



OLYMPIC COAST NATIONAL MARINE SANCTUARY

Navigating the Future

Management Plan Review



Report to the
Olympic Coast National Marine Sanctuary Advisory Council
from the
Collaborative Research, Assessment, and Monitoring to Inform
Ecosystem-Based Management (CRAM) Working Group

*Submitted to the OCNMS Advisory Council on
22 January 2010*

Introduction

This document provides strategies and activities developed by the Collaborative Research, Assessment, and Monitoring (to inform ecosystem-based management) Working Group that serves the Olympic Coast National Marine Sanctuary (OCNMS) Advisory Council. This working group first identified the highest priority data needs for the area encompassed by the Sanctuary, then developed draft strategies and supporting activities based on these data needs, as informed by feasibility and capability as well as responsibilities and authorities of OCNMS defined by its authorizing legislation. Further description of the process undertaken to develop this document is provided near the end of this document under “Document Development”.

Background

Strategies and activities in this document are organized into four general topics: 1) Habitat Mapping & Classification; 2) Physical & Chemical Oceanography; 3) Populations, Communities, and Ecosystems and 4) Data Management, Sharing, and Reporting. The first two topics focus primarily on abiotic aspects of the Sanctuary. The third topic addresses monitoring and researching the biotic components, as well as the integration of information in order to improve our understanding of broader ecosystem processes. The final topic outlines priorities for data management and sharing, and the importance of using data collected in an adaptive way to inform ecosystem-based management decisions over the course of the 5-10 year period when the revised management plan for OCNMS will be in effect.

Strategies and Activities

1. Habitat Mapping & Classification

Strategy MAP1: REGIONAL COORDINATION - Develop and sustain partnerships with Coastal Treaty Tribes, non-government organizations (NGOs), and federal (e.g., NOAA NOS, NMFS, USGS), state, and local agencies to maximize and leverage seafloor and habitat mapping resources, and to promote the use of established mapping standards.

Desired Outcome: *Ensure that seafloor mapping and characterization efforts are collaborative and coordinated with key partners.*

Activity A: Participate in regional forums to ensure alignment and collaboration with broader mapping efforts, including initiatives of the Washington State Seafloor Mapping Committee and the West Coast Governors' Agreement on Ocean Health.

Activity B: Establish standards for the collection, assessment, verification, and application of seafloor mapping data in collaboration with regional forums.

Partners: NOAA (NOS and NMFS), USGS, Makah, Quileute, and Hoh tribes, Quinault Indian Nation, Olympic Coast Intergovernmental Policy Council, Washington State Seafloor Mapping Consortium, Washington state, universities, NGOs

Resources: Ship time, staff time for ship time allocation process, staff time for grant/proposal-writing, staff time for participating in collaborative groups such as the WA Seafloor Mapping Consortium

Strategy MAP2: SEAFLOOR HABITAT MAPPING - Continue collaborative efforts to map seafloor habitats.

Desired Outcome: *Increase the area of the Sanctuary that is mapped using recognized survey protocols and data standards.*

Activity A: Prioritize seafloor habitat mapping using the following considerations:

- hard substrate areas and other areas of probable or known important biogenic habitat
- habitats with known or potential use by species of concern (threatened endangered, overfished, and/or vulnerable species)
- coastal areas less than 10 m, to provide information on habitats and natural resources that are most likely to be affected by oil spills
- opportunities to leverage ship time, equipment, and mobilization expenses

Activity B: Prioritize the collection of high quality, high-resolution sonar data in areas where no seafloor data exists

Activity C: Continue to take advantage of opportunities to collect partial sonar data types (e.g., sidescan only), and re-map areas where inadequate seafloor data exists to meet quality standards for product development

Activity D: Verify sonar data through the collection and analysis of video, physical samples, or other methodologies.

Activity E: Collect data that will contribute to the broader science and management initiatives of OCNMS and its partners, including

- understanding and assessing species habitat associations,
- assessing habitat conditions with focus on biogenic habitats, habitats used by species of concern, habitats vulnerable to disturbance from climate change, and habitats impacted by development projects

Partners: NOAA (NOS and NMFS), USGS, Makah, Quileute, and Hoh tribes, Quinault Indian Nation, Olympic Coast Intergovernmental Policy Council, Washington State Seafloor Mapping Consortium, Washington state, universities, NGOs

Resources: Ship time, funding for ROVs and/or other sensing equipment, staff time for data processing, staff time for surveys

Strategy MAP3: HABITAT CLASSIFICATION - Integrate observations from sonar data collection and ground-truthing to classify habitats and generate derivative maps and GIS products.

Desired Outcome: *Produce standardized seafloor habitat classification maps in GIS and other user-friendly formats.*

Activity A: Apply the classification scheme of Greene et al. (ref) and link with NOAA's Coastal and Marine Ecological Classification Structure (ref)

Activity B: Analyze data to generate derivatives of substrate data and geological features (e.g., seafloor morphology, slope, rugosity, stability/disturbance, tectonic features (faults) and submarine landslides).

Activity C: Combine habitat characterization information (as available) with the biological, chemical, and ocean processes information to further our understanding of habitat use by and needs of organisms during different life stages.

Partners: NOAA (NOS and NMFS), USGS, Makah, Quileute, and Hoh tribes, Quinault Indian Nation, Olympic Coast Intergovernmental Policy Council, Washington departments of Natural Resources, Ecology, and Fish and Wildlife, Washington State Seafloor Mapping Consortium, universities, NGOs

Resources: Staff time (geographer, research coordinator)

Strategy MAP4: MAPPING PRODUCTS - Report and share seafloor characterization data in useful formats for resources managers and the public.

Desired Outcome: *Ensure that mapping data is available in user-friendly formats; ensure that data is utilized to the fullest extent possible.*

Activity A: Develop habitat maps and a coastal atlas that includes fully interpreted, classified and attributed geologic and habitat maps.

Activity B: Provide Federal Geographic Data Committee standard metadata for all maps and map products

Activity C: Develop GIS products using ESRI software for export to open source GIS and Google Earth software

Activity D: Develop mapping products in a format other than GIS that are useful for public use and outreach.

Activity E: Promote the availability and integration of mapping data for multiple applications, such as:

- marine spatial planning;
- fisheries management;
- living marine resource management
- assessing climate change and sea level change impacts;
- improving earthquake and tsunami hazard assessments;
- forecasting storm inundation and coastal erosion; and
- siting of offshore infrastructure (e.g., aquaculture, renewable energy facilities).

Partners: NOAA (NOS and NMFS), USGS, USFWS, Washington departments of Fish and Wildlife, Ecology, and Natural Resources, Makah, Quileute, and Hoh tribes, Quinault Indian Nation, Olympic Coast Intergovernmental Policy Council, Washington State Seafloor Mapping Consortium, NGOs

Resources: Staff time (geographer); staff time (IT)

2. Physical & Chemical Oceanography

Strategy OCE01: COASTAL MOORING PROGRAM - Continue the OCNMS water quality monitoring program to monitor key physical and chemical oceanographic parameters in coastal waters. As feasible, expand this monitoring to include additional instrumentation, parameters, locations, year-round data collection, and real-time data transmission.

Desired Outcome: *Improve ability of OCNMS to accurately assess water quality condition in the Sanctuary*

Activity A: Continue monitoring program for coastal waters using seasonally deployed (spring through fall), instrumented moorings to collect data on temperature, salinity, dissolved oxygen, currents, chlorophyll (via fluorometer). Calibrate instrumentation annually, or as necessary.

Activity B: Continue to collaborate with partners to determine research and resource management questions that can be addressed with existing or additional sensors or parameters, or expanded spatial or seasonal coverage. Seek funding for additions and improvements to the OCNMS coastal water quality monitoring program. Program improvements could include additional instrumentation, parameters and stations, year-round data collection, and real-time data transmission.

Activity C: Seek funds for full time, permanent oceanography staff position at OCNMS.

Partners: NOAA (NOS, PMEL, NWFSC), Washington departments of Ecology, Fish and Wildlife, & Natural Resources, EPA, Makah, Quileute, and Hoh tribes, Quinault Indian Nation, NANOOS, IPC, UW, OSU/PISCO, , other universities, NGOs

Resources: staff time; equipment support and maintenance, boat maintenance

Strategy OCE02: HYPOXIA - Continue monitoring dissolved oxygen levels and ecological impacts of hypoxic conditions in coastal waters. As feasible, expand this monitoring to include additional locations, year-round data collection, and real-time data transmission, such as will be available with the La Push NANOOS buoy.

Desired Outcome: *Improve understanding of the presence, causes, and effects of hypoxic conditions in marine waters.*

Activity A: Continue collaborative efforts to monitor, assess, and understand spatial and temporal distribution of hypoxic (low oxygen concentration) conditions and their impacts on living organisms. Expand monitoring efforts, as possible and appropriate.

Activity B: Continue to collect and collaborate with the outer coast trustees and fishermen to collect field observations and gain assistance in response to hypoxic conditions.

Partners: NOAA (NOS, PMEL, NWFSC), NANOOS, Washington departments of Ecology, Fish and Wildlife, & Natural Resources, EPA, Makah, Quileute, and Hoh tribes, Quinault Indian Nation, IPC, UW, OSU/PISCO, , other universities, NGOs

Strategy OCE03: OCEAN ACIDIFICATION - Monitor key water quality parameters to track and understand changing ocean chemistry and other physio-chemical changes associated with climate change and variation.

Desired Outcome: *Develop an improved capability to track and understand significant physio-chemical changes in the marine environment associated with climate change as well as potential impacts on calcifying organisms and associated trophic processes.*

Activity A: Continue collaborative efforts to monitor carbonate system variables, such as via the La Push NANOOS buoy, to improve understanding of the incidence, extent, and severity of ocean acidification.

Activity B: Continue to conduct and collaborate in research on the effects of climate change on calcifying and non-calcifying organisms including deep sea corals, plankton, intertidal invertebrates, and on trophic relationships between these species.

Partners: NOAA (NOS, PMEL, NWFSC), EPA, ORHAB, UW, OSU/PISCO, NANOOS, Washington departments of Ecology, Fish and Wildlife, & Natural Resources, IPC, Makah, Quileute, and Hoh tribes, Quinault Indian Nation.

Resources: staff time; equipment support, boat maintenance, project funding

Strategy OCE04: OCEANOGRAPHIC PROCESSES – Support efforts to monitor and model oceanographic processes, including circulation patterns, productivity, larval distribution patterns.

Desired Outcome: *Promote expansion of oceanographic monitoring and modeling to improve understanding of ocean circulation patterns and large-scale changes in the ocean climate (e.g., PDO, ENSO), and promote NANOOS as a data resource for OCNMS partners and the public;*

Activity A: Collaborate in efforts to collect data to support model development and validation for water circulation and larval distribution patterns.

Activity B: Seek funds and/or support for expansion of OCNMS or partner mooring programs (e.g., NANOOS, NDBC) to expand an understanding of oceanography and natural resources. Support the NANOOS coastal sensor array (2 buoys, 1 glider) at La Push. Encourage management questions to be addressed.

Activity C: Participate as a partner in NANOOS meetings and conference calls. Provide a link to NANOOS on the OCNMS website.

Activity D: Support data collection that improves the understanding of primary productivity and its linkages to oceanographic processes with the response and impacts to biological communities.

Partners: NOAA (NCCOS, NWFSC, PMEL, NDBC), IPC, NANOOS, NASA, universities, Washington departments of Ecology, Fish and Wildlife, & Natural Resources and other agencies.

Resources: staff time, satellite data access, funding to support model exploration and development

Strategy OCE05: HARMFUL ALGAL BLOOMS - Continue to collaborate in regional efforts to research and monitor harmful algal blooms (HABs).

Desired Outcome: *To understand better and minimize the impacts of HABs on natural resources and humans.*

Activity A: Work within the ORHAB partnership and support efforts to monitor, detect, understand and predict HABs along west coast.

Activity B: Use known HAB events as opportunities to encourage and conduct research and monitoring to characterize the causes and extent of impacts to natural resources and humans.

Partners: ORHAB, ECOHAB-PNW, NOAA (NOS, NWFSC, NCCOS), NANOOS, Washington departments of Ecology, Health and Fish and Wildlife, universities

Resources: staff time

3. Populations, Communities, and Ecosystems

Note: Research and monitoring to support ecosystem-based management requires information collected across multiple scales. Here we specify priorities for research and monitoring at the expanding scale of individual taxa, functional groups, populations, and communities, all to support ecosystem management.

Strategy ECO1: WATER COLUMN COMMUNITIES - Continue to conduct and collaborate in research on water column communities.

Desired Outcomes: *Improve understanding of food webs/trophic interactions and provide key information to fisheries managers.*

Activity A: Continue monitoring of pelagic zooplankton and forage fish abundance during on-water seabird surveys.

Activity B: Encourage and conduct monitoring of pelagic larval phases of species of commercial and ecological significance (e.g., Dungeness crab, razor clams, mussels, euphausiids, copepods).

Partners: NOAA (NMFS, NOS), ONP, PISCO, WDFW, Makah, Quileute, and Hoh tribes, Quinault Indian Nation, IPC, universities & colleges,

Resources: staff time, project funds

Strategy ECO2: INTERTIDAL - Continue to conduct and collaborate in research on the distribution and abundance of intertidal organisms.

Desired Outcomes: *Improve understanding of health of and changes in intertidal communities.*

Activity A: Continue to monitor sand and rocky intertidal sites following the protocols used by Olympic National Park (ONP). Incorporate data into a coastal database.

Activity B: Continue to monitor rocky intertidal sites on Makah and Quinault reservations following the Multi-Agency Rocky Intertidal Network (MARINe) protocol. Enter monitoring results into the MARINe database.

Activity C: Support rocky intertidal monitoring conducted by Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO).

Activity D: Continue to evaluate indicator species and parameters for particular stressors (e.g., climate change, competition, functional group/trophic coverage), and expand intertidal monitoring efforts, as feasible.

Activity F: Continue to collaborate with partners to produce reports on the findings of intertidal monitoring efforts.

Partners: ONP, PISCO, Washington departments of Fish & Wildlife, Ecology, and Natural Resources), MARINe, Makah, Quileute, and Hoh tribes, Quinault Indian Nation, IPC, universities.

Resources: staff time, project funds

Strategy ECO3: BENTHIC - Continue to conduct and collaborate in research on the abundance and distribution of benthic organisms, both epifauna and infauna, from subtidal to deeper shelf habitats.

Desired Outcomes: *Improve understanding of health of and changes in benthos.*

Activity A: Continue partnership with Reef Environmental Education Foundation (REEF) for monitoring subtidal sites for fish and macroinvertebrate trends.

Activity B: Continue to collect data on abundance and distribution of benthic organisms, including during conduct of seafloor mapping, coral and sponge surveys, and benthic recovery studies (i.e., from submarine cable installation).

Activity C: Collaborate in and conduct surveys to identify distribution and abundance, characterize ecosystem values, and assess the condition of deep sea biogenic communities, e.g., corals and sponges.

Activity D: Develop a subtidal monitoring plan based on recommendations of Subtidal Workshop hosted by OCNMS in 2002, and implement monitoring as resources become available.

Partners: USFWS, NOAA (NMFS, NOS), Washington state departments of Fish & Wildlife, Ecology, and Natural Resources), ONP, Makah, Quileute, and Hoh tribes, Quinault Indian Nation, IPC, REEF, universities & colleges.

Resources: staff time, project funds

Strategy ECO4: FISH - Describe and understand status of fish species.

Desired Outcomes: *Improve understanding of health of and changes affecting fish species and populations.*

Activity A: Collaborate with tribal, state, federal, and university researchers to assess the distribution, abundance, and productivity of forage fish

populations within OCNMS, including documentation of intertidal areas used for spawning.

Activity B: Collaborate in monitoring larval, juvenile and adult indicator fishes, including identification of any data gaps on those key species.

Activity C: Continue to collect data on abundance and distribution of fish species during conduct of seafloor mapping, coral and sponge surveys and benthic recovery studies (i.e., from submarine cable installation)

Activity D: Continue partnership with Reef Environmental Education Foundation (REEF) for monitoring subtidal sites for fish and macroinvertebrate trends.

Partners: NOAA (NMFS, NOS), WDFW, ONP, PISCO, IPC, Makah, Quileute, and Hoh tribes, Quinault Indian Nation, universities & colleges

Resources: staff time, project funds

Strategy ECO5: MARINE BIRDS - Improve characterization of spatial and temporal distribution, abundance, and forage areas used by marine birds.

Desired Outcomes: *Improve understanding of health of and changes in bird populations.*

Activity A: Continue to conduct and collaborate in monitoring the temporal and spatial abundance and on-water distribution of marine bird species, including identification of foraging areas used throughout the year. Collaborate in assessment of need for expanded efforts to assess migration and non-breeding time periods.

Activity B: Work with WDFW, NMFS, USFWS and other resource partners in standardizing at-sea survey methodology (e.g. distance sampling), area coverage and data management for seabird distribution and abundance information. Conduct a power analysis of existing data to determine the minimum level of effort necessary to meet survey objectives (e.g. every 3-5 years vs. annual).

Activity C: Continue to collaborate in monitoring abundance, productivity, and habitat use at coastal seabird colonies.

Activity D: Continue to participate in Coastal Observation and Seabird Survey Team (COASST) as a regional coordinator of volunteers.

Activity E: Collaborate with tribal, state, and federal agencies to update Catalog of Washington Seabird Breeding Colonies for colonies adjacent to and within OCNMS.

Activity F: Collaborate with tribal, state, and federal agencies to establish a small number of coastal viewing sites to produce colony maps and periodic counts of nesting seabirds at easily-viewed coastal colonies. *(Note: This has value because species such as Pelagic Cormorants are very sensitive to changes in local forage fish populations during the nesting season, providing a relatively easy measure of coastal marine productivity.)*

Partners: USFWS, NOAA (NMFS, NOS), ONP, WDFW, USGS, MMS, universities & colleges.

Resources: staff time, vessel maintenance, project funds

Strategy ECO6: MARINE MAMMALS - Improve characterization of spatial and temporal distribution, abundance, and forage areas used by marine mammal species.

Desired Outcomes: *Improve understanding of health of and changes in marine mammal populations.*

Activity A: Continue to participate in annual sea otter census.

Activity B: Conduct and collaborate in monitoring the temporal and spatial abundance and distribution of marine mammals, including identification of foraging areas used throughout the year. Collaborate in assessment of need for expanded efforts to assess migration and non-breeding time periods.

Activity C: Encourage and collaborate in studies designed to detect the influence of sea otters on the distribution/abundance of prey species and any resulting changes in kelp habitat.

Partners: USFWS, NOAA (NMFS, NOS), ONP, WDFW, USGS, MMS, Makah, Quileute, and Hoh tribes, Quinault Indian Nation, universities.

Resources: staff time, vessel maintenance, project funds

Strategy ECO7: STRANDING NETWORK - Continue participation in the Northwest Marine Mammal Stranding Network

Desired Outcomes: *Enhance response, investigation, and data collection on all beached and stranded marine mammals to assess factors affecting the health of*

local marine mammal populations, and where possible determine whether human interactions contributed to stranding events.

Activity A: Collaborate with other Network participants, share information and resources to promote timely response and investigation of stranding events, to minimize direct interactions between stranded marine mammals, humans and domestic animals, to maximize collection of data, and to improve the detection of signs of human interactions that may have contributed to stranding events.

Activity B: Encourage additional regional partners, such as U.S. Coast Guard and spill response organizations, to assist with marine mammal stranding response and have increased participation in the Network.

Activity C: Assist with collection and transport of biological specimens and tissues for examination.

Activity D: Collaborate with NOAA Fisheries during the ongoing development of the Northwest Regional Annex to a Memorandum of Agreement between NOAA Fisheries and the U.S. Navy for the enhancement of the Marine Mammal Health and Stranding Response Program.

Partners: Marine Mammal Stranding Network; NOAA (NMFS, NOS), USFWS, USGS, ONP, Washington departments of Fish & Wildlife and State Parks & Recreation, Hoh, Makah, and Quileute tribes and Quinault Nation, IPC, Coastal Observation and Seabird Survey Team (COASST), outer coast marine resources committees (Grays Harbor and North Pacific Coast), U.S. Coast Guard, U.S. Navy, DFO, universities, coastal communities

Resources: staff time

Strategy ECO8: INVASIVE SPECIES - Reduce the potential for introduction of invasive species, monitor distributions of known invasive species, and support programs to mitigate impacts of invasive species to natural and cultural resources.

Desired Outcomes: *Prevent, minimize, and mitigate impacts of invasive species*

Activity A: Through OCNMS resource protection and outreach programs, support the work of Washington State Department of Fish and Wildlife and other agencies to prevent introduction of invasive species.

Activity B: Continue to conduct and collaborate in local and regional efforts to monitor for the presence and distribution of invasive species. Engage volunteer monitoring in this effort, where appropriate.

Activity C: Support regional efforts to develop a response protocol for non-native invasive species introductions and to reduce ecological and economic impacts of invasive species

Partners: ONP, USFWS, USGS, NOAA (NMFS, NOS), Washington departments of Fish & Wildlife, Ecology, and Natural Resources, Hoh, Makah, and Quileute tribes and Quinault Nation, IPC, Outer Coast Marine Resources Committee, Washington Invasive Species Council, NGOs, universities and colleges, coastal communities.

Resources: staff time, travel funds

Strategy ECO9: ECOSYSTEM PROCESSES - Collaborate in development and refinement of a comprehensive ecosystem model that identifies indicator species, trophic networks, and physical-biological coupling. Use this ecosystem model to guide data collection and analysis initiatives.

Desired Outcomes: *Promote an ecosystem-based approach to research and management in OCNMS that supports assessment of ecosystem status and adaptive management in response to improved understanding and changing conditions.*

Activity A: Using an established or tested framework for selection of species for evaluation of ecosystem status, consult with co-managers (e.g., state, federal and tribal) to identify a set of indicator species for OCNMS. Consult with tribes and other long-term residents to incorporate traditional ecosystem knowledge, when appropriate, to help select indicator or sentinel species.

Activity B: Conduct and encourage monitoring the abundance, distribution, habitat use and other relevant parameters of selected indicator species from various trophic levels.

Activity C: Collaborate with partners to investigate physical-biological coupling within the Sanctuary. Encourage and collaborate in studies of the interactions of physical (e.g. substrate, relief, temperature, etc.) and chemical (e.g., DO, nutrients) aspects of habitat with the productivity of individual species.

Activity D: Characterize bottom-up versus top-down forcing in trophic webs within the Sanctuary

Activity E: Evaluate research and monitoring conducted and/or encouraged by OCNMS, and recommend changes, if appropriate, to monitoring priorities.

Activity F: Use defined indicators to evaluate ecosystem status and trends, and include this information in the next OCNMS Condition Report.

Activity G: Develop a means to use observed changes in trophic processes in management decisions.

Activity H: Summarize the removal histories and biological metrics (length, weight, or age compositions) for indicator species.

Activity I: Encourage designation of the Sanctuary as a sentinel site for climate change research and monitoring. Continue to seek funds for climate change research. Implement and expand monitoring programs as funds are secured.

Partners: NOAA (NMFS, NOS, PMEL, NWFSC), USFWS, ONP, USGS, Washington departments of Fish & Wildlife, Ecology, and Natural Resources, Olympic Coast Intergovernmental Policy Council, OCNMS Advisory Council, Makah, Quileute and Hoh tribes, Quinault Indian Nation, West Coast Governors' Agreement on Ocean Health, Washington State Ocean Caucus, Puget Sound Partnership, NGOs, Juan de Fuca International Marine Conservation Initiative, universities

Resources: staff time, project funds, equipment funding

Strategy ECO10: CLIMATE SMART SANCTUARIES - Participate in the research and monitoring aspects of the Office of National Marine Sanctuaries Climate Smart Sanctuaries Program

Desired Outcome: *Support national sanctuary program efforts to certify all sanctuaries as "climate smart".*

Activity A: Develop a Climate Story/Site Scenario for OCNMS that synthesizes the best available information on climate change impacts to present a picture of what the sanctuary might look like in 50 to 100 years.

Activity B: OCNMS research staff will work with other OCNMS programs, the AC, the IPC and other partners to develop a Climate Action Plan for OCNMS.

Partners: IPC, AC, NOAA (ONMS, NMFS, PMEL) others ?

Resources: staff time

5. Data Management, Sharing & Reporting

Strategy DAT1: DATA QUALITY CONTROL AND MANAGEMENT

Desired Outcomes: *Ensure high quality of data.*

Activity A: Apply accepted quality control and metadata development procedures during data collection, processing, and management.

Activity B: Encourage use of federal guidelines for data reporting (e.g., via the Biological and Chemical Oceanography Data Management Office) for research in the Sanctuary.

Activity C: When OCNMS has authority, ensure that federally-funded research performed in the Sanctuary conforms to federal guidelines for data reporting (e.g., via the Biological and Chemical Oceanography Data Management Office)

Strategy DAT2: DATA DISTRIBUTION

Desired Outcome: *Improve data dissemination and ensure that data is used to the fullest extent possible.*

Activity A: For data that is collected and managed by OCNMS, ensure timely and wide distribution of data, as processing and analysis allows. Focus on releasing data already collected and new data in a timely manner (i.e. as it is processed).

Activity B: Collaborate with partners who are actively collecting data from the Sanctuary to identify common databases, data fields, etc. to develop standardized database(s) to facilitate data retrieval, when feasible or practical.

Activity C: Assure easy access to data, data derivatives, and data summaries through web-based data portal(s); promote NANOOS as a data resource for OCNMS partners and the public

Activity D: Periodically evaluate the data portals' performance and usability. Modify systems and procedures as appropriate.

Activity E: Identify on the OCNMS web site and notify regional natural resource managers of the data portal to be used for hosting data

Activity F: Provide data to collaborators for their reports and summaries, and assist collaborators with the development of reporting products.

Activity G: Develop mapping products in a format other than GIS that is useful for public use and outreach (e.g., XML)

Activity H: Continue West Coast Observing System collaborative efforts for metadata development and for uploading data to the NOAA Coastal Data Development Center (NCDDC) site for access by the public. *Note: Data portal has been identified by the West Coast Region.*

Strategy DAT3: ADAPTIVE MANAGEMENT - Develop an adaptive management process that periodically evaluates data collection efforts by OCNMS to ensure that data are useful to OCNMS and other marine resource managers and that data needs are clear to staff and collaborative researchers.

Desired Outcome: *Ensure that data being collected is useful for management decisions; ensure that the OCNMS research priorities are periodically reviewed*

Activity A: Work with marine resource managers to ensure that questions most important to marine resource co-managers are being addressed by research plans

Activity B: Continue to periodically hold workshops or other similar forums to engage researchers (academic and otherwise) in discussions of methodologies best suited to meet the needs of OCNMS and other marine resource managers.

Partners: NOAA (NMFS, NOS), USFWS, ONP, USGS, Washington state agencies, IPC, Makah, Quileute, and Hoh tribes, Quinault Indian Nation, NANOOS, USFWS, Washington State Seafloor Mapping Consortium, OCNMS Advisory Council

Resources: staff time, funding for workshops

Strategy DAT4: CONDITION REPORT - Publish a Condition Report on the Sanctuary prior to the next management plan review process.

Desired Outcome: *Ensure that the public is aware of the status of resources in the Sanctuary and the Sanctuary's overall ecological health.*

Partners: NOAA (NMFS, NOS), USFWS, USGS, ONP, Washington departments of Fish & Wildlife, Ecology, and Natural Resources, IPC, Makah, Quileute and Hoh tribes, Quinault Indian Nation, AC

Resources: staff time, printing expenses

Notes on Document Development

This final document, completed on 12 January 2010, is the product of discussions, writing and revisions initiated in October 2009 by the CRAM working group.

The first draft of strategies and activities was based upon the highest priority data needs identified by the working group through its data needs spreadsheet exercise. In revising the first draft, working group members were free to add in, expand or limit the scope/scale of the draft strategies and activities. OCNMS staff worked to compile and reconcile the variety of comments received from the working group to develop a second draft, which had extensive edits that were too complicated to track and had references to the CRAM data needs spreadsheet removed for ease of reading.

The second draft document was reviewed on a 9Nov09 conference call attended by Joe Schumacker (Quinault Indian Nation), Rob Jones (NWIFC), Jennifer Hennessey (Wash. Dept. Ecology), Jason Cope (NOAA Fisheries), Jody Kennedy (Surfrider), Joe Gilbertson (Hoh Tribe), Ed Bowen (citizen), and OCNMS staff (Ed Bowlby, Nancy Wright, Mary Sue Brancato, George Galasso, Lauren Bennett, and Liam Antrim). This third draft document is based on edits and recommendations shared on this conference call.

The third draft was distributed on 18Nov09 (and again on 29Nov09) and discussed on a 30Nov09 conference call attended by Terrie Klinger (UW), Deanna Lynch (USFWS), Rob Jones (NWIFC), Jennifer Hennessey (WDOE), Joe Gilbertson (Hoh Tribe), Sam Johnson (USGS), Joe Schumacker (Quinault Indian Nation), Jason Cope (NOAA Fisheries). Working group co-chairs, Terrie Klinger and Joe Schumacker, agreed to work with OCNMS staff to refine the document based on recommendations provided on this call.

A fourth draft document was developed to incorporate recommendations from the 30Nov09 conference call and ideas shared by the co-chairs on a 14Dec09 call. This document was distributed on 21 December 2009 with a request that comments be provided by 8 January 2010. Minor edits were suggested and incorporated into this final set of recommendations to the Advisory Council from the CRAM working group.

Key Notes from Working Group Discussions

Human Use: the working group recognized that humans are part of the natural ecosystem and therefore human use parameters are important to inform ecosystem-based management. Yet, human use topics were not included with the highest ranked topics on the spreadsheet because the working group felt these

topics would be more appropriately addressed by experts participating in OCNMS's socioeconomic workshop.

Intertidal Habitat Mapping: the distribution of **intertidal** habitats is considered to be well characterized, and further mapping work is not likely required except to evaluate change over time. Nevertheless, assessment of condition, species distribution and abundance, and habitat-species associations, etc. may require study.

Maximize Opportunity for Habitat Mapping: OCNMS should continue to maximize opportunities presented, such as ship time and equipment that allows for deep water data collection, or launch support that allows for nearshore mapping. Mapping efforts are dependent on funding and equipment availability.

Prioritization of Efforts: given the diversity of species and different measures of significance or importance (i.e., commercially and recreationally exploited, trophic linkages, habitat forming, charismatic nature, threatened or endangered status, vulnerability to human disturbance or climate change impacts, etc.), prioritization of research/monitoring/assessment efforts or identification of key species to inform management decisions is an essential step.