Marine Sanctuaries Conservation Series MSD-01-03

Workshop on Marine Mammal Research & Monitoring in the National Marine Sanctuaries

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service
Office of Ocean and Coastal Resource Management
Marine Sanctuaries Division

September 2001

About the Marine Sanctuaries Conservation Series

The National Oceanic and Atmospheric Administration's Marine Sanctuary Division (MSD) administers the National Marine Sanctuary Program. Its mission is to identify, designate, protect and manage the ecological, recreational, research, educational, historical, and aesthetic resources and qualities of nationally significant coastal and marine areas. The existing marine sanctuaries differ widely in their natural and historical resources and include nearshore and open ocean areas ranging in size from less than one to over 5,000 square miles. Protected habitats include rocky coasts, kelp forests, coral reefs, sea grass beds, estuarine habitats, hard and soft bottom habitats, segments of whale migration routes, and shipwrecks.

Because of considerable differences in settings, resources, and threats, each marine sanctuary has a tailored management plan. Conservation, education, research, monitoring and enforcement programs vary accordingly. The integration of these programs is fundamental to marine protected area management. The Marine Sanctuaries Conservation Series reflects and supports this integration by providing a forum for publication and discussion of the complex issues currently facing the National Marine Sanctuary Program. Topics of published reports vary substantially and may include descriptions of educational programs, discussions on resource management issues, and results of scientific research and monitoring projects. The series will facilitate integration of natural sciences, socioeconomic and cultural sciences, education, and policy development to accomplish the diverse needs of NOAA's resource protection mandate.

Workshop on Marine Mammal Research & Monitoring in the National Marine Sanctuaries

Wailea, Maui, Hawaii
28 November 1999

Report by

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and
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Silver Spring, Maryland
September 2001

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Marine Sanctuaries Division
SSMC4, N/ORM62
1305 East-West Highway
Silver Spring, MD 20910

SUGGESTED CITATION

Suggested citation:
Fangman, S.[1] and J. Roletto[2] (Eds.). 2001. Workshop on Marine Mammal Research and Monitoring in the National Marine Sanctuaries. Marine Sanctuaries Conservation Series MSD-01-3. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Marine Sanctuaries Division, Silver Spring, MD. 66 pp..

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PREFACE

The Second National Workshop on Marine Mammal Research and Monitoring in the National Marine Sanctuaries was held on 28 November 1999 in Maui, Hawaii. The workshop preceded the Thirteenth Biennial Conference on the Biology of Marine Mammals, and provided an opportunity to review and promote marine mammal research and monitoring in the National Marine Sanctuaries (NMS). The purpose of the workshop was to bring together researchers and sanctuary staff and to improve marine mammal research and monitoring throughout the sanctuaries. Discussion topics included: potential multi-sanctuary projects, sources of funding for multi-sanctuary projects, services and equipment for researchers through the sanctuaries, consolidating small levels of funding, help in funding and support for writing up data, publishing documents in Technical Memoranda, and letters of support. Representatives from the NMS national office and nine sanctuaries provided participants with overviews of marine mammal research within the sanctuaries. Presentations were also given by representatives from the National Marine Fisheries Service's Permits and Health and Stranding programs.

During the breakout working groups, there were several comments and suggestions consistent among each of the groups to improve marine mammal research. Each group emphasized the need to improve communication among researchers and to better share data. These suggestions included web-based information networks, advisory panels, and workshops. Regionally based research projects were also emphasized. In order to best study marine mammal populations, collaborative studies must take place throughout multiple sanctuaries. In order to achieve these large scale studies, funding and staffing must be directed towards these studies and distributed among each of the sanctuaries so that they may all be able to have the staffing, equipment, and vessels necessary to achieve a collaborative, ecosystem-based, regional marine mammal monitoring program.

It will take several years to achieve all of the suggestions from the workshop, but thanks to the workshop participants, the National Marine Sanctuary Program has begun to direct marine mammal research and monitoring in order to achieve the goals of the workshop.

This document provides a summary of the workshop with a focus on key points/main issues. We have included contact information intended to encourage continued collaboration among the individuals and organizations represented at the 1999 Marine Mammal Research and Monitoring in the National Marine Sanctuaries Workshop.

CONSERVATION SCIENCE IN THE NATIONAL MARINE SANCTUARIES

Steve Gittings, National Science Coordinator, National Marine Sanctuary Program

The National Marine Sanctuaries Act (NMSA) of 1972, as amended, authorizes the Under Secretary for Oceans and Atmosphere to designate discrete areas of the marine environment as National Marine Sanctuaries (NMS). To date, twelve NMS compose the National Marine Sanctuary Program (NMSP). This program is administered by the National Oceanic and Atmospheric Administration's (NOAA's) Office of Ocean and Coastal Resource Management (OCRM), Marine Sanctuaries Division (MSD). The mission of the National Marine Sanctuary Program is to serve as the trustee for the nation's system of marine protected areas and to conserve, protect and enhance the biodiversity, ecological integrity and cultural legacy of these ecosystems.

The NMS differ widely in their natural and historical resources. They include nearshore and open ocean waters and range in size from less than 1-square mile to over 5,000-square miles. Protected habitats include rocky coasts, kelp forests, coral reefs, sea grass beds, estuarine habitats, hard and soft bottom habitats, segments of whale migration routes and shipwrecks. Because of their diversity, each site has a tailored management plan. Education, research, monitoring and enforcement programs vary accordingly.

Four components of this national program include a 1) conservation policy and planning branch, 2) national programs branch, 3) stewardship development branch, and 4) the marine sanctuaries themselves. The first deals with policy analysis, program planning, management plan development and revision, new sanctuary designations and permitting for certain research or other activities otherwise prohibited by sanctuary regulations. The national programs branch deals with issues related to the conduct of conservation science programs, cultural resources, emergency response, administration and special projects. The stewardship development branch deals with education, outreach and communications for the program. The marine sanctuaries themselves deal with the broadest array of issues, including resource protection, site management, education, research, monitoring, and enforcement, thus integrating and implementing policies, management plans, permits and conservation.

Science in the Sanctuary Program

Fundamental to the success of the sites and the mission of the MSD is the development and consistent application of a rigorous, objective scientific foundation for evaluating ecosystem health and implementing effective and sustainable management strategies. A Science Plan was developed to provide the framework for establishing this scientific foundation. It enables the NMSP to accomplish priority tasks outlined in its strategic plan. Some tasks are directly accomplished by sanctuary staff, such as habitat characterization and resource monitoring, and others are indirectly accomplished by other researchers. The Plan is rooted in conservation science; a field that offers a mission-oriented, multi-disciplinary approach to the assessment, protection, monitoring, maintenance and restoration of cultural and natural resources. The Plan is also intended to contribute to the annual planning process for the sites, the national program, and to

ensure that all NMS have the staff and capability to assure effective coordination of site-specific and issue-directed planning and research.

Most sanctuaries have established Sanctuary Advisory Councils (SAC) which meet regularly. SACs consist primarily of local interest groups which may be affected or effecting the sanctuary policy and management issues. Local, regional, and national scoping meetings and workshops are held periodically, to discuss recent activities and to identify and plan to address research needs. Although funds for research are occasionally provided to meet local needs for information, current program funding levels do not allow a system-wide approach to funding extramural research. Monitoring and research needs in the marine sanctuaries are usually met through partnerships with other resource management agencies, volunteer networks, non-governmental organizations, and the private sector.

Current science priorities for the marine sanctuaries include:

- Developing site characterization guidelines for the sites.
- Evaluating the utility of zoning as a marine resource protection tool.
- Developing Geographic Information System (GIS) capabilities at all the marine sanctuaries to enhance our ability to manage resources, track use and understand land-sea interaction and climatology.
- Implementing a system-wide coral reef monitoring program to track the status and trends in benthic and pelagic resources and water quality.
- Continuing to work with the National Geographic Society's Sustainable Seas Expeditions to conduct exploration in the sanctuaries.

Future plans for the science program include:

- Developing system-wide ecosystem and sentinel species monitoring programs.
- Ensuring that all sites have comprehensive monitoring, each contributing to a system-wide approach to assessing ecosystem condition.
- Conducting comprehensive site characterizations at sites that do not already have them and updating those that do have them.
- Beginning to utilize mechanisms to fund research on a national level within the sanctuaries.

OBTAINING A MARINE MAMMAL SCIENTIFIC RESEARCH OR ENHANCEMENT PERMIT

Ann Terbush, Chief, Permits Division, National Marine Fisheries Service, Office of Protected Resources

The purpose of the Marine Mammal Protection Act (MMPA) of 1972 is to conserve and protect marine mammals by regulating activities of US citizens and activities of all persons carried on within the jurisdiction of the United States. Under the authority of the MMPA, the Endangered Species Act (ESA) and the Fur Seal Act (FSA), the National Marine Fisheries Service's Permits and Documentation Division develops and implements policies, procedures, and regulations for the issuance of permits to "take" marine mammals. These permits may be issued for: scientific research, enhancement for the survival or recovery of a marine mammal species or stock, commercial and educational photography, and public display (includes a national inventory program for tracking captive marine mammals). The MMPA, ESA, and FSA Permits and Documentation Division also develops and implements policies, procedures, and regulations for insurance of Letters of Confirmation under the General Authorization for Scientific Research. The Permits and Documents Division within the Office of Protected Resources, National Marine Fisheries Service (NMFS), works in coordination with: NMFS Regional Offices/Science Centers, the Marine Mammal Commission, the National Ocean Service, Sanctuaries and Reserves Division, US Fish and Wildlife Service (CITES/ joint permits), Office of Polar Programs, National Science Foundation and the Animal and Plant Health Inspection Service.

In the amended MMPA "take" "level A harassment" and "level B harassment" are defined. "Take" is defined as to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal. "Level A harassment" is defined as any act of pursuit, torment, or annoyance, which has the potential to injure a marine mammal stock in the wild. "Level B harassment" is defined as any act of pursuit, torment, or annoyance which has the potential to disturb a marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to migration, breathing, nursing, breeding, feeding, or sheltering but does not have to potential to injure a marine mammal or marine mammal stock in the wild.

In the amended ESA, "take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The ESA does not define harassment. Marine mammals listed as endangered or threatened under the ESA may be taken for purposes of scientific research only after insurance of a permit for such activities pursuant to the ESA.

MMPA Research Activities gives general authorization for Level B harassment only, aerial and vessel surveys, photo-identification studies, behavioral observations, marking and passive acoustic studies. The process for general authorization is to file a letter of intent 60 days prior to research. Then one of three things may happen: either a letter of confirmation good for 30 days is given, a notification may be sent stating that

insufficient information was provided or that research is not bona fide, or the applicant may receive notification that a scientific research permit is required.

The permitted activities for Level A harassment are: tag/biopsy studies, physiological and morphometric studies, acoustics and any activity involving endangered species (e.g. aerial surveys). The other permitted activities are collection of marine mammal parts, import/export, enhancement activities and photography (non-endangered species).

Typically, the permitting process includes the following steps: the Permits and Documentation Division communicates with the applicant to make sure that the application is complete. The application is then subjected to a thirty-day initial review and initial National Environmental Protection Act (NEPA) determination. After the NEPA determination is given the application is considered complete. Federal notice then opens a mandatory thirty-day public review period. The application is distributed to the Marine Mammal Commission, NMFS Enforcement Division, the NMFS Regional Offices, the National Marine Mammal Laboratory and other experts. After these reviews, a recommendation is made to issue or deny the permit. The decision is published in the federal register.

NATIONAL MARINE FISHERIES SERVICE HEALTH AND STRANDING PROGRAM

Teri Rowles, Coordinator, National Marine Fisheries Service, Marine Mammal Health and Stranding Response Program

There are six major components of the Marine Mammal Health and Stranding Response Program (MMHSRP):

- Stranding and Disentanglement networks;
- Biomonitoring, Research and Development;
- National Marine Mammal Tissue Bank;
- Quality Assurance Program;
- Response to unusual mortality events; and
- Information Management.

The goals of the MMHSRP are to collect and disseminate reference data on the health and health trends, to correlate health with physical, chemical and biological environmental parameters; and to coordinate effective responses to mortality events.

Population Health Indices - condition indices, reproductive success, mortality rate and causes, population growth, disease incidence and types, chemical contaminant loads, environmental stressors.

The Stranding Response program utilizes a network of volunteers, authorized through Letters of Authorization or Designees, to respond to 3,000 to 6,000 stranding events per year. The data gathered by these volunteers is used to develop baselines, detect unusual mortalities, and detect human related causes of mortality. A variety of information about marine mammals can be gathered from stranding events including life history, biology, causes of mortality, incidence and types of diseases, levels of contaminants, exposure to harmful algal blooms and the general health of the animal. The MMHSRP utilizes samples from stranded animals as well as subsistence hunted animals, animals involved in incidental fishery interactions and live capture/release projects.

The MMHSRP disentanglement efforts involve trained personnel in cooperation with the National Marine Sanctuaries, the Coast Guard, Navy and private organizations. There are three levels of training and response. The program is focused on right whales but responds to all whales as needed. Current population estimates for right whales are around 300 individuals. The population growth rate is slow and reproductive success is low. There is a high incidence of human interactions. Right whales are long lived and slow to mature. Right whale recovery efforts are focused on minimizing sources of human-caused death, injury or disturbance; identifying, characterizing, protecting and monitoring important habitats; monitor status and trends; and coordinating federal, state, international and private efforts to implement the recovery plan.

Emerging threats:

-Climate change	-Marine debris
-Chemical pollution	-Development
-Harmful Algal Blooms	-Fishing activities
-Noise	-Recreational activities
-Traffic	-Nutrient pollution
-Habitat destruction	-Infectious diseases

Stranding baselines:

-Temporal	-Age
-Spatial	-Sex
-Species	-Condition
-Environmental factors	-Cause of stranding

The Biomonitoring Program is designed to develop baselines on disease, health and contaminant levels; determine impacts of pollutants, diseases and harmful algal blooms on health; to determine the role of biological, physical and environmental factors in health; and to develop new assessment tools.

The National Marine Mammal Tissue Bank is maintained by multiple partners. Central to this program is the cryopreservation of tissues and fluids for future retrospective analyses. The program adheres to strict protocols for collection and storage of samples. Tissues are collected from indicator species, geographic areas and trophic levels. Tissues are examined for disease, contaminants, harmful algal blooms and others.

Research on the impacts of multiple stressors on health. Comparison of field sites; evaluate concentrations with health indices; multiple stressors; multi-disciplinary approach; and uniqueness.

The Health and Stranding Program investigates unusual mortality events. The working group was established in the 1990s. Since inception the group has responded to 15 events in the US. Causes of the events have included infectious diseases, harmful algal blooms, environmental conditions, nutritional condition, pathogens and unknown factors. The NMS have cooperated during several events: 1997 harbor seal mortalities - Gulf of Farallones; 1998 California sea lions - Monterey Bay and the Gulf of the Farallones; 1999 Gray whales - Pacific coast.

Current partners in investigation events include:

- NOS and the NMS
- US Fish and Wildlife Service
- US Geologic Survey
- Native and Tribal organizations
- Local governments
- >200 non-government organizations
- National Institute of Standards and Technology
- Armed Forces Institute of Pathology

National Veterinary Services Lab
North Slope Borough
State wildlife and fisheries agencies
National Environmental Data Information System

Future Collaborations:
Stranding or mortality response
Baseline data on health
Baseline data on distribution and habitat use
Ecosystem health using indicator species
Conservation and recovery efforts

The NMSP and sanctuaries can increase collaborative efforts through participation and data exchange and acquisition with the Health and Stranding Program. When mortality events occur, sanctuaries can provide notification efforts but also provide valuable baseline data on strandings, baseline data on distribution and habitat use by marine mammals. The Sanctuaries can also provide valuable baseline data and data during post- mortality events on ecosystem parameters using indicator species. The Sanctuaries are also excellent avenues for education of the public about events and promoting conservation efforts established through recovery plans.

MARINE MAMMAL RESEARCH IN THE NATIONAL MARINE SANCTUARIES

Channel Islands National Marine Sanctuary
Sarah Fangman, Research Coordinator

Introduction

The Channel Islands National Marine Sanctuary (CINMS) is located off the Southern California coast, and encompasses 1,658-square miles surrounding the five northern Channel Islands. Sanctuary boundaries stretch for six nautical miles around Anacapa, Santa Cruz, Santa Rosa, San Miguel and Santa Barbara Islands. The islands themselves are a National Park. The CINMS is unique because it is in this stretch of the southern California coast that the warm waters from the south mix with the colder waters from the north. This creates three distinct biogeographic regions, which support a rich diversity of life, including a variety of marine mammal species. Several species of pinnipeds breed and live in the CINMS: California sea lions, northern elephant seals, harbor seals, and northern fur seals. The large whales commonly found in Channel Islands waters include grays, fins, blues, humpbacks and minkes. And the smaller cetaceans often sited in these waters include Risso's, common and Pacific white-sided dolphin.

Research in the Channel Islands National Marine Sanctuary

Weekly aerial surveys (weather and equipment permitting) are conducted on marine mammals and vessels in Sanctuary waters. Our surveys cover three transects: the first is around the four northern islands at a distance of 0.5 mile. The second is around the four northern islands at a distance of three miles. The third transect goes from Anacapa Island to Santa Barbara Island and around Santa Barbara Island at 0.5 mile and at three miles. During each flight, aerial survey software developed specifically for this project is used. Data is collected on weather conditions to give information on the sitability of animals on that particular day. The plane's GPS is connected to the computer so that any data entered during the flight includes information on position. Two observers record any sitings of marine mammals or vessels made during the transect. The number and location of all sitings is then recorded and location automatically downloaded.

The information gathered during these flights is used to track marine mammal use of Sanctuary waters and human use of the sanctuary. The survey plane is also used for emergency response purposes. For example, a recent oil spill was mapped using the Sanctuary's aircraft. Within four hours of the flight, the trajectory and resources at risk from the spill were determined. The aerial survey data can be transmitted to the response center in real time through the use of a cellular phone.

Data gathered during each flight are entered into the Channel Islands Geographic Information System (CIGIS). The CIGIS is a spatial data infrastructure with a five-year

history of collaboration among NOAA, the University of California at Santa Barbara, the Channel Islands National Park, the California Department of Fish and Game (CDFG) Office of Spill Response (OSPR), the UC Reserve System and the Minerals Management Service. The CIGIS is a database of information, which is shared by anyone interested in participating. The data in the CIGIS includes: bathymetric, topographic, environmental sensitivity index, hydrology, vegetation, geology, side scan sonar imagery, and satellite imagery. Some of the marine mammal data we would like to add include pinniped haul-out data and any time series population information.

Information Gaps

Each of the twelve national marine sanctuaries has a management plan, which describes the goals and objectives of that sanctuary. The CINMS Management Plan was written in 1983 and since this time much has changed with regard to the status of some of the Sanctuary's resources. The 1983 plan identified pinniped populations as a major management concern. Clearly much has been learned about the status of pinnipeds and their populations have greatly increased since 1983. Because the status of sanctuary resources has greatly changed, we have undertaken a management plan revision. The information we now need to update our management plan includes:

- What do we know about Sanctuary resources?
- How have those resources changed?
- What are the potential threats to those resources?

We welcome research in the CINMS area that can help us find answers to these questions. As part of the Management Plan revision, we will also develop plans for all our programs (research, education, outreach, etc.). One program we would like to engage in is a pelagic ecosystem monitoring program.

Opportunities for Research Support

The CINMS operates three research platforms: two vessels and one aircraft. These are used to conduct our own research, and to support other agencies and institutions conducting research on Sanctuary resources. Scientists can request the use of these and whenever possible, we support those projects. The *R/V BALLENA* is our largest vessel and is well equipped to conduct a variety of projects. She can carry up to 15 people on day trips or seven on extended trips of up to five days. The *XANTU* is our smaller, faster day boat that is best for day trips and projects that are less equipment intensive. She is a 22 foot Wilson, and is a great SCUBA platform or for doing photo-identification work. The third research platform used in the CINMS is patrol aircraft, shared by the CINMS and the Monterey Bay National Marine Sanctuary. The plane is used by the CINMS for marine mammal surveys, vessel monitoring and emergency response.

Monterey Bay National Marine Sanctuary

Andrew DeVogelaere[3] and Scott Benson[4]

Introduction

Designated in 1992, the Monterey Bay National Marine Sanctuary (MBNMS) encompasses over 5,000-square miles off of central California. Marine mammal habitats within the MBNMS include estuaries, rocky shores, sandy beaches, kelp forests, continental shelf, canyons, and deep water. The MBNMS has a diverse and abundant assemblages of marine mammals in the world, including six species of pinnipeds, one species of fissiped, and 21 species of cetaceans (see the MBNMS Site Characterization at http://bonita.mbnms.nos.noaa.gov/sitechar/). Many of these marine mammals migrate north to the Gulf of the Farallones NMS and Cordell Bank NMS, and south to the Channel Islands NMS. There are also more than 20 active marine research institutions working within the MBNMS, making this a recognized center for excellence in marine science. This wealth of habitats, species, scientists, and resource managers allows for successful collaborations and opportunities to enhance scientific understanding to manage natural resources. The following is an overview of ongoing marine mammal studies in the MBNMS, successful collaborative projects, critical resource management questions to be addressed, and requests by scientists to the MBNMS to enhance research.

Research in the Monterey Bay National Marine Sanctuary

An extensive list of research projects was compiled from a survey conducted with marine mammal scientists in the MBNMS region (see DeVogelaere and Benson, http://bonita.mbnms.nos.noaa.gov/Research/techreports/techreps.html). In 1999, information was gathered from 64 scientists at 17 marine research institutions that were working on 34 different marine mammal studies. Monitoring projects ranged from monthly surveys of beachcast and pelagic organisms to disease prevalence and pathogenesis. Research studies ranged widely, including diverse topics such as diving behavior of wild and rehabilitated seals and analyses of spatio-temporal patterns in the distribution and abundance of zooplankton, fish and mammals in relation to coastal upwelling.

Collaborating Agencies, Institutions and Research Projects

In 1999, the MBNMS research staff consisted of two people, so collaboration with regional scientists was essential for addressing resource management issues. There have been numerous successful collaborations between the MBNMS and regional scientists. The MBNMS has an active Research Activity Panel (RAP), with representatives from all the major regional research institutions, that meets eight times per year. This group advises the MBNMS on science issues and played a critical role in developing the MBNMS site characterization. This continually updated document is

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[4] Moss Landing Marine Laboratories

available on the world wide web at http://bonita.mbnms.nos.noaa.gov/sitechar/. The MBNMS, largely through the RAP, also facilitates cross disciplinary collaboration on projects such as sharing oceanographic data needed for marine mammal distribution studies.

The MBNMS Beach COMBERS (Coastal Ocean Mammal and Bird Education and Research Surveys) is a collaborative beachcast monitoring effort spearheaded by MBNMS, Moss Landing Marine Laboratories and over 40 volunteers; numerous other government organizations participate in volunteer training, necropsies, facilitating beach access, and use the data. Information from this program has been used to assess impacts of oil spills, to determine species distribution patterns, and to detect by-catch impacts from a gill net fishery. This project was also involved in a comprehensive assessment, from oceanographic conditions to death of sea lions, of a harmful algal bloom (HAB) in Monterey Bay during 1998.

Opportunities for Research Support

The following is a partial list of current and opportunities for collaborative research and monitoring programs within the MBNMS:

Current projects:

- Completion of the MBNMS Site Characterization (http://bonita.mbnms.nos.noaa.gov/sitechar/index.html).
- Use of NOAA ships for critical marine mammal habitat assessments and sea otter studies.
- Funding for ship and aerial surveys to enhance pelagic and coastal surveys.
- Development of the Beach COMBERS monitoring program.
- Science and management of set gill net by-catch.
- MBNMS Beach COMBERS and CDFG: Necropsy of beachcast seabirds and seabirds caught incidentally in set gill net fishery.
- 1998 HAB assessment: from plankton to sea lions.
- Facilitating collaboration across disciplines with the Sanctuary Currents Symposium and MBNMS RAP.
- Providing office space and equipment.
- Writing letters of support to funding agencies.
- Occasional contracts on the order of $2000-$20,000

Proposed collaborative projects and expansion of current projects:

- Complete a comprehensive monitoring program for marine mammals.
- Understand links between climate variability, nearshore productivity and marine mammal populations.
- Understand links between regional nitrate loading and harmful algal blooms.
- Assess/find ways to minimize by-catch from the set gill net fishery.
- Determine cause of the southern sea otter population decline.
- Development of ecosystem health indices, complete a retrospective study.
- Assess the effect of vessel traffic on marine mammals.

- Equipment/supply pool for multidisciplinary use, including cameras, geographic information system technology, CTDs and fuel.
- Graduate student fellowships for specific topics of interest.
- Developing online directories for potential funding sources, and serving as a central location for databases on environmental conditions, maps, and marine mammal distribution and abundance to facilitate effective monitoring and information sharing.
- Expansion of the geographical range of the MBNMS Beach COMBERS program and pelagic surveys.
- Develop cross-Sanctuary projects should be supported to effectively address population assessments.
- Minimize ecotourism impacts in Elkhorn Slough.

Summary

The MBNMS is active with marine mammal research and the information is being transferred between scientists and resource managers. Important recent successes include the discovery of significant by-catch from a gill net fishery, a comprehensive assessment of the marine mammal impacts by a harmful algal bloom, and ongoing monitoring data from the Beach COMBERS and pelagic surveys. However, there are many critical resource management issues that still need to be addressed. Marine mammal research could significantly be enhanced in the MBNMS by increasing availability of monetary and research platform resources, collaboration across Sanctuaries to study migrating populations, and some moderate administration/coordination support to regional scientists.

Gulf of the Farallones National Marine Sanctuary, Cordell Bank National Marine Sanctuary & Northern Portion of the Monterey Bay National Marine Sanctuary
Jan Roletto, Research Coordinator

Introduction

The office for the Gulf of the Farallones National Marine Sanctuary (GFNMS) also administers the Cordell Bank National Marine Sanctuary (CBNMS) and the northern portion of Monterey Bay National Marine Sanctuary (MBNMS) from San Mateo County, near Año Nuevo through Marin County. All three sanctuaries are contiguous. The area within the Gulf of the Farallones is rich in marine life. There are numerous protected areas, such as the Farallones National Wildlife Refuge, two national parks, the Golden Gate National Recreation Area and the Point Reyes National Seashore, as well as numerous state and county park beaches and refuges.

Each Sanctuary has a specific set of regulations, primarily protecting the integrity and quality of the sanctuary habitat. There is a prohibition of discharging substances that will harm the sanctuary waters, no disturbance to the seabed, no removal of cultural resources, and pertaining to marine mammals and seabirds, there are areas where aircraft are restricted to minimum altitude of 1000' over colonies, sensitive haul outs and lagoons. These specific regulations can be found on the national web site or by contacting the GFMNS office for a copy of the regulations, as well as consultation and requesting permit applications. Permits are issued for research and educational purposes. By issuing permits sanctuary resources are better protected and multiple research activities are tracked and coordinated. This reduces negative impacts to sanctuary resources, e.g. no multiple overflights.

The sanctuaries research goals are basic and originate from the management plans for these sanctuaries as well as from our national strategic plan and the NMSA.

- Baseline studies for populations and habitats whose presence was critical in the Sanctuaries designation, yet whose distributions and other basic characteristics remain poorly understood;
- Directed monitoring studies focusing on indicator species and representative habitats and undertaken jointly with other Sanctuaries and agencies; and
- Analytical studies aimed at determining the cause of a condition or impacts (e.g. in a specific population).

Research conducted and funded within the Sanctuaries will continue to focus on management issues that relate to protection of significant resources. Research will typically examine questions involving communities or whole ecosystems and occasionally it may be species specific. General directions and priorities for additional research are provided in the Five-year Research Plan (1997) as a guide for identifying and selecting future research projects. Research projects are directed to answer four basic management questions:

- What are the general characteristics and distribution of species and marine communities (documentation of baseline characteristics);
- What are the short and long-term changes in species' populations and marine communities (e.g. abundance and distribution) and what are the influences of natural variability and human-caused perturbations on these changes (detectable through monitoring);
- What are possible cause and effect relationships accounting for changes observed in resource distribution, abundance, and diversity (analysis of experimental and predictive studies); and
- Which ecosystems are best studied, by students of all ages and education backgrounds, which allow for information exchange among researchers, resource managers and involves the public in conservation and protection of the marine environment and resources?

One of the primary ways these questions are answered is through the exchange of information and cooperation among the organizations and agencies undertaking management related research in the Sanctuaries to promote more informed management. In order to identify and assess the gaps in knowledge that can affect our ability to manage the area, the Sanctuary hosts a biennial research workshop. Researchers from all marine and estuarine disciplines gather at this workshop to discuss current and ongoing project results and to discuss future projects and joint funding. The biennial workshop is one of several research workshops, which the Sanctuary coordinates to encourage information exchange among San Francisco Bay Area organizations. The Sanctuary also hosts smaller workshops concentrating on specific topics or areas of interest to various researchers in the Bay Area, the State, nationally and internationally. In the past these workshops included annual seabird monitoring, multi-agency geographic information systems, research on marine mammals in multiple Sanctuaries, quarterly coordination meetings with local resource trustee agencies such as the National Park Service, use of volunteers for collecting biological parameters, long-term monitoring programs, and the biology of white sharks. These workshops allow resource managers to extend limited funds and eliminate duplicative research and monitoring efforts. All of this information is reviewed in our Five-year Research Plan. Contact our office for a copy.

Current Marine Mammal Research

The Beach Watch program is a long-term, baseline monitoring project implemented by volunteers and administered through the GFNMS. The area of operation is from Bodega Head to the San Mateo-Santa Cruz County border and includes the northern portion of the MBNMS. The program goals are to: 1) educate the public about the coastal environment; 2) encourage the public so that they can make a difference in protecting their beaches; 3) assist the Sanctuary in the early detection of natural and human-caused environmental perturbations such as warm or cold water events and oil spills; 4) provide a baseline of information on the average presence of live and beach cast marine organisms; and 5) develop a network of local experts who can document and discuss the natural changes a specific beach will undergo over a period of several years.

Surveyors' record live and dead marine organisms including: seabirds, shorebirds, marine mammals, humans, and large wracks of invertebrates and marine plants. They collect samples of oil or oiled organisms and notify the Sanctuary in the event of a violation, stranded marine mammal or unusual sightings. Beach monitors cover one or a series of pre-defined beach segments within seven regions of the coast; 86 beach segments have been designated to be monitored within this program. Surveys are conducted once every two to four weeks. A total of 56 beaches (~140 km) are monitored; of which 30 beach segments are monitored every two weeks. Data is compatible with pre- and post-spill assessment programs implemented by federal and state resource trustees. An annual report is distributed.

The Sanctuaries lead an Ecosystem Dynamics Study (EDS) to monitor Sanctuary water column, primary producers and the birds and mammals feeding in the Sanctuaries. Euphausiid shrimp are primarily responsible for the incredible production that is associated with Cordell Bank and Point Reyes. Two species of euphausiids (*Euphausia pacifica* and *Thysanoessa spinifera*) are abundant in the area and provide critical forage for locally breeding seabirds, endangered blue and humpback whales, Pacific salmon, and commercially important populations of rockfish and play a major role in the local marine vertebrate populations. The EDS project estimates the local euphausiid biomass, using net sampling techniques, acoustically assessing the scattering layer, and identify the physical and biological factors influencing the distribution and abundance of the euphausiids. The onset of El Niño-Southern Oscillation conditions allows us to investigate community interactions with environmental conditions during these extreme conditions. Physical and biological data are correlated with the relative distribution and abundance of seabirds and marine mammals.

Disturbance to wildlife, particularly harbor seals and shorebirds, is assessed through the SEALS program (Sanctuary Education, Awareness and Long-term Stewardship). Occasionally human activities in Bolinas Lagoon and Tomales Bay disturb harbor seals at their haul-outs. In Tomales Bay, pupping season coincides with clamming season, which brings large numbers of people to two seal haul-outs. In Bolinas Lagoon, seals haul out near Highway One where people are sometimes causing disturbance from unleashed dogs, kayaks, canoes, and clam digging near the seals' haul-out. A decline in the breeding population has been documented at Hog, Clam and Seal Islands in Tomales Bay. The SEALS program has been developed to educate the public in proper behavior near the seals so that recreational activities can occur without disturbing the seals. A disturbance monitoring program has been developed, at Bolinas Lagoon, to assess which human activities are causing the majority of the disturbances, assess the fecundity of the local seal population and to determine better management practices near the seal colonies. Monitors collect data on daily and seasonal disturbance rates, haul out behavior of the seals prior to and after a disturbance or a series of disturbances, population and distribution of the seals in the Lagoon.

Proposed Collaboration Projects and Expansion of Current Projects

The future goals of the Sanctuary are to integrate the Beach Watch database with a GIS program. Expand the survey program to include shoreline docents. Make selected information available through the Sanctuary web site. Compare live and dead animal encounters with locally breeding populations. Train selected volunteers to collect advanced data, i.e. bird morphometrics, reproductive status, and collection of gut contents. Complete Director's Manual for the Beach Watch Program, detailing the management of a volunteer-based shoreline survey program.

Collaborative efforts are welcomed for the EDS project in order to share ship time on large research platforms, such as the NOAA ship *McARTHUR* and year-round seasonal sampling using of smaller research platforms, such as the Sanctuary vessel, *PHOCOENA* and other sanctuary vessels; and the integration of data with GIS, ArcView.

The future goals of the Sanctuaries for the SEALS program are to determine the effectiveness of the interpretation program at Tomales Bay by comparing disturbance rate (data collected by Audubon Canyon Ranch) when SEALS docents are present and absent at the Tomales Bay haul-outs. Expand Bolinas Lagoon monitoring to include behavior assessment of the seals at the additional haul-outs. Coordinate Bolinas Lagoon, Tomales Bay and San Mateo County outer coast population assessment, with the programs at Point Reyes National Seashore, Fitzgerald Marine Reserve and other harbor seal colonies in San Francisco Bay and Sonoma County. Make selected information accessible on the Sanctuary web site.

Opportunities for Research Support

The Sanctuary's Five-year Research Plan lists all research projects, including those for which we are not primary investigators, but have contributed small levels of funding or provided in-kind funding. Examples of previous collaboration efforts include: purchase of equipment and supplies used to monitor gray whale migration and aerial surveys, photogrametry, small amount of funding for report writing, ship time and use of sanctuary vessels for graduate students studies on minke whales, humpback whales, and fishes.

There are many research opportunities in our area and we encourage independent research and student research. Occasionally additional funding is available through Congress or oil spill settlements. For example we received $150,000 from Congress to investigate the level of pollutants in seabirds and marine mammals. A Request for Proposals was issued and Point Reyes Bird Observatory was contracted to investigate contaminants in Common Murres, Western Gulls, Brandt’s Cormorants and Steller sea lions. Restoration funds are available from oil spill settlements and announcements will be made in the Federal Register as these funds become available. In the future we will be looking for a few projects that will contribute to the reduction of harassment of pinnipeds and seabirds in the sanctuaries, using these oil spill funds.

Olympic Coast National Marine Sanctuary
Ed Bowlby, Research Coordinator

Introduction

The Olympic Coast National Marine Sanctuary (OCNMS) is located off the coast of Washington state (northern boundary -- Koitlah Point, west of Neah Bay, seaward boundary -- 48-64 km offshore, roughly following the 100 fathom isobath including heads of three submarine canyons, and the Southern boundary - Copalis River). The Sanctuary encompasses approximately 3,310-square miles and has 216 km of coastline. The Sanctuary shares management responsibility of nearshore habitat with Olympic National Park, US Fish and Wildlife Service Coastal Refuge Islands, four coastal tribes, Washington Department of Natural Resources and the Washington Department of Fish and Wildlife. Twenty-nine species of marine mammal occur in the Olympic Coast National Marine Sanctuary (see Appendix B).

Research in the Olympic Coast National Marine Sanctuary

A variety of marine mammal research occurs in the OCNMS including: sea otter population, distribution, radio telemetry and food habits (Ron Jameson, BRD); pinniped aerial surveys for population/distribution (Steve Jeffries, WDFW, Pat Gearin and Harriet Huber, NOAA/NMML); gray whale photo-identification (Pat Gearin, John Calambokidis, CRC and OCNMS); killer whale photo-identification (John Calambokidis, Dave Ellifirt, CWR and OCNMS); humpback whale photo-identification (John Calambokidis and Sally Mizroch, NOAA/NMML); and offshore distribution of cetaceans and pinnipeds (Barry Troutman, WDFW and Dave Ellifirt, CWR). The Olympic Coast National Marine Sanctuary also supports habitat research (benthic surveys and kelp surveys) which provides information relevant to the local sea otter populations. In addition, John Calambokidis has proposed to research the use by west coast humpback whales of the Olympic Coast National Marine Sanctuary.

Collaborating Agencies/Institutions

BRD	Biological Resource Division, USGS
CRC	Cascadia Research Collective
CWR	Center for Whale Research
NMFS	National Marine Fisheries Service
NMML	National Marine Mammal Lab, NOAA
NOAA	National Oceanic and Atmospheric Administration
OCNMS	Olympic Coast National Marine Sanctuary
ONP	Olympic National Park
USFWS	US Fish & Wildlife Service
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources

Information Gaps

Potential new marine mammal research topics in the OCNMS include trophic investigations for humpback whales and trophic investigations for summer resident gray whales.

Opportunities for Research Support

The Olympic Coast National Marine Sanctuary provides in-kind support in the form of vessel time aboard the Sanctuary's research vessel *TATOOSH* and/or a Rigid Hull Inflatable Boat (RHIB). The Sanctuary has a field station at Neah Bay, which has been used by collaborating scientists. OCNMS has limited ship time aboard NOAA ship *McARTHUR* and other research vessels which has been used in partnership with scientists from other agencies/institutions. For researchers conducting aerial overflights, the OCNMS can provide permit coordination with other agencies and institutions. Scientists interested in support from the Sanctuary can submit a research support request form (Appendix C).

Florida Keys National Marine Sanctuary
Laura Engleby, Dolphin Ecology Project, Director

Introduction

The purpose of the Florida Keys National Marine Sanctuary (FKNMS) is to protect the ecosystem resources around the Keys for their conservation, recreational, educational, or aesthetic values through long-term management. Designated in 1990 by Congress, the FKNMS encompasses 3,674-square miles surrounding the Keys, including America's only living barrier coral reef, patch reefs, hardbottoms, seagrass meadows, mangrove fringed islands and all of the rich marine life these communities support. The FKNMS Management Plan is comprised of 10 Action Plans, including: Education, Volunteer, Mooring Buoy, Submerged Cultural Resources, Channel Marking, Enforcement, Research and Monitoring, Water Quality, Regulatory and Zoning. For the purposes of this workshop, the action plans described later will focus mostly on Research, Water Quality, and Zoning.

Beyond FKNMS boundaries, Sanctuary scientists and managers also have an interest in the overall south Florida ecosystem. The ecological degradation of South Florida, (particularly Florida Bay), is as notorious as similar degradations such as those of Lake Erie and Chesapeake Bay. These waters have experienced increased salinity due to the diversion of fresh water input. This increased salinity, together with elevated nutrient levels from land development sources, has stimulated algal blooms, resulting in large-scale die-offs of seagrasses, sponges and mangroves. Declines in these habitats have resulted in reductions of fish populations. This severe degradation over the past 50 years is well documented by scientists. During this time, top predators such as herons, brown pelicans, alligators and storks have declined by 80-95%. Sixty-eight species of South Florida's mammals, birds, reptiles, amphibians, and plants are threatened or endangered. Satellite tracking meters deployed by Dr. Tom Lee from the Rosenstiel School of Marine and Atmospheric Science, University of Miami (RSMAS) demonstrate a clear water flow linkage between south Florida and the reef tract. These problems in Florida Bay must be viewed as a potential threat to water quality and resources in the FKNMS

Water Quality

Recognizing the critical role of water quality in maintaining Sanctuary resources, Congress directed the EPA and State of Florida to develop a Water Quality Protection Program for the FKNMS. The purpose of the Program is to "…recommend priority corrective actions and compliance schedules addressing point and nonpoint sources of pollution to restore and maintain the chemical, physical, and biological integrity of the Sanctuary, including restoration and maintenance of a balanced, indigenous population of corals, shellfish, fish and wildlife and recreational activities in and on the water." (Florida Keys National Marine Sanctuary and Protection Act). In addition to the corrective actions, the Act also requires the development of a water quality monitoring program.

Marine Zoning

Zoning is critical to achieving the Sanctuary's primary goal of resource protection. Its purpose is to protect and preserve sensitive components of the ecosystem by regulating within zoned areas, while facilitating activities compatible with resource protection. Zoning will ensure that areas of high ecological importance will evolve in a natural state, with minimal human influence. There are five types of zones: Sanctuary Preservation Areas, Research Only Areas, Special Use Areas, Wildlife Management Areas, and Ecological Reserves.

Research and Monitoring

The purpose of research and monitoring in the Sanctuary is to establish a baseline of information on the components of the ecosystem and how they interact. This can ensure the effective implementation of management strategies using the best scientific information. Research and monitoring strategies are organized into five theme groups: research management, monitoring, fisheries impacts, environmental assessment and predictive strategies.

Research and Monitoring Goals of the Sanctuary include:

- Providing the knowledge necessary to make informed decisions about protecting the biological diversity and natural ecosystem processes of the Sanctuary and its resources.
- Establishment of a long-term ecological monitoring program and database, including methods to disseminate information on the management of the coral reef ecosystem.
- Establishment of an ecological monitoring program.
- Establishment of strong communication and cooperation between the scientific community and resource managers.
- Coordination of research efforts to achieve the most beneficial results.
- Promotion of public awareness and resource stewardship.

Cooperating Agencies

There are numerous government agencies and interagency groups that the FKNMS cooperates with to protect natural resources. Examples of agencies include, but are not limited to:

- Everglades National Park
- Biscayne National Park
- National Marine Fisheries Service
- Environmental Protection Agency
- Department of Environmental Protection
- Florida Fish and Wildlife Conservation Commission
- United States Fish and Wildlife Service
- United States Geological Society
- Governor's Commission for a Sustainable South Florida

- South Florida Ecosystem Restoration Working Group
- Interagency Scientific Program Management Committee for Florida Bay and adjacent marine waters.

In addition, examples of leading science groups within the FKNMS include but are not limited to:

- University of North Carolina Wilmington, NURC
- Mote Marine Laboratory
- Florida Marine Research Institute
- Florida Institute of Oceanography
- University of Miami
- Florida International University.

In March 1998, the FKNMS hosted the first workshop of south Florida scientists and managers interested in initiating a marine mammal research effort in the FKNMS. Representatives from ENP, FKNMS, NMFS, NURC-UNCW, and Duke University participated in the workshop to discuss research needs, priorities and resources.

Current Marine Mammal Research

The Keys ecosystem is diverse and complex and many of its processes and interrelationships are not well known. This is particularly true for species at higher trophic levels such as bottlenose dolphins (*Tursiops truncatus*). There is no current information available to regional managers on the life history, density, and distribution patterns of dolphins and how they relate to habitat and water quality. However, examples of population data gathered since 1969 are summarized below.

- Little population data exists for the SE Florida area before 1972, although data on bottlenose dolphins were collected during a Portuguese man-o-war study in 1969-1971 (Florida Department of Natural Resources 1971).
- Aerial Surveys in the southeastern US from 1979-1983 (Hansen and Scott 1989).
- Aerial Surveys for Sea Turtles, Marine Mammals and Vessel Activity 1992-1996 (McClellan 1996). The only marine mammals observed during these surveys were bottlenose and pantropical dolphins. Seasonal distribution showed occurrences during all months off the Southeast Florida coast and were located throughout the area from the reef tract, to offshore deeper waters.

Generally, little is known about Florida's dolphins and how they are affected by the ecological disaster occurring in South Florida. Dolphins are a highly visible, yet largely overlooked, species in this area. Meanwhile, critical projects are underway in South Florida to restore the regional hydropattern and recover endangered species and habitats. The South Florida Ecosystem Restoration Program is the largest environmental restoration project ever attempted in the United States and the cumulative projects will effect the waters surrounding the Florida Keys. We have an unprecedented opportunity to establish baseline information for bottlenose dolphins in these waters, before a major environmental restoration project takes place, and evaluate the effects of restoration

efforts on a top predator in this ecosystem. As the 20-year plan to restore the South Florida ecosystem is implemented, it is crucial to monitor a higher trophic level species such as bottlenose dolphins, and to provide regional managers with accurate information about the impacts on dolphins as water and habitat quality change.

Habitat Use of Bottlenose Dolphins in Florida Bay
Dr. Andrew Read- Duke University

This research is being conducted in partnership with the Dolphin Ecology Project, and is focusing on the coastal waters of the Florida Keys in the vicinity of Florida Bay (Everglades National Park) and the Atlantic waters encompassed by the Florida Keys National Marine Sanctuary. The research is the start of what is intended to be an ongoing, long-term monitoring program.

The primary objective of this project is to evaluate the effects of the South Florida Restoration Project on the population of bottlenose dolphins inhabiting the Florida Keys. Baseline data on dolphin distribution, density and patterns of habitat use will be established prior to initiation of restoration efforts and monitored as restoration continues. To determine how the local dolphin population will respond to changes in ecosystem health, researchers are collecting baseline data on life-history parameters such as calving intervals, and evaluating the relationship between population parameters and ecosystem health while monitoring any changes that may occur. The methods include photo-identification, focal-animal observation of dolphins with synoptic sampling of environmental parameters and prey densities, and identifying important prey species of dolphins.

Monthly Aerial Surveys
Daniel McClellan- NOAA

Continuation of monthly aerial surveys aboard a USCG helicopter to document vessel usage, dolphins, sea turtles, and manatees.

Collaborating Agencies, Institutions and Research Projects

Dolphin Ecology Project

The Dolphin Ecology Project is a non-profit organization, working in partnership with the FKNMS to generate funding and implement dolphin research in the Florida Keys. Specifically, the Dolphin Ecology Project (DEP) proposes to establish a long-term (20 years) photo-identification survey of bottlenose dolphins in the Florida Keys, including Florida Bay. Our work will encompass research, monitoring education, and volunteer components. DEP will also contribute to on-going photo-ID studies throughout Florida and the Southeast. Through education initiatives, DEP will increase public awareness about dolphins and the interrelated habitats upon which dolphins and humans depend. Education programs will further emphasize the importance of the South Florida ecosystem and its restoration.

We are currently working with researchers at Everglades National Park and the National Marine Fisheries Service (NMFS) to compare dolphin identifications and sighting histories. We are also working with researchers at Duke University to determine which fish species are important prey of bottlenose dolphins in the South Florida ecosystem, assess the impact of current patterns of prey distribution on the distribution of bottlenose dolphins, and evaluate the effects of habitat degradation on bottlenose dolphins as mediated through their prey.

The Nature Conservancy

The Nature Conservancy (TNC) works in partnership with the FKNMS and numerous other government and research organizations in the Florida Keys. Volunteers provide a mechanism for involving the community in Sanctuary activities, and represent a valuable resource to programs with limited funding. TNC recruits, maintains and selects volunteers with specific sets of skills to blend with project areas. To date, over 14 volunteers have contributed more than 400 hours of service to dolphin research in the FKNMS.

Monitoring Gaps

- Summarizing aerial data from monthly overflights by Daniel McClellan.
- Bioaccumulation of Toxins in Marine Mammals.
- Do Ecological Reserves, such as the Dry Tortugas, have an effect on marine mammals?
- Shrimp by-catch and dolphin behavior in the area of the Dry Tortugas.
- Distribution and life history parameters of dolphins in the Key West NW Channel.
- Conducting a species inventory within the FKNMS, particularly the Dry Tortugas area
- Dolphins as indicators of ecosystem health.

Opportunities for Research Support

Currently, there is no financial support available for researching marine mammals in the FKNMS. However, based on the type of project, relevance to the FKNMS' management objectives, location and time of proposed marine mammal research, the FKNMS may be able to provide in-kind support. Potential in-kind support may include vessel support, ship time on larger vessels, dockage and desk space. The FKNMS can also assist researchers with leveraging funds from Foundations and other organizations.

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Gray's Reef National Marine Sanctuary
Cathy Sakas, Education Coordinator

Introduction

Gray's Reef National Marine Sanctuary (GRNMS) was designated in January 1981 and is located 32 km east of Sapelo Island, Georgia. The sanctuary encompasses 23-square miles of sandstone "live bottom" reef. GRNMS regulates alteration of the seabed, use of wire traps, bottom trawls and explosives, damage or removal of bottom formations and other natural or cultural resources, and discharge of substances (other than engine cooling water).

The substrate of the sanctuary is sandstone deposited as sandy calcareous mud 2 to 5 million years ago; ten thousand years ago the substrate was exposed as a terrestrial environment. GRNMS is a live bottom habitat consisting of rocky sandstone outcroppings and ledges that provide attachment for a diverse community of sponges, soft corals and encrusting tunicates which attract a variety of mobile invertebrates and vertebrates. The reefs profile consists of flat top ridges, scarps, ledges and crevices, slopes and sandy areas, and flat bottom troughs. The limestone outcroppings and ledges of the reef rise up to 3 meters in height.

The invertebrate assemblage of the sanctuary consists of both sessile and mobile invertebrates. The dominant sessile invertebrates are sponges, tunicates, and sea anemones. The dominant mobile invertebrates are sea stars, brittle stars, sea cucumbers, urchins, crabs, lobsters, snapping shrimp, squid, octopus, slugs, and snails.

Common vertebrates of the GRNMS are barracudas, pinfish, tomtates, morays, sea robins, flounder, bass, grouper, mackerel, jacks, porgies, sheepsheads, butterfly fish, damselfish, blennies, gobies, trunkfish, and puffers. Large vertebrates that are common to the GRNMS are whales, dolphins, sea turtles, sharks and rays.

Research in the Gray's Reef National Marine Sanctuary

Current research being undertaken in the GRNMS include a Northern Right Whale (NRW) Stranding Network and Tagging and Educational Material project and a Loggerhead Sea Turtle Satellite Tagging project.

The GRNMS has two research vessels; the *R/V JANE YARN* and the *R/V MISS SYLVIA*. The *R/V JANE YARN* is a 65 foot vessel with a steel hull, equipped with D-GPS, Navtrek navigational software, a dry laboratory, 1500 lb capacity crane, A-frame on stern, observational tower, well equipped galley, hot water shower, two comfortable heads, berthing for six scientists and two crew; 5 day cruise capability; cruising speed 10 kts; and a day cruise capacity of 16. The *R/V MISS SYLVIA* is a 32 foot open hull fiberglass boat, with an inshore capacity of 12; offshore capacity of 8; inshore cruising speed of 40 knots; offshore cruising speed of 30 knots; a 100 miles cruising range; and it is equipped with a davit for over-the-side-operations and D-GPS.

In January of 1999 New England Aquarium and NMFS contracted with GRNMS to collaborate on the NRW tagging and tracking project. The use of the *R/V JANE YARN* and GRNMS' staff as well as other NOAA personnel was integral to the project.

Northern right whales initiate migration from their summer feeding and mating grounds of the northeastern US and southeastern Canada coastal waters from late summer to early fall. By late November through early December pregnant females accompanied by juveniles arrive off the southern Georgia and northern Florida coasts to give birth to their calves. Females and calves remain off the southern Georgia and northeastern Florida coasts through the winter months migrating back north beginning in mid February to early March. During the calving period aerial surveys are flown by the Georgia Department of Natural Resources and the Florida Department of Environmental Protection to locate migrating and over wintering NRW. The US Navy and the USCG have designated observers on board their vessels during this period who also report sightings. The US Navy at the Jacksonville Naval Air Station serves as the dispatcher to ship traffic in the area alerting them to the location of individual whales.

Current Marine Mammal Research

Southeast winter water temperatures are equivalent to or warmer than the temperatures of the northeast waters in the summer. Newborns gain weight and accumulate blubber quickly in the relatively warm winter waters of the southeast preparing them for survival in the colder spring-summer-fall waters of the northeast. Aerial survey teams photograph individuals for identification purposes. Aerial survey teams call in the locations of mother/calf pairs to the tagging team. Once a mother/calf pair is located, and the *R/V JANE YARN* is in close proximity, the tagging boat is deployed. The VHF radio tag is implanted with a specially designed arrow shot from a crossbow. Around the clock electronic readings are recorded indicating the bearing of the whales from the vessel when the beacon is on the surface. During day light hours two observers recorded the whales' activity every 60 seconds.

The results of the Northern Right Whale Skim Feeding project:

1. The mother spent 45% of her time at the surface with the rest of her time spent in shallow dives of short duration.
2. The mother/calf pair covered as much as 30 nm in a 24 period.
3. The mother spent prolonged periods of time at the surface with her calf either moving slowly or not at all.
4. Current reliance on aerial sightings to warn ship traffic of the location of whales is not adequate during this critical calving period.
5. The sight-ability and the rate of movement of NRW must be taken into account when developing future management protocols for reducing mortality associated with shipping in the calving grounds.

We will be participating in the Northern Right Whale project again this coming season to see if the behavior of other mother/calf pairs is similar to this past season's tagged whale.

Gray's Reef is part of the Marine Mammal Stranding Network. Whenever a marine mammal washes ashore or is sighted in the water in our area, we are called upon to help out with the recovery and necropsy. "Lindsay", a 45 foot subadult male northern right whale, met an untimely death from a collision with an unknown ship. Skin sections were taken for pollution bioaccumulation testing and DNA sampling.

We are frequently called upon to give programs on NRW through slide and video lectures and over the long distance learning channels. In a cooperative venture with Stellwagen Bank NMS, Gray's Reef NMS produced *From Whaling to Watching* an educational module consisting of a video, teachers manual and a two part poster.

Throughout the year loggerhead sea turtles can be found underneath ledges at Gray's Reef NMS. Once the turtle is captured it is secured in a net and brought to the surface for tagging. With the turtle at the surface the crew carefully brings it on deck and stabilizes it in a comfortable position off the hot deck. The surface of the carapace is prepared to receive the satellite tag. The transmitter is secured in place with a two part epoxy that will last up to a year or more. Spatial and temporal data are transmitted to our office and posted on our website. Specifically data gives us the turtle's position at a given time, time intervals between dives, migration patterns, diurnal/nocturnal swimming patterns, and inshore/offshore preferred water ranges. The data has added to the sparse information on the pelagic behavior of these turtles.

Information Gaps and Opportunities for Research Support

Gray's Reef welcomes research projects on our invertebrate and vertebrate communities and can provide some physical support. We invite researchers to contact us for more information on how we can collaborate and support your research.

Gerry E. Studds Stellwagen Bank National Marine Sanctuary
Anne Smrcina, Education/Outreach Coordinator

Introduction

The Gerry E. Studds Stellwagen Bank National Marine Sanctuary was nominated and designated as a sanctuary due to the fact that the area is one of the prime feeding grounds for humpbacks and other types of whales in the Gulf of Maine. In addition, the area has traditionally been important for commercial and recreational fishing, particularly groundfish such as Atlantic cod. It is the seasonal whale population that is of particular interest at this meeting.

Recently, the World Wildlife Fund listed Cape Cod as one of the ten top whalewatching sites in the world. But visitors to this southeastern portion of the state of Massachusetts, find little whalewatching opportunities from shore. Rather, Cape Cod is the point of departure for a major fleet of whalewatching vessels, most of which head out to Stellwagen Bank. This fleet provides important platforms for the research community interested in cetaceans of the Gulf of Maine. The sanctuary, which at this time has only one small boat and a small staff, relies upon this fleet for site visitation and public outreach. In addition, a number of well-known research organizations are based in the area, providing a wide breadth and depth of knowledge about local cetaceans. Included among this group of organizations is the Center for Coastal Studies, Cetacean Research Unit, and Woods Hole Oceanographic Institution.

The Stellwagen Bank National Marine Sanctuary was designated in late 1992 and has been actively operating since 1994, first out of offices in Plymouth, Mass. and more recently from Scituate, Mass. The local program is in a period of transition at this time as we search for a new superintendent. Temporarily, management is handled out of National Marine Sanctuary Program headquarters in Silver Spring, Maryland. As in any institute looking at reorganization, it is presumed that the new superintendent will have his/her own suite of interests that will guide program priorities. Despite this unknown, it can be reasonably assumed that cetacean conservation/protection (particularly for endangered species) will be an important site objective.

Stellwagen Bank is the only sanctuary in the northeast, and has no land associated with it, only open ocean and seafloor. Included within this region are a variety of bottom types, including mud flats, sandy banks, rocky ledges, cobble/gravel areas and boulder fields. The area, with its proximity to ports and research institutions, is an ideal laboratory site for studies of southern Gulf of Maine species and habitats.

The physical location of our staff headquarters is in Scituate – a community equally distant from Cape Ann and Provincetown (the two parts of Massachusetts closest to the actual sanctuary). Our offices are located within the Coast Guard building at Scituate Harbor, which will eventually pass to NOAA under recently proposed legislation. Initial plans include the installation of wet and dry labs, classroom space, and

meeting areas within the main building and boathouse after the property transfer is effected.

Current Marine Mammal Research

As was previously mentioned, access to the sanctuary is via a small vessel. This vessel, and the part-time operator, are available occasionally for sanctuary-related research projects. Individuals and projects, which have made use of this asset, include a student undertaking research on whale behavior around whalewatch vessels and a local researcher studying right whale behavior. For projects requiring greater vessel capacity for equipment and staff, the sanctuary does have annual allotments of time on the NOAA research vessel Ferrel. Most of the researchers who have used this ship time have focused on large scale projects to better understand the physical properties of the region and the nature of the living communities on the seafloor of the sanctuary. The US Geological Survey is producing a series of maps that provide topography and sediment characterization; while the National Undersea Research Program is undertaking studies of effects of bottom fishing gear on habitat. It may be possible in future Ferrel cruises to incorporate new projects, including ones that focus on local cetaceans.

The sanctuary has been working with the National Undersea Research Center, and has begun to provide some support to its Aquanaut Program for high school students. Among the projects that the students work on is a study of background noise and its relationship to whale hearing. NURC is interested in expanding on this work.

The area where the sanctuary has worked most closely with the cetacean research and whalewatching communities has been in the area of education. The sanctuary's education coordinator in cooperation with her counterpart at the Gray's Reef Sanctuary prepared a right whale curriculum (book, poster and video) that has been highly acclaimed. "Journey North" which won a "Webbie" award as the top education site on the World Wide Web for 1999 includes bi-weekly reports from the sanctuary on right whale and humpback migrations. The program looks at the northward migration of a dozen species and the environmental changes of advancing spring in the Northern Hemisphere. The sanctuary consults with many local and regional cetacean research organizations in the preparation of these reports (with appropriate credits included). The sanctuary will be working closely with the National Marine Fisheries Service, Protected Resources Office to better protect animals in the sanctuary (in relation to whalewatching guidelines and potential regulations).

The recently initiated management plan review process which will update the sanctuary's 5-year management plan will also address many cetacean issues, including conservation, research and education. Public input in all of these areas is essential towards development of a balanced and effective plan.

Hawaiian Islands Humpback Whale National Marine Sanctuary
Allen Tom, Manager

Introduction

The purpose of the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) is to improve understanding of the North Pacific population of humpback whales and their wintering habitat, to study resource management issues and to interpret research results to the public and decision-makers. Since 1994, funding support has been provided to various research projects addressing humpback whale behavior studies in Hawaii. In most cases, all researchers funded with Sanctuary moneys are also holders of a National Marine Fisheries Service research permit.

Opportunities for Research Support

The HIHWNMS objective is to become involved in research activities in the following areas:

- Baseline studies to determine features and processes of the North Pacific humpback whale wintering habitat, including, vital rates, behavior, abundance, and distribution of humpback whales, interactions among the living resources within the Sanctuary, and types and patterns of human activities within and around the Sanctuary.
- Monitoring studies to document changes in humpback whale behavior, Sanctuary use patterns, environmental quality, and human activities and their effects on Sanctuary resources.
- Predictive studies to assess causes and effects of ecological and environmental changes.
- Cataloging past, present and future research data information.
- Studies of marine resources, other than humpback whales, for possible inclusion in the Sanctuary.
- HIHWNMS has no research coordinator. Currently HIHWNMS staff, SAC and SAC research chair help fill this void.

Collaborating Agencies, Institutions and Research Projects

There is a research seat on the Sanctuary Advisory Council currently held by Dr. Paul Nachtigall of the University of Hawaii. The SAC's Research Working Group has been actively meeting since September 1998. The input provided by the SAC's Research Subcommittee has helped the Sanctuary to prioritize research and monitoring needs. The group has also been effective in helping Sanctuary staff in identifying, selecting, and sponsoring research projects that are responsive to the Sanctuary's research and management needs.

A list of priority research topics identified by the SAC Research Subcommittee will be used to guide the Sanctuary in selecting research topics for the next humpback whale season in 2000. A goal of the Research Subcommittee is to support and promote

research on, and monitoring of Sanctuary resources to improve management decision making in the Sanctuary.

Fagatele Bay National Marine Sanctuary
Nancy Daschbach, Manager

Introduction

American Samoa is a US Territory located in the South Pacific. The Territory comprises seven islands, five of which are high islands and are in a group within 80 miles of each other and two outriders are located approximately 150 miles east (Rose Atoll) and north (Swain's Island). Rose Atoll has a small island and is a US Wildlife Refuge closed to unpermitted visits. Swain's Island is a mini-atoll with a small island and lagoon; its human population is less than 20. The largest island in the Territory is Tutuila, where Pago Pago, the capital, is located. It's population is over 60,000 and the island is approximately 53-square miles, much of that land with slopes greater than 25% so that most people live within a kilometer of the shoreline. There is a small island off the southeast coast of Tutuila, and a group of three larger islands to the east that contain less than 1000 people.

Fagatele Bay National Marine Sanctuary sits in an embayment on the south coast of Tutuila. It's eastern boundary, Steps Point, is the southernmost point of land in the USA. Fagatele Bay is the smallest Sanctuary in the program, 0.25-square miles, and reaches depths of 65 m. The principle resources in the bay is the fringing coral reef that harbors 150 species of coral and several hundred species of fish. All of our research to date has been on coral reef resources.

Dolphins have been observed in the bay, most probably *Stenella longirostris*. Humpback whales have also been observed in the bay, and in the adjacent Larsen's Cove, a mirror embayment to Fagatele Bay, newborn humpback calves have been reported in two different seasons (1995 and 1997). False killer whales (*Pseudorca crassidens*) have been observed within a half-kilometer of the mouth of Fagatele Bay and pilot whales (*Globicephala malaena*) have entered Pago Pago Harbor. It is likely that other cetaceans are resident and the location of Samoa in the middle of the South Pacific ocean suggests that pelagic species are also found within our Exclusive Economic Zone. Strandings of sperm whales and an unidentified species of beaked-whale have occurred in the past 15 years.

Management Issues

In recent years, the local commercial spearfishery has hit our nearshore waters hard. Although our reefs have been recovering very well from several major perturbations in the past twenty years, the fish populations have not. Overfishing was recognized as a serious problem for Tutuila (although not so for the other islands where this spearfishery does not occur) at a coral reef plan development workshop held in May 1999. Cetacean populations that rely on the nearshore fish for their food may have been affected by the prolonged depression in the nearshore fish populations and may have moved offshore or to other nearby islands to forage.

Every winter, a small portion of the southern hemisphere humpback whale's Group Five move into Samoan waters. They are seen at virtually every island in the archipelago and at Rose Atoll. These whales are observed with small calves suggesting that they give birth in Samoa, and there are two probable eyewitness reports (made by the same person) of a birth sequence (adult[s] seen in the bay and within a few hours, a small calf seen with her [them]; a possible umbilicus may have also been observed). Singing too, is reported most years. Like people everywhere, Samoans like watching whales. Our program sponsors one or two whale watches during Coastweeks every year and we always get more people signing up than we can take. Harassment is a real threat, and we have had a few reports over the years of people coming quite close to whales in the water. Federal marine mammal laws apply in Samoa, but we have only one National Marine Fisheries Officer who would respond to any calls.

Information Gaps

To date, no research program has been based in American Samoa to study our marine mammals. All of our species are found in other places; we have no endemics. However it is virgin territory for any researcher and there are questions for which we managers would like to have answers. There is no basic population information on any of our local marine mammals. We would like to know what their diet includes, which species they target. Has overfishing impacted their populations? Have they moved away from Tutuila to better fishing grounds?

Do our megacharismatics, the humpbacks, prefer certain areas for calving and singing? Do they travel throughout the archipelago or do individuals stay in defined ranges during their visit? Do the same whales come every year and is there site fidelity across generations? What is their relationship with other Group Five humpbacks and does this group have a consistent composition from year to year? Is Samoa the northerly extent of the austral humpback range?

Opportunities for Research Support

There are several reasons why Samoa might be an attractive place to base cetacean research, and with them challenges to realize. As an American Territory, we enjoy the same language, postal service and cash. The Sanctuary and the National Park of American Samoa would both welcome and assist as much as possible anyone doing research in Samoa. The local Department of Marine and Wildlife Resources would also be helpful. All could provide at least some in-kind services. The Sanctuary and the National Park have boats as does NMFS. So in some way the logistics would be easier than the independent country of Samoa 80 miles west. However, we are still a remote location, served only twice a week by Hawaiian Air from Honolulu. Our cetacean populations are relatively low (although there is a large group of *Stenella* that have been seen consistently off Ofu, Manu'a with numbers over 100); although the humpbacks come for several months, the numbers are low and they are not predictably located.

Although Samoa may not be the first place to spring to mind when looking for a cetacean research problem, the Sanctuary urges you to consider it, if not for a primary location than perhaps as a part of a larger (geographically ranging) question.

NORTHEAST REGION BREAKOUT GROUP
Moderator: Anne Smrcina
Rapporteur: Doreen Moser

Participants

Anne Smrcina, Stellwagen Bank National Marine Sanctuary
Kate Van Dine, Stellwagen Bank National Marine Sanctuary
David Mattila, Center for Coastal Studies
Mason Weinrick, Cetacean Research Unit
Craig MacDonald, Hawaiian Islands Humpback Whale National Marine Sanctuary
Cindy Bierman, Whale Conservation Society
Doreen Moser, The Marine Mammal Center

Summary

The group identified three major goals and areas of improvement: 1) communication, 2) identification of Sanctuary priorities for research and 3) the establishment of a Research Advisory Panel for SBNMS.

1. Communication

Researchers and sanctuary staff agreed that they need to improve communication among the Sanctuary office, cetacean research organizations in the Sanctuary and other federal agencies. Possible solutions to this included an updated web site with research data; creation of a listserve of researchers and Sanctuary staff to post research activities being undertaken in the Sanctuary, recent findings and announcements; and requiring researchers to notify the Sanctuary when they are conducting studies in the Sanctuary.

2. Research Priorities

The second area identified as needing improvement is in the establishment of sanctuary research priorities. The researchers and sanctuary staff agreed that they need to define research priorities and goals within the sanctuary. Research priorities include: marine mammal/fishery interactions, long-term cetacean monitoring, the role of humpbacks in the ecosystem, site characterization (habitat usage), ecological trophic studies, ship strikes, entanglement and acoustics. The continuation of the long-term humpback database is the top priority. The group agreed that humpback distribution data, photo-identification and multi-species studies should be emphasized.

3. Research Advisory Panel

The third area identified by the group as an area of possible improvement would be the establishment of a Research Advisory Panel. The creation of such a group would provide Sanctuary staff with valuable input and guidance from the research community on issues affecting the Sanctuary. Similar to other National Marine Sanctuaries, they

would like to develop a Research Advisory Panel that could report to the Sanctuary Advisory Council. This panel would be made up of local researchers studying various aspects of marine science that influences the Sanctuary.

SOUTHEAST AND GULF REGION BREAKOUT GROUP
Moderator: Laura Engleby
Rapporteur: Leah Culp

Participants

Cathy Sakas, Gray's Reef National Marine Sanctuary
Steve Gittings, National Research Coordinator, National Marine Sanctuary Program
Laura Engleby, Florida Keys National Marine Sanctuary
Leah Culp, Gulf of the Farallones National Marine Sanctuary, Farallones Marine Sanctuary Association
Patricia Fair, National Oceanic and Atmospheric Administration, National Ocean Service
Amy Tarwick, University of South Florida

Summary

A priority marine mammal issue in the southeast region involves the northern right whale. With a population of only approximately 300 individuals, protection of this species is critical. One of the primary threats to right whales in the southeast is ship strikes. Aerial surveys have been used to coordinate shipping traffic in an attempt to prevent collisions with right whales. Recent studies of radio-tagged individuals suggest that aerial surveys are not preventing all ship strikes, although they are still being used to coordinate traffic. The key players in research and management of this issue are: the NMFS, New England Aquarium, USCG, US Navy, Florida Department of Environmental Policy, GRNMS and Georgia Department of National Resources. Radio-tagging studies will continue through the New England Aquarium and NMFS. Remaining issues to be addressed are: how to keep track of the right whales; right whale spatial positioning; general information on right whales such as where males go during that time and habitat use. There is a potential need to collaborate with SBNMS, especially on gathering general information. A meeting shall be convened in Jacksonville, Georgia regarding right whales in which the above mentioned agencies were involved in addition to the various shipping ports who come into contact with the whales. Proceedings of this meeting will be made available through GRNMS (contact information for GRNMS is listed in Appendix D).

Assessment of contaminants and residues using cellular markers and indictors is currently being performed by Fair of NOAA, NOS, Charleston, South Carolina. This research provides baseline information on ecosystem health and has the potential to indicate environmental impacts. The group discussed other opportunities for health and stranding research in the NMS. The opportunities identified included starting similar programs to accumulate life history and geographic range information on target species, accumulating site characterization information, and starting research on residue and contamination indices in filter feeders. The program could potentially detect changes at the cellular level before physical and population repercussions are detected. The goal is to link information to causes of ecosystem changes. The NMSP will investigate the

possibility to initiate contamination assessment programs through the national program and among each of the sanctuaries. The roles of the individual sanctuaries to support this idea would be: to provide information on disturbances of dolphins within the NMS, provide the site characterization as a GIS platform, provide impact assessment information, and to provide access to existing programs within the National Marine Sanctuary.

NORTHWEST REGION BREAKOUT GROUP
Moderator: Ed Bowlby
Rapporteur: Mary Jane Schramm

Participants

Ed Bowlby, Olympic Coast National Marine Sanctuary
Carol Carey, Hawaiian Islands Humpback Whale National Marine Sanctuary
Mary Jane Schramm, Oceanic Society Expeditions

Summary

The group began with a discussion of current marine mammal research projects in the northwest region. These include sea otter distribution, pinniped population studies, humpback, gray and killer whale photo-identification and cetacean distribution offshore particularly for humpbacks, transient killer whales and Pacific white-sided dolphins.

Ongoing research projects and needs in the OCNMS were reviewed. Marine mammal research efforts in the OCNMS focus on summer-resident gray whales off Washington coast, in addition to migrating gray whales. OCNMS wishes to extend its study to share a database with researchers off Oregon, British Columbia and Alaska. The OCNMS would also support research into the feeding patterns of humpbacks in relation to fisheries efforts at various sites.

There is no hard data on whether an apparent northward shift of feeding areas from Washington to British Columbia (notably Clayoquot Sound) is trophic-based. OCNMS needs solid long-term data to determine the reason for this shift.

OCNMS currently has a population of approximately 600 sea otters and this population appears to be expanding. The OCNMS would like to investigate current or potential fisheries impacts on these expanding sea otter populations. Several issues affect the sea otter populations at OCNMS. One issue is that the Makah tribe has sovereign power. The Makah tribe could designate some areas as “otter free” thereby remove/kill the otters found in that zone.

The OCNMS long term improvements to their research program includes: effective networking, better outreach pertaining to research internships that are available, contaminant load studies on transient orcas, and PCB sampling and assessment to trace the origins of the PCB’s. The Sanctuary also needs an 80 ft vessel for broader resource management capacity. The value in this will be that the data would apply to marine mammals but also be shared with seabird researchers, thereby increasing the capability for multidisciplinary approaches to looking at the ecosystem. Since funding is limited, there is a need for collaborative efforts between individuals, research and non-profit agencies. There is also a need for an innovative approach to and fresh ideas for research projects.

SOUTHWEST REGION BREAKOUT GROUP
Moderator: Andrew DeVogelaere
Rapporteur: Jan Roletto

Participants

John Calambokidis, Cascadia Research Collective
Todd Chandler, Cascadia Research Collective
Don Croll, University of California, Santa Cruz
Andrew DeVogelaere, Monterey Bay National Marine Sanctuary
Sarah Fangman, Channel Islands National Marine Sanctuary
Karin Forney, National Marine Fisheries Service, SWSC
Leslie Grella, Farallones Marine Sanctuary Association
Frances Gulland, The Marine Mammal Center
Sharon Melin, National Marine Fisheries Service, NMML
Joe Mortenson, Farallones Marine Sanctuary Association
Erin Oleson, Scripps Institute of Oceanography, UCSD
George-Kunio Uehara, Farallones Marine Sanctuary Association
Jan Roletto, Gulf of the Farallones National Marine Sanctuary & Cordell Bank National Marine Sanctuary
Teri Rowles, National Marine Fisheries Service
Jean Souza, Hawaiian Islands Humpback Whale National Marine Sanctuary
Amy Travick, University of South Florida

Summary

The working group developed hypotheses in order to develop tasks and goals that would expand marine mammal research efforts off the coast of California. The hypotheses were directed towards:

- Topics and projects which occur in multiple sanctuaries and has regional aspects;
- Develop a list of list agencies conducting marine mammal work;
- Develop ideas and tasks on how to better share information among researchers; and
- Develop tasks that will allow researchers to integrate their findings and distribute the information to the public so they may have a better understanding of the marine environment and develop a better sense of stewardship.

The working group recognized the need to develop hypotheses to test the following questions:

- How do the oceanographic processes effect the health of marine mammal populations and alter changes in the habitats of species of interest?
- Are there predictors to die-offs, other "events" or changes in populations?
- Do die-offs affect sustainability of populations?
- What are the best scales to view and assess marine mammal populations?
- Are NMS large enough to properly scale marine mammal investigations?

- Are multiple or joint Sanctuary projects necessary to investigate marine mammal populations? For example, develop a marine mammal monitoring project to assess populations on a regional/west coast basis.
- If so, how do we overcome dis-proportional budgets from one Sanctuary to the next?
- How do we detect differences between regional population changes and re-distribution changes of individuals and groups?

The primary hypothesis discussed was: how do temporal and spatial variations affect all species, from primary producers to fisheries (e.g. squid and rockfish) to apex predators? The basis of this hypothesis is the fact that there is a need for long-term baseline monitoring in order to understand ecosystem variation and causes of those variations; and whether the variations are from anthropogenic sources or from natural variability. Programs that will determine how one process affects the other and attempt to answer the question: what killed this seal vs. what killed this population?, need to be developed.

The following tasks were developed to help answer the above questions**:**

1. Improve communication between agencies and non-government organizations; develop a communication system to announce die-offs, environmental events, changes in migratory patterns; announce joint projects and research plans.

NMS coastal processes monitoring programs, including stranding and habitat assessment and inventory programs, oceanographic and pelagic processes, need to be linked. It was thought that a list-serve could help disseminate current or near real-time updates on sanctuary resources and that the list-serve could help broaden the scale of marine mammal investigations. For example, when the blue whales re-distribute themselves so that they are feeding in different areas, the sanctuaries can communicate these spatial changes and eliminate misinformation of population changes. Andrew DeVogleare and Aaron King from the MBNMS have started (January 2000) to develop the list serve across the west coast sanctuaries. A list serve should be developed for the east coast sanctuaries that are involved in marine mammal research. This will be necessary so that all NMS can have access to information on cosmopolitan species.

2. Develop a white paper to be distributed to mangers and policy makers, educating them on the benefits of long-term monitoring. Develop a directory for marine mammal monitoring and research projects that are of priority to marine resource managers.

A meeting that will focus on the development of a plan to keep track of long-term, baseline monitoring programs would be the first step toward education for managers and policy makers. These monitoring programs would help detect temporal and spatial patterns and variations over large regions of the ocean. The meeting shall also develop guidelines for developing and implementing an organized effort for baseline monitoring. This organized effort shall include government and non-governmental groups that are involved with marine mammal research and monitoring efforts on population levels and

distribution, stranding and health detection, demographics and predator prey studies. The first meeting will set an agenda and tasks to develop a multi-agency, white paper to be presented to managers and policy makers. The white paper shall serve as a tool to instruct or inform congressional representatives about the need, purpose and necessity of long-term baseline monitoring. Participants that will initiate the meeting are Jan Roletto, Teri Rowles, Karin Forney and Andrew DeVogeleare. The initial meeting is planned for the spring of 2000, in San Francisco at the GFNMS. More meetings will be planned to include a wider range of expertise and disciplines.

3. Develop a vehicle to educate the public in the need to fund long-term monitoring; even though results and conclusions are not immediate.

A final discussion was held on the need to bridge the gap between researchers and marine educators. It was discussed that educators must initiate involvement in marine mammal research meetings and join the developing list serve in order to maintain updated information. Jean Souza, HIHWNMS, will serve as the liaison between educators and researchers. The educators will be tasked with the development of a vehicle to educate the public on the need to fund long-term monitoring projects and the reason why these types of programs do not yet produce numerous annual reports. The educators will also be tasked with gathering valuable information that is needed during environmental catastrophes such as oil spills, El Niño-Southern Oscillation, mortality events, etc. The public needs to be involved with educating congressional representatives on the necessity of long-term monitoring. No time line or specific tasks for the liaison were discussed.

PACIFIC/HAWAII/SOUTHERN HEMISPHERE BREAKOUT GROUP
Moderator: Nancy Daschbach
Rapporteur: Kelly Allman

Participants

Nancy Daschbach, Fagatele Bay National Marine Sanctuary
Naomi McIntosh, Hawaiian Islands Humpback Whale National Marine Sanctuary
Christina Pomilla, American Museum of Natural History
Kristin Carden, SCRIPPS Institution of Oceanography
Rachel Cartwright, The Keiki Kohola Project
Law Man Kwan, Ocean Park Conservation Foundation
Holly Sargeant-Green, Kula Naia Wild Dolphin Research Foundation, Inc.
Athline Clarke, Hawaii Department of Land and Natural Resources
Allen Tom, Hawaiian Islands Humpback Whale National Marine Sanctuary
Francis B. Michaelis, Australian Quarantine and Inspection Service
Gabriela Paredes, UDO - Venezuela
Giovanna Giandolfi, Fantini University De Oriente
Leah Hatch, Cornell University
Stephanie Burkhart, Pacific Whale Foundation
Tricia Neesid

Summary

The group's discussion included investigations within the HIHWNMS, FBNMS and the Southern Hemisphere, and a review of current research projects in each area. The group mentioned several humpback whale projects including the ATOC and LFA programs, associated behavioral changes and disturbance, photo-identification, and investigation of genetic variability in various groups in the Southern Hemisphere. Other marine mammal species being investigated included small odontocete species, e.g. harassment and swim with the dolphin programs, spinner dolphins, monk seals in the Hawaiian area, Hector dolphins in the New Zealand area, and photo-identification and genetics of humpback whales in the South Pacific and FBNMS.

Both Sanctuary representatives requested the development of collaborative investigations. Priority projects for the HIHWNMS included an investigation of the affects of Japanese whaling on the Hawaiian stocks, assisting or supporting on-going research in the area, support for data analysis and resulting publication of reports, and identification of holes in habitat utilization of humpback whales.

It was suggested that the formation of collaborative projects could be possible, but funding from the FBNMS would be in the form of in-kind funding. There are the possibility of housing and use of office space and supplies, and the use of a small vessel. Projects could include a review of the cultural history of whales and indigenous people, genetic variability between Group 5 and 6 in the Southern Hemisphere, acoustics

and baseline population dynamics. Potential investigators should contact the FBNMS Manager at Nancy.Daschbach@noaa.gov

APPENDIX A. AGENDA

9:00 - 9:10 Welcome and Introductions

9:10 - 9:30 Introduction to the National Marine Sanctuary (NMS) Program
Steve Gittings, National Research Coordinator, National Marine Sanctuary Program

9:30 - 9:45 National Marine Fisheries Service (NMFS) Permit Overview
Ann Terbush, Chief, Permits Division, Office of Protected Resources, NMFS

9:45 -10:00 National Marine Fisheries Service Stranding Program Overview
Teri Rowles, Coordinator, NMFS Marine Mammal Health and Stranding Response Program

10:00 - 10:30 National Marine Sanctuary site presentations
Channel Islands National Marine Sanctuary - *Sarah Fangman*
Olympic Coast National Marine Sanctuary - *Ed Bowlby*
Monterey Bay National Marine Sanctuary - *Andrew DeVogelaere*

10:30-10:45 Break

10:45 - 12:00 National Marine Sanctuary site presentations (continued)
Hawaiian Islands Humpback Whale National Marine Sanctuary - *Allen Tom*
Fagatele Bay National Marine Sanctuary - *Nancy Daschbach*
Stellwagen Bank National Marine Sanctuary - *Anne Smrcina*
Gray's Reef National Marine Sanctuary - *Cathy Sakas*
Florida Keys National Marine Sanctuary - *Laura Engleby*
Cordell Bank National Marine Sanctuary - *Jan Roletto*
Gulf of the Farallones National Marine Sanctuary - *Jan Roletto*

12:00 - 13:15 Lunch

13:15 - 13:30 Review procedures for afternoon break-out groups

13:30 - 15:00 Break-out groups

Northeast - *moderated by Anne Smrcina*
Southeast & Gulf - *moderated by Laura Engleby*
California - *moderated by Andrew DeVogelaere*
Northwest (Oregon to Alaska) - *moderated by Ed Bowlby*
Pacific/Hawaii/Southern Hemisphere - *moderated by Nancy Daschbach*

15:00 - 15:20 Break

15:20 - 16:00 Review and develop a mini-report for regional abstract

16:00 - 17:15 Present current marine mammal research in NMS - Discussion and Summary of afternoon breakout groups

17:15 - 18:15 Workshop Reception

18:00 Ice Breaker Reception for Biennial Conference

APPENDIX B. MARINE MAMMAL SPECIES OCCURRING IN OLYMPIC COAST NATIONAL MARINE SANCTUARY

Group	Common Name	Species	Occurrence	Protective Status
Carnivores	Sea otter	*Enhydra lutris*	C	MMPA, WSE
Pinnipeds	California sea lion	*Zalophus californianus*	C	MMPA
	Northern sea lion	*Eumetopias jubatus*	C	MMPA, FT, WST
	Northern fur seal	*Callorhinus ursinus*	R	MMPA
	Pacific harbor seal	*Phoca vitulina*	C	MMPA
	Northern elephant seal	*Mirounga angustirostris*	R	MMPA
Cetaceans	California gray whale	*Eschrichtius robustus*	C	MMPA, WSS
	Northern right whale	*Eubalaena glacialis*	A	MMPA, WSE
	Minke whale	*Balaenoptera acutorostrata*	R	MMPA
	Fin whale	*Balaenoptera physalus*	A	MMPA, FE, WSE
	Sei whale	*Balaenoptera borealis*	A	MMPA, FE, WSE
	Blue whale	*Balaenoptera musculus*	A	MMPA, FE, WSE
	Humpback whale	*Megaptera novaeangliae*	R	MMPA, FE, WSE
	Sperm whale	*Physeter macrocephalus*	R	MMPA, FE, WSE
	Pygmy sperm whale	*Kogia breviceps*	A	MMPA
	Stejneger's beaked whale	*Mesoplodon stejnegeri*	A	MMPA
	Hubb's beaked whale	*Mesoplodon carlhubbsi*	A	MMPA
	Cuvier's beaked whale	*Ziphius cavirostris*	A	MMPA
	Baird's beaked whale	*Beradius bairdii*	A	MMPA
	Short-finned pilot whale	*Globicephala macrorhynchus*	A	MMPA
	Risso's dolphin	*Grampus griseus*	A	MMPA
	Killer whale	*Orcinus orca*	R	MMPA
	False killer whale	*Pseudorca crassidens*	A	MMPA
	Common dolphin	*Delphinus delphis*	A	MMPA
	Northern right whale dolphin	*Lissodelphis borealis*	A	MMPA
	Striped dolphin	*Stenella coeruleoalba*	A	MMPA
	Pacific white-sided dolphin	*Lagenorhynchus obliquidens*	A	MMPA
	Dall's porpoise	*Phocoenoides dalli*	R	MMPA
	Harbor porpoise	*Phocoena phocoena*	C	MMPA, WSC

C = Common
R = Rare
A = Accidental

FE- Federally Endangered under the US Endangered Species Act
FT- Federally Threatened under the US Endangered Species Act
MMPA - US Marine Mammal Protection Act
WSE - Washington State Endangered Species
WST - Washington State Threatened Species
WSS - Washington State Sensitive Species
WSC - Washington State Candidate Species

APPENDIX C. REQUEST FOR RESEARCH SUPPORT WITHIN THE OLYMPIC COAST NATIONAL MARINE SANCTUARY

One of the key goals of the Olympic Coast National Marine Sanctuary (OCNMS) is to support, promote and coordinate scientific research within the sanctuary. OCNMS support may consist of in-kind support of staff, access to OCNMS boats or ship time, use of the Neah Bay Field Trailer, letter of support for research, and limited financial support. This form is meant as a general query of possible research projects that the OCNMS may be able to facilitate. It is meant to be a first step in engaging OCNMS in a dialogue, which will likely lead to the need for more detailed information. Please feel free to utilize alternative formats for submitting proposals. OCNMS support is conditioned on investigators providing an annual 1-2 page summary report, updating their project status and findings.

PRIMARY TYPE OF SUPPORT:

- ☐ *TATOOSH,* 36' Research Boat [Skipper, Without Skipper* (circle one)]
- ☐ *OC2*, 22' Rigid-hull Inflatable Boat [Skipper, Without Skipper* (circle one)]
- ☐ Neah Bay Field Trailer
- ☐ Ship time
- ☐ Financial Support
- ☐ Sustainable Seas Expedition *DW2000* submersible **[Year 2001?]**
- ☐ Letter of Support
- ☐ Other _____

NAME: _____

AFFILIATION: _____

ADDRESS: _____

PHONE:_____EMAIL:_____FAX:_____

PROJECT TITLE: _____

PROJECT DESCRIPTION:

(Please attach a 1–3 page project description addressing the following issues: Targeted Species/Group, Principal Investigator, Study Area, Research Objective, Methodology, Expected Results/Products, Number of Participants, Budget (both project & OCNMS contribution).

DATES (& ALTERNATIVES):

_____

HOW WILL THIS ACTIVITY ASSIST OCNMS (refer to FEIS/MP or OCNMS Research Workshop. Contact Ed or Rick for a digital copy of FEIS):

Please return to:

Ed Bowlby, Research Coordinator
NOAA, Olympic Coast National Marine Sanctuary (360) 452-2153
138 West First Street FAX (360) 457-8496
Port Angeles, WA 98362-2600 ed.bowlby@noaa.gov

APPENDIX D. SANCTUARY CONTACT INFORMATION

Office of National Marine Sanctuaries
1305 East-West Highway, 11th Floor
Silver Spring, MD 20910
Tel: (301) 713-3125
Fax: (301) 713-0404

Web site: http://www.sanctuaries.nos.noaa.gov
Director, Office of National Marine Sanctuaries: Dan Basta

National Research Coordinator: Steve Gittings
Tel: (301) 713-3125 ext. 130
E-mail: steve.gittings@noaa.gov

Channel Islands National Marine Sanctuary
113 Harbor Way
Santa Barbara, CA 93109
Tel: (805) 966-7107
Fax: (805) 568-1582

Web site: http://www.cinms.nos.noaa.gov
Manager: LCDR Matthew Pickett

Research Coordinator: Sarah Fangman
Tel: (805) 884-1473
E-mail: sarah.fangman@noaa.gov

Education Coordinator: Julie Goodson
Tel: (805) 884-1462
E-mail: julie.goodson@noaa.gov

Cordell Bank National Marine Sanctuary
Fort Mason
Building #201
San Francisco, CA 94123
Tel: (415) 561-6622
Fax: (415) 561-6616

E-mail: farallones@nms.noaa.gov
Manager: Ed Ueber

Research Coordinator: Jan Roletto
Tel: (415) 561-6622
E-mail: jan.roletto@noaa.gov

Education Coordinator: Jennifer Stock
Tel: (415) 561-6622
E-Mail: Jennifer.Stock@noaa.gov

Fagatele Bay National Marine Sanctuary
P.O. Box 4318
Pago Pago, American Samona 96799
Tel: 011-684-633-7354
Fax: 011-684-633-7355

Web site: http://www.fbnms.nos.noaa.gov/
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BRD	Biological Resource Division
CBNMS	Cordell Bank National Marine Sanctuary
CDFG	California Department of Fish and Game
CIGIS	Channel Islands Geographic Information System
CINMS	Channel Islands National Marine Sanctuary
CITES	Convention on International Trade in Endangered Species
COMBERS	Coastal Ocean Mammal and Bird Education and Research Surveys
CRC	Cascadia Research Collective
CWR	Center for Whale Research
EDS	Ecosystem Dynamics Study
ENP	Everglades National Park
ESA	Endangered Species Act
FBNMS	Fagatele Bay National Marine Sanctuary
FKNMS	Florida Keys National Marine Sanctuary
FSA	Fur Seal Act
GFNMS	Gulf of the Farallones National Marine Sanctuary
GIS	Geographic Information System
GRNMS	Gray's Reef National Marine Sanctuary
HAB	Harmful Algal Bloom
HIHWNMS	Hawaiian Islands Humpback Whale National Marine Sanctuary
MBNMS	Monterey Bay National Marine Sanctuary
MMPA	Marine Mammal Protection Act
MSD	Marine Sanctuary Division
NEPA	National Environmental Protection Act
NESDIS	National Environmental Data Information System
NIST	National Institute of Standards and Technology
NMFS	National Marine Fisheries Service
NMML	National Marine Mammal Lab, NOAA
NMS	National Marine Sanctuary(ies)
NMSA	National Marine Sanctuaries Act
NMSP	National Marine Sanctuary Program
NOAA	National Oceanic and Atmospheric Administration
NRW	Northern Right Whale
NURC	National Undersea Research Center
OCNMS	Olympic Coast National Marine Sanctuary
OCRM	Office of Ocean and Coastal Resource Management
ONP	Olympic National Park
OSPR	Office of Spill Prevention and Response
RAP	Research Activity Panel
SAC	Sanctuary Advisory Council
GESSBNMS	Gerry E. Studds Stellwagen Bank National Marine Sanctuary
SEALS	Sanctuary Education, Awareness and Long-term Stewardship
UNCW	University of North Carolina at Wilmington
USCG	US Coast Guard

USFWS	US Fish & Wildlife Service
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources