Long-Term Science Plan for the Olympic Coast National Marine Sanctuary

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Introduction

The Olympic Coast National Marine Sanctuary (OCNMS or Sanctuary) convened a panel session at the Puget Sound Research Conference to highlight the overall Sanctuary program and to receive and discuss comments on its draft long-term Science Plan. The panel sought input from the conference participants in identifying ways it could support and/or leverage existing programs, and it solicited new research directions. The panel consisted of Ed Bowlby, OCNMS Research Coordinator and Session Chair, Carol Bernthal, Sanctuary Superintendent, George Galasso, OCNMS Assistant Manager, Mary Sue Brancato, OCNMS Resource Protection Specialist, Liam Antrim, OCNMS Resource Protection Specialist, and Dr. Carl Schoch, Research Coordinator for Kachemak Bay National Estuarine Research Reserve, Research Representative on the Sanctuary Advisory Council (SAC) and chair of the SAC's Research Advisory Committee (RAC).

The nationwide Sanctuary System is under the auspices of the National Oceanic and Atmospheric Administration (NOAA) with an overriding objective to provide a comprehensive ecosystem-wide approach to natural and cultural resource management (Basta and Gittings 2000).

Ed Bowlby—Session Objectives and Sanctuary Research Program

Ed Bowlby, Session chair, introduced the other panel members and provided the following outline for topics the panel members would cover in the session:

Ed Bowlby—Session objectives and overview of Sanctuary research program
Carol Bernthal—Summary of the Sanctuary history and objectives
Mary Sue Brancato—Water quality and environmental stressors
Liam Antrim—Marine Protected Areas and Sanctuary zoning process
Carl Schoch—Advisory group roles and overview of the Science Plan
George Galasso—Infrastructure and logistical support for research projects.

Time for audience questions and dialogue would be provided both during the presentations and at the conclusion of the session. Copies of the draft Science Plan with comment forms and other Sanctuary informational material were available to all session attendees. The OCNMS website address, which has an electronic version of the draft Science Plan and outlines ongoing Sanctuary activities, was announced as http://www.ocnms.nos.noaa.gov/ Ed Bowlby also recognized other Sanctuary staff in the audience as Barbara Blackie, Research Specialist, Rick Fletcher, Operations Manager, and Andy Palmer, SAC Coordinator and R/V *Tatoosh* skipper. Three Sanctuary Advisory Council members were also recognized in attendance: Marcy Golde, Michelle McConnell, and Richard Wojt.

The science program is intended to focus and support scientific investigations on improving understanding of the Sanctuary's marine ecosystems and historical and cultural resources. The Science Plan is a framework designed for long-term planning of objective, science-based strategies and implementing effective management programs. The Plan, with feedback from other resource agencies and advisory bodies, will guide the Sanctuary staff in the formation of annual Sanctuary Research Plans (SRP) that rank and implement specific research projects. The Sanctuary is seeking written comments and feedback on the draft from members of the scientific community.

When the Sanctuary was dedicated in 1994, there were existing programs from various state and federal agencies, university groups, and tribal programs. Since its inception, the Sanctuary has tried to compliment/supplement those efforts to avoid duplication. OCNMS has helped coordinate research projects whenever possible.

The OCNMS research program is promoting scientific knowledge and more informed resource management decisions by:

1. Compiling existing data.
2. Promoting information exchanges,
3. Addressing management concerns for resource issues.
4. Coordinating data collection.
5. Initiating long-term monitoring programs to assess environmental changes due to natural and human processes.
6. Identifying environmental influences from both human activities and natural phenomena.
7. Encouraging research on biodiversity.
8. Incorporating research results into interpretive and education programs.
9. Evaluating the effectiveness and efficiency of the research program.

Long-term monitoring programs are important for detecting trends over time in all habitats, from the intertidal to the deep benthic environment. Coordination of efforts by OCNMS has helped complement some of the existing monitoring programs and has helped identify where new programs needed to be established. Although the Sanctuary is committed to assisting in conservation of threatened and endangered species, single species management is not the only focus. The Sanctuary mandate expressly mentions that biodiversity is a priority and that the entire ecosystem needs to be understood. Identifying environmental stressors is a large task and the Sanctuary attempted to address this early in its development with the assistance of working group members. OCNMS has an excellent education program which strives to make information from research available and accessible. One way such information is accessed is through the website.

Carol Bernthal—Sanctuary History and Objectives

One challenge to marine conservation is that there is often a lack of an identity of a place and the feeling of connection with it. The Olympic Coast National Marine Sanctuary is fortunate in that it is a place-based program. It is one of 13 National Marine Sanctuaries around the country that come in a variety of sizes shapes. OCNMS is located off the coast of Washington with an area of 3300 square miles that extends from Cape Flattery to Copalis. The Sanctuary includes a variety of habitat types from the shoreline all the way out to 25 to 50 miles off shore. It adjoins a number of protected areas; including the coastal strip of Olympic National Park (ONP), which is designated as a wilderness. Three U.S. Fish and Wildlife Service (USFWS) Refuges exist off the coast, and Native American lands of four different local tribes. The tribes have been on the coast for thousands of years whereas the Sanctuary is the newcomer to the area, so there is a strong interest in working very closely with them.

The Sanctuary was dedicated in 1994 after about 8 years of evaluation regarding what would be the boundaries. A variety of options were originally considered, some that included going into the Strait of Juan de Fuca, or encompassing more or less area, or going further north or south. The current boundary includes a variety of habitat types: nearshore areas, the continental shelf, and the heads of three deep submarine canyons. Ultimately the Sanctuary was designated because of its outstanding nearshore kelp habitats, its highly productive continental shelf, and those unique canyon habitats.

The Sanctuary was created and charged with complimenting the existing protections, focusing on:

1. Gaining an understanding of what the marine resources are.
2. Looking at what type of additional programs were necessary to protect those resources (and not replicating what already exists).
3. Taking that information and communicating it to the public at large, including the local communities.

One of the interesting things about the Marine Sanctuary program as opposed to other programs is that it is charged specifically with protecting the ecosystem, with a strong emphasis on maintaining biodiversity.

In addition to the natural resources of the coast, the OCNMS program has the unique perspective of also being charged with protecting cultural and historic resources. This includes the Sanctuary's rich history of shipwrecks that have occurred off the coast. It is a fascinating history of the development of the marine trades along the coast. It also includes the very vibrant cultural history of the four tribes that have lived on the coast for thousands of years. Tatoosh Island, for example, was a very important cultural site for the Makah Tribe, and it is also a very important cultural site because it contains one of the first lighthouses on the coast. There is an overlapping of Native American tribes and more modern tribes that create an interesting historical blend.

Ultimately the Sanctuary strives to infuse a marine stewardship ethic that will extend beyond the boundaries of the Sanctuary.

Mary Sue Brancato—Water Quality and Environmental Stressors

Although the Olympic Coast is considered a relatively pristine coastline, there are existing stressors that the Sanctuary must consider. In the Science Plan, potential stressors are divided into six very broad categories. Below is a list of these categories with potential examples of each:

1. **Non-point pollution sources**—Watershed impacts from any of the four major rivers entering it, the Quillayute, the Hoh the Queets and the Quinault. One of the major non-point source stressors to the Sanctuary is considered to be the sedimentation from these rivers. Discharges and road runoff are also considered non-point source pollution stressors.

2. **Point source pollution**—Sewage treatment facilities are one example.

3. **Commercial activities that are not prohibited**—Commercial fishing, an allowed activity, is a potential stressor in the Sanctuary as well as shipping. The laying of fiber optic cables through the Sanctuary is a third example.

4. **Recreational stressors**—Harassment of marine mammals from over flights, kayakers, or boaters are potential stressors., Discharge from recreational boats is another, as well as trampling or harvest effects from people using the coast.

5. **Natural perturbations**—This can include effects from El Niño Southern Oscillation, harmful algal blooms, freezing temperatures, or global climate change.

6. **Anthropogenic stressors**—Perhaps the greatest threat to the Sanctuary is the threat of oil spills occurring on the outer coast. Aquatic nuisance species are also classified under potential anthropogenic introductions.

Audience Question

Could some of the Tenyo Maru funds be used towards studying the effect of sediment on kelp? Has any restoration of nearshore kelp environments been started?

Mary Sue Brancato responded that no restoration has been started to date. There are some proposed projects for habitat and watershed protection combined, for example protecting marbled murrelet nesting areas would also potentially decrease sediment loads in the river systems. These proposals are on line, but have not started yet.

Liam Antrim—Marine Protected Areas and Zoning

Liam Antrim's main role at the Sanctuary has been to coordinate the Marine Conservation Working Group (MCWG or Group). The Group was formed in April of 2000. It has representation from state and federal governments, the tribes, commercial fishing interests, and the environmental and scientific communities.

These organizations were known to have an interest in jurisdiction over the Sanctuary area. The Group was charged with the task of developing a set of recommendations for zoning of the intertidal area of the Sanctuary. The MCWG is currently a little over half way toward the goal of coming up with a set of recommendations. Their recommendations will be presented to the Sanctuary Superintendent and to the SAC.

Several steps have been identified in the process leading to the development of informed recommendations. The first step was information gathering. It was important for the group to gain a better understanding of the ecology of the outer coast and this goal was accomplished through a series of presentations on such topics as oceanography and biological monitoring. The process of learning about the system helped the group, some of whom did not have direct experience working on the coast itself, gain a better understanding of why the Sanctuary is going through this process. A vision statement was developed once understanding was achieved.

The next step of the process was to figure out exactly what the outcomes were going to be. This has been defined as the development of selection criteria and the definitions of zone classes.

The final and most challenging step is still to come and will involve looking critically at the specific sites. Where is the Group going to apply certain recommendations? Is the status quo acceptable or should there be changes in activities that will be allowed in various places?

Throughout the process a useful tool has been the Geographic Information System (GIS) nearshore habitat database that Carl Schoch developed. The database divides the shore into 145 shore-type segments based on beach geomorphology. Those segments are further subdivided, with the Sanctuary coastline having approximately 2,000 partitions based on hydrodynamic and substrate homogeneity.

The Sanctuary uses a very detailed base map to layer on other biological information as well as cultural and historical resource use areas and levels. The 145 segments will be evaluated individually and a zone class will be applied to each.

A zone is a discreet area where special guidelines could be applied. But it is important to remember that a zone is also contained within a larger area, which may have a different set of guidelines. Zoning provides integrated management of a large and complex area. It adds flexibility to the management of an area. It is useful for management of multiple use areas and the Sanctuary is a marine protected area where multiple-use is encouraged and planned for.

No-take marine reserves are being considered as an option for some areas along the coastline, but a variety of other zoning options also exist and are considered, such as seasonal restrictions of certain activities or potentially limiting access.

Draft goals for the Marine Conservation Working Group include:

1. Address biodiversity by protecting a variety of habitats and species throughout the intertidal.
2. Consider special groups of organisms or unique natural features.
3. Consider cultural and historic resources.
4. Consider areas for education.
5. Foster public stewardship, so that the public has better understanding of the value of habitat management and conservation practices.
6. Provide reference sites where long-term studies can be applied to address ecosystem changes and also provide baseline data for damage assessment studies if needed in the future.
7. Ensure sustainable populations of harvested species in a way that minimizes economic disruption that occurs in the area.
8. Provide for varied levels of human experience.
9. Evaluate effectiveness of management options.

The group will convene several more monthly meetings before coming up with a set of recommendations. It is hoped that this effort takes a precautionary approach to managing the area and that establishing some zoning will provide for a highly productive and biodiverse wilderness area.

Audience Comment
Could the Sanctuary give more details on the sorts of activities that would be allowed and whether they would be off shore or on shore and which areas might be under consideration? The question could not be answered directly because the group had not made any decisions as yet, but as an example, Liam Antrim mentioned that there are hundreds of offshore rocks, reefs and islands where the land portion falls within the refuges that the USFWS manages. One simple first cut recommendation might be to make those off shore areas no-take areas. Right now the jurisdiction of the intertidal area on the offshore islands lies with the Sanctuary. That would be a simple recommendation that would not impact very many people very few people access those areas or use them in any way. On the shoreline it gets a little more complicated. The partners, Olympic National Park in particular, does not really want to see an extremely complex zoning scheme because enforceability and management becomes an issue. It would be better to look at rather large areas, if no-take reserves were going to be designated, rather than have small pieces scattered throughout the area. Percentage has not been dealt with at all. Rather than establish a percentage up front, each beach will be assessed independently and then totals will be derived from what is recommended.

Audience Question
Do you have representations on the board or panel from both commercial and sport fishermen?
Liam Antrim responded that a commercial fisherman is on the working group and that person is also a Sanctuary Advisory Council member.

Carol Bernthal responded that, as part of the designation of the Sanctuary, there is a Sanctuary Advisory Council (SAC) that is composed of 17 or 18 different representatives from a variety of user groups. The user groups include the shipping industry, commercial fishers, citizen at large, federal/state/county governments, and tribes. The SAC meets four or five times a year to discuss issues that are coming up. The role of the SAC is to provide advice to the Sanctuary management on different provisions that should be enacted. The SAC has worked very closely with the MCWG (the SAC essentially formed the MCWG) and the MCWG will be providing recommendations to them. But it is challenging to have representation on the SAC from the less organized user groups. Other sanctuaries have encountered problems when they have tried to have an official representative from a group that does not naturally organize itself in a way that accommodates representation. For example, recreational shellfish gatherers are not organized in a way that is easy for a representative to be chosen. So rather than relying solely on specific representatives, the Sanctuary is going to put more effort into a concurrent public outreach strategy. Sanctuary personnel will go out to different communities that are utilizing intertidal resources and to talk to them about what it is that the Sanctuary is trying to accomplish. The goal will be to get input from the communities regarding their concerns.

Audience Question
What is the time frame of the plan and what types of flexibility are you building in to it? As time goes on, will you make changes to zoning? Liam Antrim responded that the Group's goal is to present a set of recommendations to the Sanctuary Advisory Council in June and is currently working toward that goal. It is recognized that these recommendations will be preliminary and will come as a first step. The Sanctuary will have to have more detailed discussions with the agencies and the tribes that are involved with the process in order to get more than the one representative of the group to buy off on some of the recommendations. Ultimately there is a hope that portions will be written into the management plan of the Sanctuary, which will be revised around 2003.

Flexibility is an important component to developing a zoning plan. Sites will need to be monitored and if the zoning is not effective it can be replaced by a better management strategy.

Audience Comment
A member of the MCWG identified herself from the audience and stated she wanted people to know that the group was only looking at the first piece, the intertidal, and is not looking beyond that right now.

Carol Bernthal also stated that intertidal was chosen specifically because it is the area with the most amount of information known about it. In the offshore areas, there is a huge need to conduct extensive habitat mapping and to work up some of the associations between different species assemblages and habitat types. The intertidal was strategically chosen to start with because it is a smaller, better understood ecosystem. Ultimately it is recognized that the entire Sanctuary should undergo a similar process but the information is not available as yet.

Audience Question
There are two ways to go about this, one is to have a voluntary no-take and the other is to have a legal no-take. What will be the Sanctuary's approach? Is the Sanctuary going to write these into the Sanctuary regulations and go through the process of changing laws, or is it going to be a state no-take or voluntary program?

Carol Bernthal responded that the type of approach would vary depending on where it lands on the beach. There are a variety of jurisdictions to consider. About 60 miles of the coast is within the boundaries of Olympic National Park. In that case, the Park would have the authority to establish no-take areas through their regulations and authority. If it landed on tidal lands that are managed by the State, the State has the ability to establish no-take areas. If it falls within an area that is within Usual and Accustomed Areas for a tribal government, the Sanctuary would have to have concurrence with them and the tribal issues are extremely complex because of the co-management. The Sanctuary made a commitment up front to the tribes that it would not enact any kind of no-take areas without their concurrence. There are a number of steps that the Sanctuary will have to go through once areas are identified. This is the first step in what will become a long-term effort to address this. One option would be to use Sanctuary regulations as well.

Audience Comment
Given the overlapping jurisdictions that you have in the Sanctuary, the person questioned the overall usefulness of zoning, since the areas have protection already.

Liam Antrim responded that jurisdiction is very complex. Just because multiple jurisdictions exist, it does not mean adequate protection of the resources also exists. Impacts have been identified, particularly on Park lands, from heavy use of certain areas associated with easy access. Most of the impact happens at places where there is harvest of surf perch bait. Trampling in high use or routine interpretive walk areas is another example of a Park concern. The zoning process is taking a precautionary approach that might justify some restrictions.

Ed Bowlby—Overview of the Sanctuary Research Program

Many ongoing research programs use the Sanctuary. One of the roles of the Sanctuary is to supplement and support those programs. The Sanctuary works collaboratively with universities, tribes, and agencies in an effort to develop a comprehensive, ecosystem-wide understanding of the Sanctuary.

The Science Plan is designed to assist in coordination of research efforts by providing a framework that will identify the gaps in the existing suite of programs and guide the Sanctuary in selection of new research initiatives. One example is the subtidal area, from understory canopy communities to the canopy kelp itself. The Sanctuary, in collaboration with the Washington Department of Natural Resources (WDNR), collects annual survey data on this resource. Are annual surveys sufficient in obtaining information such as peak biomass and distribution? Would additional work be more useful or is there a more efficient method that would provide data on more species or interactions? These are the kinds of questions that the Sanctuary is soliciting input on from members of the scientific community through the review of the Science Plan.

A partial list of the projects the Sanctuary is currently involved with include:

1. The Sanctuary is looking at prehistoric shorelines and shipwrecks using acoustic survey methodology.

2. The Sanctuary has worked collaboratively with both the Biological Resources Division (BRD) of the U.S. Geological Survey (USGS) and the Washington Department of Fish and Wildlife (WDFW) on sea otters and their potential role as a keystone species in kelp habitat. The Sanctuary will begin a sea otter contaminants study with the BRD, USFWS, and WDFW.

3. The Sanctuary supplements the on-going survey work on other marine mammal species conducted by the WDFW and the National Marine Fisheries Service (NMFS). The Sanctuary can assist these efforts by providing platforms (vessels) in order to obtain offshore surveys. These surveys provide information on distribution and abundance patterns of marine mammals using the offshore components of the Sanctuary. Similarly, marine birds are surveyed concurrently with marine mammals as part of a collaborative effort with WDFW.

4. The NMFS, the University of Washington (UW) and tribal groups work collaboratively in an effort to detect harmful algal blooms both the onshore and offshore, in an effort to determine causative factors. Satellite imagery, water samples taken during cruises, and tissue analysis of shellfish all contribute to the detective work involved in trying to relate oceanographic processes with bloom events and discern how blooms are advected to shore.

5. Seafloor mapping is a critical piece to the understanding of the deep-water ecosystem. The Sanctuary has begun acoustic mapping and sediment sampling in order to better define benthic habitats and communities.

Carl Schoch—Advisory Group Roles and Overview of Science Plan

Carl Schoch, one of two chairs on the Sanctuary Advisory Council, holds the research chair and represents the scientific community. His primary charge is to convene a Research Advisory Council. As presented in the guidelines for the Sanctuary, members of the committee must come from the Sanctuary Advisory Council. To broaden the scientific expertise of that group and provide a greater range of scientific advice, a Research Working Group was also formed. Some of the most interesting scientific questions in the Sanctuary were categorized (benthic ecology, marine archeology, marine mammals, oceanography, etc.), then experts were actively sought out to represent those categories. The Working Group will be called upon to provide scientific advice and to review any documents that are put forth by the Sanctuary.

The Sanctuary has held two research workshops, one in 1996 (Strickland 1996) and one in 1998 (Bowlby and others). Those workshops brought together researchers who had experience working within the Sanctuary. Researchers were called upon to share their knowledge and to advise the Sanctuary on how to proceed with a science program. The attendees collectively decided that the best strategy would be to develop a plan for HOW science would be done in the Sanctuary, rather than exactly WHAT science would be done. The Research Advisory Committee has been developing this science plan with the following five components:

1. Literature search and compiling historical data.
2. Inventory and monitoring
3. Experimental projects
4. Numerical modeling
5. Data dissemination

The components are hierarchical so that each component builds on the previous one. It was important to first find out what research was being done or had been done in the Sanctuary. The research workshops in 1996 and 1998 did just that by convening most of the researchers known to be conducting studies within the Sanctuary boundaries. These researchers were able to identify important information gaps and direct the focus of the Sanctuary science program.

As a result, there are now many examples of inventory and monitoring programs ongoing in the Sanctuary. For example, about 60% of the intertidal habitat has been modeled at a spatial high resolution (Schoch 1999) and 100% has been mapped and classified at a lower resolution (Harper and Berry 1999). Sanctuary

and the ONP have adopted a biological monitoring program that was first started by Dr. Megan Dethier from Friday Harbor Laboratory following the Nestucca Oil Spill in 1989. More recently, the Partnership for Interdisciplinary Studies of the Coastal Ocean (PISCO), a consortium of four west coast universities funded by the Packard Foundation, has established 18 monitoring transects in the Sanctuary to compare long-term changes in species diversity over time and space.

These monitoring programs are able to detect temporal and spatial patterns from the data, but the mechanisms driving those patterns are not well understood. In order to understand those mechanisms, more information is needed from experimental projects that can identify the physical, chemical, biological, and geological processes that control the observed patterns.

Once those mechanistic linkages are known, numerical models can be used to either forecast or hindcast the effects of large or small-scale perturbations to the system. For example, there will undoubtedly be more El Niño Southern Oscillation events, and global warming is now widely acknowledged as an on-going process, so with numerical models, we can show what will happen to these systems over time.

The final component of the science program concerns developing methods to disseminate this information to other researchers and the public. Making the data available to the broader scientific community should encourage researchers to ask more questions. One example of how this can be done would be to put the data on a webpage (as the Washington Department of Ecology has done with all of their water quality data).

The Science Plan will help the sanctuary management prioritize science projects. As the Sanctuary management considers new research projects, the framework of the Science Plan can be used to assess whether or not there is enough background information for the project to be fully useful. For example, researchers and managers should have long-term observational data, and an understanding of the observed patterns before embarking on a numerical modeling exercise that leads to new management strategies. If these data do not exist, then managers need to identify their science priorities so that resources can be allocated accordingly.

George Galasso—Infrastructure and Logistical Support for Research Projects

When the Sanctuary was first designated, the OCNMS staff was challenged with an overwhelming research and resource protection mandate combined with minimal resources. Therefore, the Sanctuary's early strategy for accomplishing its research goals was to seek out partnerships with other researchers and to leverage resources. The Sanctuary was most able to foster partnerships by providing logistical support, coordination or funding.

The Sanctuary has several components of its infrastructure that serve as potential logistical support for research projects. The 38-foot aluminum workboat, R/V *Tatoosh*, was purchased in 1994 and is now dedicated to supporting research in the Sanctuary. It usually works out of Neah Bay, where the Sanctuary also maintains a singlewide mobile home as a field station. This field station, located on the U.S. Coast Guard base in Neah Bay, provides housing for field researchers. The Sanctuary also has a 22-foot rigid hull inflatable boat available to work out of La Push or Neah Bay. There is also basic oceanographic equipment available to research partners, along with products from the Sanctuary's own research efforts, such as the habitat maps being developed through the Sanctuary office.

Probably the most significant logistical contribution the Sanctuary has brought to the research community has been a series of research cruises. Because of the support from the Sanctuary's parent organization, NOAA, large vessels have been able to be used for 10 to 14 day multi-project research cruises in 1995 through 1998 on the NOAA ship *McArthur*, and 1999-2000 on several other Navy and chartered vessels. Funds received from the installation of fiber optic cables will provide other cruise opportunities in the future.

The annual research cruises are multi-disciplinary and multi-agency efforts that operate 24 hours a day to ensure an efficient use of the ship's resources. They involve coordination with researchers from various institutions, such as the harmful algal bloom investigations being conducted through the UW and NMFS, and state and federal agencies such as the WDFW marine mammal and seabird distribution and relative abundance surveys. These are very rewarding experiences because of their collaborative nature, which encourages dialogue and exchange between researchers.

The OCNMS serves as a coordinator in other ways as well. It has sponsored two Marine Research Workshops, one in 1996 and the other in 1998 (Strickland 1996; Bowlby and others). It has convened active committees and working groups that can advise managers on resource and research oriented issues. Those groups include the Sanctuary Advisory Council, the Marine Conservation Working Group, the Research Advisory Committee and the Research Working Group. These groups foster coordination among the research community.

As an example of one project that the Sanctuary is currently involved in, Galasso briefly described the fiber optic cable Monitoring Program. In November of 1999 and then again in February 2000, two fiber optic cables were installed in the northern part of the Sanctuary. As part of the permitting for that, the Sanctuary received some money for monitoring the impact of that installation in the Sanctuary. In September of 2000, the Sanctuary conducted the first fiber optics monitoring cruise and collected the first set of seafloor impact data by videography from a submersible. Benthic samples were also collected as part of that program. A brief overview of that monitoring program can be found on the Sanctuary's website.

Other major investigations that the sanctuary has collaborated on include harmful algal bloom investigations with NMSF and UW in order to link offshore oceanographic conditions with onshore bloom events; physical oceanography work with the UW, standardized transect work for marine wildlife surveys with WDFW to track distribution and abundance patterns of marine mammals and seabirds; and benthic sampling efforts at former UW sites to characterize benthic communities over time. The latter effort will also assist the Essential Fish Habitat and Habitat Areas of Particular Concern process as well as the Sanctuary's marine zoning considerations.

The panel session concluded. Ed Bowlby listed the other oral and poster sessions at the conference that had some bearing on the OCNMS.

Oral Presentations:

1. Todd Hass, UW, on Beached Bird Surveys.
2. Liam Antrim, OCNMS, on Zoning within the Sanctuary.
3. Vera Trainer, NMFS, on Harmful Algal Bloom Investigations.

Poster Presentations:

1. Steve Jeffries, WDFW, on Trends in Harbor Seals throughout the State, including the Sanctuary.
2. Mary Sue Brancato, OCNMS, on Biomarker Investigations.
3. Rikk Kvitek, California State University at Monterey Bay, on Sea Otter Benthic Habitats in the Sanctuary.
4. Kristin Laidre, NMFS, on Carrying Capacity of Sea Otters in Washington.
5. Chris Thompson, WDFW, on Seabirds of Coastal Washington.

Summary of questions and comments from the audience with responses from the panel members

Audience Question

The Science Plan seemed to lack an emphasis on inventory and damage assessment from potential oil spills. The National Marine Sanctuary System is the natural trustee for marine resources. Is the baseline inventory of the intertidal area complete enough for good damage assessment, and if not, should that be more emphasized?

Carl Schoch responded that, in his opinion, the Sanctuary is actually a model for baseline data specifically for oil spills. One reason is that the shore zone inventory classification has its very roots in oil spill damage assessment. Secondly, underneath and nested within that inventory, is the very high-resolution data layer that gives a 10m resolution. There is much known about both the physical and biological components of the intertidal habitats and, in terms of impacts from oil spills, assessment would be possible. However, from mean low water out, there is a proportionate lack of information with distance out from shore. More information is needed in sub-tidal and benthic communities.

Carol Bernthal added that other divisions of NOAA are creating environmental sensitivity index maps that will serve a similar purpose. However, some of the data being used for those maps is out of date and could be improved upon. It will be important for NOAA to recognize that new data exists, such as the database that was previously mentioned, and incorporate that information into the environmental sensitivity index maps for the outer coast. This is one thing the Sanctuary could help facilitate.

Ed Bowlby mentioned that the need for more resource inventories was a common theme identified by the attendees of both of the OCNMS sponsored Research Workshops.

Mary Sue Brancato described several new projects that the Sanctuary is involved with that address the need for baseline information in the event of a catastrophe. One program, Coastal Observation Seabird Survey Team (COASST), monitors beached birds that will provide information on the natural mortality of seabirds. Should a catastrophe occur, the background mortality data could be used for comparison and a tool to assess impacts.

Julia Parrish, UW, Chris Thompson, WDFW, and Ulrich Wilson, USFWS, currently have seabird monitoring programs within the Sanctuary.

The Sanctuary and the USFWS have a new sea otter contaminant study that will provide baseline information on contaminant loads. And annual population surveys of sea otters by USGS, WDFW, and OCNMS also provide baseline information.

A National Sea Grant funded study is examining biological markers in several invertebrate and algal species across a known chemical gradient and this will provide baseline information on biochemistry of the invertebrate and algal populations on the coast.

Lastly the Sanctuary has one NOAA Status and Trends Mussel Watch station on the coast that also provides baseline data.

Audience Question
Have the monies from the Tenyo Maru oil spill settlement not been spent yet even though it happened so long ago?

Carol Bernthal responded that the plan for the Tenyo Maru settlement monies has finally been agreed to and signed off on, and it is currently beginning to be implemented

Audience Question
Regarding page 5 of the draft Science Plan, is there a plan to create feedback loops from stressors, be they historical or ongoing? What are the feedback loops from human activities to biodiversity that occur within the Sanctuary, such as commercial vessel traffic or recreational whale watching? Are elements of the Sanctuary being monitored separately or are there connections?

Carl Schoch responded that the Science Plan addresses this specifically through the hierarchical nature of the steps. For example, in order to find out exactly what is causing the patterns seen from monitoring, experimentation must then be conducted under very controlled conditions. Once the exact physiological mechanisms that cause the patterns are understood, researchers can go back and evaluate the situation. The process is iterative and recursive.

Audience Question
Has there been any effort to incorporate traditional science into the Science Plan? Tribal cultures often contribute to historical understanding, but there is a new emphasis to incorporate traditional knowledge into science. This is being done in Canada with the First Nations through a program called "Back to the Future". Is anything like that being done here? Also, is there tribal involvement in the Sanctuary Advisory Council?

Ed Bowlby responded that traditional knowledge is definitely recognized. As an example, he and Carol Bernthal mentioned a tribal member's observation of decreasing kelp beds along certain segments of the coast, prior to annual survey efforts. The Sanctuary's data on kelp is a snippet in time, whereas, tribal knowledge reaches back many years. Thus, traditional knowledge has helped in the development of a more defined quantitative study of sediment loads in watersheds and their effects on kelp beds. Traditional knowledge is a very important and often overlooked information source in scientific studies. It is the Sanctuary's intent to recognize the scientific implications of traditional knowledge. The Sanctuary is open to suggestions as to how to improve in this area.

Carl Schoch mentioned that there is tribal involvement in the Sanctuary Advisory Council, Research Advisory Committee, and the Marine Conservation Working Group, but not the Research Working Group. Opportunities do exist for tribes to provide input and feedback.

Audience Question
How do you create a bridge between the science plan and your annual research plans? What are the operational details, for example, and how much money do you want and need to have for the next 20 years? Where is it going to come from? What type of replacement cycles do you need to put your vessels on, et cetera? How will the Sanctuary take these high level objectives and make them come alive with consistency and long-term vision?

Carol Bernthal responded by mentioning that having a very small research budget has forced the Sanctuary to be creative and inventive with their research operations. It has required that the Sanctuary develop partnerships outside of the Sanctuary program and NOAA. By articulating the long-term plan, the Sanctuary can be more strategic in planning for some very expensive scientific studies. Implementation is very critical and is addressed in the annual Sanctuary Research Plans.

Audience Question
One comment. The Science Plan has a wonderful variety of different issues, but it really needs a focus. One question. What is the latest discussion on the Sanctuary having a facility or a place to display information?

Carol Bernthal responded that the Sanctuary headquarters is in Port Angeles and it will probably remain there because of the need for networking with other state and federal agencies that are located there. One of the efforts that will come to fruition this year is the development of the joint coastal visitor's center at Kalaloch with Olympic National Park. It will be interim to the big visitor facility that will occur there in the future, which will include OCNMS, ONP, and the USFWS Refuges. Partnerships such as this get away from jurisdictions and convey a sense of continuity across all landscapes and within the people that live or visit there or use the resources. The Sanctuary staff is growing and so will be looking long-range for a larger facility. The Sanctuary does need to be more visible to the public and this will be considered. The Sanctuary does have an enhanced website and is developing a satellite office and interpretive space at Neah Bay.

Audience Question
As a researcher who has worked in the Sanctuary, it is unclear how the Sanctuary plans to accomplish the coordination efforts with the partnerships it would like to form. The draft Science Plan does not explain or lay out the background for how the partnerships will be formed. Partnerships and coordination are complicated by the overlapping jurisdictions of the tribes, the USFWS refuge system, ONP, NMFS, and the state agencies. The researcher suggested making it clear from the beginning that the Sanctuary is dealing with a lot of overlapping jurisdictions and regulations.

When implementing the plan, he suggested looking at the baseline data first. Scientists are often guilty of going to the next project before fully working up the data that they have. From marine mammals and seabird issues, there are significant baseline data for the Sanctuary area and NMFS' National Marine Mammal Lab would be interested in working with the Sanctuary to bring this data forward so that it could be used.

The researcher concurred with the previous points that stressed the public outreach potential of the Sanctuary and its resources. He encouraged the Sanctuary to continue to stress the education value of the fascinating area of the outer coast and its resources.

Ed Bowlby pointed out that the Sanctuary is prioritizing working up its existing data and examining the baseline data before launching on to other projects. As a case in point, the Sanctuary opted to not conduct its annual research cruise in 2001. Instead, OCNMS will spend its time and resources working up the marine mammal and seabird distribution and abundance data collected over the past five years. Concurrently, the Sanctuary is going to convene a workshop of specialists in the areas of marine mammal and seabird populations and statisticians in order to solicit their advice in developing study plans that examines long-term trends. Similarly the Sanctuary will also convene specialists in subtidal communities in order to gather input on how to proceed in monitoring that habitat

Audience Question
Have you considered negotiating some financial compensation for allowing commercial activities such as the laying of the fiber optic cables to occur in the Sanctuary?

Carol Bernthal responded that for the first time OCNMS did assess a special use fee for the construction of the fiber optic cable within the Sanctuary. And the National Marine Sanctuary System just commissioned a study to look at what would be a fair market rate of return per mile for such an easement. The study looked at what had been negotiated in the past, but also considered that sanctuaries were vastly underrated public resources. The intent was to create a schedule of a per mile fee that would be charged if activity was allowed. First, the Sanctuary has to determine whether a request is an appropriate activity in order to avoid the bad situation of funding the research program by permitting actions that are not compatible with the Sanctuary. The study is near completion and there will be a public comment period for anyone interested. The bottom line is; if an activity is going to incur a private benefit from a public resource, there should be some type of compensation.

How much of that kind of negotiation could have occurred before the cable was laid in the form of an EIS?

Carol Bernthal responded that the EIS or the EA assesses what the impact of the proposed activity is and what the alternatives are. For example, with the Pacific Crossing Fiber Optic Cable proposal, the Sanctuary looked at a range of alternatives, one was outside of the Sanctuary, one was within, and one to the south. The impacts and the appropriate mitigation associated with it were evaluated. Therefore, it was part of the EA process and the permitting decision and that is how it should be.

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