issue spanned a large set of issues, NOAA, as the Nation’s lead civilian ocean agency with broad stewardship responsibilities for living marine resources, should consider asserting a stronger leadership role in how the nation should engage marine biodiversity. This perspective is consistent with the reports of the U.S. Commission on Ocean Policy [2005] and the Pew Commission Report [2004] and the continuing work of the Joint Oceans Commission. It is particularly relevant to the geospatial and biodiversity needs for coastal and marine spatial planning as recommended by the President’s Ocean Policy Task Force as well as for development of ecosystem-based management.

Based on the national need to formally address biodiversity and NOAA’s potential roles in so doing, the SAB formed a subcommittee consisting of SAB members David Fluharty (Chair), Carolyn Thoroughgood, and Frank Kudrna to respond the request from the CoML. The USNC of CoML formed a parallel subcommittee (Andy Rosenberg, Wes Tunnell, Penny Dalton, Shirley Pomponi, and Paul Sandifer) to interface with the SAB subcommittee. Given the chaotic schedules of the SAB subcommittee and CoML committee members, the two groups did not succeed in meeting as a committee although there were discussions at USNC CoML meetings and exchanges of email. CoML staff members were very responsive to requests for information and other assistance.

The SAB subcommittee conducted research, attended meetings, and interviewed individuals involved with the CoML, NOAA staff leads, and personnel from other federal agencies regarding the future of CoML and the national need to perform research, discover, manage, and engage the public with respect to marine biodiversity. The SAB Committee notes that NOAA has an internal biodiversity group which participates in an

ad hoc interagency biodiversity group that has been formed under the Interagency Working Group on Ocean Partnerships [IWG-OP].

In coming to the findings and recommendations in this report several caveats are in order. The SAB subcommittee has not performed a program-by-program analysis of the CoML projects and their utility to NOAA. Nor has the subcommittee gone program-by-program through NOAA's involvement and capabilities. Instead, the subcommittee has focused on the larger-scale issue of the merits of a successful **external** marine biodiversity enterprise that has engaged the private sector, academics, and public agencies and international organizations and coupling it with NOAA's **internal**, mission-oriented biodiversity efforts. It also focused on whether NOAA could or should provide support for an administrative and coordinating function for CoML. Nothing in this report should be seen as an evaluation criticizing the accomplishments of CoML. The intent is to encourage CoML in its efforts to develop a second decade of biodiversity engagement and to ensure that NOAA is part of that process to the appropriate extent.

How is NOAA engaged in marine biodiversity and how does that relate to CoML?

NOAA has great depth and expertise in marine biodiversity as the lead federal oceans agency. The most recent statement of the NOAA responsibilities for marine biodiversity is found in Deputy Under Secretary Mary Glackin's presentation to the Board on International Scientific Organizations Symposium of the National Academy of Sciences, February 11, 2009 entitled "Darwin's Fishes: Why Should We Care About Marine Biodiversity?" Besides the research, monitoring and exploration roles that NOAA performs, NOAA has trust responsibilities for marine fisheries, marine mammals, invasive species, endangered species, corals and other vulnerable marine ecosystems, coastal management and restoration, and marine sanctuaries. NOAA missions apply programmatically across all U.S. marine regions in the EEZ and extend to U.S. commitments under international agreements in regional fisheries management organizations, the International Whaling Commission, and scientific organizations. NOAA also has interests in U.S. participation in activities under the Law of the Sea, Convention on Biological Diversity, and the Intergovernmental Platform on Biodiversity and Ecosystem Services. Ms. Glackin emphasized the global need to perform more effective public education, to develop stronger formal and informal attention to international agreements, to focus on outcomes rather than processes, to augment capacity building in developing countries, to provide assessment and monitoring of climate impacts, to use ecosystem-based approaches to management, thinking in terms of the important roles biodiversity plays in provision of natural services to benefit society.

NOAA, along with other federal agencies (Tables 2 and 3) and academic institutions, has had significant interests and involvement in the CoML over the last decade. NOAA provides ships, ROVs, researchers and funding (Table 4). In some cases, non-NOAA personnel are engaged in NOAA-led projects and in others NOAA personnel join in projects led by other agencies or institutions. It is a fair assessment to note that NOAA's participation in CoML projects coincides with its diverse agency missions. NOAA line offices have been strategically engaged where CoML enhances NOAA's ability to fulfill

its missions through research and monitoring objectives. Interestingly, there does not appear to have been a concerted effort in NOAA to coordinate CoML activities across line offices, however. This is reflected in NOAA's effective but *ad hoc* engagements with the various projects. While such an approach may be expeditious administratively, i.e., not overly bureaucratic, the potential to gain cross agency benefits is reduced. In addition, it makes the task of sorting out NOAA's potential roles in an extended CoML more difficult to articulate. Nonetheless, the SAB subcommittee is aware that within the last two years NOAA staff member have established an *ad hoc* internal biodiversity group that meets regularly to exchange information and coordinate planning efforts. This group meets with the ad hoc interagency biodiversity group that has been formed under the Interagency Working Group on Ocean Partnerships [IWG-OP].

NOAA has incorporated and is likely to continue to incorporate biodiversity into its Ocean Research Priorities Plans. NOAA has a significant opportunity to advance coordinated biodiversity research, management and public engagement in its Next Generation Strategic Plan process now underway.

Exploring Barriers and Bridges to NOAA's Roles in marine biodiversity research, management and public engagement

The biggest barrier facing CoML is that the Sloan Foundation funding will end in 2010, which constrains the program's ability to continue important administrative and coordination functions. CoML's coordination among multiple agencies and academia on a variety of studies and disciplines is seen as an exemplary asset. So is CoML's proof of concept for many tools and approaches in examining biodiversity. However, CoML faces barriers regarding the future particularly related to funding. Despite significant efforts to obtain additional funding for the CoML and its projects, that funding has not been forthcoming except in specific programs, e.g., Canadian government funding of the Pacific Ocean Shelf Tracking project [\$15M over five years] and most recently a commitment to fund the development of the Barcode of Life [\$35M over five years].

NOAA's bridges include a strong engagement in studying biodiversity and application in management. NOAA's platforms and laboratories also provide an opportunity for biodiversity research by partners. Further, the agency has the capability to monitor change over time and this capacity is being enhanced by regionally-based implementation of the Integrated Ocean Observing Systems. NOAA resources and potential funding for the CoML projects in the future, however, are subject to budgetary fluctuations, constraints of overall Federal and NOAA appropriations, and competing priorities. Of concern, too, is the fact that within NOAA, there is a lack of coordination on CoML projects across NOAA's Line Offices despite a strong interest in biodiversity and its relationships to NOAA mandates. In fact, perhaps because of their different missions, Line Offices appear to focus on different measures of biodiversity in their operations such that they arrive at different conceptions of how biodiversity objectives are being served. For example, NOAA fisheries programs are focused on species diversity while the Marine Sanctuaries and Protected Species programs tend to examine biodiversity at at population diversity structure and community organization. Given the potential

significance of climate change and ocean acidification to food webs and distribution of marine organisms, biodiversity at the genetic, microbial and/ or organism level may be increasingly relevant yet not adequately supported financially.

Findings and Recommendations

Overall, the NOAA SAB notes both the opportunities and constraints on NOAA providing an institutional home for CoML or separately supporting it externally. Fundamentally it appears that there is a mismatch in this respect between an agency with multiple service and management mandates at national and international scales versus the CoML mission, which is driven by intellectual curiosity and opportunities for discovery and operates at project scales. NOAA can certainly learn from CoML with regard to ways to integrate and collaborate across multiple institutions and disciplines. In addition, Census has been extremely effective at communicating the excitement of marine biodiversity through news about its discoveries and insights. As one SAB member observed and others agreed [NOAA SAB Meeting Minutes 3-4 November, 2009] it is highly unusual for a private foundation-led activity to be “picked up” by a federal agency in any case but to do so in fiscally challenging times would require NOAA to make cuts in the programs to which it is already committed and to justify these changes to budget examiners.

Finding 1: At its July 2009 meeting the SAB expressed strong concerns about the fact that the CoML, while developing a Synthesis document for the 2000-2010 duration of the program, has not yet addressed in a comprehensive way, a business proposal for the post-2010 program. For such a business plan to be successful in garnering federal funding it must address NOAA priorities and to those of the President’s Ocean Policy Task Force in ways that complement governmental efforts. The SAB notes that NOAA budgetary priorities and proposals, like other federal agencies, are set two or more years in advance. Given that the CoML ends in 2010, it does not appear that funding from NOAA to support CoML administration or coordination is feasible in the near term.

The SAB is strongly supportive of the many projects of the CoML and notes that many of these are supported by NOAA both in terms of funding and through participation of its scientific and technical staff. In particular, the Pacific Ocean Shelf Tracking (POST) project is providing valuable insights into the movements of endangered species of salmon and sturgeon on the West Coast. The Tagging of Pacific Predators (TOPP) project is providing key data on movements of sea turtles, tunas and seabirds in the Western Pacific and their temporal and spatial interactions that offers ways to better manage to conserve these species and to engage with the regional fisheries management organizations. NOAA SAB anticipates that these POST and TOP efforts will continue as appropriate consistent with program mandates and funding. Similarly, ocean exploration projects funded by competitive research proposals are likely to continue as well. However, the SAB is not comfortable at this time making specific recommendations for NOAA’s role in financing the coordination and administrative functions of CoML after 2010, given that there is not yet a clear plan proposed from CoML.

RECOMMENDATION 1A: The SAB recommends that NOAA continue the discussion with the USNC and the CoML about future collaborations. This would require serious engagement to plan and budget for NOAA's mission-based activities in concert with CoML with a lead time of several years. It is unclear whether or not this dialogue should take place at the program level where working relationships are quite advanced, a central administration focus, or a combination of the two.

RECOMMENDATION 1B: Based on SAB discussions, this plan for continuation would engage other public agencies at the federal level and be part of national level ocean policy deliberations. It is unrealistic to recommend that CoML could necessarily develop this type of plan by itself. It would be more appropriate for NOAA to advocate for and lead such a planning effort given its expertise and reliance on biodiversity information in management. Thus, NOAA leadership in getting marine biodiversity considerations on the agenda of coordinated efforts among federal agencies in partnership with states, CoML and academic institutions should be strongly supported.

Finding 2: The SAB was impressed by the wide-spread expertise and responsibilities within NOAA with respect to marine biodiversity that it discovered in the course of its discussions about the CoML. This led to consideration of NOAA's overall leadership in the area of marine biodiversity and the expanded role that NOAA could play. This has become particularly urgent now that the Interim Report from the Executive Office of the President's Interim Report of the Interagency Ocean Policy Task Force (OPTF) has been released (September 10, 2009) and the Draft Framework for Coastal and Marine Spatial Planning (December 9, 2009). The term "biological diversity" (MSN Word search) is used only seven times in the Interim Report and a similar number of uses in the CMSP. However many of the actions implicitly include a biodiversity dimension, especially with respect to ecosystem-based management, monitoring change in biota as part of climate change and ocean acidification, and helping to define restoration goals in the nearshore. In addition to the OPTF Report, the Joint Subcommittee on Ocean Science and Technology (JSOST) has initiated a process to revise the Ocean Research Priorities Plan and Implementation Strategy (ORPPIS). The original ORPPIS does not have a strong focus on marine biodiversity. Thus, there are near term opportunities to bring biodiversity concerns into more prominence on the national ocean agenda.

RECOMMENDATION 2: To the extent applicable, NOAA should formulate and endorse a marine biodiversity plank in the President's Interagency Ocean Policy Task Force Reports and in JSOST's revision of its Ocean Research Priorities Plan and Implementation Strategy.

Finding 3: Despite NOAA's significant assets and mission responsibilities for research and monitoring of marine biodiversity in its mandates, there remain mismatches in the approaches used across the agency. Agency discourse on marine biodiversity can be confusing internally and externally because it lacks a common set of metrics and language. Thus, different Line Offices adopt independent approaches regarding how to use marine biodiversity in assessment and management.

RECOMMENDATION 3: At a minimum, NOAA's Line Offices should work to operationalize a definition and metrics for use across NOAA so that there can be a common approach to discussion of marine biodiversity in management contexts. As with other complicated and cutting edge issues like climate, satellite observations, etc., one approach to developing a comprehensive understanding of marine biodiversity and how to harness it as a management tool could be the development of a Cooperative Institute. Other approaches could include a National Research Council study, research contracts and an intra-agency working group convened by NOAA.

Finding 4: NOAA is a major player in marine biodiversity, yet other agencies have complementary missions and they have developed important roles and commitments. NOAA has been a consistent organizer of an *ad hoc* interagency group on marine biodiversity that meets to exchange information on individual efforts and to maintain informal coordination. An example of one topical area for discussion is the U.S. Geological Survey's involvement in funding and guiding the development of the CoML-initiated Ocean Biogeographic Information System (OBIS). CoML is constructing OBIS as part of the USGS National Biological Information System Infrastructure (NBII). While NOAA is also interested in developing georeferenced biological and ecosystem data in the context of the regional Integrated Ocean Observing System and other activities, it is not clear that NOAA has determined how to ensure compatibility and avoid redundancy in data acquisition and archiving among these efforts. Furthermore, there appear to be significant issues of security of electronically accessed data bases to be overcome in data acquired and used for management purposes versus those used for other open-access scientific purposes.

RECOMMENDATION 4: Given the multiple federal agency roles in marine biodiversity, NOAA should take the lead or at least increase its involvement in coordinating among US national and international efforts to understand and monitor marine biodiversity.

Finding 5: NOAA is an international player in marine biodiversity through its research, monitoring and management roles as well as in international fishery and marine mammal fora such as the International Whaling Commission, and numerous intergovernmental regional fishery management organizations. NOAA's international programs for sharing information, protocols, and capacity building are key components in these programs but under-recognized in the U.S.

RECOMMENDATION 5: NOAA should re-examine its commitments and capabilities to engage at the international level in marine biodiversity fora and engage with the U.S. State Department to lead the U.S. efforts in marine biodiversity policy around the globe, through intergovernmental organizations and implementing instruments.

Finding 6: Despite the considerable capacity to engage in fulfilling mandates, perform research and to provide scientific advice on marine biodiversity, there is lack of coordination and sometimes even apparent competition among Line Offices to assert

different definitions and approaches to management of marine biodiversity. As NOAA moves toward a science-based ecosystem approach to management, convergence on a common understanding of marine biodiversity is imperative as a framework for management.

RECOMMENDATION 6: Beyond the limited recommendation 3A, NOAA should consider development of a Strategic Plan for implementing a common approach to marine biodiversity research and management across the agency in the context of contributing to development of ecosystem-based management and systematically addressing the biodiversity goal enunciated in its 5-Year Research Plan. This effort should carry over into the development of the “Next Generation Strategic Plan” for NOAA.

Concluding Comments

The SAB is prepared to continue to address issues relating to marine biodiversity with NOAA as the OPTF and ORPP processes continue. The SAB can task its working groups to look specifically at these issues in the context of the other work that they do on behalf of the SAB. NOAA’s development of integrated ecosystem assessments, definition of its roles in coastal and marine spatial planning, advancement of a comprehensive integrated ocean observing system and implementation of ecosystem based management all have strong links to biodiversity research and operationalization of biodiversity concepts in management. The SAB working groups that could address these issues include the Climate Working Group, the Data Archive and Access Requirements Working Group (particularly in the context of the Ocean Biogeographic Information System, OBIS), and the Ecosystem Sciences and Management Working Group. The Ocean Exploration Advisory Working Group should address this until such time as it is replaced by the Ocean Exploration Advisory Board (OEAB) formed as a result of recent legislative mandate. The Environmental Information Services Working Group might consider this issue in the future as demand from users of NOAA’s Integrated Ecosystem Assessments increases.

Table 1. CoML Project Matrix

Human Edges	NaGISA – Natural Geography In Shore Areas CReefs – Coral Reef Ecosystems GoMA – Gulf of Maine Area Census (Regional Ecosystem) POST -- Pacific Ocean Shelf Tracking
Central Waters	TOPP – Tagging of Pacific Predators (Top Predators) CMarZ – Census of Marine Zooplankton MAR-ECO – Mid-Atlantic Ridge Ecosystems
Hidden Boundaries	CoMargeE – Continental Margins Ecosystems CeDAMar – Census of Diversity of Abyssal Marine Life CenSeam – Census of Seamounts ChEss – Chemosynthetic Ecosystems (Vents)
Ice Oceans	ArcOD – Arctic Ocean Diversity CAML – Census of Antarctic Marine Life
Microscopic Ocean	ICOMM – International Census of Marine Microbes
Other Programs	OBIS – Ocean Biogeographic Information System HMAP – History of Marine Animal Populations FMAP – Future of Marine Animal Populations OTN – Ocean Tracking Network DNA Barcoding – Marine Barcode of Life
Administrative Offices and Coordination	

Table 2. NOAA and Other Federal Agencies Engaged with CoML

NOAA – National Oceanic and Atmospheric Administration
USGS – U.S. Geological Survey
FWS – U.S. Fish and Wildlife Service
USDS – U.S. State Department
DOE – U.S. Department of Education
DOE – U.S. Department of Energy
DOD – U.S. Department of Defense
MMC – Marine Mammal Commission
EPA – Environmental Protection Agency
MMS – Minerals Management Service
RFMC – Regional Fisheries Management Councils
NSF – National Science Foundation

Table 3. Sources of CoML Funding (Million Dollars US) (through 2008)

TOTAL [Global]	352M
TOTAL U.S. CoML	194M
NOAA	30M
NSF	38M
ONR	7M
OTHER	16M
PRIVATE	
SLOAN FOUNDATION	73M
OTHER U.S. PRIVATE	30M

Source: U.S. CoML Program Office to SAB for July 2009 Meeting in Long Beach CA.

Table 4. NOAA Funding to CoML 1999-2010

1999	0
2000	0
2001	0
2002	476,861
2003	2,131,000
2004	2,939,727
2005	15,363,435 *
2006	1,669,695
2007	757,000
2008	4,104,187
2009	1,680,000
2010	0
Unknown	990,000
Total NOAA Funding	30,111,905

Source: CoML Estimates – July 2009 * Spread over multiple years

Appendix 1. Census of Marine Life Purpose, Organization, Accomplishments [source www.coml.org website]

About the Census of Marine Life

The Census of Marine Life is a global network of researchers in more than 80 nations engaged in a 10-year scientific initiative to assess and explain the diversity, distribution, and abundance of life in the oceans. The world's first comprehensive Census of Marine Life - past, present, and future - will be released in 2010.



Why a Census

The stated purpose of the Census of Marine Life is to assess and explain the diversity, distribution, and abundance of marine life. Each plays an important role in what is known, unknown, and may never be known about what lives in the global ocean.

First, diversity. The Census aims to make for the first time a comprehensive global list of all forms of life in the sea. No such unified list yet exists. Census scientists estimate that about 230,000 species of marine animals have been described and reside in jars in collections in museums of natural history and other repositories. Since the Census began in 2000, researchers have added more than 5600 species to the lists. They aim to add many thousands more by 2010. The database of the Census already includes records for more than 16 million records, old and new. By 2010, the goal is to have all the old and the new species in an on-line encyclopedia with a webpage for every species. In addition, we will estimate how many species remain unknown, that is, remain to be discovered. The number could be astonishingly large; perhaps a million or more, if all small animals and protists are included. For comparison, biologists have described about 1.5 million terrestrial plants and animals.

Second, distribution. The Census aims to produce maps where the animals have been observed or where they could live, that is, the territory or range of the species. Knowing the range matters a lot for people concerned about, for example, possible consequences of global climate change.

Third, abundance. No Census is complete without measures of abundance. We want to know not only that there is such a thing as a Madagascar crab but how many there are. For marine life, populations are being estimated either in numbers or in total kilos, called biomass.

To complete the context, it is important to understand the top motivations for the Census of Marine Life. Most importantly, much of the ocean is unexplored. Most of the records in its database are for observations near the surface, and down to 1000 meters. No observations have been made in most of the deep ocean, while most of the ocean is deep.

Another important issue is that diversity varies in space. Marine hot spots, like the rain forests of the land, exist off for large fish off the coasts of Brazil and Australia. The goal is to know much more about marine hot spots, to help conserve these large fish. Their abundance and thus their diversity is changing, especially for commercially important species. Between 1952 and 1976, for example, fishermen and their customers emptied many areas of the ocean of tuna.

The Census has evolved a strategy of 14 field projects to touch the major habitats and groups of species in the global ocean. Eleven field projects address habitats, such as seamounts or the Arctic Ocean. Three field projects look globally at animals that either traverse the seas or appear globally distributed: the top predators such as tuna and the plankton and the microbes. The projects employ a mix of technologies. These include acoustics or sound, optics or cameras, tags placed on individual animals that store or report data, and genetics, as well as some actual capture of animals. The technologies complement one another. Sound can survey large areas in the ocean, while light cannot. Light can capture detail and characters that sound cannot. And genetics can make identifications from fragments of specimens or larvae where pictures tell little.

This mix of curiosity, need to know, technology, and scientists willing to investigate the unexplored and undiscovered will result in a Census of Marine Life in 2010 that provides a much clearer picture of what lives below the surface around the globe. Several reasons make such a report timely, indeed urgent. Crises in the sea are reported regularly. One recent study predicted the end of commercial fishery globally by 2050, if current trends persist. Better information is needed to fashion the management that will sustain fisheries, conserve diversity, reverse losses of habitat, reduce impacts of pollution, and respond to global climate change. Hence, there are biological, economic, philosophical and

political reasons to push for greater exploration and understanding of the ocean and its inhabitants. Indeed, the United Nations Convention on Biological Diversity requires signatories to collect information on living resources, but, as yet, no nation has a complete baseline of such information. The Census of Marine Life's global network of researchers will help to fill this knowledge gap, providing critical information to help guide decisions on how to manage global marine resources for the future.



Moving Toward 2010

The Census of Marine Life is an unprecedented undertaking that is significantly contributing to understanding of the marine environment and life in the global ocean. Census researchers are discovering new life forms, finding life in unexpected places, advancing technology to create windows into what was an opaque ocean, and building global partnerships to advance what is known about life below the surface. During late 2008-2009, the Census will wind up its field work and begin the complex process of synthesizing the immense amount of data collected over the last eight years, with the goal of releasing the first Census of Marine Life in 2010. The first Census will not only advance knowledge about life in the global ocean, including the first ever complete catalog of marine life, but will serve to inform decisions about how to best manage the resources that live below the surface around the world.

Census Organization

The Census of Marine Life is coordinated by a Secretariat ^[1] based at the Consortium for Ocean Leadership ^[2] in Washington, D.C. and governed by an international Scientific Steering Committee ^[3]. Twelve National and Regional Implementation Committees ^[4] work under the guidance of the international Scientific Steering Committee ^[3] and serve to strengthen the global reach of the Census in support of marine biodiversity research. A Synthesis Group ^[5] has been established to organize, integrate, and synthesize the vast information gathered by the Census into common themes and overarching messages to

ensure comprehensive content and products for 2010. Census-wide communications, media relations, education, outreach activities are coordinated by the Census Education and Outreach Team [6] based at the University of Rhode Island Graduate School of Oceanography's Office of Marine Programs [7]. The Mapping and Visualization Team [8] based at Duke University's Marine Geospatial Ecology Lab [9] is responsible for developing and sharing methods to display the results of the ten-year Census of Marine Life.

Seventeen projects conduct the research and analysis on six ocean realms that will be reported in the first Census of Marine Life in October 2010. The Scientific Committee on Oceanic Research Technology Panel [10] monitors new technologies for observing marine life and recommends when cutting-edge marine technologies are mature enough to be used routinely in Census field projects.

Support [11] for the Census of Marine Life comes from government agencies concerned with science, environment, and fisheries in a growing list of nations as well as from private foundations and corporations. The Census is associated or affiliated with several intergovernmental international organizations including the Intergovernmental Oceanographic Commission [12] of the UN, the Food and Agriculture Organization [13] of the UN, the UN Environment Programme [14] and its World Conservation Monitoring Centre [15], the Global Biodiversity Information Facility [16], the International Council for the Exploration of the Seas [17], the Group on Earth Observations [18] and the North Pacific Marine Science Organization [19]. It is also affiliated with international nongovernmental organizations including the Scientific Committee on Oceanic Research [20], Partnership for Observation of the Global Oceans [21] and the International Association of Biological Oceanography [22] of the International Council for Science. [23] The Census of Marine Life has established collaborative partnership with entities such as the Encyclopedia of Life [24] and the National Geographic Society [25] to broadly disseminate program results to broader audiences.

Read more about the work of the Census in the Reports [26] and Perspectives [27] sections.

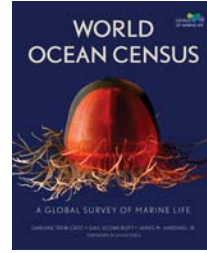
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World Ocean Census Book Released

Firefly Books recently released *World Ocean Census: A Global Survey of Marine Life*. This beautifully illustrated 256-page book tells the amazing inside story of the Census of Marine Life. Written by Census Education & Outreach Team members Darlene Crist, Gail Scowcroft, and James Harding, with a foreword written by Sylvia Earle, the book highlights the stories behind the Census through lively text and over 250 images, the majority graciously provided by Census scientists. The volume's chapters give insight into the human side of research and set the stage for the release of the first Census of Marine Life in 2010. Visit [Firefly Books](#) [1] to view a Table of Contents, sample pages, and ordering information.



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Appendix 2: Ocean Research and Resources Advisory Panel Recommendations to NORLC/ICOSRMI in Support for Census of Marine Life Continuation

Memo to: National Ocean Research Leadership Council (NORLC) / Interagency Committee on Ocean Science and Resource Management Integration (ICOSRMI)
From: Ocean Research and Resources Advisory Panel (ORRAP)
Date: April 7, 2009
Re: Recommendations for future direction of the Census of Marine Life

As the nation moves toward ecosystem- and place-based management, success will depend to a large extent upon the quality and completeness of the ecosystem-based *science* for those systems. The scientific information must not only be comprehensive spatially and across the various components of the ecosystem, but it must have a temporal dimension that documents changes that have occurred in response to various forcing functions. Longer-term observational programs that meet these criteria have not been a national priority, and few exist. One exception is the Census of Marine Life (CoML). As a nation, it is important that we find ways to exploit the data, information and advances in understanding that these programs have generated, and to continue to generate new data and information needed for ecosystem-based management.

The CoML has been a decade-long international program. Over \$1 billion USD has been invested, including \$100 million from the Sloan Foundation for management of the program and development and maintenance of the Ocean Biogeographic Information System (OBIS)—the CoML’s data repository and data management system for biodiversity and other biological data. Sloan funding ends in October 2010 and no source of funding has been identified to replace it. The scientific advances of CoML have been impressive, and the wealth of ecosystem-scale scientific data and information that exists should be exploited.

ORRAP considers the role of CoML in providing large-scale and long time series biological data to be a critical ingredient to a national need for ecosystem-scaled science. ORRAP therefore recommends that transitional funding be provided for 1-3 years, to ensure the continuation of a CoML Coordinating Secretariat, and of OBIS, until long-term funding can be secured. Moreover, ORRAP considers this as an opportunity to assess the requirements for a national marine ecosystem monitoring and science program, and we therefore recommend review of existing programs (e.g., IOOS and coordinated regional programs such as the regional ocean observing systems and PISCO) that are complimentary to CoML and OBIS, in order to identify critical components of such a national program.

This funding should be accompanied by appropriate federal oversight to ensure that the benefits of translation of the CoML data and information into tangible products to meet management needs are realized through integration and application. Oversight for such funding and the overall program review might be an appropriate interagency working group activity. (Note: NOAA and USGS have had the greatest involvement to date, and USGS has provided funding for OBIS).