

**Office of National Marine Sanctuaries/National Centers for Coastal
Ocean Science Long-term Agreement (ONMS/NCCOS LTA)**

**2005 Annual Liaison Report on Existing and Potential ONMS/NCCOS
Collaborative Studies at Hawaiian Islands Humpback Whale National
Marine Sanctuary (HIHWNMS)**



Prepared by:

**Alan Friedlander & Mark Monaco
National Centers for Coastal Ocean Science (NCCOS)
Center for Coastal Monitoring and Assessment (CCMA)**



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INTRODUCTION

Collaborative studies between the National Centers for Coastal Ocean Science (NCCOS) and the Office of National Marine Sanctuaries (ONMS) are underway in most of the 13 sanctuary sites and in the Northwestern Hawaiian Islands (NWHI) Coral Reef Ecosystem Reserve. An important part of the evolving ONMS/NCCOS collaborations is to determine how best NCCOS skills and expertise can be used to address ONMS science and management issues. To meet this goal, NCCOS liaisons to the 13 ONMS sites and the reserve are charged with preparing a report to document the status of collaboration at each site at the beginning of each fiscal year. This series of reports contain information on the research activities and capabilities of NCCOS, current science efforts and needs at ONMS sites, an assessment of overlap between NCCOS capabilities and ONMS needs, identification of areas where greater efficiencies in scientific activities could be made, research gaps, and recommendations for pursuing collaborative efforts on new or existing projects. This report will provide guidance on improving current NCCOS research at each ONMS site and recommends areas for future collaboration. The goal is to provide a concise, easily digestible report on existing and potential overlap between ONMS site needs and NCCOS capabilities. The following report addresses these considerations for the Hawaiian Islands Humpback Whale NMS (HIHWNMS).

APPROACH

The reports primary content is presented in a simple tabular format to allow easy cross-reference between sanctuary needs and NCCOS capabilities. Where sanctuary needs and NCCOS capabilities overlap, this tabular format allows easy identification of existing projects. More importantly, areas where overlap occurs but projects are lacking are identified and noted as topics for potential collaboration. Following the Needs/Capabilities summary table, existing and potential projects are then summarized and contact information provided to foster discussion and proposal opportunities for the next ONMS/NCCOS funding cycle in FY2005. More detailed information on each sanctuary and NCCOS Center is available on the internet and will not be presented here.

Table values were obtained from several documents and through consultation with ONMS and NCCOS staff. Entries under the field, "Sanctuary Science and Management Needs," were drawn directly from the July 2002 report on Sanctuary Science by Gittings *et al.* In that report, science needs and their corresponding management issues for each sanctuary were tabulated according to relevance and adequacy of current studies. Topics recommended for additional research are focused on in the Gittings *et al.* report and receive similar focus here to emphasize adequacy of current ONMS/NCCOS studies in sanctuaries and identify areas of potential collaboration. Table HI-3 of that report identifies key issues that require additional study at HIHWNMS. These issues were condensed and used as a starting point to identify Sanctuary Science and Management Needs in Table 1 below.

Entries under "NCCOS Capabilities" were obtained from the NCCOS website and liaison knowledge of NCCOS. This list includes only relevant NCCOS capabilities that are

related to HIIWNMS needs and is not intended to be an exhaustive list of NCCOS expertise. Entries under “Existing Projects” were generated from liaison knowledge and then reviewed by sanctuary staff. While it is recognized that many organizations and academic institutions outside of NCCOS are involved in science activities at each sanctuary site, the focus of this report is on improving ONMS/NCCOS collaborations. Entries under “Potential Projects” occur where sanctuary needs overlap with NCCOS capabilities but no project exists. Field entries here are generated by liaisons and serve as a flag to alert NCCOS and ONMS staff to “missed opportunities” and encourage future discussions between the relevant NCCOS Center, the liaisons, and the HIIWNMS staff.

Table 1. Hawaiian Islands Humpback Whale NMS Needs and NCCOS Capabilities

| Sanctuary Science and Management Needs | NCCOS Capabilities | Existing HIHWNMS/NCCOS Projects | Potential HIHWNMS/NCCOS Projects |
|---|---|---|--|
| <p>1. Biological Resources: Pertinent information and factors controlling species of interest and biological communities. Potential invasive, non-indigenous, keystone, indicator, non-consumptive, and specially protected species. Ecological indicators, critical habitat, multi-species relationships, competition between key species, prey availability, habitat use, stress indicators, recruitment, population trends, disease, and community dynamics.</p> | <p>CCMA: Biogeographical assessments of species distribution by life stage. Habitat Suitability Modeling.</p> | | <p>Biogeographical Characterization of HIHWNMS, include critical areas for whales, other protected species and sensitive habitat areas.</p> |
| <p>2. Event Response Causes of events. Ecological modeling for prediction of event. Mitigation alternatives, event path tracking, contingency plan, risk assessment.</p> | <p>CCMA: Ecological forecasting and modeling of changes in species distribution due to environmental perturbation. Habitat Suitability Modeling.</p> | | <p>Develop ecological forecast models based on habitat and water quality modifications that may impact whale distributions including info on vessel traffic.</p> |
| <p>3. Industrial Uses Identification of sources of invasive species.</p> | <p>NCCOS: Alien species early detection and warning system, member of the Aquatic Nuisance Species Task Force.</p> | | <p>Aid in predicting potential impacts from human and or natural disasters including invasive Species in HIHWNMS</p> |
| <p>4. Mapping Capabilities GIS compatible data: Critical habitat for species of concern, source areas of critical species.</p> | <p>CCMA: Remote sensing and mapping capability using satellite and aerial photo techniques.</p> | <p>CCMA: Using IKONOS Satellite Imagery to map shallow water benthic habitats throughout the main Hawaiian Islands.</p> | <p>Remotely sensed climatology of sea surface temperatures and chlorophyll a spatial and temporal distributions.</p> |
| <p>5. Harvesting Effects of global warming, El Nino, hurricanes, and currents, condition and trends of critical habitat, multi-species relationships, competition, recruitment, food requirements and availability, life-history information.</p> | <p>CCFHR: Fishery species responses to exploitation. CCMA: Habitat Suitability Modeling.</p> | | <p>Harvest Impacts on HIHWNMS Fauna. Assess the impact of natural and anthropogenic stressors on HIHWNMS living marine resources.</p> |
| <p>6. Restoration Valuation of sanctuary resources. Assessment of restoration technologies for biological communities, key species, and biogeochemical processes.</p> | <p>CCFHR: Damage and recovery models for seagrass communities. CCEHBR: habitat restoration research at the Oxford Cooperative Lab.</p> | | <p>Application of restoration expertise of CCFHR/CCEHBR contingent upon specific habitat damaged.</p> |
| <p>7. Water Quality Socioeconomic effects of water quality on uses and profits. Human health implications, levels and mechanisms of sublethal stressors, contaminants causing mortality. Temporal changes in levels of pathogens within beach-cast organisms, biological samples, and water column. Temporal spatial influences on water quality, non-point sources, selected human activities, atmospheric deposition, rivers, cruise ship discharges, and outfalls.</p> | <p>CCMA: Sediment contaminant studies, National Status and Trends Program. CCEHBR: Chemical contaminants studies and environmental quality. Marine toxins and Harmful Algal Blooms. HML: Ecotoxicology and environmental chemistry expertise.</p> | | <p>Assessment of water quality throughout Sanctuary and potential impact of pollutants on living marine resources.</p> |
| <p>8. Wildlife Disturbance Response of species to disturbance, spatiotemporal patterns of disturbance, verification of cause and effect, threat identification and response prediction. Acute and chronic species response, sensory capabilities, physiological tolerance, thresholds, and behavioral variability.</p> | <p>CCMA: Ecological forecasting and modeling of changes in species distribution due to environmental perturbation. Habitat Suitability Modeling.</p> | | <p>Impacts of human activities on marine mammal distributions.</p> |
| <p>9. Zone Performance Type, intensity, and spatial distribution of human impacts within zoned areas; identification of the effectiveness of zoning regime.</p> | <p>CCMA: Biogeographical characterization of resources by management zone.</p> | | <p>Biogeographical Characterization of HIHWNMS</p> |

SUMMARY OF EXISTING HIHWNMS/NCCOS STUDIES

At this time no direct partnership projects between NCCOS and the HIHWNMS are underway. However, as part of the Five Year plan to conduct biogeographic studies in all NMS, the HIHWNMS is a prime candidate to develop joint biogeographic investigations (Kendall and Monaco 2003). Also, NCCOS/CCMA's Biogeography Program is mapping shallow water benthic habitats throughout the main Hawaiian Islands as part of the NOAA Coral Reef Conservation Program studies.

SUMMARY OF POTENTIAL HIHWNMS/NCCOS STUDIES

Sanctuary Management Endpoint #1: Biological Resources

NCCOS is projected to begin a biogeographic assessment of HIHWNMS within the next few years as outline in the 5-Year joint ONMS/NCCOS Biogeographic Assessment Plan (Kendall and Monaco 2003).

Sanctuary Management Endpoint #2: Event Response

Ecological forecasts and habitat suitability modeling are suited to this topic. Both capabilities are within CCMA and Center for Coastal Fisheries and Habitat Research (CCFHR) depending on the type of event.

Sanctuary Management Endpoint #3: Industrial Uses

NCCOS scientists conduct research on both plant and animal invasive species. Working with other research partners, NCCOS is developing a pilot early warning system that will indicate the early presence of invasive species in Hawaii's marine and estuarine coastal areas.

Sanctuary Management Endpoint #4: Mapping Capabilities

The current NCCOS mapping efforts should be modified to meet the needs of the HIHWNMS where applicable. Mapping efforts could include migration pathways and distribution of prey resources of marine mammals.

Sanctuary Management Endpoint #5: Harvesting

NCCOS may be able to incorporate this information into the biogeographic assessment planned in future years.

Sanctuary Management Endpoint #6: Restoration

Application of restoration expertise of CCFHR and the Center for Coastal Environmental Health and Biomolecular Research (CCEHBR) contingent upon specific habitat damaged.

Sanctuary Management Endpoint #7: Water Quality

NCCOS currently has the capability to monitor chlorophyll, turbidity, sea surface temperature, and other parameters using remotely sensed or in-situ data collection techniques.

Sanctuary Management Endpoint #8: Wildlife Disturbance

Both CCMA and CCFHR have the skills necessary to develop various types of spatially articulated models of resource abundance and distribution. Capabilities range from deterministic to geostatistical models. CCMA's biogeographic assessment is laying a foundation for this type of work (including the development of potential resource distribution through deterministic modeling), and could easily extend current efforts to include development of robust models to estimate distributional changes in response to disturbance(s).

Sanctuary Management Endpoint #9: Zone Performance

NCCOS/CCMA has been conducting pre and post closures studies on marine protected areas throughout US coral reef ecosystems. The approaches and lessons learned could be applied to evaluate the conservation objectives of HIHWNMS as a component of the planned Biogeographical Characterization.

Permits Issued by the State (the sanctuary does not issue permits)

| Name1 | Name2 | Affiliation | Activities | NMFS Permit |
|------------------------|---------------------|--|--|--------------------|
| Louis M. Herman, Ph.D. | Adam A. Pack, Ph.D. | University of Hawaii Kewalo Basin Marine Mammal Laboratory | (a) in air photo-identification of individuals to determine individual life histories, social role, migration, habitat use, distribution, and reproductive status; (b) underwater videogrammetry to determine the sizes of animals in different social roles and how size affects or is correlated with the social role adopted, and to derive estimations of sexual maturity of animals; (c) underwater videography to document behaviors and aid in sex determination; (d) song recording and observation of singers to determine song source levels and propagation characteristics; e) Crittercam studies of animals in competitive groups and in dyads, and of singers, to help in the understanding of the mating system; and (f) skin biopsy sampling for sex determination and individual identification to accompany and supplement Crittercam information. | 707-1531 |

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|------------------------------|---|---|--|----------|
| Robin W. Baird, Ph.D. | Daniel Webster Dan McSweeney Greg Schorr | Cascadia Research Collective | This permit authorizes take, solely by harassment and/or pursuit, in the process attaching suction-cup time-depth recorders to study sub-surface behavior, photo-identification and behavioral observations (including in-water) and biopsy sampling, humpback and sperm whales. | 774-1714 |
| Dan R. Salden, Ph.D. | | Hawaii Whale Research Foundation | This permit authorizes take, solely by harassment and/or pursuit, in the process of conducting vessel-based observation and photography, underwater observation and photography, and underwater sound recording, the following endangered species of aquatic life: | 587-1472 |
| David Mattila | Allan Ligon | Hawaiian Islands Humpback Whale National Marine Sanctuary | This permit authorizes take, solely by harassment and/or pursuit, in the process of conducting vessel-based observation/photography, biopsy darting, underwater observation/photography and underwater sound recording, the following endangered species of aquatic life: | 782-1438 |
| Christine Gabriele | Adam Frankel, Ph.D., Suzanne Yin, and Susan H. Rickards | Hawaii Marine Mammal Consortium | This permit authorizes take, solely by harassment and/or pursuit, in the process of conducting vessel-based observation and photography, and biopsy darting, the following endangered species of aquatic life: | |
| Joseph R. Mobley, Jr., Ph.D. | | University of Hawaii - West Oahu | This permit authorizes take, solely by harassment and/or pursuit, in the process of conducting aircraft-based and vessel-based observation and photography of the following endangered species of aquatic life: | 642-1536 |
| Marc O. Lammers, Ph.D. | | Oceanwide Science Institute | This permit authorizes take, solely by harassment and/or pursuit, in the process of conducting vessel-based observation and photography, underwater observation and photography, the following endangered species of aquatic life: | |

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|------------------------------------|---------------------|---|--|-----------|
| Jim Darling, Ph.D. | | West Coast Whale Research Foundation | This permit authorizes take, solely by harassment and/or pursuit, in the process of conducting vessel-based observation and photography, underwater observation and photography, underwater sound recording, biopsy darting, and aerial overflights, the following endangered species of aquatic life: | 753-1599 |
| Deborah A. Glockner- Ferrari | Mark J. Ferrari | Center for Whale Studies | This permit authorizes take, solely by harassment and/or pursuit, in the process of conducting vessel-based observation and photography, underwater observation and photography, and collection of sloughed skin and mucous samples, the following endangered species of aquatic life: | 393-1480 |
| Lloyd F. Lowry | Kathryn J. Frost | University of Alaska, Fairbanks | This permit authorizes take, solely by harassment and/or pursuit, in the process of conducting vessel-based observation and photography, and biopsy darting, the following endangered species of aquatic life: | 774-1437 |
| Marsha Green, Ph.D. | | Albright College | This permit authorizes take, solely by harassment and/or pursuit, in the process of conducting vessel-based observation and photography, underwater observation and photography, and underwater sound recording, the following endangered species of aquatic life: | 924-1484 |
| Ann Zoidis | Tom Norris | Tetra Tech | This permit authorizes take, solely by harassment and/or pursuit, in the process of conducting vessel-based observation and photography, underwater observation and photography, and underwater sound recording, the following endangered species of aquatic life: | 1039-1699 |

CONTACTS

Office of National Marine Sanctuaries

David Mattila, Science Coordinator

Hawaiian Island Humpback Whale National Marine Sanctuary

PH: (808)879-2818 FAX:(808)874-3815

Internet Address: David.Matilla@noaa.gov

<http://hawaiihumpbackwhale.noaa.gov/>

National Centers for Coastal Ocean Science

Center for Characterization and Monitoring

<http://ccma.nos.noaa.gov/>

Dr. Alan Friedlander, NCCOS Pacific Coral Reef Science Coordinator

PH: (808) 259-3165 FAX: (808) 259-5971

Internet Address: afriedlander@oceanicinstitute.org

Dr. Mark Monaco

PH: (301) 713-3028 ext. 160

Mark.Monaco@noaa.gov

REFERENCE

Kendall, M.S, and M.E. Monaco. 2003. Biogeography of the National Marine Sanctuaries: A partnership between NOS Biogeography Program and the National Marine Sanctuary Program. NOAA Silver Spring, MD. 8 pp.