B. Conduct Collaborative Research, Assessments and Monitoring to Inform Ecosystem-Based Management

B1. Habitat Mapping and Classification Action Plan

B2. Physical and Chemical Oceanography Action Plan

B3. Populations, Communities and Ecosystems Action Plan

B4. Data Management, Sharing and Reporting Action Plan

Introduction

The OCNMS 2008 Condition Report, along with comments received during MPR scoping, emphasized the importance of data to inform management decisions and also identified significant data gaps related to our understanding of natural resources and ecosystem processes within the sanctuary. The intent of these four action plans is to outline a comprehensive research and monitoring program for OCNMS to undertake in partnership with other entities.

To maximize effectiveness of OCNMS' efforts, these action plans place a strong emphasis on maintaining and further developing collaborative scientific research and monitoring programs that address diverse aspects of habitat characterization, living resources monitoring and oceanographic and water quality monitoring. Additionally, a strong emphasis is placed on the need to improve data management, sharing and reporting.

The action plans presented here are ambitious, and OCNMS' success in implementing them will in large part depend upon receipt of substantial grant funds (by OCNMS or its research partners). Activities that cannot be funded with the OCNMS budget alone are purposely included in the action plans because it is impossible to know how grant funding opportunities will change from year to year and what unforeseen funding sources might become available. OCNMS also hopes, in publishing a broad and comprehensive framework for research in the sanctuary, other

agencies, organizations and academic institutions might be encouraged to develop and fund research projects that OCNMS is unable to support.

B1. Habitat Mapping and Classification Action Plan

Desired Outcome: Improved understanding of OCNMS habitats.

Links to Goals:
Goal C - Investigate and enhance the understanding of ecosystem processes, and inform ecosystem-based management efforts, through scientific research, monitoring, and characterization.

Background:
The mapping and classification of habitats and characterization of habitat-species associations provide critical information to support management, research, monitoring, and education within OCNMS, as well as within larger, regional ocean management regimes. Thus far, only 25% of the OCNMS seafloor has been adequately mapped, and only 19% has been characterized to habitat type. There is a clear need to complete seafloor surveys and characterize and identify species-habitat associations in order to inform management decisions.

Habitat mapping and characterization are high priorities for OCNMS, especially for recently discovered deep sea biogenic habitats that may be sensitive to anthropogenic disturbance. Mandates and needs for habitat mapping and characterization are highlighted in the NMSA, the West Coast Governor's Ocean Action Plan, the Washington State Seafloor Mapping Workshop, and for groundfish fishery management plans (which involve the Pacific Fishery Management Council, NMFS, Washington Department of Fish and Wildlife, Northwest Indian Fisheries Commission and Olympic Coast Intergovernmental Policy Council).

Strategy MAP1: REGIONAL COORDINATION
Develop and sustain partnerships to maximize and leverage seafloor and habitat mapping resources and to promote the use of established mapping standards.

Activity A: Participate in regional forums to advance 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.

Activity C: Pursue opportunities to acquire and share existing seafloor and marine habitat data from federal, state, and local partners.

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

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

- Collect high quality, high-resolution sonar data in areas where no seafloor data exists
- Map contiguous areas
- Map hard substrate areas and other areas of probable or known important biogenic habitat

- Map habitats with known or potential use by species of concern
- Map coastal areas less than 10 m water depth (i.e., areas most likely to be affected by oil spills)
- Utilize opportunities to collect partial sonar data types (e.g., sidescan only);
- Re-map areas where inadequate seafloor data exists
- Utilize opportunities to leverage ship time, equipment, and mobilization expenses

Activity B: Verify/ground truth sonar data through the collection and analysis of video, physical samples, or other methodologies.

Strategy MAP3: HABITAT CLASSIFICATION
Integrate observations from sonar data and ground truthing to classify habitats and generate derivative maps and Geographic Information System (GIS) products.

Activity A: Apply the classification scheme of Greene et al. (1999) and link this classification scheme with NOAA's Coastal and Marine Ecological Classification Structure.

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: Integrate habitat characterization information (as available) with biological, chemical, and ocean processes information to further understanding of habitat use.

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

Activity A: Develop digital mapping products that include 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, as well as other formats useful for public use and outreach.

Activity D: Make mapping data available for integration and use in 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
- Siting of offshore infrastructure (e.g., aquaculture, renewable energy facilities)

Links to Other Action Plans: Collaborative and Coordinated Management**,** Marine Debris**,** Regional Ocean Planning**,** Habitat Protection

Key Partners: NOAA (National Ocean Service and NMFS), U.S. Geological Service, USFWS, Washington Departments of Fish and Wildlife, Ecology, and Natural Resources, Makah, Quileute, and Hoh tribes, Quinault Indian Nation, Olympic Coast Intergovernmental Policy Council, Northwest Indian Fisheries Commission, Washington State Seafloor Mapping Consortium, West Coast Governors' Agreement on Ocean Health Seafloor Mapping Action Coordination Team, Washington Coast Sustainable Salmon Partnership, other NGOs, universities, international entities, U.S. Navy

B2. Physical and Chemical Oceanography Action Plan

Desired Outcome: Improved understanding of overall water quality in the sanctuary

Links to Goals:
Goal C - Investigate and enhance the understanding of ecosystem processes, and inform ecosystem-based management efforts, through scientific research, monitoring, and characterization.

Background:
Near shore oceanographic conditions within OCNMS are poorly characterized with respect to temporal and spatial dynamics and ecological processes associated with changing conditions. Coastal ocean conditions off the Olympic Coast of Washington have a high degree of variability, which complicates a thorough characterization of regional oceanographic processes and limits predictive abilities. This variability can span time scales from diel (day vs. night) through decadal (e.g., Pacific Decadal or El Niño Southern Oscillations) and spatial scales of micro- (1 to 10 km) and meso- (10's to 100's of km). Such variability can have profound implications for the sanctuary's living resources. For example, strong El Niño years bring increased sea surface temperature and decreased primary productivity within the sanctuary.

Physical and chemical oceanographic data are useful to federal, tribal, university and state-sponsored studies predicting harmful algal blooms, thereby helping assess potential threats to human health, shellfisheries, seabirds and marine mammals. These data are also used in the study of intertidal invertebrate and algae dynamics, in the ground truthing remote sensing data, in assisting with oil spill response and in improving our understanding of hypoxic conditions measured in near shore waters of Washington and Oregon. Additionally, expanded physical and chemical oceanographic monitoring programs are needed to address emerging concerns about ocean acidification.

OCNMS currently deploys (seasonally) anywhere from 10 to 13 monitoring buoys in the sanctuary's near shore environment to monitor water temperature, salinity, dissolved oxygen, currents and indicators of primary productivity. Additionally, OCNMS partners with and supports other agencies, organizations and academic institutions' efforts to conduct oceanographic monitoring in the sanctuary. OCNMS has supported University of Washington and Northwest Association of Networked Ocean Observing Systems (NANOOS) efforts to build and deploy a year-round, real-time oceanographic monitoring buoy and glider system off the coast of La Push and has frequently encouraged and supported efforts of researchers to conduct ocean acidification, harmful algal bloom, and oceanographic conditions research projects in the sanctuary. OCNMS also looks for opportunities to incorporate oceanographic monitoring, where appropriate and feasible, into sanctuary permit requirements.

However, much more oceanographic information is needed in order to 1) understand the effects of a changing climate on sanctuary ecosystems and the large-scale ocean processes affecting these ecosystems and 2) make informed sanctuary management decisions in response to a changing climate. Moreover, during the MPR process it became clear obtaining this oceanographic information is a priority for all statewide and regional ocean management entities and ocean researchers. The sanctuary is in a unique position to serve as both a laboratory and

classroom for conducting and sharing, respectively, oceanographic research. The aim of this action plan is to identify strategies OCNMS can undertake in order to foster regional oceanographic research efforts and build a stronger base of knowledge related oceanographic processes in the sanctuary.

Strategy OCEO1: 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 (including acoustic monitoring), parameters, locations, year-round data collection, and real-time data transmission.

Activity A: Monitor coastal waters using seasonally-deployed (spring through fall), instrumented moorings.

- Continue use of established seasonal mooring locations.
- Collect data on temperature, salinity, dissolved oxygen, currents, chlorophyll.
- Calibrate instrumentation annually, or as necessary.
- Process data within one year and make available via a central, publically accessible web site.

Activity B: Consult with partners to determine research and resource management questions that can be addressed with existing or expanded water quality monitoring efforts.

Activity C: Secure funding for additions and improvements to the OCNMS coastal water quality monitoring program. Program improvements could include:

- Additional sensors or parameters
- Expanded spatial coverage
- Expanded seasonal coverage, potentially to year-round data collection
- Real-time data transmission

Activity D: Support efforts to expand regional oceanographic monitoring programs (e.g., NANOOS, NDBC, UW), share data, model oceanographic processes, and improve public accessibility of this information.

- Support the NANOOS coastal sensor array (2 buoys, 1 glider) at La Push.
- Participate as a partner in NANOOS meetings and conference calls.
- Promote NANOOS as a data resource for OCNMS partners and the public.
- Provide a link to NANOOS on the OCNMS website.

Strategy OCEO2: HYPOXIA
Monitor dissolved oxygen levels and ecological impacts of hypoxic conditions (low oxygen concentration) in coastal waters.

Activity A: Monitor, assess, and understand the spatial and temporal distribution of hypoxic conditions and their impacts on living organisms.

Activity B: Expand monitoring to include additional locations, year-round data collection, and/or real-time data transmission, such as will be available with the La Push NANOOS buoy.

Activity C: Promote collaborative efforts with the outer coast trustees and fishermen to collect field observations and conduct additional monitoring in response to identified hypoxic conditions.

Strategy OCEO3: OCEAN ACIDIFICATION
Investigate changing ocean chemistry, acoustics and other physio-chemical changes and impacts to living organisms associated with increasing carbon dioxide levels in the atmosphere.

Activity A: Collaborate in regional efforts to monitor and model carbonate system variables to improve understanding of the extent and severity of ocean acidification.

Activity B: Collaborate in research on the effects of ocean acidification on calcifying and non-calcifying organisms, including deep sea corals, plankton, intertidal invertebrates, and on trophic relationships between these organisms.

Strategy OCEO4: HARMFUL ALGAL BLOOMS
Collaborate in regional efforts to research and monitor harmful algal blooms (HABs).

Activity A: Work within the Olympic Region Harmful Algal Blooms (ORHAB) partnership and support efforts to monitor, detect, understand and predict HABs in the sanctuary region.

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

Links to other Action Plans: Climate Change**,** Populations, Communities and Ecosystems**,** Collaborative and Coordinated Sanctuary Management, Water Quality Protection

Key Partners: ORHAB, ECOHAB-PNW, NOAA (NOS, NWFSC, PMEL, NDBC, NCCOS), NANOOS, NASA, Makah, Quileute and Hoh Tribes, Quinault Indian Nation, Washington Departments of Ecology, Health, Fish and Wildlife, and Natural Resources, U.S. EPA, IPC, West Coast Governors' Agreement on Ocean Health Research Action Coordination Team, University of Washington, Oregon State University/PISCO, Olympic National Park, other universities, international entities, and NGOs

B3. Populations, Communities and Ecosystems Action Plan

Desired Outcomes: 1) Improved understanding of health of and changes in sanctuary ecosystems; and 2) a more adaptive, ecosystem-based approach to research and management in the sanctuary.

Links to Goals:
Goal C - Investigate and enhance the understanding of ecosystem processes, and inform ecosystem-based management efforts, through scientific research, monitoring, and characterization.

Background:
It is of significant interest to OCNMS, its Advisory Council and the IPC that data collected in the sanctuary be used to support adaptive and ecosystem-based management frameworks. Utilizing an ecosystem-based approach to ocean management is also a priority for NMFS, the Coastal Treaty Tribes and the state of Washington. For OCNMS and others to implement ecosystem-based management in the sanctuary, information about biological and physical resources in the sanctuary must be collected across multiple scales.

This action plan focuses primarily on biological resources and understanding the interactions between organisms and the physical environment. The action plan details research and monitoring priorities on an expanding scale including individual taxa, functional groups, populations, communities, and ecosystems. The goal of this action plan is to develop the body of scientific knowledge about the sanctuary in such a way ecosystem-based management decisions can be more effectively developed and substantiated.

Strategy ECO1: WATER COLUMN COMMUNITIES
Conduct and collaborate in investigations of water column communities.

Activity A: Monitor and encourage others to monitor pelagic larval phases of species of commercial and ecological significance (e.g., Dungeness crab, razor clams, mussels, euphausiids, copepods).

- Improve characterization of locations in water column, seasonal abundance and distribution of pelagic life phases of key marine species.
- Monitor pelagic zooplankton and forage fish abundance during on-water seabird and marine mammal surveys.
- Extend to year-round monitoring, as feasible.

Strategy ECO2: INTERTIDAL
Conduct and collaborate in research on the distribution and abundance of intertidal organisms.

Activity A: Coordinate with Olympic National Park (ONP) to evaluate the utility of continued monitoring of sand and rocky intertidal sites on Makah and Quinault reservations following ONP protocols.

Activity B: Monitor rocky intertidal sites on Makah and Quinault reservations following the Multi-Agency Rocky Intertidal Network (MARINe) protocols.

- Incorporate data into the MARINe database.
- Report the findings of intertidal monitoring efforts on an annual basis.

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

Strategy ECO3: SUBTIDAL
Characterize the habitats and biota of the nearshore subtidal zone.

Activity A: Develop a Subtidal Monitoring Plan based on recommendations of Subtidal Workshop hosted by OCNMS in 2002.

Activity B: Based on the Subtidal Monitoring Plan, implement subtidal habitat characterization and monitoring projects.

Activity C: As indicator species and parameters for particular stressors (e.g., climate change, competition, functional group/trophic coverage) are identified, establish subtidal monitoring efforts.

Strategy ECO4: BENTHIC
Investigate the abundance and distribution of benthic organisms, both epifauna and infauna, from subtidal to deeper shelf habitats.

Activity A: Collect data on abundance and distribution of benthic organisms, including during conduct of seafloor mapping, coral and sponge surveys, and benthic recovery studies.

Activity B: Analyze and interpret data collected through video monitoring and other techniques and maintain a database for benthic organism distribution, abundance, and other quantifiable measures.

Activity C: 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: As required in the Settlement Agreement between OCNMS and operators of the PC-1 submarine telecommunications cables, conduct benthic habitat monitoring on the PC-1 cable routes to evaluate recovery of habitats following remediation of the cables conducted in 2005.

Strategy ECO5: FISH
Improve characterization of spatial and temporal distribution, abundance, and habitat use of fish.

Activity A: Collaborate with tribal, state, federal, and university researchers to assess the distribution, abundance, and productivity of forage fish populations, including documentation of intertidal areas used for spawning.

Activity B: Solicit the AC's assistance, through establishment of an AC working group, in developing recommendations for pilot project(s) to investigate the abundance and distribution of fish.

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

Strategy ECO6: MARINE BIRDS
Improve characterization of spatial and temporal distribution, abundance, forage behavior and areas used by marine birds.

Activity A: Work with partners to evaluate past efforts for at-sea surveys and make recommendations for future surveys for temporal and spatial abundance and on-water distribution of marine birds.

- Key partners include WDFW, NMFS, UW, and USFWS.
- Evaluation should include survey methodology (e.g., distance sampling), area coverage, data management and analysis, and reporting.
- Data gaps and information needs should be identified. Potential information needs include:
  - Forage areas used throughout the year
  - Migration periods
  - Non-breeding seasons
  - Parallel monitoring of pelagic zooplankton and forage fish abundance during on-water seabird surveys
- 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 B: Conduct at-sea monitoring of marine bird species following recommendations developed through evaluation of past survey efforts.

Activity C: Provide in-field staff assistance to USFWS 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 in update of the Catalog of Washington Seabird Breeding Colonies for colonies adjacent to and within OCNMS.

Activity F: Work with partners to establish a small number of coastal viewing sites to produce colony maps and periodic counts of nesting seabirds at easily-viewed coastal colonies.

Strategy ECO7: MARINE MAMMALS
Improve characterization of spatial and temporal distribution, abundance, forage behavior and areas for marine mammals.

Activity A: Provide in-field staff assistance to support the state of Washington's annual sea otter census.

Activity B: 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.

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

Activity D: Monitor underwater acoustic environment and, as feasible, responses of marine mammals to acoustic disturbance.

Strategy ECO8: STRANDING NETWORKS
Participate in the regional marine mammal incident response networks.

Activity A: Collaborate with other Northwest Marine Mammal Stranding Network (http://www.nwr.noaa.gov/Marine-Mammals/Stranding-Information.cfm) participants to share information and resources. Goals of the Network are to:

- Promote timely response and investigation of stranding events
- Minimize direct interactions between stranded marine mammals, humans and domestic animals
- Maximize collection of biological specimens for examination and other data
- Improve the detection of signs of human interactions that may have contributed to stranding events

Activity B: Participate in the regional sea otter stranding network.

Strategy ECO9: ECOSYSTEM PROCESSES
Collaborate in ongoing efforts by the NOAA Northwest Fisheries Science Center and others to develop and apply a comprehensive ecosystem model that identifies indicator species, trophic networks, and physical-biological coupling.

Activity A: Evaluate indicator species identified by and currently used by OCNMS and regional co-managers (i.e., routine monitoring, 2008 OCNMS Condition Report).

- Base this evaluation on an established or tested framework for selection of indicator species for ecosystem status assessment.
- Consult with co-managers and ecosystem model experts.
- Consider trophic networks and physical-biological coupling.
- Incorporate traditional ecosystem knowledge, as appropriate.
- Develop a formal report to summarize this evaluation.
- Include recommendations for a revised set of indicator or sentinel species for which monitoring can be conducted or encouraged by OCNMS.

Activity B: Based on the revised set of indicator species (developed in Activity A), evaluate OCNMS' research and monitoring priorities, and recommend changes, if appropriate.

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

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

Links to other Action Plans: Habitat Mapping and Classification, Physical and Chemical Oceanography, Data Management, Sharing and Reporting, Collaborative and Coordinated Sanctuary Management, Habitat Protection

Key Partners: NOAA (NMFS, NOS, PMEL, NWFSC), USFWS, ONP, USGS, USCG, MMS, U.S. Navy, OSU/PISCO, DFO, MARINe Washington Departments of Fish and Wildlife, Ecology, and Natural Resources, Olympic Coast Intergovernmental Policy Council, OCNMS Advisory Council, Makah, Quileute and Hoh tribes, Quinault Indian Nation, Northwest Marine Mammal Stranding Network, West Coast Governors' Agreement on Ocean Health Ecosystem Indicators Action Coordination Team, Washington State Ocean Caucus, Puget Sound Partnership, REEF, COASST, Grays Harbor and North Pacific Coast marine resources committees, NGOs, Juan de Fuca International Marine Conservation Initiative, universities and colleges, coastal communities, international entities

B4. Data Management, Sharing and Reporting Action Plan

Desired Outcome: Improved awareness of the status of OCNMS resources and the sanctuary's overall ecological health.

Links to Goals:
Goal C - Investigate and enhance the understanding of ecosystem processes, and inform ecosystem-based management efforts, through scientific research, monitoring, and characterization.

Background:
The importance of analyzing and sharing data collected by OCNMS in a timely manner has been emphasized throughout the MPR process. Because data management, sharing and reporting is a topic relevant to all research, assessment and monitoring strategies and activities, it was decided to consolidate a concise set of data management strategies into one action plan.

Processing, analyzing and reporting OCNMS data collection efforts in a timely manner, has been a real challenge for OCNMS staff in recent years, particularly given decreasing resources to support this work. Often times, OCNMS receives funding to conduct research projects, but not the funding to support data processing and analysis after the fact. OCNMS' ability to manage, share and report the data it collects directly affects its ability to support an ecosystem-based management framework and the ability of OCNMS partners to make informed management decisions. Thus, the goal of this action plan is to guide OCNMS in improving its data management, sharing and reporting efforts for the benefit of OCNMS and all its partners.

Strategy DAT1: DATA QUALITY CONTROL AND MANAGEMENT
Develop and promote data management procedures.

Activity A: Develop a data management plan outlining OCNMS' entire data management process. The data management plan should define quality control, data documentation, data collection, data processing, and data management (metadata) methods.

Activity B: Encourage, and when OCNMS has authority ensure, the use of federal guidelines for data reporting (e.g., as promoted by the Biological and Chemical Oceanography Data Management Office) for research in the sanctuary.

Strategy DAT2: DATA DISTRIBUTION
Provide easy and timely access to data collected or managed by OCNMS.

Activity A: For data collected and managed by OCNMS, ensure timely and wide distribution of data, as data management procedures allow.

- Focus on releasing data collected in the past.
- Make new data available in a timely manner (i.e., as it is processed).
- Provide annual summaries of OCNMS data products.

Activity B: Encourage access to data, data derivatives, and data summaries through widely-used and appropriate web-based data portals.

- Collaborate with partners who collect data in the sanctuary to identify common databases, data fields, etc. and to develop standardized databases to facilitate data retrieval, when feasible or practical
- Participate in West Coast Observing System efforts related to metadata development
- Upload data to the NOAA Coastal Data Development Center (NCDDC) web site for public access

Activity C: Provide links on the OCNMS web site to data portals that host OCNMS data and notify regional natural resource managers of these portals.

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

Strategy DAT3: ADAPTIVE MANAGEMENT
Periodically evaluate 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 other researchers.

Activity A: Solicit the AC's and IPC's assistance in developing recommendations for periodically assessing and updating OCNMS research activities and priorities based upon evolving scientific information and management needs, through the establishment of an AC working group or other available means.

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

Strategy DAT4: CONDITION REPORT
Publish a Condition Report on the sanctuary at a regular frequency, at a minimum prior to the next management plan review process.

Links to other Action Plans: Collaborative and Coordinated Sanctuary Management**,** Habitat Mapping and Classification, Physical and Chemical Oceanography, Populations, Communities and Ecosystems, Climate Change, Regional Ocean Planning

Key Partners: NOAA (NMFS, NOS), USFWS, USGS, ONP, Washington Departments of Fish and Wildlife, Ecology, and Natural Resources, IPC, Makah, Quileute and Hoh tribes, Quinault Indian Nation, NANOOS, USFWS, Washington State Seafloor Mapping Consortium, OCNMS Advisory Council, NGOs, universities and colleges