Office of National Marine Sanctuaries
National Oceanic and Atmospheric Administration

OLYMPIC COAST NATIONAL MARINE SANCTUARY

Olympic Coast
National Marine Sanctuary

Final Management Plan and Environmental Assessment

September 2011

http://olympiccoast.noaa.gov

ABOUT THIS DOCUMENT

This document is a combined final management plan for Olympic Coast National Marine Sanctuary as well as the environmental assessment, required under the National Environmental Policy Act (NEPA). This document also fulfills compliance requirements under Section 106 of the National Historic Preservation Act.

This plan will serve as the primary management document of OCNMS for approximately the next five to ten years.

Comments or questions on this management plan should be directed to:

George Galasso
Management Plan Review Coordinator
Olympic Coast National Marine Sanctuary
115 East Railroad Avenue, Suite 301
Port Angeles, WA 98362-2925

LIST OF PREPARERS

Liam Antrim, Olympic Coast National Marine Sanctuary (OCNMS)
Lauren Bennett, OCNMS
Craig Bowhay, Northwest Indian Fisheries Commission
George Galasso, OCNMS
Molly Holt, NOAA Office of the General Counsel
Hélène Scalliet, Office of National Marine Sanctuaries
Bruce Terrell, Office of National Marine Sanctuaries
Herrera Environmental Consultants, Inc.
Representatives of the Hoh, Quileute and Makah Tribes and Quinault Indian Nation
Members of the OCNMS Advisory Council and associated working groups

TABLE OF CONTENTS

1. Introduction 1
1.1. Office of National Marine Sanctuaries 1
1.2. Significance of The Sanctuary 2
1.3. OCNMS' collaborative management framework 3
1.4. OCNMS goals and objectives 6

2. Treaty Trust Responsibility 8
2.1. Coastal Treaty Tribes, the Treaty Right to Fish, and the Magnuson-Stevens Fishery Conservation Act 9
2.2. OCNMS and Tribal Trust and Treaty Responsibilities 11
2.3. Consultation with Coastal Treaty Tribes 12
2.4. Tribal Consultation Procedures 13

3. PURPOSE AND NEED FOR REVISING THE MANAGEMENT PLAN AND REGULATIONS 14
3.1. Purpose 14
3.1.1. National Marine Sanctuaries Act (NMSA) 14
3.1.2. Olympic Coast National Marine Sanctuary 16
3.1.3. Management Plan Review 16
3.2. Need 16
3.2.1. Outdated Management Plan 16
3.2.2. Ocean Governance 17
3.2.3. Data Gaps 18
3.2.4. New Technologies 18
3.2.5. Scope of Issues 18

4. MANAGEMENT PLAN REVIEW PROCESS 20
4.1. Overview of The MPR Process 20
4.1.1. Public Involvement 21
4.2. MPR Preliminary Priority Topics 22
4.3. Summary of Public Scoping 24
4.4. Issue Prioritization and Final Priority Topics 26
4.5. Working Groups and Workshops 27

4.6. Draft Action Plans 28
4.7. Improving Collaboration through MPR process 29
4.8. Scoping Ideas Considered But Not Developed As Alternatives 30
4.8.1. Boundary expansion 30
4.8.2. Alternative energy development 30
4.8.3. Compatibility determinations 30
4.8.4. No-take zones/marine reserves 31
4.8.5. Aquaculture ban 31
4.8.6. Harbors of refuge 32

5. FINAL MANAGEMENT PLAN 33
5.1. Introduction 33
5.2. Action Plans 34
A. Achieve Effective Collaborative and Coordinated Management 35
A1. Collaborative and Coordinated Sanctuary Management Action Plan 36
A2. Community Involvement in Sanctuary Management Action Plan 41
A3. Sanctuary Operations Action Plan 44
B. Conduct Collaborative Research, Assessments and Monitoring to Inform Ecosystem-Based Management 50
B1. Habitat Mapping and Classification Action Plan 51
B2. Physical and Chemical Oceanography Action Plan 54
B3. Populations, Communities and Ecosystems Action Plan 57
B4. Data Management, Sharing and Reporting Action Plan 62
C. Improve Ocean Literacy 65
C1. K-12 Education Action Plan 66
C2. Higher Education Action Plan 69
C3. Visitor Services Action Plan 71
C4. Community Outreach Action Plan 74
D. Conserve Natural Resources in the Sanctuary 77
D1. Spills Prevention, Preparedness, Response and Restoration Action Plan 78
D2. Climate Change Action Plan 85
D3. Marine Debris Action Plan 88
D4. Wildlife Disturbance Action Plan 91
D5. Water Quality Protection Action Plan 95
D6. Habitat Protection Action Plan 97

D7. Regional Ocean Planning Action Plan 99
E. Understand the Sanctuary's Cultural, Historical and Socioeconomic Significance 101
E1. Maritime Heritage Action Plan 102
E2. Socioeconomic Values of Resources in the Sanctuary Action Plan 105
5.3. Performance Measures 107
5.4. Cost Estimates and Timelines 110
5.5. Implementation Table 114
5.5.1. Explanation of Implementation Table 115

6. AFFECTED ENVIRONMENT 119
6.1. Physical Setting 119
6.1.1. Geography and Geology 120
6.1.2. Oceanography 121
6.1.3. Water Quality 121
6.1.4. Climate/Meteorology 134
6.1.5. Climate Change 135
6.2. Biological Setting 136
6.2.1. Intertidal Habitats 136
6.2.2. Nearshore Habitats 137
6.2.3. Pelagic (Water Column) Habitats 138
6.2.4. Seafloor Habitats 139
6.2.5. Benthic Invertebrates 141
6.2.6. Fishes 141
6.2.7. Seabirds 142
6.2.8. Marine Mammals 144
6.3. Cultural and historical setting 146
6.3.1. American Indian Cultural Resources 146
6.3.2. Historical and Archaeological Resources 147
6.4. Human/socioeconomic Setting 151
6.4.1. Population, Housing, Income, and Employment 151
6.4.2. Maritime Transportation 154
6.4.3. Commercial Fishing 156
6.4.4. Developed Environment 158
6.4.5. Department of Defense Activities 159

6.4.6. U.S. Coast Guard/Homeland Security Activities 161
6.4.7. Recreational Fishing 162
6.4.8. Recreation and Tourism 162
6.4.9. Research and Monitoring 163
6.4.10. Education and Outreach 164
6.4.11. Passive Users 164

7. DESCRIPTION OF ALTERNATIVES 166
7.1. Alternative A (no-action alternative) 168
7.2. Alternative B (preferred alternative) 168
7.3. Alternative C (not preferred) 170

8. Environmental Consequences of Alternatives 176
8.1. Physical Setting 182
8.1.1. Actions with Negligible Effects to the Physical Setting 182
8.1.2. Actions with Beneficial Effects to the Physical Setting 185
8.1.3. Actions with Adverse Effects to the Physical Setting 195
8.1.4. Summary of Effects to Physical Setting 199
8.2. Biological Setting 200
8.2.1. Actions with Negligible Effect to Biological Setting 200
8.2.2. Actions with Beneficial Effects to the Biological Setting 202
8.2.3. Actions with Adverse Effects to the Biological Setting 207
8.2.4. Summary of Effects to Biological Resources 212
8.3. Historical/Cultural Setting 213
8.3.1. Actions with Negligible Effect to the Historical/Cultural Setting 213
8.3.2. Actions with Beneficial Effects to the Historical/Cultural Setting 215
8.3.3. Actions with Adverse Effects to the Historical/Cultural Setting 217
8.3.4. Summary of Effects to Historical/Cultural Setting 218
8.4. Human/Socioeconomic Setting 218
8.4.1. Actions with Negligible Effects to the Human/Socioeconomic Setting 219
8.4.2. Actions with Beneficial Effects to the Human/Socioeconomic Setting 221
8.4.3. Actions with Adverse Effects to the Human/Socioeconomic Setting 226
8.4.4. Summary of Effects to Human/Socioeconomic Setting 231
8.5. Cumulative Effects 231

8.6. Summary of effects 237

9. Persons and Agencies Contacted 239

10. References 243

Appendix A – Designation Document 250
Appendix B – Notice of Intent for Initiation of Management Plan Review 254
Appendix C – Initiation of Section 106 Consultation 256
Appendix D –Enhancing the Intergovernmental Partnership (EO 12875) 257
Appendix E – Executive Order 12898 259
Appendix F – Secretarial Order 3206 264
Appendix G – Executive Order 13084 271
Appendix H – Presidential Memorandum of November 5, 2009 274
Appendix I – Executive Order 13175 276
Appendix J – Department of Commerce American Indian and Alaska Native Policy 280
Appendix K – Discharge Estimation Methodology 284

FIGURES

Figure 1 National Marine Sanctuary System 1
Figure 2 Diagram showing jurisdictional boundaries within OCNMS. 36
Figure 3 Olympic Coast National Marine Sanctuary 119
Figure 4 Schematic of general physical factors controlling ocean surface response during January, May, July, and September (from Pirhalla et al. 2009) 121
Figure 5 Kelp Distribution 137
Figure 6 Habitat Map 140
Figure 7 Potential historic distribution of biologically structured habitat associated with hard substrate overlaid on Olympic 2 EFH Conservation Area (data from Curt Whitmire, NOAA) 140
Figure 8 Vessel Traffic Management System 156
Figure 9 Location of the Alaska United and Pacific Crossing Fiber Optic Cables 159
Figure 10 Military Operating Areas 160

Figure 11 CVTS Radar Coverage - OCNMS 2009 transits (6,128 transits) 193
Figure 12 CVTS Radar Coverage – ATBA 2009 transits (68 transits) 194
Figure 13 The OCNMS Research Vessel Tatoosh 198
Figure 14 Picture of OCNMS mooring anchor 210
Figure 15 Extent of the Canadian Coast Guard Radar Coverage on the West Coast of Vancouver Island 285
Figure 16 WDFW Marine Areas and OCNMS Boundary 286

TABLES

Table 1 Olympic Coast National Marine Sanctuary Goals and Objectives 6
Table 2 List of 37 topics raised during scoping 25
Table 3 Olympic Coast National Marine Sanctuary Management Plan Action Plans 33
Table 4 List of Cost Estimates Associated with the Action Plan Strategies (in thousands of dollars) 110
Table 5 OCNMS Management Plan Implementation Table 116
Table 6 Potential Gallons of Sewage Discharges in Olympic Coast National Marine Sanctuary in 2009 132
Table 7 Potential Gallons of Graywater Discharges in OCNMS in 2009 133
Table 8 Population, Housing, Poverty, and Income[a] 151
Table 9 Population, Housing and Income for American Indian Tribes adjacent to OCNMS ... 152
Table 10 Employment in counties adjacent to OCNMS (2008) 153
Table 11 All Cooperative Vessel Traffic Service (CVTS) Vessel Transits in 2009. For transits in OCNMS, the cumulative time and average transit time in OCNMS for all vessels of a given classification combined is provided for each vessel class. .. 155
Table 12 Summary of three alternatives analyzed 167
Table 13 Summary of Analyzed Actions 179
Table 14 Comparison of estimated potential discharges (in gallons) under alternatives A, B and C 190
Table 15 All Cooperative Vessel Traffic Service (CVTS) Vessel Transits in 2009 193
Table 16 Echosounder specifications for equipment most commonly used by OCNMS for hydrographic surveys 209
Table 17 Protected and/or listed marine species of concern for impact by sonar within OCNMS .....**Error! Bookmark not defined.**
Table 18 Comparison of effects of the three alternatives on physical, biological, historic/cultural and socioeconomic resources 237
Table 19 Comparison of Vessel Data Sources 284
Table 20 Recreational Fishing Boat Trips, within OCNMS, for 2009 286
Table 21 Recreational Fishing Angler Trips, within OCNMS, for 2009 287

ACRONYMS

AC	Olympic Coast National Marine Sanctuary Advisory Council
ADEC	Alaska Department of Environmental Conservation
ADV	Annual Discharge Volume
AIS	Automated Identification System
AOP	Annual Operating Plan
AOPA	Aircraft Owners and Pilots Association
ATBA	Area-to-be-Avoided
AUV	Autonomous Underwater Vehicle
AWTS	Advanced Wastewater Treatment System
CMECS	Coastal and Marine Ecological Classification Standard
CMSP	Coastal and Marine Spatial Planning
COASST	Coastal Observation and Seabird Survey Team
CSS	Carbon Saturation State
CVTS	Cooperative Vessel Traffic Service
CWA	Clean Water Act
DEA	Draft Environmental Assessment
DFO	Department of Fisheries and Ocean (Canada)
DMP	Draft Management Plan
DO	Dissolved Oxygen
DOC	Department of Commerce
DOD	Department of Defense
DOI	Department of Interior
EA	Environmental Assessment
EBM	Ecosystem Based Management
EFH	Essential Fish Habitat
ENSO	El Nino/La Nina Southern Oscillation
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FGDC	Federal Geographic Data Committee
FMP	Final Management Plan
FOSC	Federal On-Scene Coordinator
GIS	Geographic Information System
GRP	Geographic Response Plans
GT	Gross Tons
HAB	Harmful Algal Blooms
HAPC	Habitat Areas of Particular Concern
ICS	Incident Command System
IMO	International Maritime Organization
IPC	Olympic Coast Intergovernmental Policy Council
IT	Information Technology
MARINe	Multi-Agency Rocky Intertidal Network
MCTS	Marine Communications and Traffic Services
MMS	Minerals Management Service
MMPA	Marine Mammal Protection Act

MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPR	Management Plan Review
MRC	Marine Resource Committees
MSD	Marine Sanitation Device
NANOOS	Northwest Association of Networked Ocean Observing Systems
NBDC	National Buoy Data Center
NCDC	National Climatic Data Center
NCDDC	NOAA Coastal Data Development Center
NDZ	No Discharge Zone
NEPA	National Environmental Policy Act
NGO	Non-governmental organization
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NMSA	National Marine Sanctuaries Act
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NPS	National Park Service
NRDA	Natural Resource Damage Assessment
NWAC	Northwestern Area Committee
NWACP	Northwestern Area Contingency Plan
NWCCA	North West & Canada Cruise Association
NWFSC	NOAA Northwest Fisheries Science Center
NWSC	Northwest Straits Commission
NWTRC	Northwest Training Range Complex
OAP	Washington Ocean Action Plan
OCNMS	Olympic Coast National Marine Sanctuary
OLE	National Marine Fisheries Service Office of Law Enforcement
ONMS	Office of National Marine Sanctuaries
ONMS WCRO	Office of National Marine Sanctuaries West Coast Regional Office
ONP	Olympic National Park
ORHAB	Olympic Region Harmful Algal Bloom Partnership
ORR	NOAA Office of Response and Restoration
OSLTF	Oil Spill Liability Trust Fund
OSU	Oregon State University
PAC	Procurement, Acquisition, Construction
PaCOOS	Pacific Coast Ocean Observing System
PFMC	Pacific Fisheries Management Council
PISCO	Partnership for Interdisciplinary Studies of Coastal Oceans
PMEL	NOAA Pacific Marine Environmental Laboratory
QUTR	Quinault Underwater Tracking Range
REEF	Reef Environmental Education Foundation
ROV	Remotely Operated Vehicle
RRT	Regional Response Team
SECO	NOAA Safety and Environmental Compliance Office
SHIELDS	Sanctuary Hazardous Incident Emergency Logistics Database System

SHPO	State Historic Preservation Office
SIMoN	Sanctuary Integrated Monitoring Network
SOC	Standards of Care
THPO	Tribal Historic Preservation Office
TNC	The Nature Conservancy
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UV	Ultraviolet Light
UW/APL	University of Washington Applied Physics Lab
VEAT	Vessel Entry and Transit
VGP	Vessel General Permit
VMS	Vessel Monitoring System
VTSPS	Vessel Traffic Service Puget Sound
WCCA	Washington Clean Coast Alliance
WCGA	West Coast Governors' Agreement
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WDE	Washington Department of Ecology
WPA	Washington Pilots Association
WSDOT	Washington Department of Transportation
WSPRC	Washington State Parks and Recreation Commission
WWU	Western Washington University

EXECUTIVE SUMMARY

Designated in 1994, Olympic Coast National Marine Sanctuary (OCNMS or sanctuary) is a place of regional, national and global significance. The sanctuary, which is connected to both the Big Eddy Ecosystem and the California Current Large Marine Ecosystem, is the site of one of North America's most productive marine regions and spectacular, undeveloped shorelines.

OCNMS' current management plan was written at the time of sanctuary designation in 1994. A sanctuary management plan is a site-specific planning and management tool that describes the goals, objectives and activities for a sanctuary, and guides future activities. NOAA's Office of National Marine Sanctuaries (ONMS) is required by the National Marine Sanctuaries Act (NMSA) to review and revise, if necessary, sanctuary management plans at periodic intervals. The 1994 management plan was written to give broad, general direction for the formation of OCNMS' program areas. Many of the activities it describes are too general to provide useful guidance now that OCNMS is over a decade old. Sixteen years after sanctuary designation, OCNMS is in need of more refined and directed guidance.

Since fall 2008, ONMS has worked closely with the OCNMS Advisory Council (AC), the Olympic Coast Intergovernmental Policy Council (IPC) and the public to review and revise the 1994 management plan. Commonly referred to as management plan review or MPR, for OCNMS this process was also labeled "*Navigating the Future.*" OCNMS' MPR process has focused and will continue to focus on public and stakeholder involvement and to ensure all aspects of MPR are transparent. ONMS went through a detailed issue analysis process with the AC and the IPC, which included a series of AC working group meetings and workshops to explore priority issues in greater detail. These AC working groups and workshops involved over 100 subject area experts and interested members of the public. Through these meetings, specific strategies and activities for the revised management plan were developed. The AC then reviewed these suggested strategies and activities, recommended minor changes and voted to forward them to the OCNMS Superintendent with a recommendation they be included in the revised management plan.

This document includes both the final management plan (FMP) and an environmental assessment (EA) that analyzes the impacts of the FMP. The EA fulfills compliance requirements under the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA) in accordance with 36 CFR 800.8(c).

Section 1 (Introduction) of the document introduces OCNMS, the Office of National Marine Sanctuaries (ONMS) and the National Marine Sanctuaries Act (NMSA). This section also presents the revised goals and objectives for OCNMS, which were developed as part of the MPR process and are considered an integral part of the FMP.

Section 2 (Treaty Trust Responsibility) focuses on explaining the nature and significance of OCNMS' treaty trust responsibility to the Hoh, Quileute and Makah Tribes and Quinault Indian Nation. A team of sanctuary, tribal and Northwest Indian Fisheries Commission representatives wrote this section jointly. OCNMS' treaty trust responsibility is an integral part of its mission;

and fulfilling this responsibility is critical to the successful implementation of this management plan. This section provides critical supporting information for both the FMP and the EA.

Section 3 (Purpose and Need) summarizes the purpose of and need for reviewing and revising the OCNMS management plan. This section is required by NEPA implementing regulations. The purpose and need section also provides important context and support for the FMP.

Section 4 (MPR Process) summarizes the history of the MPR process to facilitate transparency by explaining systematically the process by which the FMP was developed. Included in this section is a discussion of topics raised during the public MPR scoping process but not developed as management plan alternatives.

Section 5 is the FMP, which consists of 20 action plans grouped under five priority needs. During the MPR process, six priority needs were identified. In recognition of its unique nature and importance the priority need to fulfill treaty trust responsibility was developed into section 2 of this document. The remaining five priority needs are addressed by the action plans. The action plans are comprised of a series of non-regulatory actions, regulatory strategies, and activities. The management plan includes a total of 84 strategies and 293 activities. Each action plan also includes a desired outcome, links to the revised OCNMS goals, and a list of key partners.

Included at the end of the FMP are a set of performance measures, cost estimates for each strategy, and an implementation table prioritizing strategies. It is estimated it would take an annual budget of $4.2 to $5.4 million to implement *all* of the strategies in the FMP effectively over the next five years (Table 4). OCNMS currently operates with an annual budget of around $1.5 million, not including in-kind support from other NOAA offices or grants from NOAA or other agencies and organizations. The amount of in-kind support and grant funding OCNMS receives each year varies greatly. Thus, in order to implement the entire FMP, ONMS would need to significantly increase directed funding for OCNMS management (whether through project-specific allocation or base funding). Given the substantial federal budget constraints anticipated for the next few years, OCNMS staff worked with its AC and the IPC to develop the implementation table that appears at the end of the FMP. The implementation table explains what strategies will be the highest priorities for ONMS to implement under three potential budget scenarios: level-funding (i.e., no budget increase), a moderate budget increase and a significant budget increase. ONMS will use the implementation table to guide and inform its annual operating planning efforts.

The FMP, while it can be considered a stand-alone document, is also an important component of the EA. The role of the EA is to analyze the action of revising the OCNMS management plan. The FMP presented in section 5 is ONMS's preferred management plan revision. Later sections of the document related specifically to the EA analyze the environmental consequences of the FMP as well as other alternatives for revising the management plan.

OCNMS Final Management Plan - Action Plans	
A. Achieve Effective Collaborative and Coordinated Management	
	A1. Collaborative and Coordinated Sanctuary Management Action Plan
	A2. Community Involvement in Sanctuary Management Action Plan
	A3. Sanctuary Operations Action Plan
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
C. Improve Ocean Literacy	
	C1. K-12 Education Action Plan
	C2. Higher Education Action Plan
	C3. Visitor Services Action Plan
	C4. Community Outreach Action Plan
D. Conserve Natural Resources in the Sanctuary	
	D1. Spills Prevention, Preparedness, Response and Restoration Action Plan
	D2. Climate Change Action Plan
	D3. Marine Debris Action Plan
	D4. Wildlife Disturbance Action Plan
	D5. Water Quality Protection Action Plan
	D6. Habitat Protection Action Plan
	D7. Regional Ocean Planning Action Plan
E. Understand the Sanctuary's Cultural, Historical and Socioeconomic Significance	
	E1. Maritime Heritage Action Plan
	E2. Socioeconomic Values of Resources in the Sanctuary Action Plan

Section 6 (Affected Environment) provides a detailed description of the environment (biological, physical and human) affected by the action of revising the OCNMS management plan. The action plans in the FMP are purposefully written in a concise manner and do not provide extensive background information. The background and supporting information for the action plans is in the affected environment discussion.

Section 7 (Description of Alternatives) summarizes three alternatives (A, B and C) considered for revising the management plan. One of these alternatives (alternative B, the preferred alternative) is the FMP presented in section 5. In accordance with NOAA NEPA guidelines, ONMS also considered two other alternatives: alternative A - a "no-action" alternative (in which the 1994 management plan would not be revised at all), and alternative C (in which the 1994 management plan would be revised but in way different from the preferred alternative).

Section 8 (Environmental Consequences of Alternatives) provides a detailed analysis of the potential effects of all three alternatives on the biological, physical, and human resources discussed in the affected environment (section 6). Section 8 fulfills ONMS' responsibility under NEPA to analyze the potential beneficial and adverse effects of its actions on the environment. Additionally, Section 106 of the NHPA requires federal agencies to analyze the potential impacts of their actions on historic properties and resources (as defined under the NHPA). This analysis is also incorporated into section 8 of the document.

The findings of the Environmental Consequences section indicate revision of the OCNMS management plan under all three alternatives would have a less than significant effect on the biological, physical, and human environment, both as an individual action and cumulatively with other actions.

It should also be noted that NOAA is concurrently issuing a final rule in the *Federal Register* to make changes to OCNMS regulations under the preferred alternative. Descriptions of these regulatory changes appear in the FMP (section 5); and the environmental consequences of these regulatory changes are analyzed in section 8.

Sections 9 and 10 list the persons and agencies contacted during the management plan review process and the references cited in this document, respectively.

Finally, the appendices include supporting document such as the OCNMS Designation Document, the Proposed Rule announcing initiation of management plan and regulations review, relevant Executive and Secretarial orders, and the Response to Comments, including comments on all components of the management plan, environmental assessment, and regulations.

1. INTRODUCTION

1.1. OFFICE OF NATIONAL MARINE SANCTUARIES

The Office of National Marine Sanctuaries (ONMS) serves as a trustee for a system of 14 marine protected areas (13 national marine sanctuaries and Papahanāumokuākea Marine National Monument, Figure 1), which together encompass more than 290,000 square miles of marine and Great Lakes waters from Washington state to the Florida Keys, and from New England to American Samoa.

The ONMS is an office within the National Ocean Service of the National Oceanic and Atmospheric Administration (NOAA). The ONMS works cooperatively with other governments, agencies, resource users and the public to protect the living, non-living, and cultural marine resources of sanctuaries while allowing recreational and commercial activities that are compatible with the NMSA's primary goal of resource protection. The ONMS also raises public awareness and deepens understanding of sanctuary resources and management issues through research, monitoring, exploration, education and outreach programs.

Figure 1 National Marine Sanctuary System

Throughout its work ONMS is guided by these vision and mission statements (ONMS 2005):

> ***Vision*** *- The National Marine Sanctuary Program is a world-class system of sanctuaries that protect the nation's natural and cultural marine resources for this and future generations and provides both national and international leadership for marine conservation.*
>
> ***Mission*** *- Identify, protect, conserve, and enhance the natural and cultural resources, values, and qualities of the National Marine Sanctuary System for this and future generations throughout the nation.*

National marine sanctuaries are an essential part of the country's collective environmental riches. Within their protected waters, giant whales feed, breed and nurse their young, coral colonies flourish, and shipwrecks tell stories of our maritime history. Sanctuary habitats include beautiful reefs, lush kelp forests, whale migration corridors and destinations, spectacular deep-sea canyons, and underwater archeological sites. The areas range in size from one-quarter square mile (American Samoa's Fagatele Bay) to the more than 140,000 square miles (Papahanāumokuākea Marine National Monument in the Northwestern Hawaiian Islands). Each sanctuary is a unique place requiring special protections. Serving as natural classrooms, cherished recreation spots, places for valuable commercial activities, and places of profound cultural significance, national marine sanctuaries represent many things to many people.

1.2. SIGNIFICANCE OF THE SANCTUARY

Designated by NOAA in 1994 (Appendix A), Olympic Coast National Marine Sanctuary (OCNMS or the sanctuary) is a place of regional, national and global significance. OCNMS, which is connected to both the Big Eddy Ecosystem and the California Current Large Marine Ecosystem, is home to one of North America's most productive marine regions and spectacular, undeveloped shorelines.

Article III of the OCNMS terms of designation identifies "characteristics of the sanctuary area that give it particular value" (59 FR 24586, May 11, 1994; Appendix A). These characteristics include a highly productive ocean and coastal environment that is important to the continued survival of numerous ecologically and commercially important species of fish, seabirds, and marine mammals; a diversity of habitats supporting a great variety of biological communities; significant historical resources; and exceptional opportunities for scientific research and public education and awareness programs. Additional description of the environment in the area of the sanctuary is provided in section 6 and in the 2008 OCNMS Condition Report (ONMS 2008).

OCNMS spans 2,408 square nautical miles (8,259 square kilometers) of marine waters off Washington state's rugged Olympic Peninsula coast. Extending seaward 40 to 72 kilometers (25 to 45 miles) and to depths of over 1,400 meters (4,500 feet), the sanctuary covers much of the continental shelf and the heads of three major submarine canyons. Approximately 17% of the sanctuary is located within state of Washington waters.

OCNMS covers an area is approximately 1.7 times larger than the entire Puget Sound and is almost 2.5 times larger than Olympic National Park.

The sanctuary borders one of the few undeveloped coastlines remaining in North America, enhancing the protection provided by both Olympic National Park, which includes 52 miles (87-kilometers) of wilderness shoreline adjacent to the sanctuary and the Washington Maritime National Wildlife Refuge Complex, which includes more than 600 offshore islands and emergent rocks within the sanctuary. Olympic National Park is designated a World Heritage Site and a UNESCO Biosphere Reserve.

Located in a nutrient-rich upwelling zone, the sanctuary supports high primary productivity and is home to a diversity of organisms and habitats. Twenty-nine species of marine mammals have been sighted in the sanctuary, and the seabird colonies off the Olympic Coast are among the largest in the continental United States. Commercially important fish species in the sanctuary include groundfish, shellfish and five species of salmon. Influenced by geology, ocean currents and other global processes, OCNMS' temperate location and physical environment support critical habitats and unique communities of organisms, including deep sea corals and one of the most diverse seaweed communities in the world.

Beyond its ecological significance, the sanctuary has extraordinary cultural significance. For time immemorial, American Indians have inhabited and cared for the coastal and marine ecosystems that are now part of the sanctuary. The Hoh, Makah and Quileute tribes, and the Quinault Indian Nation, collectively referred to in this document as "the Coastal Treaty Tribes", continue to make their home on the Olympic Peninsula's outer coast maintaining the continuity of cultures that remain intimately connected with the ocean and its resources.

The sanctuary also hosts commercial enterprises, local and international. Some of the busiest shipping lanes in the world run through sanctuary. Commercial fisheries, both tribal and non-tribal, occur in sanctuary waters and are critical components of the regional economy.

1.3. OCNMS' COLLABORATIVE MANAGEMENT FRAMEWORK

In managing OCNMS, ONMS is guided by the following mission statement:

> ***Mission - t****o protect the Olympic Coast's natural and cultural resources through responsible stewardship, to conduct and apply research to preserve the area's ecological integrity and maritime heritage, and to promote understanding through public outreach and education.*

OCNMS is managed using a collaborative management framework unique to the sanctuary system and the world. Given the sanctuary is adjacent to Canada and is encompassed by the usual and accustomed areas of the Hoh, Makah, and Quileute tribes, and the Quinault Indian Nation, OCNMS' management framework is truly multi-national and multi-cultural in nature.

The Coastal Treaty Tribes have treaty-protected fishing rights and share co-management responsibilities for fishing activities within the sanctuary with the state of Washington and federal government. These common interests and joint authorities led the Coastal Treaty Tribes, the state of Washington and ONMS to create the Olympic Coast Intergovernmental Policy Council (IPC) in 2007. The first of its kind in the nation, the IPC provides a regional forum for resource managers to exchange information, coordinate policies, and develop recommendations for resource management within the sanctuary.

The IPC's goals include:

- Protecting the safety and health of coastal residents;
- Enhancing the social and economic vitality of coastal communities; and
- Improving the understanding and management of marine resources.

Since its inception, the IPC has laid the groundwork for successful government-to-government collaboration, focusing on the following activities:

- Participating in the review of OCNMS' management plan;
- Identifying research priorities, including the development of a five-year Ocean Ecosystem Monitoring and Research Initiative;
- Establishing initial priorities for a transition to ecosystem-based management;
- Seeking stable and long-term funding to support operation of the IPC; and
- Collaborating on planning for a national symposium focused on climate change and indigenous coastal cultures.

Sanctuary management also relies on community and stakeholder involvement. In addition to working with the IPC, ONMS works closely with the OCNMS 21-seat Advisory Council (AC). The AC, established in 1996, consists of representatives from four Coastal Treaty Tribes, nine state and federal agencies, local governments, and a variety of local user and interest groups who provide advice to the Sanctuary Superintendent. All AC meetings are open to the public with agendas providing opportunity for public comment.

The AC provides advice to the OCNMS Superintendent on the management and protection of the sanctuary, and deliberates and provides recommendations on sanctuary operations, education and outreach programs, research and science programs, regulations and enforcement efforts, and marine policy and management plans. The AC also provides advice to ONMS on national and regional issues impacting the OCNMS such as ocean acidification. The AC has played a vital role in decisions affecting Olympic Coast marine resources. To date, the AC has focused on issues such as oil spill preparedness and prevention, vessel traffic measures, fiber optic cables, alternative energy and military activities within the sanctuary. The AC has also helped define research and educational programmatic priorities. Both the AC and the IPC have been invaluable in guiding the MPR process.

Not only is OCNMS management based on a collaborative, community-based framework, but OCNMS managers also participate on a larger regional and national stage acting as key players in a variety of statewide, regional and international collaborative ocean management frameworks. The West Coast Governor's Agreement on Ocean Health, the Washington Ocean Action Plan and the Juan de Fuca International Marine Ecosystem Initiative are all ocean management frameworks within which OCNMS plays an important role. In this way, the FMP complements and emphasizes the importance of these larger collaborative frameworks.

List of Advisory Council (AC) seats and their voting status

Makah Tribe	Voting
Quileute Tribe	Voting
Hoh Tribe	Voting
Quinault Indian Nation	Voting
Citizen-at-large	Voting
Education	Voting
Research	Voting
Conservation/Environmental	Voting
Chamber of Commerce, Tourism, Recreation	Voting
Marine Business/Ports/ Industry	Voting
Commercial Fishing	Voting
Washington Department of Ecology	Voting
Washington Department of Natural Resources	Voting
Washington Department of Fish and Wildlife	Voting
Local Counties (rotating seat)	Voting
Northwest Straits Commission	Non-voting
U.S. Department of Homeland Security/ U.S. Coast Guard	Non-voting
Olympic National Park	Non-voting
Washington Maritime National Wildlife Refuge Complex	Non-voting
NOAA National Marine Fisheries Service	Non-voting
U.S. Navy	Non-voting

1.4. OCNMS GOALS AND OBJECTIVES

As part of the MPR process, OCNMS worked with the AC and IPC to revise its goals and objectives. The revised goals and objectives presented below were adopted by OCNMS in September 2009 (Table 1).

Table 1 Olympic Coast National Marine Sanctuary Goals and Objectives

Goals and Objectives	
A. Build and strengthen OCNMS' partnerships with the coastal treaty tribes and the Olympic Coast Intergovernmental Policy Council (IPC), and honor the sanctuary's treaty trust responsibility.	
	Objective 1: Promote a transparent, cooperative and coordinated management structure for Olympic Coast marine resources within tribal, state and federal jurisdictions.
	Objective 2: Work with the four coastal treaty tribes to improve the government-to-government consultation process.
	Objective 3: Work collaboratively with the IPC to identify common goals and reach consensus on management priorities within the boundaries of the OCNMS for the protection, management and sustainable use of natural resources, and the promotion of educational opportunities and scientific research.
	Objective 4: Work with the IPC to improve communication and facilitate the exchange of information to foster more effective decision-making.
B. Promote collaborative and coordinated management and stewardship of resources in the sanctuary.	
	Objective 1: Actively encourage the State, tribes, interested agencies, coastal communities, and organizations to partner in addressing specific sanctuary management concerns, joint work on action plans, and marine stewardship and sustainable use opportunities.
	Objective 2: Improve intra-agency partnerships within the National Oceanic and Atmospheric Administration.
	Objective 3: Create linkages between OCNMS' action plans and ocean initiatives of other entities.
	Objective 4: Maintain and support the OCNMS Advisory Council.
C. Investigate and enhance the understanding of ecosystem processes, and inform ecosystem-based management efforts, through scientific research, monitoring, and characterization.	
	Objective 1: Understand the effects of changing climate and ocean conditions on sanctuary ecosystems.
	Objective 2: Monitor key resources within the sanctuary to identify significant changes over time.
	Objective 3: Characterize and map the sanctuary's species and habitats.
	Objective 4: Promote more informed management by improving opportunities and mechanisms for sharing scientific data and research results.
	Objective 5: Collaborate with the IPC and coastal treaty tribes on research and monitoring activities within the tribes' usual and accustomed areas.
	Objective 6: Promote and coordinate scientific research in the sanctuary in collaboration with others.
D. Enhance Ocean Literacy, promote awareness of the sanctuary and foster a sense of ocean stewardship	

through outreach, education, and interpretation efforts.	
	Objective 1: Collaborate to enhance K-12 and adult education programs on the Olympic Peninsula related to marine ecology and conservation.
	Objective 2: Promote and support community-based conservation and education efforts.
	Objective 3: Improve the public's understanding of coastal tribal cultures and awareness of the sanctuary and its marine ecosystem.
E. Maintain the sanctuary's natural biological diversity and protect, and where appropriate, restore and enhance sanctuary ecosystems.	
	Objective 1: Work collaboratively with strategic partners to conserve natural habitats, populations, and ecological processes by preventing, minimizing and/or mitigating stressors on resources in the sanctuary.
	Objective 2: Actively participate in regional spill prevention, contingency planning, emergency response, damage assessment, and restoration activities.
	Objective 3: Develop and maintain permitting and enforcement programs and partnerships to maximize protection of resources in the sanctuary.
	Objective 4: Promote marine debris removal in coordination with federal, state, local, and tribal authorities and volunteer organizations.
F. Enhance understanding and appreciation of the Olympic Coast's maritime heritage (living cultures, traditions, and cultural resources).	
	Objective 1: Map and interpret cultural resources in the sanctuary.
	Objective 2: Improve understanding of and education about regional tribal cultures.
	Objective 3: Incorporate local and customary knowledge into sanctuary programs.
G. Facilitate wise and sustainable use in the sanctuary to the extent that such uses are compatible with resource protection.	
	Objective 1: Assess, monitor and manage, as appropriate, levels of human use in the sanctuary.
	Objective 2: Create and support programs and strategies that protect tribal welfare.
	Objective 3: Understand the sanctuary's socioeconomic values.
H. Build, maintain, and enhance an operational capability and infrastructure.	
	Objective 1: Ensure that OCNMS regulations are consistent with other sanctuaries, where appropriate.
	Objective 2: Pursue the infrastructure improvements and staffing increases necessary to achieve the work identified in the management plan.
	Objective 3: Identify strategies to minimize the contribution of sanctuary operations to climate change.
	Objective 4: Support and expand volunteer opportunities at the sanctuary.
	Objective 5: Improve communication and collaboration between sanctuaries to share best practices.

2. TREATY TRUST RESPONSIBILITY

From left, Vivian Lee, Hoh tribal chairman; Micah McCarty, Makah tribal chairman; Washington Gov. Chris Gregoire; Daniel Basta, director of NOAA's Office of National Marine Sanctuaries; Scott Rayder, NOAA Chief of Staff (standing); Chris Morganroth, Quileute tribal policy representative; and Fawn Sharp, Quinault Indian Nation tribal chairman complete the signing of the charter to create the Intergovernmental Policy Council (May 2007)

This section was prepared by a working group of tribal and NOAA ONMS representatives to provide background information for NOAA's policies, operations, program planning and program implementation that assists in satisfying the requirements of the federal trust responsibility to the sovereign tribal governments of the Hoh, Makah, Quileute tribes and the Quinault Nation (collectively the Coastal Treaty Tribes).

NOAA seeks to work directly with the Coastal Treaty Tribes on a government-to-government basis to promote a healthy ecosystem in the waters adjacent to the Olympic Peninsula for the support and enhancement of tribal treaty rights and resources, cultural resources and activities, tribal self-determination and sovereignty. In addition, NOAA supports and works with the Olympic Coast Intergovernmental Policy Council (IPC) to obtain guidance and the collective views of the Coastal Treaty Tribes and the state of Washington on maintaining a healthy marine ecosystem in the waters off the Olympic Peninsula for the benefit of all citizens and for future generations. NOAA believes these activities are mutually supportive of both the federal government's treaty trust responsibility as well as its responsibilities under the National Marine Sanctuaries Act (NMSA).

2.1. COASTAL TREATY TRIBES, THE TREATY RIGHT TO FISH, AND THE MAGNUSON-STEVENS FISHERY CONSERVATION ACT

The marine ecosystem off the Olympic Peninsula provides habitat for a wide variety of marine and terrestrial birds, fish, mammals and plants. Through treaties with the United States, the Coastal Treaty Tribes reserved hunting, fishing, and gathering rights to access and utilize the plants, mammals, fish and other resources of the Olympic Peninsula and its adjacent waters in their respective treaty areas in perpetuity. The marine ecosystem and its associated natural resources form an essential foundation for the economies and cultures of the Coastal Treaty Tribes, and the Coastal Treaty Tribes view the continued ability to harvest and utilize water, plants, mammals, fish and other resources of this region as being critical to the protection of their treaty rights and the continuity of their distinct societies.

The treaties of the Coastal Treaty Tribes are part of the "Stevens treaties." These treaties were negotiated in the mid-1850s throughout the lands that are now western Washington with Governor of the Washington territory, Isaac Stevens. The 1855 Treaty of Neah Bay with the Makah Indian Tribe and the 1855 Treaty of Olympia with the Hoh Indian Tribe, Quileute Indian Tribe and the Quinault Indian Nation govern the relationships between the federal government and the Coastal Treaty Tribes.

In the 1970s American Indian tribes in the state of Washington sought to have greater access to their treaty resources and uphold their treaty rights in federal court. The outcome of this arduous legal path re-established these treaties as the supreme law of the land and culminated in the seminal case of *United States v. Washington*, written by Judge George Boldt and often referred to as the "Boldt" decision. (*U. S. v. Washington*, 384 F. Supp. 312, 353(W.D. Wash. 1974), *aff'd* 520 F.2d 676 (9th Cir. 1975), *aff'd sub nom. State of Washington et al. v. Washington State Commercial Passenger Fishing Vessel Association et al.* 443 U.S 658, 99 Ct. 3055 (1979)). In arriving at the decision upholding the treaty rights, Judge Boldt traced the history of the salmon fishing tribes of the state of Washington to treaty-time signing periods. Judge Boldt's decision recounts:

> *"From the earliest known times, up to and beyond the time of the Stevens' treaties, the Indians comprising each of the treating tribes and bands were primarily a fishing, hunting, and gathering people dependent almost entirely upon the natural animal and vegetative resources of the region for their subsistence and culture."* 384 F. Supp 312, 406 (W. D. Wash. 1974)
>
> *"The treaty-secured rights to resort to the usual and accustomed places to fish were a part of larger rights possessed by the treating Indians, upon the exercise of which there was not a shadow of impediment, and which were nor much less necessary to their existence than the atmosphere they breathed. The treaty was not a grant of rights to the treating Indians, but a grant of rights from them, and a reservation of those not granted."* 384 F. Supp. 312, 407 (W. D Wash. 1974).

The treaty right to fish is constrained only by the requirement to ensure fishery resources are preserved and maintained. *U.S. v. Washington,* 384 F. Supp. 312, 402 (W.D. Wash. 1974). Further, the Coastal Treaty Tribes' fishing rights are:

> *" …not limited as to species of fish, the origin of fish, the purpose or use, or the time or manner of taking except to the extent necessary to achieve preservation of the resource and to allow non-Indians an opportunity to fish in common with treaty right fishermen outside the reservation boundaries."* 384 F. Supp. 312, 401(W.D. Wash. 1974).

The state of Washington may regulate tribal fisheries only in very limited circumstances:

> *"The State's police power to regulate the off-reservation fishing activities of members of the treaty tribes exists only to the extent necessary to protect the fishery resource. This power does not include the authority to impair or qualify the treaty right by limiting its exercise to State-preferred times, manners or purposes except as such limitations may be necessary for preservation of the resource and protection of the interests of all those entitled to share it. This power does not include the power to determine for the Indian tribes what is the wisest and best use of their share of the common resource."* 384 F. Supp. 401-402. (W.D. Wash. 1974).

Circumstances under which the United States may limit the exercise of the treaty right are broader than the State's. Congress has plenary authority to modify the exercise of American Indian treaty rights through the enactment of laws and statutes, subject to Constitutional limitations. The federal courts are very reluctant to interpret federal statutes as abrogating or modifying an Indian treaty absent an explicit statement by Congress to do so. In its role as co-manager of the ocean fisheries, the United States acts in concert with the Coastal Treaty Tribes to preserve and maintain marine resources for future generations.

Because the Coastal Treaty Tribes' right to fish is held "in common with" the non-Indian citizens of present-day Washington and Oregon, Judge Boldt determined the tribes are "co-managers" of the fishery resource (*U. S. v. Washington,* 384 F. Supp. 312, 403 (W. D. Wash. 1974)). Thus, each of the Coastal Treaty Tribes regulates and controls tribal fishing at its usual and accustomed grounds in accordance with tribal law and judicially prescribed fishery management responsibilities, maintains its own fisheries management and enforcement staff, enters into management agreements with other co-managers, and engages in a wide variety of research, restoration and enhancement activities to improve the scientific basis for resource stewardship.

In state waters, the Coastal Treaty Tribes are co-managers of the fishery with the state of Washington. In federal waters (beyond three miles off shore), the Coastal Treaty Tribes are co-managers with the federal government through the implementation of the Magnuson Stevens Fishery Conservation Act (Magnuson Stevens Act; 16 U.S. 1801et seq.*)* by NOAA's National Marine Fisheries Service (NMFS). This tribal/federal/state co-management framework has evolved as a reliable planning forum for all aspects of fishery

management, including but not limited to planning harvest time, place and manner, and constraining fishing mortality. The co-managers are charged with the responsibility for managing all aspects of fishery resources and for coordinating their efforts through the development, adoption and implementation of fishery management plans under the Magnuson Stevens Act. The NMSA provides authority for the ONMS to regulate activities in marine sanctuaries for comprehensive and coordinated conservation and management in a manner which complements existing regulatory authorities (15CFR 922.2(b)(2)) and to develop and implement coordinated management plans for the protection and management of the sanctuary together with the state of Washington and the Coastal Treaty Tribes (15 CFR 922.2(b)(6)).

Over the years, the federal courts have become the chief protectors of the exercise of American Indian treaty rights and many cases and sub-proceedings have been brought in Washington and Oregon courts to interpret tribal rights under the Stevens' treaties. In the 1990s, the United States Government, in exercise of its trust responsibility, asked the federal courts to establish the rights of Stevens' treaty tribes in western Washington to access shellfish beds across private lands and to an equitable harvest of the shellfish resource (*U. S. v Washington,* 873 F. Supp. 1422 (W. D. Wash. 1994), *aff'd in part, rev'd in part,* 135 F.3d 618 (9th Cir. 1998), *amended* 157 F. 3d 630 *(9th* Cir. 1998), *cert. den.,* 526 U.S. 1060 (1999)). The resulting decision established the tribal right to harvest not just shellfish, but also any species of fish, finned or not finned, in the usual and accustomed area of a tribe. In recent years, the United States has sought to ensure the State of Washington does not allow the treaty fishery resource to be adversely impacted by state-sanctioned activities impeding fish migration and production and diminishing the available fish resource (*U. S. v Washington,* (CV9213RSM August 22, 2007) 2007 WL 2437166 (W. D. Wash. 2007) (also known as the Culverts Case)).

2.2. OCNMS AND TRIBAL TRUST AND TREATY RESPONSIBILITIES

NOAA's implementation of the NMSA and its duty to implement the federal trust responsibility toward American Indian tribes complement and support one another. The purposes and policies of the NMSA include the following, *"to maintain the natural biological communities in national marine sanctuaries, and to protect, and where appropriate restore and enhance natural habitats, populations, and ecological processes."* This statutory mission supports NOAA's implementation of its trust responsibility for the protection of treaty trust resources, tribal access to treaty resources and the sustainable development of treaty rights. One of the purposes and policies of the NMSA is *"to develop and implement coordinated plans for the protections and management of [sanctuaries] with …Native American Tribes and organizations…and other public and private interests concerned with the continuing health and resilience of these marine areas."* This policy statement in the NMSA supports OCNMS' efforts to defer to tribal management plans that achieve the statutory mission and obligations of OCNMS.

Finally, the NMSA's objective *"to facilitate to the extent compatible with the primary objective of resource protection, all public and private uses of the resources of"* national

marine sanctuaries supports implementation of NOAA's trust responsibility to protect the exercise of treaty rights, now and in perpetuity. The NMSA and the federal trust responsibility provide one basis, among many, for the determination OCNMS regulations do not restrict the ability of Coastal Treaty Tribes to exercise their treaty protected rights (15 CFR 122.152(f)). The Coastal Treaty Tribes and NOAA strive to develop joint activities and projects, and to engage in the collaborative development and implementation of coordinated plans for the management and protection of treaty resources, to ensure resilience of those resources, and to promote the continuing health of the OCNMS ecosystem.

In summary, to the extent consistent with federal law, NOAA implements its trust responsibility toward the Coastal Treaty Tribes and discharges its statutory mission under the NMSA to:

- Protect and conserve treaty trust resources;
- Protect the exercise of treaty rights by the Coastal Treaty Tribes;
- Support the development of and deference to tribal treaty resource management plans meeting the objectives of the NMSA; and
- Consult with the Coastal Treaty Tribes on a government-to-government basis when proposing to take an action that may affect treaty resources or tribal treaty rights or resources of cultural or historical significance (15 CFR 922.153(g)(h)).

2.3. CONSULTATION WITH COASTAL TREATY TRIBES

Executive Orders 12875 and 13175 (Appendices D and I) direct federal agencies to consult with Native American tribes on a "government-to-government" basis when proposing to take an action affecting tribal sovereignty or tribal trust resources or tribal treaty rights. Executive Order 13175 also requires federal agencies to encourage American Indian tribes to develop their own policies to achieve program objectives, defer to tribally established standards, and preserve the prerogatives and authority of Indian tribes to the extent permitted by federal law. Executive Order 12898 (Appendix E) on Environmental Justice, specifies that federal agencies must ensure that environmental justice requirements are applied to American Indian tribes and their subsistence consumption of fish and wildlife. These policies are also reflected in the *Department of Commerce American Indian and Alaska Native Policy, 1995* (Appendix J) and in *Secretarial Order 3206, American Indian Tribal Rights, Federal-Tribal Trust Responsibilities and the Endangered Species Act* (Appendix F).

Whenever it is determined by a Coastal Treaty Tribe or NOAA that actions proposed or authorized by the NMSA may impact tribal trust resources, the exercise of tribal treaty rights, Indian lands, or tribal self- government and determination, NOAA will consult with, and seek the participation of, the affected Coastal Treaty Tribe(s) in accordance with the executive orders and other agency guidance relating to such consultation.

2.4. TRIBAL CONSULTATION PROCEDURES

Tribal consultations are planned, structured meetings between the OCNMS superintendent or Director of ONMS and the affected tribe(s) or their designees. They refer to meetings, either in person or via phone/video teleconference, between officials of ONMS and the affected tribe(s) or their designees, which are planned, structured and understood by both parties to be consultation. Communications outside of consultation meetings may be part of the overall consultation process, but these communications are not consultations themselves.

As used in this document, tribal consultation means the process of seeking, discussing, and considering the views of the tribal government(s) at the earliest time in ONMS' decision-making about the management of OCNMS. Tribal consultation is more than simply providing information about what ONMS is planning to do and allowing comment. Rather, tribal consultation means respectful, meaningful, and effective two-way communication that works towards the goal of consensus reflecting the concerns of the affected Coastal Treaty Tribe(s) before ONMS makes its decision or moves forward with its action. The objective is to promote cooperative decision making on activities that may impact treaty trust resources or the exercise of tribal rights on American Indian lands and waters.

Individual Coastal Treaty Tribes may choose to work with ONMS to develop more specific, individually defined tribal consultation procedures beyond those outlined here. The tribal consultation procedures outlined above reflect the guiding objective and basic process that will be enacted. These procedures may be modified as a result of the Department of Commerce Consultation Procedures initiative being conducted in response to Executive Order 13175 (Appendix I).

3. PURPOSE AND NEED FOR REVISING THE MANAGEMENT PLAN AND REGULATIONS

3.1. PURPOSE

The purpose for taking action to address the need described below is derived principally from the National Marine Sanctuaries Act (NMSA) and the goals and objectives for Olympic Coast National Marine Sanctuary (OCNMS).

3.1.1. National Marine Sanctuaries Act (NMSA)

The NMSA (16 U.S.C. § 1431 et seq.) is the legislative mandate governing the Office of National Marine Sanctuaries (ONMS) and the National Marine Sanctuary System (NMSS). Under the NMSA, the Secretary of Commerce is authorized to designate and manage areas of the marine environment as national marine sanctuaries. Such designations are based on attributes of special national significance, including conservation, recreational, ecological, historical, scientific, cultural, archaeological, educational, or aesthetic qualities. With the primary mandate to provide protection for the resources of these special ocean and Great Lakes areas, the NMSA identifies nine purposes and policies[1]:

> (1) To identify and designate as national marine sanctuaries areas of the marine environment which are of special national significance and to manage these areas as the National Marine Sanctuary System;
>
> (2) To provide authority for comprehensive and coordinated conservation and management of these marine areas, and activities affecting them, in a manner complementary to existing regulatory authorities;
>
> (3) To maintain the natural biological communities in the national marine sanctuaries, and to protect, and, where appropriate, restore and enhance natural habitats, populations and ecological processes;
>
> (4) To enhance public awareness, understanding, appreciation, and wise and sustainable use of the marine environment, and the natural, historical, cultural and archeological resources of the National Marine Sanctuary System;
>
> (5) To support, promote and coordinate scientific research on, and long-term monitoring of, the resources of these marine areas;

[1] The purposes and policies of the NMSA have changed over time. They are presented here in their current form. Since NOAA designated OCNMS in 1994, the purposes and policies have been changed twice (1996 and 2000).

(6) To facilitate to the extent compatible with the primary objective of resource protection, all public and private uses of the resources of these marine areas not prohibited pursuant to other authorities;

(7) To develop and implement coordinated plans for the protection and management of these areas with appropriate Federal agencies, state and local governments, Native American tribes and organizations, international organizations, and other public and private interests concerned with the continuing health and resilience of these marine areas;

(8) To create models of, and incentives for, ways to conserve and manage these areas, including the application of innovative management techniques; and

(9) To cooperate with global programs encouraging conservation of marine resources.

The NMSA also states the ONMS shall "maintain for future generations the habitat and ecological services of the natural assemblage of living resources that inhabit [sanctuaries]" (16 U.S.C. 1431 et seq., §301(a)(4)(A),(C)). The NMSA further recognizes "while the need to control the effects of particular activities has led to enactment of resource-specific legislation, these laws cannot in all cases provide a coordinated and comprehensive approach to the conservation and management of the marine environment" (16 U.S.C. 1431 et seq., §301(a)(3)). Accordingly, the ONMS subscribes to a broad and comprehensive management approach to meet the NMSA's primary mandate of resource protection. This approach differs from various other national and local agencies and laws directed at managing single or limited numbers of species, habitats, or specific human activities within the marine environment.

Sanctuary management, therefore, serves as a framework for providing long-term protection of a wide range of living and non-living marine resources, while allowing multiple uses of the sanctuaries to the extent that they are compatible with resource protection. The ecosystems managed by the ONMS span diverse geographic, administrative, political and economic boundaries. To comprehensively manage national marine sanctuaries, individually and as a system, strong partnerships between the ONMS and local, state and tribal governments, resource management agencies, the scientific community, stakeholders and the public at-large are needed to achieve the coordination and program integration called for by the NMSA. The proposed revised management plan would enable sanctuary staff to manage the ecosystem resources of the sanctuary more effectively and transparently by building stronger partnerships and providing the public with a management plan that identifies sanctuary priorities in great detail.

3.1.2. Olympic Coast National Marine Sanctuary

OCNMS encompasses approximately 2,408 square nautical miles of coastal and ocean waters and the submerged lands thereunder, off the central and northern coast of the state of Washington. In designating and managing OCNMS, NOAA's mission is to protect the Olympic Coast's natural and cultural resources through responsible stewardship; to conduct and apply research to preserve the area's ecological integrity and maritime heritage; and to promote understanding through public outreach and education. In preparation for a review of this management plan, OCNMS staff worked with the OCNMS Advisory Council (AC) and the Olympic Coast Intergovernmental Policy Council (IPC) to update the OCNMS goals and objectives, which are presented in section 1.3 of this document. The proposed revised management plan would more clearly align management priorities with the revised goals and objectives for the sanctuary.

3.1.3. Management Plan Review

New challenges and opportunities emerge with time. To ensure sanctuary management keeps up with the pace of change, Section 304(e) of the NMSA requires periodic updating of sanctuary management plans to re-evaluate site-specific goals and objectives and to develop management strategies and activities to ensure the sanctuary best protects its resources. As an outcome of the management plan review (MPR) process, NOAA may need to revise the regulations for the sanctuary to ensure they meet the sanctuary goals and objectives and the purposes and policies of the NMSA.

The Management Plan Review (MPR) process includes five fundamental steps:

1) Public scoping to identify a broad range of issues and concerns related to management of the sanctuary;
2) Analysis and prioritization of the issues raised during scoping;
3) Preparation of the draft management plan and relevant environmental analysis;
4) Public comment on the draft plan and environmental analysis; and
5) Revision and preparation of the final management plan and environmental analysis.

3.2. NEED

Since 1994, there have been several developments which make the revision of the original OCNMS management plan a necessity if OCNMS is to have a management plan meeting the requirements presented in section 3.1 (Purpose). The various needs for such a revised management plan are described below.

3.2.1. Outdated Management Plan

OCNMS' current management plan was drafted in advance of sanctuary designation in 1994. The current management plan was written to give broad, general direction for the formation of OCNMS' program areas. Many of the activities it describes are too general to provide useful guidance now OCNMS is over a decade old (e.g., "Focus and coordinate data collection efforts on the physical, chemical, geological and biological oceanography of the Sanctuary"). Sixteen years after sanctuary designation, OCNMS is in need of more refined and directed guidance.

Additionally, as our knowledge about the sanctuary and its resources has improved over the past 16 years, several topics have emerged that are not addressed in the current management plan. For example, the current management does not directly address cultural or maritime heritage resources, nor does it specifically acknowledge traditional ecological knowledge from American Indian cultures. It also does not mention or address ecologically important resources in the sanctuary that have only recently been discovered, such as deep sea corals.

3.2.2. Changes in Ocean Governance

Since 1994, there have been significant discussions focused on ocean governance issues nationwide in the United States, as well as regionally on the West Coast, statewide in Washington, and locally on the Olympic Coast. Resulting changes in local, state, regional and national frameworks for ocean governance are not reflected in OCNMS' current management plan.

In 2003 and 2004 two major commissions, the Pew Oceans Commission and the U.S. Commission on Ocean Policy, addressed diverse ocean issues including ocean governance. The reports produced by these commissions served as impetus for the governors of California, Oregon and Washington to develop the West Coast Governors' Agreement on Ocean Health, which was released on September 18, 2006 (http://westcoastoceans.gov/docs/WCOceanAgreementp6.pdf). This agreement launched a new, proactive, regional collaboration to protect and manage the ocean and coastal resources along the entire West Coast.

On December 31, 2006, the Washington State Ocean Policy Work Group, under direction from the Washington State Legislature completed the Washington Ocean Action Plan. Since that time the Governor's Office and state agencies have been acting on the plan's recommendations through the State Ocean Caucus. The State Ocean Caucus provides a way for state agencies to work together to prioritize activities and solve problems related to the ocean environment of Washington state.

In 2007 the Hoh, Makah, Quileute tribes, the Quinault Indian Nation, the state of Washington and OCNMS collaborated to form the Olympic Coast Intergovernmental Policy Council (IPC). The first of its kind in the nation, the IPC provides a regional forum for marine resource managers to exchange information, coordinate policies, and develop recommendations for resource management within the sanctuary.

On a local level, in 2009, the Washington Department of Fish and Wildlife, directed by the Washington State Legislature, worked with Washington's five coastal counties to create a Coastal Marine Resource Committee (MRC) Program. The goal of the MRC Program is to understand, steward, and restore the marine and estuarine ecological processes of the Washington coast in support of ecosystem health, sustainable marine resource-based livelihoods, cultural integrity, and coastal communities. Two of the coastal MRCs formed are adjacent to OCNMS: the North Pacific Coast MRC and Grays Harbor MRC. These

MRCs represent a new grassroots, local, community-based marine stewardship effort not envisioned in 1994.

While the original 1994 OCNMS management plan allows for OCNMS to pursue partnerships with other organizations and ocean management initiatives, by revising the management plan, OCNMS can elucidate more specifically its role in these multiple new collaborative ocean management frameworks in the Olympic Coast region.

3.2.3. Data Gaps

In September 2008 OCNMS published a Condition Report on the status and trends for resources within the sanctuary. This report found, in general, the resources within the sanctuary appear to be in good to fair condition, which may in large part be a reflection of the sanctuary's isolation from major urban areas and industrial complexes. The 2008 Condition Report also identified significant data gaps in existing knowledge about resources in the sanctuary. Currently only 25% of the seafloor habitat in the sanctuary has been accurately mapped and characterized. There is also limited understanding of some fisheries resources, current patterns of exploitation, and overall marine ecosystem functioning in the sanctuary. Furthermore, there is limited understanding of phenomena recently observed in the sanctuary (e.g., hypoxia, ocean acidification) that may be related to climate change. The Condition Report also emphasized the critical need for an ecosystem-based approach to research and monitoring in the sanctuary. While there was a general research and monitoring component in the original 1994 management plan, the data gaps identified in the 2008 Condition Report indicate a much more detailed and comprehensive suite of research and monitoring strategies are needed to guide management of OCNMS.

3.2.4. New Technologies

There have been significant improvements in technology related to habitat mapping, ocean exploration, water quality monitoring and other data collection efforts that have increased the capacity of NOAA and its partners' research and monitoring programs. None of these new technologies are mentioned in the original 1994 management plan. In revising the management plan, OCNMS can highlight these technologies and provide a more specific research plan for the next five to ten years.

3.2.5. Recent and Emerging Issues

Several ocean conservation and management issues currently at the forefront of discussions are not addressed in the 1994 management plan. These emerging issues include climate change, ocean acidification, ocean hypoxia, open ocean aquaculture, and alternative energy development. By revising the OCNMS management plan, NOAA will be able to address several of these issues directly.

In particular, the revised management plan includes a physical and chemical oceanography action plan placing a strong emphasis on ocean acidification and hypoxia research, as well as a climate change action plan. While the revised management plan does not include policies or regulations related to specific emerging ocean development uses, such as wave energy and open ocean aquaculture, it does include a regional ocean planning action plan,

as well as focused strategies for OCNMS permitting and enforcement programs. Rather than instituting new policies or regulations related to particular types of ocean development, OCNMS' revised management plan focuses on participation in emerging regional planning efforts in order to guide and locate ocean development projects in a manner that best protects marine ecosystems inside and adjacent to the sanctuary.

4. MANAGEMENT PLAN REVIEW PROCESS

Management Plan Review, or MPR, is the process by which ONMS reviews and revises the management plans for all national marine sanctuaries. A sanctuary management plan is a site-specific planning and management document that describes the goals, objectives and activities for a sanctuary, and guides future management activities. Sanctuaries are currently mandated under the National Marine Sanctuaries Act (NMSA) to review and, if necessary, revise their management plans on 5-year intervals.

4.1. OVERVIEW OF THE MPR PROCESS

Phases of the Management Plan Review Process

Phase I – Initiation (2005-2008)
Phase II – Project Planning (2005-2008)
Phase III – Public Scoping & Issues Analysis (2008-2010)
Phase IV – Develop Draft Management Plan (2010)
Phase V – Public Review (2011)
Phase VI – Issue Final Management Plan & Environmental Analysis (2011)

Olympic Coast National Marine Sanctuary's (OCNMS) MPR process consists of six distinct phases:

Phases I and II began in 2005, years before ONMS began the formal public scoping process. During Phases I and II, ONMS planned for the public phases of MPR by briefing the OCNMS Advisory Council (AC) on details of the MPR process, developing a communications plan for the MPR process, and developing a detailed MPR timeline and process outline. Additionally, during these early phases ONMS worked with the Coastal Treaty Tribes and the state of Washington to form the IPC in 2007. Early work of the IPC included discussions on the proposed MPR process and preliminary priority topics for MPR.

The final task in Phase II was the production of the 2008 OCNMS Condition Report (ONMS 2008). The Condition Report provided a summary of resources in the sanctuary, pressures on those resources, current resource conditions and trends, and management responses to the pressures that threaten the integrity of the sanctuary's marine environment. This report served as one source of background and supporting material for the MPR process.

Phase III, Public Scoping & Issues Analysis, was initiated when ONMS published a Notice of Intent (NOI) in the *Federal Register* (73 FR 53162; Appendix B) announcing a 60-day public comment period on the scope and need for conducting OCNMS' MPR. This NOI initiated the public portion of the MPR process. Phase III continued for 16 months after the

close of the public comment period to allow for in-depth public and stakeholder involvement in analyzing the comments received and developing a suite of priority issues to address in the revised management plan. Also during this phase, OCNMS went through a detailed priority issue analysis process with the AC and the IPC, which included a series of AC working group meetings and workshops to explore priority issues in greater detail.

The AC working groups and workshops involved over 100 subject area experts and interested members of the public. Through these meetings specific strategies and activities for the revised management plan were developed. The AC then reviewed these suggested strategies and activities, recommended minor changes and voted to forward them to the OCNMS Superintendent with a recommendation they be included in the revised management plan.

Phase IV of the MPR process focused on developing the Draft Management Plan (DMP), proposed regulatory changes and requisite environmental compliance documentation. ONMS took the strategies and activities forwarded by the AC, as well as some developed internally based on agency priorities, and shaped them into the 20 action plans provided in section 5.0 of the DMP. Staff also developed a draft environmental assessment (DEA) to analyze the environmental impacts of the DMP, as required under the National Environmental Policy Act (NEPA). Lastly, ONMS developed changes to the OCNMS regulations in order to implement several activities identified in the DMP. The regulatory changes were published separately through a notice of proposed rulemaking in the *Federal Register* (76 FR 2611). The publication of the DMP, DEA and the notice of proposed rulemaking marked the end of Phase IV of the MPR.

Phase V, public review of the DMP/DEA, occurred from January 14 to March 25, 2011 and included public hearings followed by Phase VI, finalization of the management plan and environmental compliance documentation which led to this final management plan and environmental assessment document (FMP/EA).. All documents produced as part of the MPR process can be found on-line at http://olympiccoast.noaa.gov/.

4.1.1. Public Involvement

There has been continual and significant public involvement in the MPR process and the development of the FMP. Nationwide, the ONMS MPR process is driven largely by the input of sanctuary advisory councils, members of the public and topic area experts. ONMS has strived throughout the MPR process to offer its partners and the public numerous opportunities to contribute to and shape the revised management plan.

During Phase III of MPR, Public Scoping and Issues Analysis, ONMS encouraged public involvement by:

- Hosting seven public scoping meetings in Port Angeles, Neah Bay, La Push, Westport, Ocean Shores, Olympia and Seattle;
- Holding a 60-day public comment period during which members of the public could submit MPR comments via e-mail, fax or letter;

- Hosting 23 additional public meetings related to MPR, including AC meetings, workshops and working group meetings;
- Posting approximately 20 updates to OCNMS' MPR Current Status website (http://olympiccoast.noaa.gov/) to keep the public informed about the MPR process;
- Sending approximately 20 updates to the OCNMS MPR listserv, which has over 1,000 members; and
- Making all MPR documents available on the OCNMS MPR Documents webpage in a timely manner (http://olympiccoast.noaa.gov/).

Public attendance at bi-monthly AC meetings has varied throughout the MPR process. Usually, a minimum of one or two members of the public were present at any given meeting. At meetings during which major MPR decisions were made, upwards of 20 members of the public attended. Additionally, a few individuals expressed participated in AC working group meetings and workshops held during Phase IV, development of the draft management plan.

Throughout phases III, IV and V, ONMS informed the public about MPR-related meetings by sending out press releases and listserv e-mails, and posting notices on its website in advance of every public meeting. Additionally, OCNMS staff actively sought out opportunities to present information about the MPR process at various public events and meetings. ONMS also produced and publicized numerous documents detailing each step in the MPR process so the public could stay informed as progress was made.

During Phase V, public review of the DMP/DEA, ONMS announced the availability of the DMP/DEA and Proposed Rule in a *Federal Register* notice, newspaper articles, web site updates and listserv e-mails. In addition, two public meetings were held in Port Angeles and Forks to provide opportunity for public comment.

4.2. MPR PRELIMINARY PRIORITY TOPICS

In preparation for the public scoping process, OCNMS staff and the IPC identified six topics anticipated to be high priorities for consideration during the MPR process. These preliminary priority topics were published in the Notice of Intent (Appendix B) initiating the public scoping period in order to share with the public the best professional judgment of OCNMS and the IPC on important issues needing to be considered during MPR, and to encourage public comments on specific issues. Preliminary priority topics were:

1. **Improved Partnerships**

   Recent initiatives for regional ocean management, including the formation of the IPC, the Washington Ocean Action Plan and the West Coast Governors Agreement on Ocean Health, provide the sanctuary with new opportunities to strengthen partnerships, particularly with the four Coastal Treaty Tribes and the state of Washington in their role as governments. OCNMS will work in active partnership to provide a more transparent,

cooperative and coordinated management structure of Olympic Coast marine resources within tribal, state and federal jurisdictions.

2. **Characterization and Monitoring**

   There is a need to develop an understanding of baseline conditions of marine resources and ecosystem functions of the sanctuary, and status and trends of biological and socioeconomic resources to effectively inform management. OCNMS, in conjunction with the IPC and other entities, will work to address these needs.

3. **Spill Prevention Contingency Planning and Response**

   The risk from vessel traffic and other hazards remains a significant threat to marine resources. The potential for a catastrophic oil spill remains a primary concern and while advances in maritime safety have been made since the sanctuary was designated, better coordination is needed for response to these threats. Oil spills cause immediate and potentially long-term harm to marine resources as well as socioeconomic impacts to coastal communities.

4. **Climate Change**

   Climate change is widely acknowledged, yet there is considerable uncertainty about current and future consequences at local, ecosystem and oceanic scales. Increased coordination and cooperation among resource management agencies is required to improve planning, monitoring and adaptive management to address this phenomenon.

5. **Ocean Literacy**

   Enhancing the public's awareness and appreciation of marine, socioeconomic, and cultural resources is a cornerstone of the sanctuary's mission. Recent regional initiatives offer opportunities for the sanctuary, in conjunction with the IPC and other entities, to expand education contributions and reach a larger audience.

6. **Marine Debris**

   Coastal marine debris is a persistent and poorly diagnosed problem within the sanctuary negatively impacting natural and socioeconomic resources and qualities.

ONMS clarified in the NOI the publication of these six preliminary priority topics in no way restricted the content and scope of comments the public could submit. ONMS encouraged members of the public to submit comments on any topic or issue that they felt was important for ONMS to address in its revised management plan. All of the six preliminary priority topics were retained in the FMP, though the topic titles and characterizations were modified as a result of public comment and the issue prioritization process.

4.3. SUMMARY OF PUBLIC SCOPING

The 60-day public scoping comment period was open from September 15 to November 14, 2008. A total of 166 people attended the seven public scoping meetings, and they provided 516 recorded comments. During the public scoping comment period, an additional 688 letters, e-mails and public comment forms were received, of which approximately 600 were from an e-mail campaign and included the same five comments.

Many of the letters and e-mails contained comments on multiple topics, which were separated for analysis. The total number of unique or individual comments analyzed by ONMS staff was 1,009 (516 from the public meetings and 493 from written comments). Staff summarized and analyzed these comments by grouping them under 37 topics (Table 2).

In December 2008, ONMS published on its website (http://olympiccoast.noaa.gov/) and presented to the AC and IPC:

1. All of the public comments received
2. A Scoping Summary describing the process by which the public comments were binned under the 37 public scoping topics, and showed which comments were binned under each topic
3. A Topic Analysis Report analyzing each of the 37 topics in greater detail and summarized the types of public comments submitted on each topic

Table 2 List of 37 topics raised during scoping

	Public Scoping Topics (in alphabetical order)
1	Administration - Flexibility to Respond to Emerging Issues
2	Administration -Infrastructure
3	Administration - Sanctuary Goals & Objectives
4	Boundary Adjustment
5	Climate Change
6	Collaborative and Coordinated Management
7	Community Outreach
8	Ecosystem Impacts of Fishing
9	Fisheries Stock Assessment
10	Habitat Characterization
11	Habitat Protection
12	Invasive Species
13	Living Resource Conservation
14	Living Resources Monitoring
15	Local and Customary Knowledge
16	Marine Debris - Abandoned Submerged Equipment
17	Marine Debris - Shoreline Clean-Up
18	Maritime and Environmental Safety - Harbors of Refuge
19	Maritime and Environmental Safety - Navigation
20	Maritime and Environmental Safety - Vessel Management
21	Maritime and Environmental Safety - Weather Forecasting
22	Maritime Heritage - Cultural Resource Management
23	Maritime Heritage - Living Cultures
24	Military Activities
25	Non-point Source Pollution
26	Ocean Literacy
27	Public and Private Resource Use - Commercial Development
28	Public and Private Resource Use - Compatibility Analysis
29	Public and Private Resource Use - Recreational Opportunities
30	Public and Private Resource Use - Socioeconomic Values & Human Use
31	Regulations, Permitting & Enforcement
32	Research to Support Ecosystem Management
33	Spill Prevention, Contingency Planning and Response
34	Treaty Trust Responsibility
35	Visitor Services
36	Water Quality Monitoring
37	Water Quality Protection

4.4. ISSUE PRIORITIZATION AND FINAL PRIORITY TOPICS

In January 2009, ONMS worked with the OCNMS AC and the IPC to begin the issue prioritization process, which was also part of Phase III, Public Scoping and Issues Analysis. To initiate this process, the AC hosted a two-day, facilitated Issue Prioritization Workshop in January 2009. IPC members were invited to participate along with AC members. The workshop was open to the public and members of the public were given several opportunities to comment during the workshop.

In preparation for the workshop, each AC seat was asked to score each of the 37 public scoping topics based upon 1) benefits to sanctuary resources, 2) urgency of the topic, 3) extent to which the topic advances the mission and goals of the ONMS, and 4) any limiting factors that could prevent ONMS from successfully addressing a topic. The compiled scores were reviewed by the participants at the workshop.

During the workshop, AC members made comments and suggestions about potential grouping/combining of topics, ways in which the topics should be characterized, and OCNMS' specific role in addressing the topics. By the end of the workshop, the AC had generated lists of 1) highest priority topics, 2) second-tier topics, 3) topics that should be grouped under other topics, and 4) topics that should not be addressed in the revised management plan. A detailed description of the workshop and its outcomes can be found in the AC Issue Prioritization Workshop Report published in March 2009 (http://olympiccoast.noaa.gov/).

After analyzing the workshop results, ONMS drafted a Priority Issue Work Plan. The aims of the Priority Issue Work Plan were to 1) identify the final list of priority topics to be addressed in the revised management plan, and 2) identify a suite of working groups and workshops supported by the AC through which each priority topic would be addressed in greater detail. The AC and IPC were intimately involved in developing the Priority Issue Work Plan, which went through several iterations of review. The final Priority Issue Work Plan was the result of a detailed, facilitated discussion between the AC, OCNMS staff and IPC representatives at the May 2009 AC meeting. At that time, all parties agreed on the final list of priority topics, as well as the working groups and workshops the AC would host and organize. The Priority Issue Work Plan was published on the OCNMS website in July 2009. (http://olympiccoast.noaa.gov/).

Final list of priority topics, which are described in the Priority Issue Work Plan as priority issues:

A. Fulfill treaty trust responsibility
B. Achieve collaborative and coordinated management
C. Conduct collaborative research, assessments and monitoring to inform ecosystem-based management
D. Improve ocean literacy
E. Conserve natural resources in the sanctuary
F. Understand the sanctuary's cultural, historical and socioeconomic significance

4.5. WORKING GROUPS AND WORKSHOPS

The final stage of Phase III (public scoping and issues analysis) involved the AC sponsoring several working groups and workshops to address the six priority issues identified in the Priority Issue Work Plan. AC members and IPC members, with support from OCNMS staff, hosted the working group meetings and workshops between July and December 2009. It should be noted some priority issues were addressed solely by OCNMS staff, who reported their findings to the AC for review and comment. Additionally, the working group addressing treaty trust responsibility was comprised solely of IPC and federal representatives (United States government, state of Washington, Hoh Tribe, Makah Tribe, Quileute Tribe and the Quinault Indian Nation). This group was not considered an AC working group and did not report to the AC. Below is a list of all the working groups and workshops, grouped under the six priority issues:

Working Groups and Workshops *Grouped under the six priority issues identified in the Priority Issue Work Plan*
Fulfill treaty trust responsibility
1. Governments Working Group: Treaty Trust Responsibility
Achieve collaborative and coordinated management
2. OCNMS Staff Working Group: Collaborative and Coordinated Management
3. OCNMS Staff Working Group: Sanctuary Operations
Conduct collaborative research, assessments and monitoring to inform ecosystem-based management
4. Advisory Council Working Group: Collaborative Research, Assessments and Monitoring to Inform Ecosystem-Based Management
Improve ocean literacy
5. Workshop: Ocean Literacy
Conserve natural resources in the sanctuary
6. Advisory Council Working Group: Spills Prevention, Preparedness, Response and Restoration
7. Advisory Council Working Group: Living Resources Conservation
Understand the sanctuary's cultural, historical and socioeconomic significance
8. Workshop: Maritime Heritage
9. Workshop: Socioeconomic Values of Resources in the Sanctuary

OCNMS staff worked with AC members to identify subject-area experts to participate in the working group meetings and workshops. All working group meetings and workshops were open to the public with the exception of the working group addressing treaty trust responsibility.

With the exception of the governments working group, which developed section 2.0 (Treaty Trust Responsibility) of this document, all working groups and workshop organizers submitted reports to the AC detailing their final recommendations and findings, including specific strategies and activities to be included in the revised management plan. Representatives from each working group and workshop presented their reports to the AC during its November 2009 and January 2010 meetings. All reports were published on-line (http://olympiccoast.noaa.gov/) in advance of the AC meeting at which they were presented.

The AC discussed each report and voted to forward all of the strategies and activities recommended by the working groups/workshops, with minor changes, to the OCNMS Superintendent with a formal endorsement and recommendation that they be included in the revised management plan. The AC's recommendations were published on-line (http://olympiccoast.noaa.gov/), along with a letter of support from the AC.

4.6. ACTION PLANS

OCNMS staff took the strategies and activities recommended by the AC and used them to develop a suite of 20 action plans:

A. Achieve Effective Collaborative and Coordinated Management

A1. *Collaborative and Coordinated Sanctuary Management Action Plan*
A2. *Community Involvement in Sanctuary Management Action Plan*
A3. *Sanctuary Operations Action Plans*

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*

C. Improve Ocean Literacy

C1. *K-12 Education Action Plan*
C2. *Higher Education Action Plan*
C3. *Visitor Services Action Plan*
C4. *Community Outreach Action Plan*

D. Conserve Natural Resources in the Sanctuary

D1. *Spills Prevention, Preparedness, Response and Restoration Action Plan*
D2. *Climate Change Action Plan*
D3. *Marine Debris Action Plan*
D4. *Wildlife Disturbance Action Plan*
D5. *Water Quality Protection Action Plan*
D6. *Habitat Protection Action Plan*
D7. *Regional Ocean Planning Action Plan*

E. Understand the Sanctuary's Cultural, Historical and Socioeconomic Significance

E1. *Maritime Heritage Action Plan*
E2. *Socioeconomic Value of Resources in the Sanctuary Action Plan*

ONMS staff presented the preliminary draft action plans to the AC and the IPC at their March 2010 meetings and received comments from both councils that were used to refine the action plans. Between spring and fall 2010, ONMS worked to develop the Draft Management Plan and Draft Environmental Assessment (DMP/DEA). The DMP/DEA was available for public comments from January through March 2011. The final management plan and environmental assessment (FMP/EA) presented here is based on the January 2011 DMP/DEA, modified after comments from the public, agencies and governments.

4.7. IMPROVING COLLABORATION THROUGH MPR PROCESS

One of the most beneficial aspects of the MPR process is it has given ONMS a vehicle through which to build stronger relationships with its partners. Throughout the MPR process, ONMS has focused on improving its communications and relationships with the IPC, the AC, each Coastal Treaty Tribe, the Pacific Fishery Management Council (PFMC), National Marine Fisheries Service (NMFS), Olympic National Park, the Washington Maritime National Wildlife Refuge Complex, the state of Washington Ocean Caucus, the local marine resources committees and a host of others.

ONMS has worked to make the MPR process transparent and inclusive of all interested partners with the goal of building the support necessary to implement the revised management plan in a collaborative manner. Given the multitude of jurisdictions overlaying the sanctuary and the paucity of resources of all agencies and organizations, successful marine conservation efforts in the sanctuary will require OCNMS to build long-term, trusting and functional partnerships allowing groups to pool resources, share information and manage ecosystems in an effective manner that protects our ocean resources for future generations.

During the MPR process, ONMS made great strides in improving relationships with its partners. ONMS is committed to maintaining and growing these relationships while it implements the management plan.

4.8. SCOPING IDEAS CONSIDERED BUT NOT DEVELOPED AS ALTERNATIVES

Most of the 37 topics identified through public scoping are addressed in some manner in the FMP (section 5). However, a few topics or particular aspects of topics raised by the public were not incorporated into the FMP or into the other alternatives analyzed in this document. In most cases, these scoping topics were eliminated from further consideration early in the MPR process. The reasons for their elimination are provided below. It should be noted any of these issues can be identified and considered again during future MPR cycles.

4.8.1. Boundary expansion

Several public comments requested NOAA expand OCNMS' boundary to include the Strait of Juan de Fuca or additional parts of the deep sea canyons on the western edge of the current sanctuary boundary. ONMS decided not to pursue boundary expansion because information on the characteristics of the deep sea canyons is not extensive. Thus, it is too early to say whether these canyons warrant inclusion in the sanctuary. The expansion of the sanctuary to include the canyons could be considered in the future when more information is available.

4.8.2. Alternative energy development

ONMS received many public comments on specific types of alternative energy development in the sanctuary (e.g., wave energy, wind energy). Some comments were supportive of alternative energy development in the sanctuary, and others were opposed. Because marine spatial planning efforts are just getting underway nationally and regionally, ONMS decided to address ocean energy activities under the broad topic of marine spatial planning, and developed a regional ocean planning action plan. ONMS plans to participate actively in state and regional ocean planning processes and believes alternative energy project siting is better addressed within the context of these larger-scale planning processes. In addition, ONMS would likely be involved in any offshore commercial development proposed within the sanctuary through the ONMS permitting process.

4.8.3. Compatibility determinations

One of the goals of the NMSA is to facilitate human uses in sanctuaries that are compatible with the NMSA's primary mandate of resource protection. ONMS received several public comments asking for clarification on which and to what extent different human uses are compatible with the goals and objectives of OCNMS.

OCNMS' existing permitting regulations and procedures already provide a framework for evaluation of compatibility of proposed activities in the sanctuary on a case-by-case basis. Thus, ONMS did not opt to pursue development of a detailed compatibility or more holistic determination process at this time.

4.8.4. No-take zones/marine reserves

ONMS received multiple public comments requesting the establishment of fishing and boating bans in the sanctuary, including "no-take zones," marine reserves, bottom trawling bans, and motorized boating bans. In general, these comments reflect a desire for stronger resource protection and conservation efforts in the sanctuary. In the FMP, ONMS has addressed the need for improved conservation and protection through seven action plans focusing on spills, climate change, marine debris, wildlife disturbance, water quality protection, habitat protection and regional ocean planning. Given the regulatory and political complexity of the process, ONMS decided it would not initiate action on or explore the specific topic of creating no-take zones or marine reserves (both terms describe areas where all extractive activities, including fishing, are prohibited) as part of this MPR process. ONMS is, however, working to identify locations of habitats in the sanctuary that are important for various life stages of fish and other marine organisms, will share this information with other management authorities, and will continue to work within the context of existing fishery management frameworks to ensure fishing practices are compatible with sustainable fisheries in the sanctuary.

4.8.5. Aquaculture ban

During the public scoping period, ONMS received comments requesting aquaculture be banned in the sanctuary. Some comments focused on the potential adverse impacts associated with farming Atlantic salmon, a non-native species. Since sanctuary designation no aquaculture permit applications have been received nor issued by the OCNMS Superintendent, and no aquaculture activities are known to occur within sanctuary boundaries.

ONMS has addressed one aspect of the aquaculture issue in alternative C (section 7), which includes the consideration of a regulatory ban on the introduction of invasive species in the sanctuary. Atlantic salmon and a few other cultured organisms are classified as invasive species by the state of Washington and, as such, project proposals with these species would receive rigorous scrutiny and installed facilities would require effective containment, as is the current practice in Washington state. Similar to the alternative energy topic, ONMS would treat any future aquaculture proposal as an offshore commercial development project that likely would be subject to the ONMS permitting process. It can be assumed any aquaculture project proposed in the sanctuary would require an ONMS permit based on OCNMS regulations related to seabed disturbance (for anchoring/mooring aquaculture structures) and discharge. While efforts are being made to develop aquaculture technologies not requiring seafloor anchoring (i.e., a project that may not be subject to ONMS permitting), such technologies are not widely used at this time and are unlikely to be technologically and/or economically feasible in the near future in the dynamic ocean conditions of the outer Washington coast. During review of an aquaculture project's permit application, ONMS would consider all the potential impacts of any proposed aquaculture operation. Therefore, ONMS did not pursue specific regulatory actions related to aquaculture in any of the alternatives in this document. In addition, appropriate siting for aquaculture projects should also be addressed in regional ocean planning processes, in

which ONMS intends to participate, and be guided by NOAA's Aquaculture Policy and Guidance issued in 2011 (NOAA 2011).

4.8.6. Harbors of refuge

ONMS received one public comment requesting harbors of refuge be established along the outer coast of Washington. In the context of oil spill response, a harbor of refuge is where a distressed, and possibly leaking, vessel goes to control the emergency situation and possibly limit environmental impacts of spilled oil. This issue was not considered in the management plan because there are no suitable locations for harbors of refuge in the sanctuary. Furthermore, this issue is being addressed by the Region 10 Regional Response Team/Northwest Area Committee.

5. FINAL MANAGEMENT PLAN

5.1. INTRODUCTION

The OCNMS Final Management Plan (FMP) is comprised of a series of 20 action plans (Table 3), which are grouped under five of the six priority issues. One priority issue, Fulfill Treaty Trust Responsibility, is not addressed directly through an action plan but is the sole focus of section 2 of this document.

Table 3 Olympic Coast National Marine Sanctuary Final Management Plan Action Plans

A. Achieve Effective Collaborative and Coordinated Management.	
	A1. Collaborative and Coordinated Sanctuary Management Action Plan
	A2. Community Involvement in Sanctuary Management Action Plan
	A3. Sanctuary Operations Action Plan
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
C. Improve Ocean Literacy	
	C1. K-12 Education Action Plan
	C2. Higher Education Action Plan
	C3. Visitor Services Action Plan
	C4. Community Outreach Action Plan
D. Conserve Natural Resources in the Sanctuary	
	D1. Spills Prevention, Preparedness, Response and Restoration Action Plan
	D2. Climate Change Action Plan
	D3. Marine Debris Action Plan
	D4. Wildlife Disturbance Action Plan
	D5. Water Quality Protection Action Plan
	D6. Habitat Protection Action Plan
	D7. Regional Ocean Planning Action Plan
E. Understand the Sanctuary's Cultural, Historical and Socioeconomic Significance	
	E1. Maritime Heritage Action Plan
	E2. Socioeconomic Values of Resources in the Sanctuary Action Plan

These action plans represent OCNMS' preferred alternative for its management plan revision and were analyzed as the preferred alternative in accordance with the National Environmental Policy Act (NEPA). Later in this document, sections 7 (Description of Alternatives) and eight (Environmental Consequences of Alternatives) specifically reference the strategies and activities described in the FMP as the "preferred" alternative (alternative B).

Regulatory changes ONMS proposed during the management plan review (MPR) process are included as activities in relevant action plans, and the environmental consequences of these regulatory changes are analyzed, as required under NEPA, in section 8 of this document.

In addition to the 20 action plans (section 5.2), section 5.3 provides a set of performance measures ONMS will use to assess its progress in implementing the new management plan. Section 5.4 provides cost estimates for each strategy for the first five years of management plan implementation; however, it is possible implementation of the management plan will extend beyond five years.

The suite of strategies and activities in this FMP is ambitious and anticipated to be more than can be accomplished with available resources. To accommodate uncertainties associated with future funding and staffing levels, section 5.5 provides an implementation table (Table 5) indicating which strategies will be high, medium, and low priorities for ONMS to implement under different budget scenarios.

5.2. ACTION PLANS

The twenty action plans outline the specific work ONMS will undertake over the effective life of this management plan, which is anticipated to be five to ten years. ONMS' ability to implement these action plans will depend primarily on its success in forming the necessary partnerships as well as the availability of required resources. Each action plan includes a common set of elements:

- Desired outcome statement;
- Links to relevant OCNMS goals (section 1.3) and other action plans;
- Background information on the topic and why it is priority for OCNMS;
- Strategies and activities; and
- List of key partners.

A. Achieve Effective Collaborative and Coordinated Management

A1. Collaborative and Coordinated Sanctuary Management Action Plan
A2. Community Involvement in Sanctuary Management Action Plan
A3. Sanctuary Operations Action Plans

Introduction
Collaboration and coordination are essential to achieving effective sanctuary management. Since OCNMS was designated in 1994, OCNMS management has fostered relationships with multiple government agencies, the Coastal Treaty Tribes, academic and educational institutions, local communities and groups involved in research, educational programming and resource protection efforts. The scope of these efforts has ranged from sharing information, to coordinating independent actions aimed at achieving a common goal, to developing close and durable partnerships. These efforts have enabled OCNMS management and its partners to accomplish far more than would have been possible by any single entity.

Throughout the MPR process, the AC, IPC and public have repeatedly expressed the need for improved collaboration and coordination between OCNMS and its multitude of partners. The three action plans presented here outline how OCNMS intends to improve and grow its relationships with other governments and government entities, non-government and grassroots organizations and local communities over the life of the management plan.

A1. Collaborative and Coordinated Sanctuary Management Action Plan

Desired Outcome: Improved communication, greater collaboration and stronger relationships between OCNMS and other agencies and governments with jurisdiction over resources in the sanctuary.

Links to Goals:

Goal A - Build and strengthen OCNMS' partnerships with the Coastal Treaty Tribes and the IPC, and honor the OCNMS' treaty trust responsibility.

Goal B - Promote collaborative and coordinated management and stewardship of resources in the sanctuary.

Background:

Almost all of OCNMS' research, education and stewardship efforts are done in collaboration with other agencies and organizations. Throughout the action plans there are references to collaborative and coordinated efforts associated with specific strategies and activities. This action plan, rather than calling out all of these project-level partnerships, instead focuses on how OCNMS will develop and improve its relationships with governments and government agencies at the leadership or management level.

The focus of this action plan is on partnerships with entities having jurisdiction over resources in the sanctuary (Figure 2) and with which OCNMS coordinates and collaborates at a managerial level, including the IPC, NMFS, U.S. Coast Guard, U.S. Navy, the National Park Service, which manages Olympic National Park (ONP), the U.S. Fish and Wildlife Service (USFWS), which manages the Washington Maritime National Wildlife Refuge Complex, and Canadian government agencies. Active collaboration with these organizations will provide a more transparent and inclusive structure for management of Olympic Coast marine resources that span tribal, local, state, federal and international jurisdictions.

During the MPR process, improving collaborative and coordinated sanctuary management repeatedly emerged as one of the highest priorities for OCNMS to address over the next five to ten years. Ongoing regional efforts such as the Washington Ocean Action Plan and the West Coast Governor's Agreement on Ocean Health also have a strong focus on improving collaboration and coordination in order to address the complexity and enormity of current ocean management issues.

Figure 2 Diagram showing jurisdictional boundaries within OCNMS.

Strategy CCM1: EXTERNAL EVALUATION

Evaluate the contribution of OCNMS' institutional relationships to the management of resources within OCNMS.

Activity A: Bring in an independent organization to conduct an external evaluation of OCNMS' institutional relationships in order to obtain fresh insights, and to assess and support programmatic improvements in management of resources in the sanctuary.

Activity B: Report to the IPC and AC on the findings of the evaluation, and seek advice on potential improvements.

Strategy CCM2: COASTAL TREATY TRIBES
Consult with the Coastal Treaty Tribes (Makah, Quileute and Hoh Tribes and Quinault Indian Nation) in accordance with Executive Order 13175, and partner with tribal staff members to address sanctuary projects and management issues that are of interest to the tribes.

Activity A: Consult early and often with the Coastal Treaty Tribes on any changes to OCNMS regulations that could affect the tribes.

Activity B: Ensure individual tribes are kept informed about sanctuary projects, permit applications and management issues of interest.

Activity C: Work with individual Coastal Treaty Tribes to develop more specific, individually-defined tribal consultation procedures beyond those outlined in section 2.4.

Strategy CCM3: OLYMPIC COAST INTERGOVERNMENTAL POLICY COUNCIL
Continue OCNMS' partnership with the IPC.

Activity A: Implement the ONMS-IPC Memorandum of Agreement (MOA) by supporting quarterly IPC meetings, including an annual meeting with the ONMS Director and OCNMS staff.

Activity B: The Sanctuary Superintendent will brief the IPC annually on the previous year's progress in implementing the OCNMS management plan and on proposed annual operating plan activities for the coming year.

Activity C: In 2012, the respective parties will review and update the ONMS-IPC MOA with the intent to initiate another five-year term.

Activity D: Collaborate with the IPC to develop a long-term research and monitoring plan that focuses on issue of mutual interest.

Strategy CCM4: WASHINGTON STATE
Support implementation of the Washington Ocean Action Plan (OAP), the West Coast Governor's Agreement on Ocean Health, and other applicable state initiatives.

Activity A: Provide staff support and other resources to support Washington Ocean Caucus efforts on the Olympic Peninsula.

Activity B: Meet at least once a year with the Washington state Ocean Caucus and OCNMS Advisory Council state representatives to discuss implementation of the OAP and OCNMS management plan. Identify how OCNMS research and conservation efforts can complement OAP implementation efforts.

Strategy CCM5: DEPARTMENT OF THE INTERIOR
Enhance partnerships with Department of the Interior agencies, particularly the National Park Service (NPS) which manages Olympic National Park (ONP), and the U.S. Fish and Wildlife Service (USFWS) which manages the Washington Maritime National Wildlife Refuge Complex (WMNWR).

Activity A: Meet with NPS and USFWS leadership no less than twice a year.

Activity B: On an annual basis review areas of existing and potential future collaboration.

Strategy CCM6: UNITED STATES COAST GUARD
Coordinate with the U.S. Coast Guard (USCG) on the protection and management of the Nation's coastal waters and marine resources within OCNMS.

Activity A: Meet annually with the USCG to discuss collaborative efforts undertaken as part of this strategy; jointly prepare an Annual Report on the previous year's activities; and prepare a work plan for the coming year.

Activity B: Work with the USCG to develop an orientation plan for USCG personnel on joint USCG and OCNMS issues and regulations.

Activity C: Review and update the OCNMS/USCG Memorandum of Agreement (MOA-2002-117) prior to its expiration date (September 30, 2012).

Strategy CCM7: UNITED STATES NAVY
Improve collaboration and coordination with the U.S. Navy.

Activity A: Coordinate with other NOAA agencies in providing NOAA comments on Navy environmental compliance documents.

Activity B: Periodically meet with the Navy to identify ways to share, combine and maximize resources to conduct mutually beneficial research activities (e.g., habitat mapping) and to identify additional sources of data that support OCNMS management (e.g., bathymetric data).

Activity C: Collaborate with the Navy to establish a mechanism through which the Navy and NOAA can work together on an ongoing basis to ensure Navy activities within OCNMS continue to be conducted in a manner that avoids to the maximum extent practicable any adverse impacts on resources in the sanctuary.

Strategy CCM8: NATIONAL MARINE FISHERIES SERVICE (NMFS)
Enhance ONMS' partnership with NMFS.

Activity A: Meet annually with NMFS Northwest Region and Northwest Fisheries Science Center leadership.

Activity B: Work with NMFS to ensure the Pacific Fishery Management Council is informed about relevant projects, events and issues in the sanctuary and vice-versa.

Activity C: Coordinate with NMFS on issues of common interest within OCNMS boundaries, particularly ecosystem and habitat related research, policy and management actions.

Activity D: On an annual basis, document areas of existing and potential future collaboration.

Strategy CCM9: OFFICE OF NATIONAL MARINE SANCTUARIES
OCNMS staff will fully participate as a member of the Office of National Marine Sanctuaries (ONMS).

Activity A: Participate in annual national and regional leadership and programmatic meetings**.**

Activity B: Respond to agency requests for data and information.

Activity C: Locally implement national and regional initiatives.

Activity D: Provide subject matter expertise to regional, national and international initiatives as appropriate.

Activity E: Request and apply national and regional subject matter expertise to OCNMS issues.

Strategy CCM10: CANADIAN GOVERNMENT
Work with Canadian government agencies to address transboundary issues.

Activity A: Work with US and Canadian agencies, Coastal Treaty Tribes and First Nations, and conservation organizations to identify opportunities for advancing ecosystem-wide protection, research, education and outreach programs initiatives within the Juan de Fuca Eddy International Marine Ecosystem.

Activity B: Work with Parks Canada and British Columbia Parks to evaluate options for improving transboundary coordination and cooperation on shared objectives with adjoining Canadian marine protected areas (Pacific Rim National Park Preserve and Race Rocks Ecological Reserve/Marine Protected Area), including potential designation as a sister sanctuary through the ONMS International Program.

Activity C: Work with Fisheries and Oceans Canada on maritime safety and oil spill response issues through the Canada/U.S. Cooperative Vessel Traffic Service and the Pacific States/British Columbia Oil Spill Task Force.

Links to Other Action Plans: Community Involvement in Sanctuary Management, Sanctuary Operations, Habitat Mapping and Characterization, Physical and Chemical Oceanography, Populations, Communities and Ecosystems, Data Management, Sharing and Reporting, K-12 Education, Higher Education, Visitor Services, Community Outreach,

Spills Preparedness, Prevention, Response and Restoration, Climate Change, Marine Debris, Wildlife Disturbance, Water Quality Protection, Habitat Protection, Regional Ocean Planning, Maritime Heritage, Socioeconomic Values of Resources in the Sanctuary

Key Partners: Parks Canada, British Columbia Parks, Fisheries and Oceans Canada, Big Eddy International Marine Ecosystem Initiative and member organizations, Hoh, Makah and Quileute tribes, Quinault Indian Nation, Northwest Indian Fisheries Commission**,** Washington Departments of Natural Resources Fish and Wildlife, and Ecology, Washington Governor's Office, Washington Ocean Caucus, Olympic National Park, Washington Maritime National Wildlife Refuge Complex, U. S. Coast Guard, U.S. Navy, NMFS-Northwest Region, Northwest Fisheries Science Center, Pacific Fishery Management Council, NOAA Office of National Marine Sanctuaries (ONMS) and the ONMS West Coast Regional Office

A2. Community Involvement in Sanctuary Management Action Plan

Desired Outcome: Increased involvement of Olympic Peninsula communities in sanctuary management issues and ocean conservation.

Links to Goals:
Goal B - Promote collaborative and coordinated management and stewardship of resources in the sanctuary.

Background:
In addition to strengthening its relationships with agencies and governments with jurisdictional authority over resources in the sanctuary, OCNMS also recognizes the importance of improving 1) its partnerships with local communities and non-governmental organizations and 2) the involvement of these groups (and individual citizens) in the sanctuary management process. As with the Collaborative and Coordinated Sanctuary Management Action Plan, this action plan focuses on building relationships and improving the sanctuary management process. Descriptions of specific, project-level partnerships with community groups (e.g., beach clean-up activities) appear in the appropriate, topical action plans (i.e., Marine Debris Action Plan).

OCNMS is mandated by the NMSA (Section 301(b)(7)) to involve communities and local organizations in the MPR process. The NMSA also mandates OCNMS involve local communities and groups in its Advisory Council (AC). Currently, the local county governments have a shared seat on the OCNMS AC, which also includes a citizen-at-large seat. Additionally, several other AC seats are currently filled by local community members who have expertise in particular fields such as education, tourism, commercial fishing and conservation.

During the public scoping phase of the MPR process, it became clear:

- OCNMS should work to improve local communities' awareness of the sanctuary,
- OCNMS should work to improve public involvement in the AC,
- OCNMS should work to involve local communities in developing and shaping OCNMS education, research and stewardship programs, and
- OCNMS programs would benefit from more overall success if local communities were more actively involved in implementing these programs.

Community involvement is increasingly recognized as crucial to achieving effective marine resource protection, which is the primary goal of the National Marine Sanctuaries Act. The state of Washington's recent initiative to empower and fund local counties to form Marine Resources Committees (MRCs) on Washington's outer coast underscores the importance of community-level involvement in ocean stewardship and conservation. MRCs are citizen-based organizations, the goal of which is to, "understand, steward, and restore the marine

and estuarine ecological processes of the Washington coast in support of ecosystem health, sustainable marine resource-based livelihoods, cultural integrity, and coastal communities." Other statewide and regional ocean conservation and management initiatives, including the West Coast Governor's Agreement on Ocean Health, the Washington Ocean Action Plan and the recently-passed state marine spatial planning bill, also emphasize active community involvement in ocean management decision-making processes. This action plan seeks to support these statewide and regional efforts and improve the sanctuary management process through more effective community partnerships and involvement. In addition to the strategies listed in this section, OCNMS work under Action Plan C, Improve Ocean Literacy, also directly benefits OCNMS community relations and strengthens community involvement in OCNMS activities.

Strategy COM1: ADVISORY COUNCIL
Involve local communities in sanctuary management issues through the AC process.

Activity A: Fill all AC seats (both voting and non-voting) and encourage improved AC member attendance.

Activity B: Encourage stronger connections between AC members and local communities by increasing AC outreach efforts.

- Encourage AC members to post links to their organizations' on-line calendars on the OCNMS website.
- Encourage every AC member to forward AC meeting announcements to their organization's distribution list.
- Encourage AC members to include articles explaining the value of their involvement in the AC in their organizations' outreach publications.
- Work with AC members and OCNMS to host and attend social events in local communities on the outer coast (e.g., an annual open house).

Activity C: Actively involve the AC in implementing the management plan.

- Identify strategies in the management plan that particular AC members, due to their skills and interests, could help OCNMS implement. Put these AC members in contact with the staff in charge of these strategies.
- Solicit the AC's assistance in implementing management plan strategies through the establishment of standing subcommittees or working groups, as appropriate under the AC charter.
- Annually report to the AC on management plan implementation, including status of performance measures.
- Encourage the AC to provide advice on the success of management plan implementation efforts.

Strategy COM2: MARINE RESOURCES COMMITTEES
Continue and expand collaborative marine stewardship efforts with Clallam, Jefferson and Grays Harbor counties.

Activity A: Participate in the North Pacific Coast Marine Resources Committee.

Activity B: Participate in the Grays Harbor Marine Resources Committee.

Strategy COM3: NON-GOVERNMENTAL ORGANIZATIONS
Continue and increase, to the extent practicable, collaborative efforts with non-governmental organizations on the Olympic Coast.

Activity A: Continue participation in/sponsorship of the Washington Clean Coast Alliance and the Coastal Observation and Seabird Survey Team (COASST).

Activity B: Maintain and develop partnerships with environmental NGOs such as Surfrider, The Nature Conservancy, Oceana, the Marine Biology Conservation Institute, Ecotrust and others in order to build support for marine conservation efforts in the sanctuary and the California Current ecosystem.

Activity C: Increase interactions and, if appropriate, develop partnerships with organizations representing commercial and recreational fishing industries and the shipping industry.

Links to Other Action Plans: Community Outreach, Marine Debris, Data Management, Sharing and Reporting, Climate Change, Habitat Protection, Regional Ocean Planning

Key Partners: Marine Conservation Institute, Surfrider Foundation, The Nature Conservancy, Oceana, Ecotrust, Olympic Coast Alliance, other NGOs, Westport Charterboat Association, Marine Exchange of Puget Sound, and other marine shipping and coastal fishing organizations, Olympic Coast National Marine Sanctuary Advisory Council and its members, North Pacific Coast and Grays Harbor marine resources committees, Clallam County, Jefferson County, Grays Harbor County

A3. Sanctuary Operations Action Plan

Desired Outcome: Improved efficiency and effectiveness in OCNMS management capacities and capabilities.

Links to Goals:
Goal H - Build, maintain, and enhance an operational capability and infrastructure.

Background:
In order to effectively achieve the strategies outlined in the other 19 action plans, OCNMS needs to maintain basic staffing, infrastructure and administrative functions. This action plan addresses these operational needs and details OCNMS' plans to maintain its research vessel and on-water capabilities, maintain and train its staff and volunteers, maintain adequate facilities and other infrastructure, complete its annual budgeting process, manage contracts, maintain its regulatory program and report on management plan implementation progress. In effect, this Sanctuary Operations Action Plan supports all other action plans in the Final Management Plan.

Strategy OPS1: VESSEL INFRASTRUCTURE AND OPERATIONS
Maintain an on-water presence in the sanctuary to ensure effective and efficient sanctuary operations, including research and education activities.

Activity A: Develop annual operational plans for aircraft and vessels (NOAA, charter) to support the revised management plan.

Activity B: Maintain and implement operational guidelines and a vessel operator and crew member qualification plan.

Activity C: Implement field operations to address activities identified in the other action plans.

Strategy OPS2: FACILITIES
Develop new and maintain current infrastructure for sanctuary offices, programs, research vessels, equipment, and field operations.

Activity A: Provide office, field station, interpretive facilities, and warehouse facilities.

Activity B: Update and implement the OCNMS long-range facilities plan. Evaluate OCNMS' current office, lab and warehouse space and determine if changes need to be made to the plan to meet program needs identified during MPR.

- Evaluate current office spaces to determine if they meet future needs as articulated in the revised management plan
- Evaluate the need to refurbish/replace OCNMS' Neah Bay field station
- Evaluate the need for laboratory infrastructure

- Evaluate OCNMS pier space needs
- Evaluate the need for public meeting space and support infrastructure
- Evaluate options for a satellite office on the Outer coast and/or a visitor center in the southern part of the sanctuary
- Evaluate options for a joint visitor center in Port Angeles with the Feiro Marine Life Center and Olympic National Park
- Explore opportunities to work with existing facilities on the outer coast, such as the University of Washington Olympic Natural Resources Center, in order to maintain an OCNMS staff presence on the outer coast

Activity C: Develop the infrastructure to support and implement OCNMS' long-range interpretive plan.

Activity D: Implement OCNMS requirements of ONMS small boats requirements studies, as amended (including scheduled replacements of *R/V Tatoosh* and rigid hull inflatable boat).

Strategy OPS3: ANNUAL PLANNING
Prepare annual budgets, and develop and implement annual operating plans (AOPs) in support of management plan activities.

Activity A: Produce an annual operating plan and budget, per ONMS guidance and timelines.

Activity B: Oversee budget, contracts and acquisitions in compliance with Federal Acquisition Regulations.

Activity C: Submit required reports to ONMS headquarters.

Strategy OPS4: SAFE OPERATIONS
Maintain and, where appropriate, further develop procedures to ensure safe and responsible sanctuary operations.

Activity A: Develop, maintain and periodically test an OCNMS continuity of operations plan.

Activity B: Ensure compliance with NOAA directives, safety and workplace regulations, including those related to vessel safety.

Activity C: Ensure compliance with NOAA directives and local, state and federal environmental compliance regulations.

Strategy OPS5: STAFFING
Recruit, retain and support staff in order to support ongoing programs and achieve the goals and objectives presented in the management plan.

Activity A: Support and maintain appropriate staffing to implement the OCNMS management plan.

Activity B: Contract for support services that cannot be filled by limited federal positions and are needed to implement the OCNMS management plan.

Activity C: Improve training opportunities for staff, prioritizing training that will support management plan implementation.

Activity D: Conduct an internal evaluation of the OCNMS information technology (IT) plan on an annual basis and work to ensure IT services are adequate to support staff and program needs.

Strategy OPS6: VOLUNTEER PROGRAM
Maintain and enhance OCNMS' volunteer programs in order to build connections with the community and achieve the goals and objectives of the management plan.

Activity A: Actively recruit and train volunteers to promote community stewardship and to assist in the implementation of the OCNMS management plan.

Activity B: Improve training opportunities for volunteers, prioritizing training to support management plan implementation.

Strategy OPS7: PERMITTING AND CONSULTATIONS
Implement the OCNMS permitting program based on OCNMS and national program regulations, guidance and performance measures; as well as other applicable laws, regulations and agreements.

Activity A: Review permit applications, conduct consultations with other agencies, governments and organizations, make permit decisions, develop appropriate documentation (may include permits, NEPA analysis, mitigation recommendations, and decision memos) and maintain records in the ONMS database.

Activity B: Brief the AC and IPC on major permit applications constituting new or major activities in the sanctuary.

Activity C: Report to the Coastal Treaty Tribes, AC and IPC annually on the status of permit applications and decisions to OCNMS and associated tribal consultations.

Activity D: Formally articulate the current tribal consultation process for permits.

Activity E: Work with the state and other interested agencies and/or Coastal Treaty Tribes to develop a programmatic agreement on how OCNMS interprets and meets the requirements of Section 106 of the National Historic Preservation Act in the context of sanctuary historic resources.

Strategy OPS8: VOLUNTARY COMPLIANCE
Promote knowledge and understanding of OCNMS regulations, along with other regulations and voluntary programs that apply to sanctuary waters.

Activity A: Assess opportunities for educational signage about regulations at access points to the sanctuary (e.g., Neah Bay and La Push boat ramps).

Activity B: Develop interpretive materials to support enforcement efforts and promote public awareness of sanctuary regulations.

Activity C: Distribute a flyer on the Area to Be Avoided to the maritime industry through direct mail and by including in the Vessel Traffic Service Puget Sound Users Manual.

Activity D: Develop and distribute education materials on OCNMS' overflight regulation at air shows and other events.

Strategy OPS9: ENFORCEMENT AND INCIDENT RESPONSE
Improve compliance with and enforcement of OCNMS regulations, other regulations, and voluntary programs that apply to sanctuary waters.

Activity A: Develop training opportunities for law enforcement professionals to promote and enhance their understanding of cultural and natural resources in the sanctuary and the regulations protecting them.

Activity B: Maintain bi-annual meetings with law enforcement staff (as described in the NMFS Office of Law Enforcement (OLE) 2009 report) and encourage increased presence of NOAA OLE and Washington Department of Fish and Wildlife (WDFW) law enforcement in the sanctuary.

Activity C: Work with NOAA OLE and the ONMS to clarify OCNMS enforcement needs as identified in 2010 ONMS/OLE 3-year Strategy for Clarifying Enforcement Needs and Testing Enforcement Measures.

Activity D: Promote active enforcement of the no-discharge regulation as it applies to abandoned vessels.

Activity E: Encourage vessel owners to carry insurance that would cover the salvage of their vessel if it sank in the sanctuary. Discuss sanctuary regulations and concerns with insurance companies to evaluate issues related to issuing insurance policies to cover salvaging of sunken vessels.

Activity F: Engage the USCG, at the earliest opportunity, to develop removal strategies for vessel incidents that may result in vessel sinkings within sanctuary and to utilize the Oil Spill Liability Trust Fund (OSLTF) to prevent or mitigate oil pollution impacts.

Activity G: Work with NMFS, Pacific Fishery Management Council, Coastal Treaty Tribes and other partners to monitor compliance with Essential Fish Habitat regulations in the sanctuary.

Activity H: Clarify ambiguous or confusing aspects of the OCNMS regulations, and delete extraneous clauses. These changes to OCNMS regulations are being made as a rulemaking *concurrently* with the publication of the FMP. Regulatory changes include the following:

- Replace the term "seabed" with the term "submerged lands" throughout the regulations to match the language used in the OCNMS designation document;
- Replace the term "traditional fishing" with "lawful fishing" throughout the OCNMS regulations;
- Delete the out-dated OCNMS address and replace it with OCNMS' current address;
- Delete reference to leases/permits existing at the time of OCNMS designation (as none were found to exist);
- Delete the term "federal project" from the definitions and replace this reference in the regulations with a reference to the specific "Quillayute River Project"; and
- Clarify treaty trust responsibility language.

Activity I: Respond to emergency incidents in the sanctuary, as appropriate.

Strategy OPS10: MANAGEMENT PLAN IMPLEMENTATION REPORTING
Establish reporting mechanisms/processes for management plan implementation and emerging issues.

Activity A: Report to partners and the public annually on the implementation of the management plan, particularly on performance measure achievement.

Activity B: Report to partners and the public annually on ONMS' response to emerging issues not anticipated in the management plan.

Activity C: Annually document any clarifications, lessons learned, enhancements or recommended changes to existing strategies and activities.

Activity D: Develop outreach materials to be used by OCNMS staff, AC and IPC members to convey information about management plan implementation to partners, stakeholders and constituent groups.

Activity E: Collaborate with regional natural resource management agencies to develop a response strategy or plan for unusual natural resource events (e.g., unexpected wildlife mortality events) not anticipated in the management plan.

Links to Other Action Plans: Collaborative and Coordinated Sanctuary Management, Community Involvement in Sanctuary Management, Habitat Mapping and Characterization, Physical and Chemical Oceanography, Populations, Communities and Ecosystems, Data Management, Sharing and Reporting, K-12 Education, Higher Education, Visitor Services, Community Outreach, Spills Preparedness, Prevention, Response and Restoration, Climate Change, Marine Debris, Wildlife Disturbance, Water

Quality Protection, Habitat Protection, Regional Ocean Planning, Maritime Heritage, Socioeconomic Valuation of Resources in the Sanctuary

Key Partners: Advisory Council, Olympic Coast Intergovernmental Policy Council, West Coast sanctuaries, Makah, Quileute, Hoh Tribes and Quinault Indian Nation, Office of National Marine Sanctuaries, NOAA Safety and Environmental Compliance Office , NOAA Small Boat Program, NOAA Workforce Management Office, NOAA Acquisition and Grants Office, Feiro Marine Life Center, Makah Cultural and Research Center, Ocean Shores Visitor Center, Grays Harbor Historical Seaport Authority, COASST, State of Washington, ONP, FWS, ACOE, USCG, NOAA Office of Law Enforcement, Aircraft Owners and Pilots Association, Washington Pilots Association and others, Washington Department of Ecology, NMFS, Washington Department of Natural Resources, Washington Department of Fish and Wildlife, Washington Department of Archeology and Historic Preservation

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

C. Improve Ocean Literacy

C1. K-12 Education Action Plan
C2. Higher Education Action Plan
C3. Visitor Services Action Plan
C4. Community Outreach Action Plan

Introduction
Enhancing the public's awareness and appreciation of natural and cultural resources is a cornerstone of OCNMS' mission, which follows directly from mandates of the NMSA. Over the next five to ten years, OCNMS, in partnership with the Coastal Treaty Tribes, non-tribal coastal communities, National Park Service, Seattle Aquarium, Feiro Marine Life Center, Ocean Shores Interpretive Center, E3 Washington, and others, proposes to continue and expand existing – and develop new – education and outreach programs around the concept of Ocean Literacy.

Ocean Literacy, broadly defined, is an enduring understanding of the ocean's influence on people and people's influence on the ocean in a manner encouraging lifelong attitudes of ocean resource stewardship and personal commitment. In addition to conveying information about the sanctuary's marine organisms, habitats and ecosystems, OCNMS' Ocean Literacy program will work collaboratively to convey information about

- Tribal culture and traditions, as well as treaty making and implementation
- Climate change and ocean acidification
- Cultural uses and socioeconomic values of sanctuary resources
- Ocean management and policy frameworks, such as ecosystem-based management
- Ocean stewardship

Each action plan in this grouping addresses a different sector of the public served by OCNMS programs: K-12 students, post-secondary students, local communities and visitors (including the general public outside the sanctuary region).

C1. K-12 Education Action Plan

Desired Outcomes: 1) Improved understanding by teachers and students of Ocean Literacy principles and the ocean's importance; and 2) K-12 students in the sanctuary region are better prepared to enter careers that require an understanding of Ocean Literacy.

Links to Goals:
Goal D - Enhance Ocean Literacy, promote awareness of the sanctuary and foster a sense of ocean stewardship through outreach, education, and interpretation efforts.

Background:
Engaging K-12 students and teachers in experiential education programs focused on the Olympic Coast marine environment is key to improving Ocean Literacy and fostering a lifelong respect for and understanding of the Olympic Coast and ocean ecosystems in general. The outer coast of the Olympic Peninsula is a remote and economically depressed region and the K-12 schools in the area do not have access to the resources necessary to provide students with hands-on marine science education.

OCNMS is one of a very few organizations on the Olympic Peninsula with staff expertise in both marine science and environmental education and thus it is crucial that OCNMS maintain and build upon its K-12 Ocean Literacy programs. OCNMS' collaborative K-12 Ocean Literacy programs have been incredibly successful and OCNMS receives more requests for programs than can be accommodated. Local schools are depending upon OCNMS to provide marine science and education programs, and OCNMS has both a strong obligation and interest in providing local students with hands-on opportunities to learn about the sanctuary.

Strategy ED1: K-12 PARTNERSHIPS
Work in partnership with regional education organizations in order to leverage resources for K-12 Ocean Literacy programs.

Activity A: Collaborate with partners, including recipients of NOAA funding (e.g., B-WET grants), to maximize the effectiveness of NOAA resources and promote the NOAA Strategic Education Plan.

Activity B: Promote education opportunities that bring NOAA science and education resources to educators and students in the region. These opportunities include, but are not limited to: Teacher At Sea, Get to Know NOAA, various data visualization products, and distance learning.

Activity C: Work directly with classroom teachers to integrate OCNMS and other Ocean Literacy programs into existing school curricula.

Activity D: Promote the Ocean Literacy goals and strategies in the West Coast Governors' Agreement on Ocean Health (which include incorporating Ocean Literacy into Washington State Learning Goals Standards).

Strategy ED2: PLACE-BASED EDUCATION
Work collaboratively with rural schools and tribal communities adjacent to the sanctuary and within the sanctuary region to develop place-based education opportunities for K-12 students.

Activity A: Work with school districts, tribal partners, home-school organizations in local communities, non-profit and other education organizations to design and implement program curricula to 1) meet education standards, 2) fulfill needs identified by regional educators and, 3) emphasize place-based and hands-on learning.

Activity B: Work with local area high schools to develop senior culminating projects that involve students in OCNMS programs, and engage the Pacific Education Institute in training OCNMS staff to be student mentors.

Activity C: Collaborate with local schools to develop student citizen science projects in and adjacent to the sanctuary (e.g. beach clean-ups).

Activity D: Develop summer youth programs and/or curricula to support summer youth programs.

Strategy ED3: REGIONAL INITIATIVES
Participate actively in relevant regional education organizations and initiatives.

Activity A: To the greatest extent feasible, participate in meetings, conferences and projects of the Pacific Education Institute, E3 Washington, the Northwest Aquatic and Marine Educators, the Environmental Education Association of Washington and the Washington Science Teachers Association.

Activity B: Work to promote regional environmental education initiatives in the sanctuary region (e.g., “no child left inside”).

Strategy ED4: TECHNOLOGY
Employ current and emerging technologies in order to make Ocean Literacy information and curricula more accessible and provide students with a richer educational experience.

Activity A: Enhance OCNMS website to be a source of Ocean Literacy information such as NOAA-authored educational/curriculum materials and news articles on ocean issues.

Activity B: Develop the capacity for high-quality video conferencing to enhance collaboration with partners and deliver education programming to geographically remote audiences.

Activity C: Work cooperatively with other sanctuaries, the Office of National Marine Sanctuaries and the National Estuarine Research Reserves to bring into classrooms live, interactive educational programs that utilize telepresence.

Links to Other Action Plans: Collaborative and Coordinated Sanctuary Management, Climate Change, Marine Debris, Wildlife Disturbance, Higher Education

Key Partners: Makah, Quileute and Hoh Tribes and the Quinault Indian Nation, Olympic Coast Intergovernmental Policy Council, Seattle Aquarium, Olympic Park Institute, Olympic National Park, North Pacific Coast and Grays Harbor marine resources committees, Feiro Marine Life Center, Port Townsend Marine Science Center, Port Angeles School District, Quillayute Valley School District, North Beach School District, Cape Flattery School District, Sequim School District, Quileute Tribal School, local home school organizations, University of Washington Olympic Natural Resources Center, West Coast Governors' Agreement on Ocean Health Ocean Awareness and Literacy Action Coordination Team, Washington State Ocean Caucus, Washington Sea Grant, North Olympic Skills Center, the Pacific Education Institute, Grays Harbor Historical Seaport Authority, Northwest Aquatic and Marine Educators, Environmental Education Association of Washington, Washington Science Teachers Association, Makah Cultural and Research Center, National Park Service Research Learning Centers, Office of National Marine Sanctuaries, other sanctuaries

C2. Higher Education Action Plan.

Desired Outcomes: 1) OCNMS becomes a catalyst for higher education opportunities in marine fields; and 2) post-secondary students in the sanctuary region have greater access to career-building opportunities in ocean research, education, policy and management

Links to Goals:
Goal D - Enhance Ocean Literacy, promote awareness of the sanctuary and foster a sense of ocean stewardship through outreach, education, and interpretation efforts.

Background:
Coastal rural and American Indian communities face a paradoxical challenge: they depend increasingly on science-based natural resource management in order to sustain resources and economies, yet lack of educational funding, opportunities, expertise and conflicting social problems create overwhelming educational challenges. Opportunities to learn basic and applied science and job skills in these communities are limited, and pathways to careers and success are not evident. In addition, connections between vocational, college and graduate students, and working experts are poorly defined.

OCNMS is in a unique position to show leadership in the region in promoting career-building opportunities in marine sciences, education, management and policy. The aim of this action plan is to identify ways in which OCNMS can collaborate with universities, colleges and community colleges to improve higher educational opportunities for students and encourage students to pursue ocean and marine-related fields.

Strategy HED1: INTERNSHIP DEVELOPMENT
Coordinate internship activities between local colleges, universities, community colleges and OCNMS to create learning opportunities within the areas of sanctuary operations, research, education and management.

Activity A: Formalize an OCNMS internship coordinator staff role.

Activity B: Develop appropriate guidelines for academic elements of OCNMS internships.

Activity C: Establish an OCNMS summer internship program for undergraduates and Running Start students (http://www.k12.wa.us/runningstart/default.aspx) and advertise this program locally.

Strategy HED2: VOLUNTEER POSITIONS
Develop the necessary agreements and advertising instruments to recruit and utilize AmeriCorps and/or Student Conservation Association volunteer positions at OCNMS.

Strategy HED3: COLLEGE PARTNERSHIPS
Build partnerships with regional colleges, universities, foundations and other institutions in order to increase educational opportunities in ocean science, education, policy and management fields.

Activity A: Participate in local career days and job fairs.

Activity B: Develop opportunities with local colleges to provide OCNMS staff and other experts as lecturers, presenters and/or adjunct faculty.

Activity C: Develop continuing education programs on ocean issues and explore opportunities for developing consortia between local colleges, Coastal Treaty Tribes, agencies and non-profits.

Activity D: Develop opportunities for students to be involved in marine research – in person or via high-quality video conferencing with research vessels or stations.

Activity E: Provide continuing education opportunities for teachers to receive academic credit and gain experience in order to enhance their understanding of marine science content areas and methods for hands-on science education.

Activity F: Work collaboratively with foundations, local colleges and universities, tribal communities and other agencies to develop college scholarship funds for students from the Coastal Treaty Tribes who are interested in pursuing college degrees in marine policy, science, conservation, education and other related fields.

Links to Other Action Plans: Collaborative and Coordinated Sanctuary Management**,** Community Involvement in Sanctuary Management, Sanctuary Operations, Climate Change

Key Partners: Peninsula College, WWU Huxley Program on the Peninsula, Grays Harbor College, the University of Washington Olympic Natural Resources Center , North Olympic Skills Center, Olympic National Park, Olympic Park Institute, North Pacific Marine Resources Committee, Grays Harbor Marine Resources Committee, Makah, Quileute and Hoh Tribes and the Quinault Indian Nation, Olympic Coast Intergovernmental Policy Council, Seattle Aquarium, Olympic Park Institute, Feiro Marine Life Center, West Coast Governors' Agreement on Ocean Health Ocean Awareness and Literacy Action Coordination Team , Washington Sea Grant, Office of National Marine Sanctuaries, AmeriCorps, American Indian College Fund (and other foundations), Makah Cultural and Research Center, National Park Service Research Learning Centers, Office of National Marine Sanctuaries, Seattle Aquarium, other sanctuaries

C3. Visitor Services Action Plan

Desired Outcomes: 1) Improved awareness of OCNMS; 2) increased visitor awareness of ocean issues; and 3) an enriched and extended coastal travel experience.

Links to Goals:
Goal D - Enhance Ocean Literacy, promote awareness of the sanctuary and foster a sense of ocean stewardship through outreach, education, and interpretation efforts.
Goal G - Facilitate wise and sustainable use in the sanctuary to the extent that such uses are compatible with resource protection.

Background:
Improving the general public's awareness of OCNMS, providing planning assistance and information to Olympic Coast visitors, providing high-quality educational experiences to visitors, encouraging visitors to the sanctuary to become better ocean stewards, and working with local communities to encourage sustainable tourism in the sanctuary region are all important aspects of OCNMS' visitor services program.

OCNMS' current visitor services program is relatively small and the public scoping process made it clear, the public would like to see a more robust OCNMS visitor services program. In recent years, funding for OCNMS visitor services activities has been drastically reduced. Thus, the goal of this action plan is to outline a series of strategies to guide development of OCNMS' visitor services program as resources become available. The action plan focuses on both using new technology (social networking, podcasts, interactive website tools, etc.) to disseminate information about OCNMS to a wider audience and working with partners to leverage limited resources.

Strategy VISIT1: VISITOR EXPERIENCE
Actively collaborate with other agencies, tribal governments, tourism organizations and the private sector to provide services and products that contribute to high-quality educational experiences for visitors to the Olympic Peninsula.

Activity A: Develop education and outreach materials, in a variety of media, to attract visitors, orient them to the region's amenities, educate them on resources in the sanctuary and inspire a sense of stewardship for the environment.

Activity B: Participate in regional forums and planning processes that contribute to a strong tourism economy for the Olympic Peninsula.

Activity C: Offer technical assistance and training to partners and businesses that serve and educate visitors.

Activity D: Provide funding, training and support to cooperative interpretation programs with OCNMS partners.

Activity E: Expand efforts to develop interpretation programs on the Makah, Quileute, Hoh and Quinault Indian reservations as a way of developing program capacity, tourism enterprise, and training and job opportunities for tribal members.

Strategy VISIT2: LONG-RANGE INTERPRETIVE PLAN
Develop and implement a Long-Range Interpretive Plan for OCNMS.

Activity A: Actively involve partners and stakeholders in Long-Range Interpretive Plan development.

Activity B: Work collaboratively to identify opportunities to develop additional visitor centers, wayside exhibits, informational signs, kiosks and aquarium/museum exhibits in the sanctuary region.

Activity C: Work collaboratively to ensure the Long-Range Interpretive Plan reflects the region's specific needs as they relate to visitor service infrastructure development.

Activity D: Coordinate with other sanctuaries in the West Coast Region also developing interpretive plans.

Activity E: Include in the Long-Range Interpretive Plan specific strategies to enhance effectiveness of the Olympic Coast Discovery Center (OCDC). These strategies should identify ways to: recruit, train and retain volunteers; coordinate and collaborate with the Feiro Marine Life Center and Olympic National Park as they develop a larger and more expansive coastal visitor and education center in Port Angeles; maintain and update existing exhibits; attract new visitors; and increase development and enrichment activities for staff and volunteers.

Strategy VISIT3: NEW TECHNOLOGY
Utilize current and emerging technologies in order to educate and inform physical and virtual visitors to the Olympic Coast.

Activity A: Complete an update and overhaul of the OCNMS website.

Activity B: Integrate other appropriate technologies, as feasible, into the website including social networking resources, smartphone applications, podcasts, webcasts of video etc.

Activity C: Update facilities, hardware and software to accommodate telepresence so visitors to sanctuary and partner facilities can be linked to research vessels, other education centers etc.

Links to Other Action Plans: Climate Change**,** Marine Debris**,** Wildlife Disturbance**,** Maritime Heritage**,** Collaborative and Coordinated Sanctuary Management

Key Partners: Makah, Quileute and Hoh Tribes and the Quinault Indian Nation, Olympic Coast Intergovernmental Policy Council, Makah Cultural and Research Center, Olympic National Park, Feiro Marine Life Center, Port Townsend Marine Science Center, Port Angeles School District, Ocean Shores Interpretive Center, Grays Harbor Historical Seaport Authority, OCDC volunteers,

the communities of Port Angeles, Sequim, Neah Bay, La Push, Forks, Hoh River, Taholah, Ocean Shores, Westport and Pacific Beach, Makah Cultural and Research Center, Aramark/Kalaloch Lodge, West Coast Governors' Agreement on Ocean Health Ocean Awareness and Literacy Action Coordination Team, National Park Service Research Learning Centers, Office of National Marine Sanctuaries, Seattle Aquarium, other sanctuaries

C4. Community Outreach Action Plan

Desired Outcomes: 1) Greater involvement of local communities in OCNMS programs and on-the-ground marine conservation efforts; and 2) a stronger connection between local communities and OCNMS.

Links to Goals:
Goal D - Enhance Ocean Literacy, promote awareness of the sanctuary and foster a sense of ocean stewardship through outreach, education, and interpretation efforts.
Goal H - Build, maintain, and enhance an operational capability and infrastructure.

Background:
Effective community outreach is critical to the success of all OCNMS programs; and the need to improve OCNMS' relationships with local communities on the Olympic Peninsula has repeatedly emerged as a high priority during the MPR process. The Community Involvement in Sanctuary Management action plan, presented earlier in the FMP, addresses ways in which OCNMS can facilitate more community involvement in OCNMS management and decision-making. The Community Outreach action plan focuses more on involving local citizens in specific OCNMS volunteer programs and improving OCNMS staff presence on the outer coast so that local communities develop a stronger connection with staff. While the Community Outreach action plan is housed within the "Improve Ocean Literacy" priority issue, the action plan has been written broadly so it supports action plans related to research, living resources conservation and other program areas.

Strategy OUT1: STEWARDSHIP AND CITIZEN SCIENCE
Actively support marine stewardship and citizen science volunteer programs.

Activity A: Provide training and staff support to OCNMS volunteers involved with the Coastal Observation and Seabird Survey Team, Washington CoastSavers, and other volunteer programs in the sanctuary.

Activity B: Support efforts of the North Pacific Coast and Grays Harbor marine resources committees to develop citizen science and marine stewardship efforts in the sanctuary.

Activity C: Use traditional media and new technologies to advertise opportunities for community members to volunteer on OCNMS education and research projects.

Strategy OUT2: STAFF PRESENCE ON OUTER COAST
Assess needs and opportunities to develop a stronger OCNMS staff presence on the outer coast of the Olympic Peninsula.

Activity A: Work with sanctuary partners who have existing facilities on the outer coast to explore office-sharing opportunities.

Activity B: Conduct feasibility and cost analyses of a "South Coast" satellite office in Grays Harbor County and a "West End" satellite office in Forks.

Activity C: Evaluate opportunities for "storefronts" and/or visitor information centers in coastal communities.

Strategy OUT3: COMMUNITY EVENTS
Maintain an OCNMS staff presence at community events and meetings in the sanctuary region.

Activity A: Develop an annual outreach plan including priorities for community events, staffing and volunteers, as well as priority themes and messages.

Activity B: Attend (as invited) events, festivals and meetings in tribal and non-tribal communities in the sanctuary region.

Activity C: Provide regular briefings to service clubs, local governments, chambers of commerce, tourism organizations, stakeholder groups and others on matters pertaining to the sanctuary.

Activity D: Furnish expert speakers for public lecture series, community meetings and other forums in order to provide up-to-date information on sanctuary research, education, policies and management activities.

Strategy OUT4: COMMUNITY-BASED EFFORTS
Actively support the efforts of the North Pacific and Grays Harbor marine resources committees, regional watershed councils, salmon recovery teams, the Puget Sound Partnership, other community-based NGOs, and local and state governments in areas of marine research, education, and policy coordination.

Activity A: Participate in relevant meetings of community-based organizations and initiatives in the sanctuary region.

Activity B: Jointly pursue opportunities for community-based marine education, stewardship and research programs.

Activity C: Use the OCNMS website, e-mail listserv and other media to communicate the efforts of community-based organizations working on ocean issues in the sanctuary region.

Links to Other Action Plans: Community Involvement in Sanctuary Management**,** Maritime Heritage**,** Populations, Communities and Ecosystems**,** Climate Change, Marine Debris**,** Regional Ocean Planning**,** Collaborative and Coordinated Sanctuary Management

Key Partners: COASST, Washington CoastSavers, Washington Clean Coast Alliance, Makah, Quileute and Hoh Tribes and the Quinault Indian Nation, Olympic Coast Intergovernmental Policy Council, Makah Cultural and Research Center, Feiro Marine Life

Center, Port Townsend Marine Science Center, Olympic National Park, Grays Harbor and North Pacific Coast marine resources committees, Grays Harbor Historical Seaport Authority, National Coast Trail Association, Puget Sound Partnership, West Coast Governors' Agreement on Ocean Health Ocean Awareness and Literacy Action Coordination Team, Washington State Ocean Caucus, Washington Sea Grant, Clallam, Jefferson and Grays Harbor counties, state of Washington, local organizations such as Rotary and Lions Clubs, Surfrider Foundation chapters, local kayaking groups and others

D. Conserve Natural Resources in the Sanctuary

D1. Spills Prevention, Preparedness, Response and Restoration Action Plan
D2. Climate Change Action Plan
D3. Marine Debris Action Plan
D4. Wildlife Disturbance Action Plan
D5. Water Quality Protection Action Plan
D6. Habitat Protection Action Plan
D7. Regional Ocean Planning Action Plan

Introduction
The primary mandate of the Office of National Marine Sanctuaries is to protect sanctuary resources. Therefore, it is OCNMS' responsibility to reduce threats to sanctuary resource sustainability and condition. OCNMS also has a responsibility to facilitate compatible uses in the sanctuary in a manner that 1) is consistent with its treaty trust responsibilities, 2) promotes healthy and resilient natural resources, and 3) allows human uses to continue in a sustainable way. The seven action plans presented here highlight the primary resource conservation concerns that emerged from the MPR scoping process and the Living Resources Conservation working group that was formed as part of the MPR process. In many cases, the action plans indicate further assessment of potential impacts to resources in the sanctuary is needed in order to determine if there is a need for additional management measures.

D1. Spills Prevention, Preparedness, Response and Restoration Action Plan

Desired Outcomes: 1) Increased protection of marine, cultural, and shoreline resources from the impacts of an oil or hazardous materials spill; and 2) improved preparedness and coordination for responding to spills affecting marine resources within OCNMS.

Links to Goals:

Goal A - Build and strengthen OCNMS' partnerships with the Coastal Treaty Tribes and the Olympic Coast Intergovernmental Policy Council, and honor the sanctuary's treaty trust responsibility.

Goal B - Promote collaborative and coordinated management and stewardship of resources in the sanctuary.

Goal E - Maintain the sanctuary's natural biological diversity and protect, and where appropriate, restore and enhance sanctuary ecosystems.

Goal G - Facilitate wise and sustainable use in the sanctuary to the extent that such uses are compatible with resource protection.

Background:

The potential release of oil or other hazardous material from a marine accident is widely seen as the greatest threat to sanctuary resources and qualities. Prevention of spills is therefore one of the sanctuary's highest priorities. As a steward of these vitally important natural resources, OCNMS must continue to collaborate with other agencies and user groups to reduce the potential for oil spills and improve contingency planning for spill response.

Preventing, preparing for, and responding to hazardous spills continue to be high priorities for OCNMS. Additionally, better support for the damage assessment and restoration process is also a high priority. During the MPR process a spills working group was formed to bring together area experts to discuss OCNMS' role in regional spills prevention, preparedness, response and restoration efforts. The strategies and activities below reflect the recommendations of this working group.

Strategy SPILL1: ATBA MANAGEMENT, COMPLIANCE AND MONITORING

Sustain or improve the maritime industry's compliance with the Area to be Avoided (ATBA).

> **Activity A:** Work with the USCG to prepare a proposal to the International Maritime Organization Subcommittee on Safety to Navigation to implement legislation requiring that voluntary "restrictions apply to all vessels required to prepare a response plan pursuant to Section 311(j) of the Federal Water Pollution Control Act (33 U.S.C. 1321(j)) (other than fishing or research vessels while engaged in fishing or research within the area to be avoided)" (Section 704, Coast Guard Authorization Act for Fiscal Years 2010 and 2011).

Activity B: Monitor voluntary compliance with the ATBA by conducting monthly processing of radar data from the jointly operated Canada/U. S. Cooperative Vessel Traffic Service (CVTS), augmented with Marine Exchange of Puget Sound Automated Identification System (AIS) data. Analyze vessel traffic patterns, track and identify the type and status of vessels that travel within OCNMS and the ATBA. Archive data to be able to identify trends in activity.

Activity C: Improve the OCNMS vessel monitoring program by developing the capability to view, analyze and archive vessel data within the entire sanctuary using AIS data.

Activity D: Conduct directed outreach to non-compliant vessels. Send letters jointly signed by the OCNMS Superintendent and U.S. Coast Guard Captain of the Port requesting compliance with the ATBA.

Activity E: Promote and facilitate reporting of ATBA compliance statistics and analysis to vessel traffic and oil spill prevention interests. This includes providing compliance data to Washington Department of Ecology (WDE) for inclusion within their annual Vessel Entry and Transit (VEAT) Report.

Activity F: Make ATBA compliance information available to regional marine spatial planning efforts and to the public.

Strategy SPILL2: REGIONAL VESSEL MANAGEMENT FORUMS
Work within regional vessel management forums to analyze and reduce risks and hazards.

Activity A: Encourage and collaborate in review and development of Standards of Care (SOC) identifying accepted best marine practices for engaging in coastal towing operations off the Olympic Coast. Actively participate in local public meetings and comment on the USCG's proposed towing vessel inspection regulations with the goal of encouraging the earliest implementation of appropriate final rules.

Activity B: After SOCs are developed, utilize ATBA monitoring information to advise the USCG and industry of apparent non-compliance with developed SOCs.

Activity C: Encourage the USCG, in collaboration with the U.S. Army Corps of Engineers (USACE) vessel traffic risk assessment, to analyze vessel traffic patterns and risks, particularly in the vicinity of Duntze Rock, Tatoosh Island, and Duncan Rock, and to determine whether additional protective measures (e.g., additional aids to navigation or new routing schemes) are required for safer navigation.

Strategy SPILL3: REGIONAL PLANNING AND TRAINING EXERCISES
Promote improved spill preparedness and response through OCNMS participation in training exercises and regional oil spill planning activities.

Activity A: Engage in regional efforts to promote, plan and conduct comprehensive drills and exercises.

- Promote regular testing and coordination of multiple response assets, equipment deployment, wildlife recovery and treatment equipment, emergency response tug located at Neah Bay, USCG emergency towing resources, communication systems, and natural resource damage assessment resources in these drills and exercises
- Integrate OCNMS assets, including staff and vessels, into regional emergency response drills, exercises, and area contingency planning

Activity B: Develop training/exercises, in conjunction with key partners, that target specific issues and concerns relevant to OCNMS and partners to improve planning and overall readiness.

- Training and exercise topics could include roles and responsibilities of various Incident Command System positions; dispersant consultation process; waste management tradeoffs; shoreline cleanup assessment technology training; shoreline treatment tactics; cleanup endpoints for different shoreline types; natural resource damage assessment; liaison function with key stakeholders; lessons learned from recent spills and exercises

Activity C: Collaborate in planning and conduct, if feasible, an exercise to test debris removal from remote shoreline locations.

- Test and evaluate issues and methods useful for pre-cleaning beaches and removing oily waste materials during response operations
- If successful, promote regular exercise of safe and effective methods
- Partner on debris removal projects with USCG and outer Olympic Coast land owners (Olympic National Park, Washington Maritime National Wildlife Refuge Complex, Coastal Treaty Tribes)

Activity D: Participate in technical workgroups and task forces of the Regional Response Team (RRT) and Northwest Area Committee (NWAC).

- Support integration of OCNMS priorities, data, and equipment into the Northwest Area Contingency Plan
- Key workgroups and task forces include Volunteers; Response Science and Technology; Geographical Response Plans; Wildlife; and Communications and Outreach (separate activities for key NWAC workgroups are provided below)

Activity E: Assist in the review, development and improvement of Geographic Response Plans (GRPs) of the NWAC focusing on initial resource protection.

- Potential areas for GRP improvement include protection of cultural resources and threatened and endangered species, equipment appropriate for the operating environment, and additional shoreline protection strategies

Activity F: Participate in the Response Science and Technology workgroup of the NWAC to develop a Shoreline Operational Guide.

- The Shoreline Operational Guide will address treatment tactics and cleanup endpoints for affected shorelines, proposed monitoring and other requirements for sensitive resources or habitats, and waste management guidelines
- Promote integration of this Guide and its development into the Area Committee process

Activity G: Participate in the Response Science and Technology workgroup of the NWAC to develop a dispersant use matrix that summarizes spatial and temporal data related to natural resources in the water column that could potentially be impacted by dispersed oil.

- Provide data held by OCNMS
- Facilitate assembly and incorporation of data from NMFS

Activity H: Support NWAC efforts to promote a strong non-dedicated vessel program including use of local resources, including fishing vessels regularly based in Neah Bay, La Push, and the Grays Harbor area.

Activity I: Participate in the Places of Refuge workgroup of the NWAC in the evaluation of areas adjacent to OCNMS.

Activity J: Support development of a digital environmental sensitivity index database and maps of Washington's outer Olympic Coast.

Activity K: Participate in US/Canada transboundary spill response planning through the Pacific States/British Columbia Oil Spill Task Force.

Strategy SPILL4: OUTER COAST TRUSTEES WORKING GROUP
Promote improved regional preparedness for spill response through coordination of an ad hoc Outer Coast Trustees working group (state of Washington, Coastal Treaty Tribes, local governments, National Park Service, U.S. Fish and Wildlife Service, Parks Canada) as a forum to share information and training opportunities.

Activity A: Maintain a current contact list for natural and cultural resource trustees, natural resource managers, and spill response leads from agencies and organizations on the outer coast of Washington.

- Include multiple means of communication (office and cell phone numbers, emails, agency emergency contact numbers, pagers) on contact list
- Coordinate with RRT to regularly update the Northwest Area Contingency Plan

Activity B: Identify opportunities for joint training and information sharing related to regional preparedness for spill response, and promote regional participation through the Outer Coast Trustees.

Activity C: Identify emergency response plans developed by co-trustees and collaborate with co-trustees to minimize inconsistencies and maximize the effectiveness of these plans.

Strategy SPILL5: OCNMS ORGANIZATIONAL RESPONSE PLAN
Develop policies, tools and procedures for OCNMS staff and resource mobilization, OCNMS integration into an Incident Command Structure, and effective consultation on emergency response actions.

Activity A: Develop an OCNMS Organizational Response Plan.

- Ensure consistency between the OCNMS Organizational Response Plan and Northwest Area Contingency Plan (NWACP)
- Integrate OCNMS information, policy and procedures into the NWACP, as appropriate
- Identify OCNMS staff training requirements and needs for emergency response, and maintain appropriate training levels
- As part of the plan, consider an outreach policy that explains how OCNMS will liaison with key stakeholders, the public, elected officials and co-trustees within their shared boundaries during spill responses
- Develop a clear process or decision tool to identify steps for dispersant, in-situ burn, or shoreline chemical use decision-making by OCNMS to support consultation with co-trustees, the FOSC, and the RRT consistent with the NWACP
- Identify training opportunities for OCNMS volunteers to improve their ability to participate in spill response

Activity B: Develop a database that includes natural and cultural resource information useful for shoreline protection countermeasures, as well as evaluation of potential resource impacts from spilled petroleum products and associated response activities.

- Assemble the most current and detailed data available for the region
- Utilize effective technologies to access, display and analyze resource information
- Collaborate with regional resource managers, co-trustees, response organizations and the RRT to share data, tools, and products
- Regularly complete updates and improvements to these data and tools

Activity C: Work with the Office of National Marine Sanctuaries and NOAA Office of Response and Restoration to regularly update and improve SHIELDS (Sanctuary Hazardous Incident Emergency Logistics Database System).

Strategy SPILL6: DAMAGE SURVEY AND ASSESSMENT PROTOCOLS
Collaborate in regional efforts to develop plans, protocols, capacity and baseline data to support natural resource damage assessment (NRDA) efforts.

Activity A: Collaborate with co-trustees of resources in the sanctuary to develop an Outer Coast NRDA Response Plan that includes:

- Notification requirements
- Prioritized objectives
- Supplies and equipment for ephemeral data collection
- Standardized protocols for ephemeral data collection
- Identification of beach access points
- Property access permissions
- Cultural resource considerations and points of contact
- Lists of response resources (vessels, aircraft, personnel) that could be hired for NRDA purposes (vs. spill response clean-up efforts)
- Data quality objectives
- Training recommendations and requirements

Activity B: Collaborate with co-trustees to improve capabilities for NRDA work.

- Integrate NRDA components into local and regional response exercises
- Seek funding to support participation in NRDA planning and training opportunities
- Review and revise response plans, as appropriate, following incidents that include NRDA efforts
- Inventory, purchase, place, and maintain ephemeral data collection equipment on the outer coast

Activity C: Collaborate with co-trustees to identify natural and cultural resources most vulnerable to oil spills and prioritize baseline data collection for species and services useful for NRDA.

- Outline needed data and studies
- Assemble existing data into a database for baseline information on natural and cultural resources
- Determine who can conduct additional studies and sampling
- Seek funding to support baseline data collection

Activity D: Participate in any restoration projects, should they occur, within sanctuary boundaries or directly affecting the sanctuary through phases of planning, implementation, and monitoring. Coordinate with other trustees with responsibilities for affected resources and provide data and input to support decision-making.

Links to other Action Plans: Collaborative and Coordinated Sanctuary Management, Marine Debris, Wildlife Disturbance, Sanctuary Operations, Regional Ocean Planning

Key Partners: USACE Seattle District; Puget Sound Harbor Safety Committee; Canadian Coast Guard Marine Communications and Traffic Services, Tofino; Marine Exchange of Puget Sound; Makah Office of Marine Affairs; Makah, Quileute and Hoh Tribes and Quinault Indian Nation; American Waterways Operators; U.S. Navy (for movement of reactor core by barge); Lower Columbia Region Harbor Safety Committee; United States Coast Guard Thirteenth District Commander; Sectors Puget Sound and Columbia River; Canadian Coast Guard Marine Communications and Traffic Services Tofino; Marine Exchange of Puget Sound; Washington Department of Ecology; Washington Department of Fish and Wildlife; Washington Department of Natural Resources, Washington Department of Archaeology and Historic Preservation; Washington State Parks and Recreation Commission; Washington Resource Damage Assessment Committee; marine resource committees (MRCs); other natural resource trustees; on-scene spill response organizations; NOAA Office of Response and Restoration; NOAA Restoration Center; Department of Interior NRDA staff; Canadian Coast Guard; Canadian First Nations; Transport Canada , Olympic National Park; Washington Maritime National Wildlife Refuge Complex/U.S. Fish and Wildlife Service; U.S. Coast Guard; Clallam, Jefferson, and Grays Harbor counties; Parks Canada; NMFS; Northwest Area Committee and Regional Response Team members; OCNMS volunteers; academic institutions

D2. Climate Change Action Plan

Desired Outcomes: 1) OCNMS is a sentinel site in the Pacific Northwest for climate change monitoring; 2) OCNMS is a go-to source for climate change information on Washington's outer coast marine ecosystems; and 3) ONMS understands and is prepared for likely climate change impacts in the sanctuary region.

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.
Goal E - Maintain the sanctuary's natural biological diversity and protect, and where appropriate, restore and enhance sanctuary ecosystems.
Goal G - Facilitate wise and sustainable use the sanctuary to the extent that such uses are compatible with resource protection.
Goal H- Build, maintain, and enhance an operational capability and infrastructure.

Background:
The public repeatedly raised concerns about climate change and its potential effects on organisms and ecosystems within the sanctuary during the MPR scoping process. Additionally, the Olympic Coast Intergovernmental Policy Council (IPC) and the OCNMS Advisory Council (AC) identified climate change as a high priority to be addressed in the revised management plan.

Climate change is an ecosystem management issue cutting across all disciplines and will be addressed by all of OCNMS' program areas over the next decade. Indeed, references to climate change can be found in strategies and activities throughout this management plan. Because climate change is expected to be such an important issue for the sanctuary, it was important to highlight the issue in its own action plan. Other action plans reference ways in which individual OCNMS programs will address aspects of the climate change topic, but this action plan is focused on how ONMS will coordinate its efforts across program areas in order to address climate change in a holistic and interdisciplinary way. This action plan also promotes OCNMS as a sentinel site for ocean acidification and climate change research. Sentinel sites are locations in the marine environment that support sustained observations of changes in the status of the marine environment. They allow investigators to track the status of key indicators of ecosystem integrity, serve as a means to provide early warning to resource managers, and offer opportunities for protocol testing. They address NOAA activities in areas of mandated responsibility and help address questions about regional issues such as habitat degradation and invasive species impacts.

Strategy CLIM1: CLIMATE-SMART SANCTUARY PROGRAM
Participate in the Office of National Marine Sanctuaries Climate-Smart Sanctuaries program in order to become certified as a climate-smart sanctuary.

Activity A: Conduct an audit of OCNMS' carbon footprint and determine what changes are needed to ensure OCNMS meets the minimum green operating standards outlined in the Climate-Smart Sanctuary guidelines.

Activity B: Develop a Climate Change Site Scenario for OCNMS synthesizing 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 C: Work with the AC and IPC to review (and revise if necessary) this Climate Change Action Plan based upon the findings of the Climate Change Site Scenario.

Activity D: Brief the AC and IPC on OCNMS' Climate-Smart Sanctuary certification process, and ensure information compiled for Climate Smart Sanctuary certification is widely distributed to OCNMS partners and the public.

Strategy CLIM2: SANCTUARY AS SENTINEL SITE
Work to establish OCNMS as a sentinel site for long-term climate change research and monitoring in the Pacific Northwest.

Activity A: Propose to NOAA leadership that OCNMS be identified as a sentinel site for climate change research and monitoring.

Activity B: Work with the AC to establish a climate change working group to help 1) develop a climate change research prospectus describing specific climate change research priorities for the sanctuary, and 2) identify marine chemical, physical, and biological indicators of climate change that OCNMS and partners should consider monitoring.

Activity C: Provide relevant scientific and technical information to the Washington Department of Ecology to support the State's central climate change information clearinghouse and utilize this clearinghouse to support OCNMS research and planning efforts.

Strategy CLIM3: RESILIENT ECOSYSTEMS
Work with natural resource managers and local communities on the Olympic Peninsula to improve the resiliency of ecosystems in the face of climate change impacts.

Activity A: Work with the AC to establish a climate change working group to provide recommendations to ONMS, and to collaborate with tribal, federal, state and local governments on potential joint management responses to climate change impacts.

Activity B: Participate in the state of Washington's integrated climate change response strategy as well as in other regional efforts to develop and understand climate change impacts to natural and cultural resources.

Activity C: Host workshops and provide training for OCNMS staff and local communities on the outer coast on planning, mitigating for, and managing climate change impacts.

Strategy CLIM4: COMMUNICATING CLIMATE CHANGE

Communicate information about climate change and its potential effects on the sanctuary and Washington's outer coast to OCNMS partners and the public.

Activity A: Ensure information and data collected by OCNMS on climate change and its effects on the sanctuary are readily available to other resource managers and interested parties.

Activity B: Provide local communities and the public with information about potential climate change impacts on the Olympic Coast and local, tribal, state and regional efforts to plan for climate change.

Activity C: Work with tribal communities to develop public outreach materials that convey tribal perspectives on climate change and its potential effects on tribal communities.

Activity D: Promote education and outreach elements in climate change research projects that occur within OCNMS.

Activity E: Develop a Climate Literacy education and outreach plan and incorporate it into OCNMS' Ocean Literacy Action Plan.

Links to Other Action Plans: Collaborative and Coordinated Sanctuary Management**,** Physical and Chemical Oceanography, K-12 Education, Higher Education, Visitor Services, Data Management, Sharing, and Reporting

Key Partners: Hoh, Makah, and Quileute tribes and Quinault Indian Nation, Washington State Ocean Caucus, UW Climate Impacts Group, West Coast Governors' Agreement on Ocean Health Climate Change Action Coordination Team, NOAA/PMEL, OCNMS Advisory Council, West Coast Regional Sanctuaries, Monterey Bay Research Institute, Grays Harbor and North Pacific Coast marine resources committees, Washington Sea Grant, Port Townsend Marine Science Center, UW Friday Harbor Labs, U.S. Fish and Wildlife Service, Olympic National Park, NOAA Ocean Services, and non-governmental organizations, AC, NOAA (ONMS, NMFS, PMEL), NGOs, IPC, Washington Department of Ecology

D3. Marine Debris Action Plan

Desired Outcomes: 1) Increased identification of the types and locations of abandoned submerged and floating marine debris; and 2) reduced environmental and aesthetic impacts of debris on coastal beaches.

Links to Goals:
Goal E - Maintain the sanctuary's natural biological diversity and protect, and where appropriate, restore and enhance Sanctuary ecosystems.

Background:
Manufactured materials disposed of in the ocean are known as marine debris; these debris are unsightly on our beaches, harmful to wildlife, and can reduce fishery profits. Removing marine debris from the ocean and beaches, and working with partners to reduce the production and disposal of materials that frequently become marine debris, are both important to protecting the health of the sanctuary and the wildlife that inhabit it. This action plan outlines the strategies and activities by which OCNMS will continue and expand its efforts to reduce marine debris in and prevent it from entering the sanctuary.

OCNMS formally defines marine debris, in accordance with the NOAA Office of Response and Restoration Marine Debris Program's definition, as "any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment." Marine debris can be submerged or floating in the ocean; it can also be beached. Submerged marine debris includes sunken, derelict vessels. Marine debris removal and reduction, in addition to being a high priority for OCNMS, is also a high priority for the state of Washington, the Coastal Treaty Tribes, non-governmental organizations such as Surfrider and a wide range of other organizations and agencies. Affecting ocean and beach ecosystems all over the world, marine debris is a global ocean epidemic. Thus, in supporting local marine debris efforts, OCNMS is also helping to promote nation and worldwide awareness of the marine debris problem.

Strategy MD1: SUBMERGED OR FLOATING DEBRIS
Identify, locate, and remove lost or abandoned submerged or floating marine debris.

Activity A: Promote use by tribal and non-tribal fishers of the Washington Department of Fish and Wildlife (WDFW) derelict fishing gear hotline, Northwest Straits Marine Conservation Initiative derelict fishing gear reporting system, or other systems established for reporting locations of lost fishing gear, sunken vessels, and other forms of submerged and floating marine debris.

Activity B: Support programs focusing on Washington's outer coast to locate abandoned submerged and floating marine debris, develop safe and minimal impact removal techniques, and remove known marine debris.

Activity C: Support local efforts to reduce generation of sea-based marine debris through improvements in opportunities for solid waste and marine debris disposal and recycling programs.

Activity D: Record observations of abandoned submerged and floating marine debris made during OCNMS research and monitoring programs. Report relevant observations to WDFW, Northwest Straits Marine Conservation Initiative and/or other appropriate reporting systems.

Activity E: Maintain an OCNMS database and geographic information system (GIS) products for marine debris identified by OCNMS and others. Collaborate in efforts to prioritize removal of submerged and floating marine debris.

Activity F: Collaborate with the U.S. Department of Defense to mitigate military use of expendable materials that become marine debris.

Strategy MD2: BEACH DEBRIS
Mitigate impacts of marine debris on coastal beaches.

Activity A: Participate as an active partner in the Washington Clean Coast Alliance (WCCA). Engage coastal communities and volunteers in beach cleanups, including expansion of efforts to include multiple volunteer beach cleanup efforts on shores adjacent to the sanctuary throughout the year.

Activity B: Conduct outreach to increase public understanding of the nature and scope of environmental impacts of marine debris, and encourage individual efforts to reduce sources of marine debris.

Activity C: Collaborate with Olympic National Park and the Washington Maritime National Wildlife Refuge Complex to develop beach cleanup initiatives focused on refuge island shores and remote coastal areas of the park.

Activity D: Promote inventory of marine debris from Washington's outer coast beaches. Use marine debris data in public outreach efforts and to support regional efforts to reduce sea- and land-based sources of marine debris.

Activity E: Support programs in coastal communities to identify potential sources of land-based marine debris, and improve garbage management, recycling opportunities and other programs with potential to reduce beach debris.

Activity F: When feasible, collaborate with the U.S. Department of Defense to use military manpower and equipment to support beach cleanups and other marine debris removal efforts in the sanctuary.

Links to Other Action Plans: Collaborative and Coordinated Sanctuary Management, Community Outreach, Community Involvement in Sanctuary Management, Habitat Protection, Spills

Key Partners: Hoh, Makah, and Quileute tribes and Quinault Indian Nation, coastal communities, Washington Clean Coast Alliance, NOAA Marine Debris Program, West Coast Governors' Agreement on Ocean Health Marine Debris Action Coordination Team, Washington state, Olympic National Park, Washington Maritime National Wildlife Refuge Complex, U.S. Department of Defense, North Pacific Coast and Grays Harbor marine resources committees, Northwest Straits Marine Conservation Initiative, non-governmental organizations, and regional port authorities

D4. Wildlife Disturbance Action Plan

Desired Outcomes: 1) Minimized disturbance to wildlife in the sanctuary; and 2) improved protection for wildlife potentially impacted by human activities.

Links to Goals:
Goal E - Maintain the sanctuary's natural biological diversity and protect, and where appropriate, restore and enhance sanctuary ecosystems.

Background:
During the MPR public scoping process, numerous comments identified protection of wildlife, including minimization of wildlife disturbance from human activities, as an important topic for sanctuary management. The outer coast of Washington, particularly the northern portion, is recognized for its unique and abundant wildlife, relatively undeveloped condition, and productive ecosystem through state and federal designations – Washington Seashore Conservation Area, Olympic National Park's coastal strip, Washington Maritime National Wildlife Refuge Complex, and Olympic Coast National Marine Sanctuary. These extraordinary natural values were acknowledged and protected as early as 1907 when seabird colonies on the coast's islands were first granted federal conservation protection under a seabird reserve system by President Theodore Roosevelt.

The phrase 'wildlife disturbance' encompasses acoustic, physical and visual disturbances caused by human activities that can have physical and behavioral impacts on wildlife above, below and on the water surface. Overt responses of fish and wildlife species to disturbance include flushing birds from their nesting roosts, flushing of marine mammals from haul out areas, or even death. Sources of wildlife disturbance in OCNMS could include low-flying aircraft, motorized personal watercraft, fireworks, close approach to wildlife aggregation areas (either humans on foot or in a vessel) and other excessive anthropogenic noises that could originate from shipping, military exercises, or seismic exploration. Research has documented variability in disturbance distances and responses based on differing activities and vessel types, as well as on the species affected. In marine areas, these data have supported protective regulations to establish approach limits, speed restrictions and buffer zones around sensitive wildlife assemblages and habitats. Wildlife disturbance also can be minimized through outreach both to expand citizen familiarity with issues and to encourage appropriate behavior around wildlife.

The focus of this action plan is on working collaboratively to improve outreach, education and enforcement efforts related to wildlife disturbance, as there are existing regulations (OCNMS, USFWS, NMFS) addressing wildlife disturbance concerns and impacts. However, awareness and enforcement of these regulations is inadequate and greater efforts need to be made to improve:

- Sanctuary users' understanding of appropriate and mandated wildlife etiquette
- Voluntary compliance with wildlife disturbance regulations so impacts to wildlife are avoided

- Enforcement of wildlife disturbance regulations so future impacts to wildlife are reduced

Strategy WD1: OUTREACH ON WILDLIFE DISTURBANCE
Promote public understanding of wildlife disturbance issues through education and outreach programs.

Activity A: Collaborate with other wildlife management agencies in the region to develop wildlife viewing guidelines addressing shore-based and vessel activities. Produce and distribute those outreach products that address wildlife viewing guidelines.

Activity B: Collaborate on outreach efforts targeting specific user groups in order to improve public understanding of wildlife disturbance and the impacts of human behavior on wildlife. Promote best practices, guidelines and regulations that benefit wildlife, reduce disturbance, and enhance human enjoyment of natural resources.

- Model programs include NOAA's Ocean Etiquette and Watchable Wildlife
- User groups include charter fishing and wildlife viewing operators, kayakers and surfers
- During outreach efforts, identify legitimate uses of the airspace within the OCNMS wildlife disturbance mitigation (overflight restriction) zone

Activity C: Collaborate in training regional interpreters, rangers, enforcement staff and volunteers on wildlife disturbance issues.

Activity D: Improve OCNMS web site content related to visitor appreciation of wildlife and wildlife disturbance caused by human activities.

Activity E: Maintain the OCNMS incident database to record times, locations, and other information for reported wildlife disturbance events.

- Incident database entries will include reported overflight violations, as well as permitted and exempted low altitude flights
- Include marine mammal ship strikes in the database
- Incident database information will be shared with regional enforcement officers, permitting staff and concerned management entities to reinforce wildlife disturbance concerns

Strategy WD2: OVERFLIGHT RESTRICTION ZONE
Support and improve recognition of and compliance with the existing OCNMS wildlife disturbance mitigation (overflight restriction) zone.

Activity A: Improve compliance with the OCNMS wildlife disturbance mitigation (overflight restriction) zone through collaboration with Aircraft Owners and Pilots Association (AOPA) and Washington Pilots Association (WPA) to improve outreach products for and communication with local pilots.

Activity B: Develop outreach products and orientation materials on the OCNMS wildlife disturbance mitigation (overflight restriction) zone and associated wildlife disturbance issues useful for regional enforcement officers. Organize and conduct regular training sessions for regional enforcement officers.

Activity C: Support efforts to have the OCNMS wildlife disturbance mitigation (overflight restriction) zone depicted on Federal Aviation Administration (FAA) aeronautical charts.

Strategy WD3: MARINE MAMMAL DISTURBANCE
Assess the potential for and occurrence of marine mammal disturbance and injury from human activities.

Activity A: Participate and encourage activities to characterize the acoustic environment and potential acoustic impacts on marine mammals in the sanctuary including:

- Supporting long-term acoustic monitoring to establish background sounds levels and changes over time
- Collaborating with researchers and other agencies to identify potential emerging issues related to sources of underwater sound that could impact the sanctuary environment
- Considering how proposed activities in and around sanctuary waters might generate underwater sound that could impact marine mammals

Activity B: Identify degree of risk posed to marine mammals from ship strikes in the sanctuary by:

- Coordinating with the Northwest Marine Mammal Stranding Network to identify potential increased incidences of ship strikes that may have occurred in the sanctuary
- Supporting efforts to examine overlap areas of high marine mammal density and shipping lanes
- Assessing acoustic impact mitigation strategies used by other sanctuaries and NOAA agencies and considering such strategies in OCNMS

Activity C: Work with the fishery co-managers and fishing organizations to identify existing conflicts between marine mammals and other activities in the sanctuary including:

- Marine mammal entanglement in fishing and other gear occurring in sanctuary waters
- New emerging conflicts such as those between long-line fishing operations and depredating sperm whales (i.e., whales that are taking or trying to take fish from fishing gear)

Links to other Action Plans: Sanctuary Operations**,** Habitat Protection**,** Populations, Communities and Ecosystems**,** Visitor Services**,** Community Outreach**,** Collaborative and Coordinated Sanctuary Management, Physical and Chemical Oceanography

Key Partners: Hoh, Makah, and Quileute tribes and Quinault Indian Nation, Olympic National Park, U.S. Fish and Wildlife Service, Washington State Parks and Recreation Commission, Washington Department of Fish and Wildlife, COASST, Washington Clean Coast Alliance; Grays Harbor and North Pacific Coast marine resource committees, Surfrider, NMFS, Westport Charterboat Association, regional port authorities and marina facilities, Northwest Marine Mammal Stranding Network, U.S. Coast Guard, U.S. Navy, Aircraft Owners and Pilots Association (AOPA), Washington Pilots Association (WPA), regional airports, shipping industry, coastal communities

D5. Water Quality Protection Action Plan

Desired Outcome: High water quality to ensure protection of natural resources in the sanctuary

Links to Goals:
Goal E - Maintain the sanctuary's natural biological diversity and protect, and where appropriate, restore and enhance sanctuary ecosystems.

Background:
ONMS strives to maintain and improve water quality in the sanctuary. Water quality protection is critical to ensuring the health of marine organisms and habitats from the bottom to the top of the food chain. Given increasing concerns about ocean acidification, harmful algal blooms and hypoxic events, it is crucial that OCNMS do its utmost to identify, mitigate, reduce and/or remove, where possible, known causes of water quality degradation in the sanctuary.

Strategy WQP1: VESSEL DISCHARGES
Reduce, through regulatory changes, voluntary and outreach measures, or marina facilities improvements, the degradation of water quality caused by vessel wastewater and sewage discharges.

Activity A: Work with the shipping industry and others to assess potential impacts of wastewater discharges from large vessels (300 gross tons or greater) and identify measures to prevent or mitigate those impacts.

Activity B: During the management plan review process, publish a rulemaking proposing to modify OCNMS regulations to prohibit all discharges from cruise ships into sanctuary waters, except those necessary for vessel operations (e.g., clean vessel engine cooling water, clean vessel generator cooling water, clean bilge water, engine exhaust, and anchor wash).

Activity C: Encourage regional port authorities, and assist in their efforts, to improve availability and use of sewage pump-out facilities for vessels.

Activity D: Work collaboratively with coastal communities to develop and implement a water quality education and outreach program to promote best practices regarding vessel discharges from marine sanitation devices, or those vessels lacking marine sanitary devices.

Activity E: In year five of management plan implementation review the progress made on activities WQP1 A-D, and evaluate if additional actions are warranted.

Strategy WQP2: CONTAMINANTS
Support efforts to monitor contaminant levels, understand potential impacts of contaminants, and reduce, eliminate, or mitigate impacts of contaminants to natural resources in the sanctuary.

Activity A: Support local, state, tribal and federal efforts to identify, characterize, and mitigate sources of contaminants within or entering waters of the sanctuary and accumulating in biota and habitats.

Activity B: Support closure and remediation of the Warmhouse Dump (on Makah Tribe's Reservation) to minimize contaminant release to marine waters.

Links to other Action Plans: Physical and Chemical Oceanography**,** Collaborative and Coordinated Sanctuary Management

Key Partners: U.S. Environmental Protection Agency, Washington Department of Ecology, Hoh, Makah, and Quileute tribes and Quinault Indian Nation, local governments, coastal communities, outer coast Marine Resources Committees, Olympic National Park, Washington Maritime National Wildlife Refuge Complex, West Coast Governors' Agreement on Ocean Health Polluted Runoff Action Coordination Team, U.S. Department of Defense, non-governmental organizations, regional port authorities, cruise ship industry, shipping industry, commercial fishing interests

D6. Habitat Protection Action Plan

Desired Outcomes: Human-caused degradation of marine habitats is minimized and mitigated, particularly for those habitats 1) demonstrating high value to ecosystem functioning and productivity; and 2) are most vulnerable to human disturbance.

Links to Goals:
Goal E - Maintain the sanctuary's natural biological diversity and protect, and where appropriate, restore and enhance sanctuary ecosystems.

Background:
The phrase 'habitat protection' is used here to reference actions taken to prevent, mitigate, or eliminate degradation of marine habitats in the sanctuary. A fundamental premise of habitat protection actions is that healthy habitats support healthy marine populations and communities, including exploited fishery resources. Habitat protection actions must be supported by research and monitoring efforts that improve our understanding of functions and values of marine habitats, document how, when and where habitat degradation occurs, and evaluate the effectiveness of management responses. In addition, habitat protection actions need to be reinforced through outreach, both to expand citizen familiarity with issues and to encourage actions that individuals and organizations can take to minimize habitat impacts.

This action plan focuses heavily on collaborative work to 1) understand potential habitat impacts in the sanctuary, 2) identify habitats of special concern critical to ecosystem functioning in the sanctuary, and 3) monitor for and prevent invasive species introductions.

Strategy HP1: THREAT ASSESSMENT AND MITIGATION
Assess existing and potential natural and human-caused threats to physical and biogenic marine habitats (e.g., deep sea corals and sponge, kelp and other macroalgae), and collaboratively develop appropriate management measures to protect and conserve physical and biological habitats.

Activity A: Identify, in consultation with co-management authorities, existing and potential impacts and threats to, as well as relative vulnerability of, physical and biogenic marine habitats in the sanctuary. Recommend and/or implement monitoring to assess relative habitat vulnerabilities to, and impacts and threats from natural disturbances and human activities, including cumulative impacts.

Activity B: Recommend, or implement collaboratively with co-managers, management measures minimizing and mitigating human-caused impacts to physical and biogenic marine habitats.

Activity C: Monitor the recovery rates of habitats, associated biological communities, and habitat-forming biogenic structures following disturbance by human activities.

Strategy HP2: HABITATS OF SPECIAL IMPORTANCE
Develop criteria to identify marine habitats of special importance. Collaborate with co-managers to identify and implement management measures necessary for protection of habitats of special importance.

Activity A: Develop criteria, in collaboration with natural resource co-managers, for habitat types of special importance to ecosystem function or managed species and identify the locations of such habitats.

Activity B: Develop and implement, in collaboration with natural resource co-managers, potential management strategies for protection of habitats of special ecosystem value.

Activity C: Participate in Pacific Fishery Management Council processes, including identification and review of essential fish habitat (EFH) and habitat areas of particular concern (HAPC) through OCNMS representation on the EFH Review Committee.

Activity D: Collaboratively develop and evaluate recommendations for HAPC site and EFH conservation areas.

Activity E: Assist the National Park Service with designation and management of intertidal reserve areas as identified in the ONP 2008 General Management Plan.

Strategy HP3: INVASIVE SPECIES
Reduce the potential for introduction of invasive species in the sanctuary region, monitor distributions of known invasive species, and support programs to mitigate impacts of invasive species to natural and cultural resources.

Activity A: Through OCNMS monitoring, stewardship 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: Engage in regional efforts to monitor for the presence and distribution of invasive species, including volunteer monitoring, where appropriate.

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

Links to Other Action Plans: Water Quality Protection**,** Populations, Communities and Ecosystems, Habitat Mapping and Classification, Collaborative and Coordinated Sanctuary Management

Key Partners: ONP, USFWS, USGS, NOAA (NMFS, NOS), Washington Departments of Fish and Wildlife, Ecology, and Natural Resources, Washington Invasive Species Council, Hoh, Makah, and Quileute tribes and Quinault Indian Nation, IPC, North Pacific Coast and Grays Harbor marine resources committees, NGOs, universities and colleges, coastal communities, Pacific Fishery Management Council, academic organizations, Department of Fisheries and Oceans Canada, local governments, and coastal communities

D7. Regional Ocean Planning Action Plan

Desired Outcome: Improved integration of best available science into OCNMS decision making.

Links to Goals:
Goal E - Maintain the sanctuary's natural biological diversity and protect, and where appropriate, restore and enhance Sanctuary ecosystems.
Goal G - Facilitate wise and sustainable use in the sanctuary to the extent that such uses are compatible with resource protection.

Background:
Throughout the MPR process, the issue of human development in the sanctuary – and how to facilitate human activities in the sanctuary compatible with the primary OCNMS objective of resource protection – has repeatedly arisen. The ocean is a busy place; there are many activities occurring in sanctuary waters and many activities that may be proposed in the near future. It is a complex task to facilitate human use of the sanctuary while maintaining adequate protection for resources. Each human use and its potential associated impacts need to be analyzed and understood; likewise, the cumulative impacts of all human uses need to be considered. Moreover, ONMS needs to understand potential conflicts between human uses. Thus, in order to make sound decisions about human use development in the sanctuary, ONMS cannot consider each human use in isolation.

ONMS also needs to consider human uses in the sanctuary within the context of regional human use patterns and development. Currently, there are significant regional and national ocean planning efforts being made to address human use development in the ocean and balance development of ocean resources with the protection of these resources; these efforts are commonly described as "marine spatial planning." The National Ocean Council describes coastal and marine spatial planning (CMSP) as:

"…a comprehensive, adaptive, integrated, ecosystem-based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean, coastal and Great Lakes areas. CMSP identifies areas most suitable for various types of classes of activities in order to reduce conflicts among uses, reduce environmental impacts, facilitate compatible uses, and preserve critical ecosystem services to meet economic, environmental, security and social objectives. In practical terms, CMSP provides a public policy process for society to better determine how the ocean, coasts, and Great lakes are sustainably used and protected now and for future generations." Executive Order 13547, *Stewardship of the Ocean, Our Coasts, and the Great Lakes*

ONMS decisions about human use planning and permitting in the sanctuary should be informed by regional ocean planning efforts. And, conversely, those making ocean planning decisions about human uses on a regional scale will include OCNMS and its role

in promoting marine conservation and ocean stewardship in their decision-making process. This action plan explains how ONMS will integrate itself into regional and other ocean planning efforts in order both to make and promote sound decisions about compatible human use development in the sanctuary and the northwest region.

Strategy ROP1: REGIONAL OCEAN PLANNING – Investigate how recent initiatives in marine spatial planning can improve sanctuary management by participating in regional ocean planning processes.

Activity A: Work with the IPC and AC to develop a plan to integrate sanctuary efforts into regional ocean planning processes.

Activity B: Make existing OCNMS spatial data available to existing marine spatial tools, such as the Multipurpose Marine Cadastre.

Activity C: Identify, prioritize and collect spatial data on marine uses and resources that contribute to regional ocean planning processes and improve ONMS decision-making.

Activity D: Support the state of Washington's efforts to develop a statewide Marine Spatial Plan, as well as other regional and federal ocean planning efforts that may emerge in the future.

Activity E: Participate in planning processes and site evaluations for proposed development projects in or immediately adjacent to OCNMS and utilize existing (or collaborate in collecting new) natural and cultural resource information to avoid, minimize, and mitigate user conflicts and impacts to habitats and natural and cultural resources.

Links to Other Action Plans: Collaborative and Coordinated Sanctuary Management, Community Involvement in Sanctuary Management, Habitat Mapping and Classification, Habitat Protection, Wildlife Disturbance, Sanctuary Operations

Key Partners: Hoh, Makah, and Quileute tribes and Quinault Indian Nation, Department of Interior (National Parks, U.S. Fish and Wildlife Service), NMFS, Washington State Departments of Fish and Wildlife, Natural Resources, and Ecology, Washington State Ocean Caucus, West Coast Governors' Agreement on Ocean Health Renewable Ocean Energy Action Coordination Team, West Coast CMSP Regional Planning Body, local governments, coastal communities and non-governmental organizations

E. Understand the Sanctuary's Cultural, Historical and Socioeconomic Significance

E1. Maritime Heritage Action Plan

E2. Socioeconomic Values of Resources in the Sanctuary Action Plan

Introduction

Characterizing, protecting, and enhancing public awareness of the sanctuary's maritime heritage (including living cultures, cultural resources, and local and customary knowledge) is an important role of OCNMS – and a role mandated by Section 110 of the National Historic Preservation Act. Additionally, facilitating compatible and sustainable human uses of sanctuary resources is also an important role of OCNMS. In many cases, OCNMS does not have a strong understanding of the cultural, historical and socioeconomic significance of its resources. Thus, over the next five to ten years, OCNMS needs to work collaboratively with tribal and non-tribal communities, as well as with experts in archeology, anthropology, history, social sciences and economics to build this understanding and communicate maritime heritage messages effectively to the public.

E1. Maritime Heritage Action Plan

Desired Outcomes: 1) Improved understanding of the cultural and historic resources in the sanctuary region; and 2) Improved communication between OCNMS, the Washington State Historic Preservation Office, the Makah Tribal Historic Preservation Office, and the Quileute, Hoh and Quinault cultural resource management representatives.

Links to Goals:
Goal F - Enhance understanding and appreciation of the Olympic Coast's maritime heritage (living cultures, traditions, and cultural resources).

Background:
The National Marine Sanctuaries Act (NMSA) mandates sanctuaries "enhance public awareness, understanding, appreciation, and wise and sustainable use of the marine environment, and the natural, historical, cultural and archeological resources of the National Marine Sanctuary System (NMSA, Section 301(b)(4))." The NMSA also mandates sanctuaries comply with the federal archeological program, of which the National Historic Preservation Act is the primary tenant. It is important OCNMS continue to characterize and understand the cultural and historical resources in the sanctuary, particularly in light of the unique American Indian cultural context within which the sanctuary resides. While OCNMS' maritime heritage program is small in size, it can play a significant role in understanding and communicating the outer coast's rich cultural heritage to the public. The aim of this action plan is to define OCNMS' unique role in working collaboratively with tribal and non-tribal communities on the outer coast to:

- Continue and develop efforts to understand the region's rich cultural heritage
- Improve the public's understanding of the significance of the region's maritime heritage
- Incorporate local and customary knowledge (knowledge gained by experience and collected by tribal and non-tribal individuals and communities) into sanctuary management processes
- Gain an improved understanding of the past in order to make better ocean management decisions and policies today

One reason OCNMS' maritime heritage program is especially important to develop is the sanctuary area is also the usual and accustomed areas of four Coastal Treaty Tribes. In this way, OCNMS is unique within the national marine sanctuary system; and the interconnectedness between the American Indians of the Olympic Peninsula and the ocean resources that are now a part of the sanctuary presents OCNMS with a unique opportunity and responsibility to work with the Coastal Treaty Tribes on maritime heritage projects and to communicate to the public the significance of tribal cultures. The non-tribal fishing communities adjacent to the sanctuary also possess a rich cultural heritage that OCNMS has a role in exploring and communicating. In addition to the cultural heritage of the region, a multitude of physical cultural resources exist in the sanctuary. Heavily-used

historical and contemporary trade routes run through OCNMS and there are hundreds of shipwrecks supposed to have occurred in the sanctuary, only a handful of which have been verified, mapped and assessed.

This action plan identifies several specific ways in which OCNMS can more fully develop its maritime heritage program, improve its understanding of this heritage, and improve the way it communicates information about maritime and cultural heritage to the public.

Strategy MH1: CULTURAL RESOURCE CONSERVATION
Work collaboratively to locate, inventory, assess, interpret and protect cultural resources in the sanctuary, and develop further the cultural resource components of OCNMS' permitting and compliance program.

Activity A: Identify priorities for future cultural resource surveys in the sanctuary and assess the resources needed to complete those surveys and implement OCNMS' maritime heritage program.

Activity B: Work with partners to develop uniform guidelines/protocols for cultural resource data collection in the sanctuary.

Activity C: In consultation with the Coastal Treaty Tribes, the state of Washington Historic Preservation Office, the state of Washington Department of Historic Preservation and Archeology, Olympic National Park and others develop a programmatic agreement describing the way in which OCNMS' routine activities will comply with Section 106 of the National Historic Preservation Act.

Activity D: Pursue research funding and partnerships with academic institutions and tribal communities to support the study and analysis of existing cultural resource collections (e.g., at the Makah Cultural and Research Center and other tribal centers) in order to test hypotheses and answer questions about past and future changing ecological conditions on the Olympic Peninsula.

Strategy MH2: LOCAL AND CUSTOMARY KNOWLEDGE
Work with tribal and non-tribal partners to explore ways to gather, share and apply (when appropriate) traditional ecological knowledge, local and customary knowledge, and information obtained from cultural resource analyses.

Activity A: In collaboration with the Coastal Treaty Tribes, develop a program to survey and map "traditional cultural properties" in marine areas of interest to each tribe. This would include working with individual tribes to develop survey protocols to address the nature of properties surveyed, survey methodology, the sensitivity of survey data, disclosure and non-disclosure limitations, disposition of the data, and products derived from the data.

Activity B: Work with the Coastal Treaty Tribes, non-tribal communities and other partners to host scholarly and educational events that bring together natural science, social science and tribal knowledge experts to discuss pressing sanctuary management issues and ways in which traditional ecological knowledge could help to resolve those issues.

Activity C: Collect, analyze and share (as agreed) historical accounts and oral histories from historic (tribal and non-tribal) user groups of resources in the sanctuary, including community members, fishermen, divers, and others, in order to improve understanding of the role that maritime heritage played in the sanctuary's past and collect information relevant to current/future resource management in OCNMS. Ensure the information collected from local communities as part of historical and cultural research projects is shared with these communities in a timely manner once projects are completed.

Strategy MH3: PUBLIC UNDERSTANDING OF TREATY RIGHTS
Work collaboratively with the Coastal Treaty Tribes to improve the public's understanding of treaty rights and how traditional lifeways form a vital connection between the past, the present and the future, with a focus on marine areas.

Activity A: Work with the Coastal Treaty Tribes to create protocols for developing, reviewing and communicating information about treaty rights and tribal cultures to sanctuary visitors, volunteers, staff, partners and local communities.

Activity B: Maintain ongoing communications with Coastal Treaty Tribes about opportunities to collaborate on events such as community festivals (Makah Days, Quileute Days, Chief Taholah Days, etc), special events like Tribal Journeys and other commemorations or significant celebrations within tribal communities.

Activity C: Work collaboratively with the Coastal Treaty Tribes, Olympic National Park and other partners in the development of an OCNMS Long-Range Interpretive Plan that emphasizes appropriate messages and content relating to treaty rights, traditional and contemporary tribal communities, cultures and cultural values.

- Identify opportunities for projects, facilities and program development with each Coastal Treaty Tribe (e.g., maps with American Indian place names, wayside exhibits on each of the tribes, new visitor centers, publications) to be located or distributed on tribal reservations and other locations
- Identify opportunities for interpreting traditional culture and cultural values at the Olympic Coast Discovery Center
- Continue to incorporate information about the Coastal Treaty Tribes into the standard training for sanctuary volunteers (including AC members)

Links to Other Action Plans: Collaborative and Coordinated Sanctuary Management**,** Community Outreach**,** K-12 Education**,** Higher Education**,** Visitor Services

Key Partners: Makah, Quileute and Hoh Tribes and the Quinault Indian Nation, Olympic Coast Intergovernmental Policy Council, Olympic National Park, Olympic Park Institute, OCNMS Advisory Council, Washington State Historic Preservation Office, Washington Department of Archeology and Historic Preservation, Makah Cultural and Research Center, Advisory Council on Historic Preservation, Puget Sound Maritime Historical Society, Washington State Historical Society, Washington Trust for Historic Preservation, Museum of History and Industry, commercial and sport fishermen, divers, local residents, historians and history organizations, Puget Sound Maritime Historical Society, Museum of History and Industry, Grays Harbor Historical Seaport Authority and Westport Maritime Museum

E2. Socioeconomic Values of Resources in the Sanctuary Action Plan

Desired Outcome: Improved ecological, social, and economic resilience for the Olympic Peninsula.

Links to Goals:
Goal G - Facilitate wise and sustainable use in the sanctuary to the extent that such uses are compatible with resource protection.

Background:
Socioeconomic valuation of sanctuary resources is critical to sanctuary management. Social science data are used to examine the human dimension of marine resource management; to understand consumptive and non-consumptive human use patterns; to assess economic impacts of proposed activities; and to understand the attitudes, perception and beliefs of resource users. Each of these factors is not only directly relevant to the National Marine Sanctuaries Act (NMSA) and laws such as the National Environmental Policy Act (NEPA), but is also critical to devising policies and management strategies resulting in ecological, social, and economic resilience. Currently, very little socioeconomic or human use information exists for OCNMS. Thus, at this time OCNMS is not able to analyze socioeconomic effects of the sanctuary and sanctuary management as comprehensively as is needed, nor is it able to pursue an ecosystem-based management (EBM) framework. EBM, to be effective, requires integrating both natural and social science data into ecosystem management decisions.

With improved information about the socioeconomic values of resources in the sanctuary, an improved understanding of what human uses are occurring in the sanctuary, and an improved understanding of what human uses might be proposed in the sanctuary, OCNMS will be better equipped to make sound sanctuary management decisions. Moreover, ecosystem-based management frameworks require management agencies to consider humans and human uses as part of ecosystems. To develop an effective ecosystem-based management framework, OCNMS management needs to develop a better understanding of socioeconomics and human uses in the sanctuary. Thus, this action plan is focused on socioeconomic and human use research and assessment and is intended to complement the Habitat Mapping and Classification Action Plan, Physical and Chemical Oceanography Action Plan, Populations, Communities and Ecosystems Action Plan, and Data Management, Sharing and Reporting Action Plan.

Strategy SV1: EXISTING SOCIOECONOMIC INFORMATION
Foster analysis and dissemination of existing socioeconomic data about Olympic Coast marine resources and human use patterns, including consumptive, non-consumptive and passive human use patterns.

Activity A: Identify key socioeconomic players in the sanctuary region and begin targeted outreach effort to communicate OCNMS goals, and its role as a facilitator, in regional socioeconomic characterization.

Activity B: Further develop the existing annotated bibliography of references relevant to socioeconomic valuation of marine resources on the Olympic Peninsula, and make this annotated bibliography widely available (post it on OCNMS website).

Activity C: Review and summarize information on West-Coast wide efforts to collect data on human use patterns in the marine and coastal environment.

Activity D: Make existing socioeconomic data widely available in user-friendly formats (such as GIS layers).

Strategy SV2: NEW SOCIOECONOMIC INFORMATION
Develop partnerships in order to collect, assemble, and analyze new information about human uses/activities occurring in the sanctuary and their socioeconomic values.

Activity A: Submit a formal request to the Coastal Treaty Tribes expressing OCNMS' interest in partnering to assess and apply information on human use patterns and socioeconomic values.

Activity B: Work with the AC to form a working group to make recommendations on developing a common understanding of the human dimension of marine spatial planning and management in the OCNMS, and prioritizing socioeconomic data needs.

Activity C: Encourage the working group to initiate a small, joint (partnership driven) human use mapping project in order to develop an initial (general) socioeconomic characterization of the sanctuary region. This should be done using as many known resources as possible to minimize cost, time, and to build on or create new partnerships in the region. The socioeconomic characterization should address consumptive, non-consumptive, and passive use.

Activity D: Develop a joint proposal for a more extensive socioeconomic study or expanded (more detailed) human use mapping project and pursue funding for this proposal. Look for opportunities to leverage capacity and share costs, e.g., through the West Coast Governor's agreement, the Sea Grant Program, and the state of Washington.

Links to Other Action Plans: Regional Ocean Planning, Populations, Communities and Ecosystems, Data Management, Sharing and Reporting, Collaborative and Coordinated Sanctuary Management, Community Involvement in Sanctuary Management, Community Outreach

Key Partners: Makah, Quileute, Hoh Tribes and Quinault Indian Nation, state of Washington, Olympic Coast Intergovernmental Policy Council, NMFS/NWFSC, Ecotrust and other NGOs, outer coast Marine Resource Committees, Olympic National Park, county Economic Development Councils and the Olympic Peninsula Tourism Commission

5.3. PERFORMANCE MEASURES

Performance evaluation is an integral component of ONMS efforts to improve sanctuary management. The performance measures proposed here are designed to serve three purposes: 1) to better understand OCNMS' ability to meet its objectives; 2) to track OCNMS' success in addressing the issues identified in this management plan; and 3) to identify tangible examples of how OCNMS is contributing to both the performance targets developed for the Office of National Marine Sanctuaries and to achieving the mission of the NMSA.

With implementation of the revised OCNMS management plan, OCNMS staff will monitor these performance measures over time, collecting data on progress towards their achievement. Results will be compiled for the AC, IPC, and other interested parties on an annual basis (see Sanctuary Operations Action Plan, Strategy OPS10). Accomplishments, as well as any inabilities to achieve outcomes will be reported, including potential strategies for mitigating shortfalls. This internal review represents one of the primary benefits of the performance evaluation process: the ability to provide feedback about why particular actions are or are not meeting stated targets and how they can be altered to do so. This process, where appropriate will mesh with other programmatic evaluation tools, such as the OCNMS Condition Report.

Eight performance measures (and associated outcomes) are listed below. Under each outcome and performance measure, a list of the relevant priority issues addressed is provided (see section 4.5). OCNMS may opt to modify or augment these performance measures in the future.

In some cases, it is difficult to measure the achievement of the priority issues (e.g., Improve Ocean Literacy, Achieve Effective Collaborative and Coordinated Sanctuary Management). In these cases, the performance measures provided are serving as proxies for difficult to measure outcomes.

OUTCOME 1: ONMS is recognized by its partners and constituents as an organization effectively seeking and considering information and opinions from external sources in its management and decision making.

> **Performance Measure** 1: Maintain undiminished or improve ratings of OCNMS' effectiveness as evaluated by key partners and constituents through a brief annual survey (e.g., using a web survey tool) designed to assess their involvement in sanctuary management processes and the perceived effectiveness of this involvement in sanctuary management processes over the past year. This survey should use the same survey questions each year so that results can be compared over time.
>
> ***Relevant Priority Management Need (s):*** *Achieve Effective Collaborative and Coordinated Management*

OUTCOME 2: Increased involvement of communities on the Olympic Peninsula in sanctuary management issues and ocean conservation.

Performance Measure 2: Demonstrate an increase in 1) individual public attendance at OCNMS-hosted public meetings and events (e.g., open houses, Advisory Council meetings); and 2) volunteer hours in OCNMS-led education, stewardship and research efforts (e.g., Discovery Center, COASST, intertidal monitoring). This measure will be evaluated on an annual basis.

Relevant Priority Management Need(s): *Achieve Effective Collaborative and Coordinated Management, Improve Ocean Literacy*

OUTCOME 3: Increase the area of sanctuary seafloor where efforts to map, groundtruth, characterize or analyze habitats have been completed.

Performance Measure 3: Map, groundtruth, characterize, and/or analyze 300 square nautical miles of sanctuary seafloor each year.

Relevant Priority Management Need(s): *Conduct Collaborative Research, Assessments and Monitoring to Inform Ecosystem-Based Management*

OUTCOME 4: ONMS will support collaborative and coordinated management through timely sharing of data collected by OCNMS.

Performance Measure 4: On an annual basis, track the progress made analyzing and distributing each data set that OCNMS collects. For each data set, report on 1) the date(s) the data were collected; 2) the expected annual and ultimate end product(s); 3) data sharing methods; 4) the time taken to analyze the data; 5) the time to disseminate the data; and 6) if necessary, when OCNMS anticipates completing a final analysis, report and dissemination.

Relevant Priority Management Need(s): *Conduct Collaborative Research, Assessments and Monitoring to Inform Ecosystem-Based Management*

OUTCOME 5: Determine the effectiveness of sanctuary Ocean Literacy programs whose audiences include sanctuary users, students, teachers, volunteers and partner organizations.

Performance Measure 5: Track progress made during each year toward improving the quality of Ocean Literacy programs and their impacts on participants in improving their understanding of ocean processes and resources and enhancing their commitment to act as stewards.

Relevant Priority Management Need(s): *Improve Ocean Literacy, Achieve Effective Collaborative and Coordinated Management*

OUTCOME 6: Communicate the importance of the sanctuary and its unique resources, and the unique role of NOAA and Olympic Coast National Marine Sanctuary as a marine resource manager using a wide variety of media and methods to reach broad audiences.

Performance Measure 6: Track effort and outputs of outreach programs, using tools appropriate for the media, communication methods and audiences.

Relevant Priority Management Need(s): *Achieve Effective Collaborative and Coordinated Sanctuary Management, Improve Ocean Literacy*

OUTCOME 7: ONMS is prepared for an oil or hazardous spill in or near the sanctuary.

Performance Measure 7: On an annual basis, 1) summarize and evaluate OCNMS participation in regional response planning efforts and spill drills; and 2) confirm that all OCNMS staff that have completed their assigned oil spill response training plan on an annual basis.

Relevant Priority Management Need(s): *Conserve Natural Resources in the Sanctuary*

OUTCOME 8: The condition of water quality, habitat and living resources in the sanctuary is maintained or improved.

Performance Measure 8: Every five years, evaluate if the condition of sanctuary resources has been maintained or improved, as assessed through an OCNMS Condition Report.

Relevant Priority Management Need(s): *Conserve Natural Resources in the Sanctuary*

5.4. COST ESTIMATES AND TIMELINES

Cost estimates for each strategy were developed to provide a general sense of the scope and scale of the work being proposed in the FMP and the resources necessary to accomplish this work (Table 4). These estimates are *not* proposed budgets. Estimates were developed based upon a series of assumptions that included a fixed cost of labor, and fixed estimates for travel time, supplies, printing, and other costs. These estimates do not account for inflation, staff merit pay increases, increases in cost of living, variable fuel and utility costs, etc, nor do these estimates differentiate between funds from the OCNMS base budget versus other funding sources (e.g., external grants, partnership with other agencies).

Table 4 List of Cost Estimates Associated with the Action Plan Strategies (in thousands of dollars).

Strategies	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
CCM1 External Evaluation	$8	$37	$4	$0	$0
CCM2 Coastal Treaty Tribes	$55	$55	$55	$55	$55
CCM3 Olympic Coast Intergovernmental Policy Council	$165	$165	$165	$165	$165
CCM4 State of Washington	$9	$9	$9	$9	$9
CCM5 Department of Interior	$8	$8	$8	$8	$8
CCM6 US Coast Guard	$9	$9	$9	$9	$14
CCM7 US Navy	$16	$9	$9	$9	$9
CCM8 NMFS	$24	$24	$24	$24	$24
CCM9 Office of National Marine Sanctuaries	$107	$107	$107	$107	$107
CCM10 Canadian Government	$8	$8	$8	$8	$8
COM1 Advisory Council	$51	$51	$51	$51	$51
COM2 Marine Resources Committees	$13	$13	$13	$13	$13
COM3 Non-Governmental Organizations	$17	$17	$17	$17	$17
OPS1 Vessel Infrastructure and Operations	$148	$306	$306	$306	$306
OPS2 Facilities	$211	$165	$165	$165	$165
OPS3 Annual Planning	$40	$40	$40	$40	$40
OPS4 Safety Operations	$12	$12	$12	$12	$12
OPS5 Staffing	$104	$104	$104	$104	$104
OPS6 Volunteer Program	$92	$92	$92	$92	$92
OPS7 Permitting and Consultations	$48	$30	$30	$30	$30

Strategies (cont.)	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
OPS8 Voluntary Compliance	$32	$16	$16	$16	$16
OPS9 Enforcement and Incident Response	$18	$25	$18	$18	$18
OPS10 Management Plan Implementation Reporting	$40	$40	$40	$40	$40
MAP1 Regional Coordination	$11	$11	$11	$11	$11
MAP2 Seafloor Habitat Mapping	$37	$218	$218	$218	$218
MAP3 Habitat Classification	$42	$67	$67	$67	$67
MAP4 Mapping Products	$30	$30	$56	$56	$56
OCEO1 Coastal Mooring Program	$286	$286	$286	$286	$286
OCEO2 Hypoxia	$31	$31	$31	$31	$31
OCEO3 Ocean Acidification	$21	$21	$21	$21	$21
OCEO4 Harmful Algal Blooms	$17	$17	$17	$17	$17
ECO1 Water Column Communities	$0	$41	$41	$41	$41
ECO2 Intertidal	$14	$28	$28	$28	$28
ECO3 Subtidal	$10	$70	$70	$70	$70
ECO4 Benthic	$337	$34	$337	$34	$337
ECO5 Fish	$10	$10	$10	$10	$10
ECO6 Marine Birds	$50	$78	$137	$82	$82
ECO7 Marine Mammals	$13	$110	$225	$110	$90
ECO8 Stranding Networks	$17	$17	$17	$17	$17
ECO9 Ecosystem Processes	$23	$1	$71	$0	$0
DAT1 Data Quality Control and Management	$7	$2	$2	$2	$2
DAT2 Data Distribution	$33	$33	$33	$33	$33
DAT3 Adaptive Management	$0	$13	$3	$3	$3
DAT4 Condition Report	$0	$0	$0	$0	$36
ED1 K-12 Partnerships	$52	$52	$52	$52	$52
ED2 Place-Based Education	$118	$118	$118	$118	$118
ED3 Regional Initiatives	$19	$19	$19	$19	$19

Strategies (cont.)	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
ED4 Technology	$52	$52	$52	$52	$52
HED1 Internship Development	$58	$58	$58	$58	$58
HED2 Volunteer Positions	$7	$7	$7	$7	$7
HED3 College Partnerships	$59	$59	$59	$59	$59
VISIT1 Visitor Experience	$186	$186	$186	$186	$186
VISIT2 Long-Range Interpretive Plan	$34	$34	$34	$34	$34
VISIT 3 New Technology	$294	$294	$294	$294	$294
OUT1 Stewardship and Citizen Science	$154	$154	$154	$154	$154
OUT2 Staff Presence on Outer Coast	$27	$27	$27	$27	$27
OUT3 Community Events	$74	$74	$74	$74	$74
OUT4 Community-Based Efforts	$43	$43	$43	$43	$43
SPILL1 ATBA Management, Compliance and Monitoring	$11	$20	$72	$36	$36
SPILL2 Regional Vessel Management Forums	$12	$4	$4	$0	$0
SPILL3 Regional Planning and Training Exercises	$39	$26	$21	$20	$26
SPILL4 Outer Coast Trustees Working Group	$5	$5	$5	$5	$5
SPILL5 OCNMS Organizational Response Plan	$3	$2	$2	$2	$2
SPILL6 Damage Survey and Assessment Protocols	$5	$9	$20	$5	$5
CLIM1 Climate-Smart Sanctuary Program	$75	$75	$75	$75	$75
CLIM2 Sanctuary as Sentinel Site	$36	$36	$36	$36	$36
CLIM3 Resilient Ecosystems	$73	$73	$73	$73	$73
CLIM4 Communicating Climate Change	$101	$101	$101	$101	$101
MD1 Submerged or Floating Debris	$8	$8	$8	$8	$8
MD2 Beach Debris	$27	$27	$27	$27	$27
WD1 Outreach on Wildlife Disturbance	$27	$27	$27	$27	$27
WD2 Overflight Restriction Zone	$12	$0	$0	$0	$0
WD3 Marine Mammal Disturbance	$0	$0	$12	$7	$0

Strategies (cont.)	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
WQP1 Vessel Discharges	$6	$16	$0	$0	$0
WQP2 Contaminants	$3	$2	$2	$2	$2
HP1 Threat Assessment and Mitigation	$40	$0	$411	$16	$108
HP2 Habitats of Special Importance	$37	$25	$34	$25	$34
HP3 Invasive Species	$11	$13	$11	$11	$11
ROP1 Regional Ocean Planning	$87	$95	$98	$98	$98
MH1 Cultural Resource Conservation	$92	$92	$92	$92	$92
MH2 Local and Customary Knowledge	$90	$90	$90	$90	$90
MH3 Public Understanding of Treaty Rights	$28	$28	$28	$28	$28
SV1 Existing Socioeconomic Information	$0	$39	$0	$0	$0
SV2 New Socioeconomic Information	$0	$13	$21	$57	$0
TOTAL	$4,228	$4,462	$5,431	$4,452	$4,819

5.5. IMPLEMENTATION TABLE

The action plans in the FMP comprise a body of work that, to fully implement, would require resources well beyond what is currently available –and expected to be available – to ONMS. Cost estimates developed by OCNMS staff for each action plan indicate OCNMS would need an annual base budget ranging between $4.2 and $5.4 million (and a staff of approximately 40 people) in order to accomplish all of the work in the action plans. OCNMS currently operates with an annual budget of around $1.5 million, not including in-kind support from other NOAA offices or grants from NOAA or other agencies and organizations. OCNMS staff is the equivalent of 16 full-time staff (including federal employees and contracted support services). The amount of in-kind support and grant funding OCNMS receives each year varies greatly. All of the strategies in the action plans are important in helping OCNMS meet its goals and objectives. However, given funding limitations, it was necessary to prioritize the strategies to show which are most likely to be implemented under various budget scenarios. In this way, OCNMS hopes to implement the management plan in as transparent a manner as possible.

OCNMS staff worked with the OCNMS Advisory Council, the Olympic Coast Intergovernmental Policy Council and ONMS leadership in order to develop the implementation table that follows (Table 5), showing which strategies will be high, medium and low priorities for ONMS to complete under three different hypothetical budget scenarios:

- OCNMS remains level funded
- OCNMS receives a moderate increase in base funding
- OCNMS receives a significant increase in base funding

A considerable number of OCNMS projects are grant-funded. It is difficult to predict what grant funding will be available and how much of it ONMS will receive on an annual basis. Grant funds are typically geared toward one specific activity (and cannot be put toward other activities). ONMS will use the implementation table to guide staff efforts, but acknowledge that successful acquisition of grant funding for particular projects might also influence how ONMS allocates its staff resources year to year.

5.5.1. Explanation of Implementation Table

Strategy Status
The status of the strategy indicates the amount of work completed on the strategy at the time of MPR. Certain strategies and activities have been partially or wholly implemented prior to or during the MPR process. Many of these represent ongoing initiatives that will continue. Other strategies are new as part of the updated management plan and have not been worked on at all.

Funding Scenarios 1, 2 and 3
Implementation at various budget scenarios indicates the priority of a strategy or action plan and subsequent level of effort based on resources available. As stated previously, full implementation of the management plan exceeds the resources available to OCNMS, therefore requiring some prioritization of the strategies. As more resources become available (i.e., the budget grows), a greater level of implementation is possible. This table outlines to what extent implementation could occur with OCNMS' existing resources and how increases in resources would affect the amount of implementation possible for each strategy.

Partnership Coordination
Implementation of most of the strategies in the FMP will require some input or coordination from partners, particularly the Coastal Treaty Tribes, other government agencies, research institutions, and NGOs. The table outlines the level of involvement expected from partners to achieve full implementation of each strategy. Many action plans and strategies are completely dependent on involvement from other agencies or dependent on research conducted by an outside institution.

Internal/External Funding Sources
Funding for implementation of many strategies will require a mix of internal ONMS/OCNMS funds as well as funding from external sources such as grants, or in-kind work from partner agencies. The table highlights the probable source of funding as either primarily internal (either at base of increased level), external or a mix of both. The table notes where it is anticipated the current OCNMS base budget would be sufficient to fund a strategy. The table also notes where a significant increase to OCNMS' base budget would be required to fund a strategy.

Table 5 OCNMS Management Plan Implementation Table

Table Legend			
Strategy Status: ● – Existing w/o significant modification ◗ – Existing w/ significant modification ○ – New or future (Not yet implemented.)	Implementation Ranking: H – High M – Medium L – Low	Necessary Partnership Coordination: ● – Not possible w/o partners ◗ – Significant reliance on partners ○ – Little reliance on partners	Primary Funding Sources: ● – External (e.g. Grants) ◗ – Internal and External ◉ – Internal (increased budget) ○ – Internal (base budget)

Action Plans	Strategy Status	Level Funding: Scenario 1	Moderate Increase: Scenario 2	Substantial Increase: Scenario 3	Partnership Coordination	Internal/external Funding Sources
Collaborative and Coordinated Sanctuary Management						
CCM1 External Evaluation	○	L	L	M	●	●
CCM2 Coastal Treaty Tribes	●	H	H	H	●	○
CCM3 Olympic Coast IPC	●	H	H	H	●	○
CCM4 Washington State	◗	H	H	H	●	○
CCM5 Department of Interior	●	H	H	H	●	○
CCM6 US Coast Guard	●	H	H	H	●	○
CCM7 US Navy	○	H	H	H	●	○
CCM8 NMFS	◗	M	H	H	●	○
CCM9 Office of National Marine Sanctuaries	●	H	H	H	●	○
CCM10 Canadian Government	◗	L	M	M	●	◗
Community Involvement in Sanctuary Management						
COM1 Advisory Council	●	H	H	H	●	○
COM2 Marine Resource Committees	◗	M	M	M	●	○
COM3 Non-government Organizations	◗	H	H	H	●	◉
Sanctuary Operations						
OPS1 Vessel Infrastructure and Operations	●	H	H	H	○	○
OPS2 Facilities	●	H	H	H	○	○
OPS3 Annual Planning	●	H	H	H	○	○
OPS4 Safe Operations	●	H	H	H	○	○
OPS5 Staffing	●	H	H	H	○	○
OPS6 Volunteer Program	●	M	H	H	●	◉
OPS7 Permitting and Consultation	◗	H	H	H	○	○
OPS8 Voluntary Compliance	●	M	M	M	○	◉
OPS9 Enforcement and Incident Response	◗	L	L	H	●	◗
OPS10 Implementation Reporting	○	H	H	H	○	○
Habitat Mapping and Classification						
MAP1 Regional Coordination	●	H	H	H	●	○
MAP2 Seafloor Habitat Mapping	●	H	H	H	◗	◗
MAP3 Habitat Classification	●	H	H	H	○	◗
MAP4 Mapping Products	○	H	H	H	●	◗

Action Plans	Strategy Status	Level Funding: Scenario 1	Moderate Increase: Scenario 2	Substantial Increase: Scenario 3	Partnership Coordination	Internal/external Funding Sources
Physical and Chemical Oceanography						
OCEO1 Coastal Mooring Program	●	H	H	H	●	◉
OCEO2 Hypoxia	●	M	H	H	●	◉
OCEO3 Ocean Acidification	◗	H	H	H	●	●
OCEO4 Harmful Algal Blooms	●	M	M	H	●	●
Populations, Communities and Ecosystems						
ECO1 Water Column Communities	○	L	M	H	●	◗
ECO2 Intertidal	●	M	H	H	●	○
ECO3 Subtidal	○	L	M	H	●	◗
ECO4 Benthic	●	M	H	H	●	●
ECO5 Fish	○	L	L	M	●	◗
ECO6 Marine Birds	◗	M	H	H	●	◗
ECO7 Marine Mammals	◗	M	M	H	●	◗
ECO8 Stranding Network	●	L	L	M	●	◗
ECO9 Ecosystem Processes	○	M	M	H	●	◗
Data Management, Sharing and Reporting						
DATA1 Data Quality Control and Management	◗	H	H	H	○	◉
DATA2 Data Distribution	●	H	H	H	○	○
DATA3 Adaptive Management	◗	L	M	H	●	◉
DATA4 Condition Report	●	M	H	H	◗	◉
K-12 Education						
ED1 K-12 Partnerships	○	H	H	H	●	◗
ED2 Place-Based Education	◗	M	M	H	●	◗
ED3 Regional Initiatives	●	L	L	M	●	○
ED4 Using Technology	○	L	L	M	◗	◉
Higher Education						
HED1 Internship Development	○	L	L	M	◗	◉
HED2 Volunteer Positions	○	L	L	M	●	◉
HED3 College Partnerships	○	L	L	L	●	◉
Visitor Services						
VISIT1 Visitor Experience	●	L	M	H	●	◉
VISIT2 Long-Range Interpretive Plan	○	M	M	M	●	●
VISIT 3 New Technology	○	L	L	L	◗	◉
Community Outreach						
OUT1 Stewardship and Citizen Science	◗	L	M	M	●	◗
OUT2 Staff Presence on Outer Coast	○	L	L	M	◗	◉
OUT3 Community Events	◗	M	M	M	●	○
OUT4 Community-Based Efforts	○	L	M	H	●	◗
Spills Prevention, Preparedness, Response and Restoration						
SPILL1 ATBA Management, Compliance and Monitoring	◗	H	H	H	●	◉
SPILL2 Regional Vessel Management Forums	○	L	M	H	●	◉
SPILL3 Regional Planning and Training Exercises	◗	H	H	H	●	◗

Action Plans	Strategy Status	Level Funding: Scenario 1	Moderate Increase: Scenario 2	Substantial Increase: Scenario 3	Partnership Coordination	Internal/external Funding Sources
SPILL4 Outer Coast Trustees Working Group	●	M	M	M	●	○
SPILL5 OCNMS Organizational Response Plan	○	H	H	H	○	◉
SPILL6 Damage Survey and Assessment Protocols	○	H	H	H	●	◗
Climate Change						
CLIM1 Climate Smart Sanctuary Program	○	L	L	M	◗	◉
CLIM2 Sanctuary as Sentinel Site	○	M	H	H	●	◉
CLIM3 Resilient Ecosystems	○	L	L	M	●	◉
CLIM4 Communicating Climate Change	○	L	L	H	◗	◉
Marine Debris						
MD1 Assessment and Removal	◗	H	H	H	●	◗
MD2 Mitigating Impacts	◗	H	H	H	●	◗
Wildlife Disturbance						
WD1 Outreach on Wildlife Disturbance	◗	L	L	M	●	◉
WD2 Overflight Restriction Zone	◗	L	L	L	●	◉
WD3 Marine Mammal Disturbance	○	M	M	M	●	◉
Water Quality						
WQP1 Vessel Discharges	○	H	H	H	●	◗
WQP2 Contaminants	◗	L	L	L	●	◗
Habitat Protection						
HP1 Threat Assessment and Mitigation	○	M	H	H	●	◗
HP2 Habitats of Special Importance	◗	H	H	H	●	◗
HP3 Invasive Species	◗	M	H	H	●	◗
Regional Ocean Planning						
ROP1 Regional Ocean Planning	○	L	M	H	●	◗
Maritime Heritage						
MH1 Cultural Resource Conservation	○	L	L	M	●	◗
MH2 Local and Customary Knowledge	○	L	L	M	●	◉
MH3 Public Understanding of Treaty Rights	○	L	L	L	●	◉
Socioeconomic Values of Sanctuary Resources						
SV1 Existing Socioeconomic Information	○	L	L	L	●	○
SV2 New Socioeconomic Information	○	L	L	L	●	●

Table Legend			
Strategy Status: ● – Existing w/o significant modification ◗ – Existing w/ significant modification ○ – New or future (Not yet implemented.)	Implementation Ranking: H – High M – Medium L – Low	Necessary Partnership Coordination: ● – Not possible w/o partners ◗ – Significant reliance on partners ○ – Little reliance on partners	Primary Funding Sources: ● – External (e.g. Grants) ◗ – Internal and External ◉ – Internal (increased budget) ○ – Internal (base budget)

6. AFFECTED ENVIRONMENT

The Affected Environment section describes the setting in which Olympic Coast National Marine Sanctuary's (OCNMS) management plan will be implemented. This section focuses on those resources most likely to be affected by specific actions and regulatory changes being considered in the management plan alternatives. OCNMS' original Final Environmental Impact Statement/Management Plan (NOAA 1993) also contains an in-depth affected environment section, which is incorporated here by reference. The more recent OCNMS Condition Report (ONMS 2008) is also incorporated by reference.

6.1. PHYSICAL SETTING

The physical setting of the sanctuary is the structural and dynamic foundation for its biological processes. Through the physical setting and the linkages between its geography, geology and oceanography, regional and large-scale ecosystem processes connect with and directly impact local productivity and biodiversity patterns in the sanctuary.

OCNMS spans 2,408 square nautical miles (8,259 square kilometers) of marine waters and the submerged lands thereunder off Washington state's Olympic Peninsula coast (Figure 3). In the north, OCNMS lies at the western entrance to the Strait of Juan de Fuca, a large waterway between United States and Canada that connects the Pacific Ocean with the Salish Sea.

The sanctuary boundary, as defined in the OCNMS regulations (15 CFR 922, Subpart O), extends from Koitlah Point due north to the United States/Canada international boundary seaward to the 100 fathom isobath (approximately 180 meters depth). The seaward boundary of the sanctuary generally follows the 100 fathom isobath in a southerly direction to a point due west of the Copalis River, cutting across the heads of Nitinat, Juan de Fuca, and Quinault Canyons. The shoreward boundary of the sanctuary is the mean lower low water line when adjacent to American Indian lands and state lands. When adjacent to federally managed lands, the sanctuary includes intertidal areas to the mean higher high water line. The coastal boundary of the sanctuary cuts across the mouths of but does not extend up rivers and streams.

Extending seaward 25 to 40 nautical miles (46 to 74 kilometers), the sanctuary covers much of the continental shelf and the heads of three major submarine canyons, in places reaching depths of over 1,400 meters (750 fathoms or 4,500 feet). The sanctuary borders a largely undeveloped coastline, enhancing the protection provided by both the 104 kilometer-long (65 mile) coastal strip of Olympic National Park (ONP) that includes 87 kilometers (52 miles) of designated wilderness coast, as well as the approximately 600 offshore islands and emergent rocks within the Washington Maritime National Wildlife Refuge Complex.

Figure 3 Olympic Coast National Marine Sanctuary

OCNMS lies in the northern portion of the Oregonian biogeographic province extending from Point Conception, California, to Cape Flattery, Washington (Airame et al. 2003). The province is characterized by a narrow continental shelf, mountainous shoreline, steep rocky headlands, sandy pocket beaches with sea stack islands, many small and a few large rivers, and small estuaries with barrier islands. The province is also noted as exhibiting the greatest volume of upwelling in North America. This nutrient-rich upwelling zone drives high primary productivity and supports a multitude of marine habitats. The sanctuary resides within the California Current System (CCS) and represents one of North America's most productive marine ecosystems.

6.1.1. Geography and Geology

The Olympic Coast is located at a tectonically active boundary known as the Cascadia Subduction Zone, where the edge of the North American continental plate meets and overrides the Juan de Fuca oceanic plate. The geologic activity in the area creates potential hazards such as earthquakes and associated submarine landslides, tsunamis and volcanic eruptions (McGregor and Offield 1986).

The continental shelf extends 7 to 35 nautical miles (13 to 64 kilometers) from the outer coast of Washington and provides a relatively shallow coastal environment between the near shore and the shelf break at about the 100-fathom (180-meter) contour. The majority of the sanctuary overlays the continental shelf. The shelf is composed primarily of soft sediment and glacial deposits of cobble, gravel and boulders, punctuated by rock outcrops. As described in section 6.2.4, the majority of the sanctuary seafloor has not yet been adequately mapped or characterized, so a full understanding of sediments and habitat distribution remains elusive (Intelmann 2006).

Sanctuary boundaries include portions of the Nitinat, Juan de Fuca, and Quinault submarine canyons that cut into the continental shelf along the western boundary of the sanctuary (Figure 3). The Quinault Canyon is the deepest, descending to 1,420 meters (777 fathoms or 4,660 feet) at its deepest point within the sanctuary. The Juan de Fuca Canyon Trough transects the northern portion of the sanctuary angling toward the Strait of Juan de Fuca. These canyons are dynamic areas where massive submarine landslides occur on the steep side walls and canyon bottoms collect sediment deposited from above. These canyons also serve as conduits for dense, cold, nutrient-rich seawater that is pulled toward shore into sunlight, an upwelling that feeds surface productivity at the base of the food web.

Broad beaches, dunes, and ridges dominate the coastline from Cape Disappointment, on the north side of the Columbia River, to the Hoh River, and rocky shores with smaller stretches of beach dominate to the north. Wave action has eroded the shoreline through time to form steep, tall cliffs at various places along the coast. Forested hills and sloping terraces are found near river mouths. In many places, a wave-cut platform, underwater with the tides, fronts the ocean where small islands, sea stacks, and rocks dot the platform's surface.

6.1.2. Oceanography

The area around the sanctuary is characterized by distinct patterns in oceanographic circulation, winter storms, water flows influenced by topography and land-sea interactions. Large-scale processes are the predominant controlling factors for seasonal upwelling-downwelling fluctuations that produce a highly dynamic oceanographic environment. Large-scale movements of oceanic water masses, such as the California Current, which flows southward beyond the continental shelf, connect the sanctuary with the broader seascape of the eastern North Pacific Ocean and influence climate and marine productivity for the region.

A general characterization of ocean climate and behavior for the sanctuary region was developed recently from satellite imagery (Pirhalla et al. 2009; Figure 4). Winter months (November-mid-February) are characterized by strong winds from the south (which forces downward transport of surface waters), heavy rainfall, and northward transport of the Columbia River discharge of fresh water and suspended materials. A spring transition period with variable conditions typically occurs in March. A spring/early summer bloom period occurs in April-June, when strengthened upwelling, increased surface water temperatures, and the Juan de Fuca outflow encourage increased plankton growth. During the summer/early fall period, offshore transport of surface waters, continued upwelling, increased light and temperature, with available nutrients out of the Juan de Fuca Strait combine to promote chlorophyll (phytoplankton) production along the entire Olympic Coast. A relaxation in upwelling, decrease in nutrients and chlorophyll, and shift toward northward flow of surface waters typify the fall transition period.

On shore, the visible rise and fall of tides follow a mixed, semidiurnal pattern with two high-water and low-water phases per day. A mixed pattern means consecutive highs and lows have different tidal heights. The tidal range on the outer coast of Washington is large, averaging about 11.5 feet (3.5m) between high and low tides. Ocean surface water temperatures average about 9°C (48°F) in winter and 15°C (58°F) in summer.

Figure 4 Schematic of general physical factors controlling ocean surface response during January, May, July, and September (from Pirhalla et al. 2009).

6.1.3. Water Quality

Water quality within OCNMS is largely representative of natural ocean conditions, with relatively minor influence from human activities at sea and on land (ONMS 2008). By conventional measures, marine water quality within OCNMS is not notably compromised, in part because there have been few point sources of pollution in the vicinity, such as sewage outfalls or industrial discharge sites, and because there are no large industrial developments or large population centers adjacent to OCNMS.

Stressors that may impact water quality in the sanctuary include hypoxic (low oxygen) conditions and harmful algal blooms. Results of increased water quality monitoring efforts in recent years indicate more frequent occurrence of hypoxic conditions as well as greater depression in oxygen levels than previously recorded (Chan et al. 2008; ONMS 2008),

phenomena that have been tentatively linked to climate change impacts on ocean systems. Harmful algal blooms that impact wildlife and human populations are a naturally occurring phenomena subject to monitoring since the 1990's. There are limited data that define an increased frequency or geographical range of harmful algal blooms to human activities, such as nutrient inputs or factors related to climate change. A large-volume oil spill is generally considered the greatest threat to water quality in the sanctuary – a low-probability but high-impact threat. Another water quality concern is impact to nearshore habitats of increased sediment loading in rivers due to upland development, primarily road building and logging (see section 6.2.2).

Another source of pollutants with potentially negative water quality impacts is intentional discharges from vessels (e.g. sewage, graywater, ballast and bilge water). Vessel traffic volume through the sanctuary is high, as most vessels using the Strait of Juan de Fuca heading to the ports in Puget Sound and Vancouver, Canada, transit through OCNMS. Certain vessel classes, particularly cruise ships, are capable of generating wastewater quantities on par with small cities. The following sections evaluate vessel traffic in OCNMS and the quantity and types of vessel discharges in the context of existing regulations.

6.1.3.1. Vessel Discharges

Wastewater is generated on all vessels through their normal operation. The quantity generated and the types of discharges vary depending on vessel size, function, and condition. The following sections describe types of discharges incidental to vessel operation, review the regulatory context for vessel discharges to marine areas, and provide an analysis of the potential annual inputs of specific discharges produced by the range of vessel types that use the sanctuary. The potential direct and indirect environmental effects these discharges have on water quality and marine life within the sanctuary are described in section 8.

Sewage, also referred to as blackwater, is defined as human body wastes and the wastes from toilets and other receptacles intended to receive or retain body wastes 40 CFR 140.1(a). Sewage from vessels is generally more concentrated than sewage from land-based sources, as it is diluted with less water when flushed (e.g., 0.75 versus 1.5 - 5 gallons), and on many vessels sewage is not further diluted with graywater (NOAA 2008). Sewage generated on vessels should be directed to a marine sanitation device (MSD). MSDs, which are described in more detail below, may either a) hold untreated waste until it can be legally discharged into the ocean (e.g., beyond 3 nmi from shore) or pumped to a land based treatment facility, or b) treat the sewage by reducing bacteria concentrations through chemical means and reducing the amount of solids by mechanical maceration or microbial decomposition prior to its discharge as treated effluent. In the past decade, some large passenger vessels, or cruise ships, that transit through the sanctuary have installed and utilized advanced wastewater treatment systems (AWTS) to treat sewage and, on some vessels, graywater. AWTS are a type of MSD that typically utilize a combination of biological and chemical treatment, and additional system components to produce an effluent with substantially better water quality than a traditional MSD.

Graywater originates from a variety of sources, such as showers, sinks, galleys, food waste pulpers and laundry and, if untreated, often contains pathogen and nutrient concentrations equal to or higher than untreated domestic sewage (EPA 2008a). Graywater on vessels may be discharged immediately upon generation, diverted to a wastewater treatment apparatus (e.g., MSD) or pumped to a long term holding tank. An individual vessel's ability to hold or treat wastewater can be highly variable, and capacities for various vessel types have not been accurately characterized in available literature.

Bilgewater is the mixture of fresh water and seawater, oily fluids, lubricants, cleaning agents, paint and metal shavings and other similar materials that accumulate in the lowest part of a vessel from a variety of different sources including the main and auxiliary engines; boilers, evaporators and related auxiliary systems; equipment and related components; and other mechanical and operational sources found throughout the machinery spaces of a vessel. Bilgewater may also originate from onboard spills, wash waters generated during the daily operation of a vessel, or waste water from operational sources (e.g., condensate from air coolers, etc.) that collect in the bilge (EPA 2008a).

Ballast water is water intentionally taken on board and stored in ballast tanks to provide stability under a range of vessel loading scenarios. Ballast water may contain a variety of marine organisms that can be transported and discharged outside their native range where they can pose a risk to local ecosystems.

Sewage, graywater, and other vessel discharges are regulated through a complex framework of overlapping international treaties and standards, national laws and regulations, and local and area-specific rules. In general, the purpose of such rules and regulations is to protect water quality. The International Convention for the Prevention of Pollution from Ships (MARPOL) was created in 1973 to regulate marine pollution including oil, chemicals, harmful substances in package form, and sewage and garbage that enter the marine environment from either accidental or operational causes. State and federal laws also regulate certain types of discharges from vessels under authority of the Federal Water Pollution Control Act, also informally called the Clean Water Act (CWA; 33 U.S.C.1251 et seq.), and other regulations.

In the U.S., all non-recreational vessels 79 feet or greater in length may not discharge substances to marine waters without operating under a National Pollutant Discharge and Elimination System vessel general permit (VGP). This permit allows and sets effluent limits for most discharges incidental to the operation of large vessels, including desk wash, bilgewater, ballast water, boiler blowdown, chain locker effluent, elevator pit effluent, graywater, distillation and reverse osmosis brine, and more. Sewage discharges, however, are not covered by the VGP but are subject to the applicable local, state, federal jurisdictional regulations. The geographic extent of coverage of the VGP extends to 3 miles from shore, so the guidance and regulations therein do not pertain to the majority of the sanctuary. However, the VGP does recognize national marine sanctuaries as "waters federally protected wholly or in part for conservation purposes" and includes more restrictive provisions addressing various wastewater sources that apply in OCNMS and other national marine sanctuaries. Fishing and commercial vessels under 79 feet long are

exempt from VGP coverage based on a moratorium extending through December 2013. Certain discharges from these vessels, such as ballast water, are not exempt even during the moratorium. Recreational vessels and all military vessels are exempt from the VGP permanently, or until the law changes.

The OCNMS boundary lies between 25 and 40 nmi from shore, with approximately 83% of the sanctuary's area beyond 3 nmi from shore. Thus, Washington State regulations and the VGP apply in near shore waters that comprise less than one fifth of the sanctuary. As outlined below, under current federal, state, and local regulations and agreements, treated or untreated sewage and graywater discharges by recreational and commercial vessels are allowed under current regulations throughout a large portion of the sanctuary.

Regulatory Context for Vessel Discharges - Sewage

Internationally, sewage discharges are regulated under the authority of Annex IV of MARPOL, adopted in 2003. These regulations and revisions now apply to all vessels over 400 gross tons (GT) or certified to carry more than 15 persons, require an approved sewage treatment system, and prohibit discharge of treated sewage within three nmi from shore and untreated sewage within 12 nmi from shore (IMO 2002). Although the United States did not ratify MARPOL Annex IV, it does apply to most foreign flagged ships. In 2009, 74% of the vessels included in the analysis of sewage discharges below (Table 6) were foreign flagged. U.S. flagged vessels are not subject to MARPOL Annex IV regulations, but they must comply with the CWA, VGP or other state laws when operating in waters within 3 miles of shore.

The U.S. regulates sewage discharges from all vessels under the CWA. Collectively, CWA Section 312 and its implementing regulations require all vessels with toilet facilities to have operable MSDs, allow discharges of treated sewage any distance from shore (except where a no discharge zone has been established), and allow discharges of both untreated and treated sewage beyond three miles from shore or at land based pump-out facilities. CWA Section 312 requires federal performance standards for MSDs, which have been described by the U.S. Coast Guard (33 CFR Part 159). Standards for discharge from MSDs were developed by the U.S. EPA and are described in 40 CFR Part 140. Larger vessels, such as cruise ships, may combine sewage (blackwater) with graywater prior to treatment and discharge. Combined discharges of this sort are subject to graywater effluent limits set forth in the VGP rather than MSD (sewage) effluent standards.

Under the authority of the CWA states may establish No Discharge Zones (NDZs) in which the discharge of sewage from vessels is prohibited if any of the following three criteria are met:

1. The state determines that the water body requires greater environmental protection, and EPA finds that adequate pump-out facilities are available (commonly known as a 312(f)(3) NDZ).

2. EPA, upon application by the state, determines that the protection and enhancement of the water body requires establishment of an NDZ even if pump-out facilities are not reasonably available (commonly known as a 312(f)(4)(A) NDZ).

3. EPA, upon application by a state, will, by regulation, prohibit the discharge of sewage from vessels within a drinking water intake zone (commonly known as a 312(f)(4)(B) NDZ).

Historically, NDZs have not distinguished between vessel categories and apply to all vessels regardless of size or purpose. However, the EPA and the State of California are in the process of establishing a NDZ for the length of the California coast, based on criteria 2 (above), which will prohibit sewage discharge, whether treated or not, and will apply only to commercial passenger vessels 300 GRT or larger, and commercial vessels larger than 300 GRT with two or more days of sewage holding capacity. The proposed rule (40 CFR 140) was signed in 2010 and finalization of the regulation is pending.

In Washington State waters, vessel discharges must meet state water quality standards (per Chapter 90.48 RCW and Chapter 173-201A WAC), yet most traditional MSDs and, in some cases, AWTS do not meet those standards. Thus, Washington State guides vessels to onshore pumpout treatment facilities or to withhold discharges until outside of state waters via general outreach measures or by documented guidance, such as agreements.

In Washington State, cruise ships are subject to the same regulations as other large vessels. However, in 2004, a memorandum of understanding (MOU) was developed between the North West & Canada Cruise Association (NWCCA), Port of Seattle and the Washington Department of Ecology (WDE), prohibiting sewage and graywater discharges within state waters (which extend north to the border with Canada in the Strait of Juan de Fuca and 3 nautical miles offshore from the Olympic Peninsula) from cruise ships not utilizing AWTS. This MOU is a voluntary agreement with NWCCA member organizations. Cruise ships utilizing AWTS may attain permission to discharge in Washington State waters if effluent limits and monitoring constraints of the NWCCA MOU are met. Cruise ships without AWTS or without approval to discharge are not allowed to discharge treated wastewater and all untreated wastewater is prohibited in state waters. In 2007, this MOU was modified to eliminate any discharge into waters of OCNMS of residual solids from either a Type II MSD or an AWTS (WDE 2009). However, there are no provisions in the NWCCA MOU related to discharge of treated sewage from MSDs or AWTS in OCNMS waters. In 2010, OCNMS proposed amendment of the MOU to prohibit all discharges from cruise ships into waters of the sanctuary, but this amendment was opposed by the cruise ship industry, which wanted to avoid complicating the MOU with multiple boundaries subject to differing MOU provisions. In 2010, representatives from the NWCCA confirmed that affiliated vessels currently avoid all wastewater discharges in OCNMS, a practice consistent with regulatory requirements in national marine sanctuaries in California (John Hansen, former President, NWCCA).

Cruise ships, as described in the discharge analysis below, have the potential to generate and discharge greater quantities of sewage and graywater than other vessel categories. In light of this fact, various jurisdictions have adopted regulatory and voluntary measures to mitigate environmental impacts of sewage discharges from cruise ships. In 2001, The Alaska Department of Environmental Conservation (ADEC) developed the Commercial

Passenger Vessel Environmental Compliance Program under Alaska Statute 46.03.460. This program set effluent limits and sampling requirements for the discharge of blackwater and graywater from cruise ships. Since then, additional measures have been instituted by ADEC to further regulate discharges from cruise ships. Beginning in 2003 all blackwater and graywater discharges from cruise ships in Alaska were subject to stricter water quality standards, with a requirement for treatment by an approved AWTS. Cruise ships discharging treated sewage into Alaska state waters are now required to operate under a State vessel general permit, which sets stringent effluent limits for sewage and graywater discharges (ADEC 2010b).

There is a precedent for limiting sewage discharges from large vessels (greater than 300 GT), and in some cases explicitly cruise ships, from national marine sanctuaries or other waters protected for conservation purposes on the West Coast. The four national marine sanctuaries off California, Cordell Bank, Gulf of the Farallones, Monterey Bay, and Channel Islands, have instituted rules prohibiting vessels 300 GT or larger from discharging treated or untreated sewage regardless of sanitation device type (15 CFR 922 Subparts G, H, K, and M). Cruise ship discharges are expressly prohibited within Glacier Bay National Park through the U.S. National Park Service's concession contract with large cruise ships for entry into the park.

Existing OCNMS regulations allow for MSD-treated sewage discharges from all vessel types, although discharge of untreated sewage is prohibited under the CWA in state waters. In addition, the Area to be Avoided (ATBA), a voluntary vessel traffic routing measure that applies to vessels above 1600 GT and those carrying petroleum and hazardous materials as cargo, indirectly prevents sewage and other vessel wastewater discharges from approximately 70% of OCNMS. The ATBA routes these vessels 25 nmi off the coast except at the approach to the Strait of Juan de Fuca (Figure 8; see section 6.4.2). Compliance with the ATBA is routinely monitored, and compliance rates have been consistently near 98%. Thus, the majority of the discharges from large commercial vessels estimated in Tables 6 and 7 would take place in the 30% of the sanctuary that is outside the ATBA.

Marine Sanitation Devices

The CWA requires that any vessel with installed toilet facilities must have an operable MSD. Three general types of MSDs are available and in use. Type I MSDs rely on maceration and chemical disinfection for treatment of the waste prior to its discharge into the water, and are only legal in vessels under 65 feet in length (EPA 2010a). Type II MSDs utilize aeration and aerobic bacteria in addition to maceration for the breakdown of solids. As with Type I MSDs, the waste is chemically disinfected, typically with chlorine, ammonia or formaldehyde, prior to discharge. Type II MSDs are legal in any size class of vessel, and there are a variety of different types (EPA 2008b). Type III MSDs are storage tanks, may contain deodorizers and other chemicals, predominantly chlorine, and are used to retain waste until it can be disposed of at an appropriate pump-out facility or at sea. Most MSDs do not have the same nutrient removal capability as land-based treatment plants. Thus, even treated vessel wastewater can have elevated nutrient concentrations.

Advanced wastewater treatment systems (AWTS) are a complex form of Type II MSD that meet a higher standards and testing regime as set out in federal law, and utilize techniques such as reverse osmosis, ultrafiltration and ultra violet (UV) sterilization to provide more effective treatment. AWTS have been installed and operational on more than half (9 of 15) larger passenger vessels that will transit the sanctuary in 2011 and on these vessels blackwater and graywater are combined (WDE 2011). AWTS have been installed on some of the other passenger vessels; however, due to equipment and operating challenges, they are not functioning properly and are not being used (Amy Jankowaic, WDE, personal communication). These vessels are therefore currently using traditional (Type II) MSDs. The treatment capabilities of AWTS for certain constituents (e.g. nutrients and metals) vary by design and manufacturer, but overall, the performance of these units far surpasses the performance of traditional (Type II) MSDs if functioning properly. For example, suspended solids, residual chlorine, and fecal coliform concentrations in AWTS effluent are typically zero (ADEC 2010b). Because of the varying treatment capabilities of the different AWTS systems, ADEC established technology based effluent limits, similar to the methodology used by the EPA for issuing municipal wastewater permits. The NWCCA MOU specifies effluent limits for conventional pollutants, including organics, solids, pH, fecal coliform and residual chlorine for discharges from AWTS, and does not include limits for ammonia, metals or other pollutants. The MOU also does not differentiate between AWTS types.

Regulatory Context for Vessel Discharges - Graywater

Currently, there are no existing or proposed international regulations regarding graywater. In the U.S., graywater discharge from ships is regulated under the VGP. The VGP graywater rules include guidance to minimize production and discharge while in port, include different requirements for medium (100-499 berths) and large (500 or more berths) cruise ships, prohibit discharge within 3 miles of shore within a national marine sanctuary for vessels with graywater storage capacity, allow for discharge from vessels greater than 400 gross tons if the effluent meets treatment standards or if the vessel is underway more than 1 nmi of shore, and include special considerations for nutrient impaired waters. Treated graywater must meet strict standards for fecal coliform and chlorine concentrations that far exceed standards for traditional MSD effluent (EPA 2008b). The VGP does not have treatment requirements for large vessels when discharging underway (i.e., greater than 1 nmi from shore and when traveling faster than 6 knots).

Current OCNMS regulations allow discharge of graywater as “water generated by routine vessel operations”. Under voluntary measures defined in the MOU between the North West and Canada Cruise Association, Port of Seattle, and WDE, cruise ships represented by the association will not discharge graywater (treated or untreated) in Washington State waters, with an exception for discharge of treated graywater from vessels with AWTS.

Regulatory Context for Vessel Discharges - Ballast Water

The discharge rate and constituent concentrations of ballast water from vessels will vary by vessel type, ballast tank capacity, and type of deballasting equipment. Volumes of ballast water discharged are large and can be several hundred or thousand cubic meters of water. For instance, passenger vessels have an average ballast capacity of about 2,600 cubic

meters (about 686,850 gallons), and ultra large crude carriers have an average ballast capacity of about 93,000 cubic meters (about 24,568,000 gallons) (EPA 2008b). Ballast water exchange volume for each of the vessel classes was not computed for further analysis, as the risk that ballast water poses to the sanctuary has more to do with the manner (i.e., location) that ballast water is exchanged rather than the volume of exchanges.

Ballast water from ships has been a major source of non-native species introduction around the world. The current best practice for managing ballast water is an at-sea exchange of ballast water, wherein coastal water taken at or near a port is replaced with less biologically productive open oceanic water. Fewer organisms are present in open ocean water than in coastal waters. This practice is not 100% effective as some non-native organisms can survive until discharged in a foreign port or coastal area (NOAA 2008).

OCNMS is partially protected from the introduction of non-native species through existing federal, state and international regulations associated with ballast water management. In July 2004, the U.S. Coast Guard published a final rule changing the nation's voluntary Ballast Water Management Program to a mandatory one requiring all vessels equipped with ballast water tanks and bound for ports or places of the United States to conduct a mid-ocean ballast water exchange (more than 200 nmi offshore), retain their ballast water onboard, or use an alternative, environmentally sound, ballast water management method approved by the USCG (69 FR 44952). The state of Washington's regulations have this same requirement for mid-ocean exchange that applies to vessels 300 gross tons or larger that have traveled outside the economic exclusion zone (EEZ). For vessels that do not leave the EEZ, ballast water exchanges must be conducted beyond 50 nmi from shore (WDFW 2009). These measures substantially reduce the risk of invasive species introductions into sanctuary waters. Washington State ballast water management regulations only apply to vessels bound for American ports; however, Canada has adopted the 2004 IMO International Convention for the Control and Management of Ship's Ballast Water and Sediment (Transport Canada 2010). This agreement provides the same restrictions as Washington State regulations, and all ships calling on Canadian ports are required to comply (IMO 2004). The VGP requires vessels to avoid discharge of ballast waters within 3 nmi of shore within a national marine sanctuary. In summary, these regulations and agreements prohibit discharge of all ballast water that originates from distant nearshore areas but allow discharge into the sanctuary beyond 3 nmi from shore and other Washington State waters of ballast water that originates from an open ocean exchange.

Regulatory Context for Vessel Discharges – Bilgewater

Bilgewater is the mixture of fresh water and seawater, oily fluids, lubricants, cleaning fluids and other wastes that accumulate in the bilge, or lowest part of a vessel hull, from a variety sources including leaks, engines and other parts of the propulsion system and other mechanical and operation sources found throughout the vessel (EPA 2008a). All vessels accumulate bilgewater through their normal operation, but the generation rates depend on a variety of factors including hull integrity, vessel size, engine room design, preventative maintenance and the age of the vessel (EPA 2008a; EPA 2010b). In addition to oil and grease, bilgewater may also contain a variety of other solid and liquid contaminants, such

as rags, metal shavings, soaps, detergents, dispersants and degreasers (EPA 2008a). Estimates of bilgewater discharges to the sanctuary are not available for most classes of vessels. Data for bilgewater generation from cruise ships were available, with an estimated volume of 25,000 gallons produced per week (3,500 gallons per day) on vessels with 3000 passenger/crew capacity (EPA 2008b).

Several national and international regulations govern allowable discharges of bilgewater in an effort to reduce oil contamination of the oceans. These regulations require ships to have in operation oily-water separating equipment, and discharges may not exceed 15 parts per million oil. The VGP prohibits discharge of treated or untreated bilgewater from vessels 400 gross tons or more within 3 mi of shore in a national marine sanctuary. OCNMS regulations prohibit all discharge of oily waste from bilge pumping. Because sanctuary regulations do not specify a limit, this has been interpreted by ONMS as prohibiting any detectable amount of oil as evidenced by a visible sheen (EPA 2008a; 73 FR 70488). Under current OCNMS regulations, discharge of bilgewater not leaving a visible sheen is allowed.

Regulatory Context for Vessel Discharges – Other Discharges

Several discharges incidental to the normal operation of a vessel covered by the exclusion in 40 CFR 122.3 are also eligible for coverage under the VGP. Below is a list of these discharges

- Anti-fouling hull coatings
- Boiler blow-down
- Cathodic protection
- Chain locker effluent (anchor wash)
- Controllable pitch propeller and thruster hydraulic fluid and other oil to sea interfaces
- Distillation and reverse osmosis brine
- Elevator pit effluent
- Firemain systems
- Freshwater layup
- Gas turbine water wash
- Motor gasoline and compensating discharge
- Non-oily machinery wastewater,
- Refrigeration and air condensate discharge
- Seawater cooling overboard discharge (including non-contact engine cooling water, hydraulic system cooling water, refrigeration cooling water
- Seawater piping biofouling prevention
- Boat engine wet exhaust
- Sonar dome discharge
- Underwater ship husbandry discharges
- Welldeck discharges

The volume and contents of the above listed discharges are presumed to be similar for similarly sized vessels and are not dependent on the vessel purpose (EPA 2008b). With the exception of graywater and pool and spa discharges from cruise ships, oily discharges, including oily mixtures, and residual biocide limits from vessels utilizing experimental ballast water treatment systems, numeric effluent limitations are not feasible to calculate for vessel discharges in VGP. Therefore, the EPA establishes effluent limits based on Best Practical Control Technology Currently Available (BPT) or Best Available Technology (BAT) rather than specifying specific effluent limits. Existing OCNMS regulations include an exception to the discharge prohibition for water generated by routine vessel operations, which includes those mentioned above.

Discharge Volume Estimation Methods

In order to evaluate the potential for water quality impacts to the sanctuary from vessel discharges, estimates of discharges generated by classes of vessels were calculated based on the time a given vessel class spent in the sanctuary during 2009 (vessel days) and published waste generation rates. Vessel days for a given vessel class was calculated by determining the cumulative time individual vessels of a specified class were within sanctuary boundaries. Sewage generation rates used for estimates provided in Table 6 were based on information from MSD manufacturers. Additional details regarding discharge volume estimation methods can be found in Appendix K.

Although many vessels do have wastewater holding tanks and may not discharge while operating in the sanctuary, it is not possible to accurately characterize the times, locations, and volumes of sewage and other discharges that actually occur in the sanctuary. For the purpose of this document, analysis was conducted on the potential to discharge to sanctuary waters based on estimated waste generation rates and residence time (vessel days) in the sanctuary. Potential discharge volumes are proportional to waste generation rates, which can be considered a worst-case scenario because discharges may or may not occur in waters of the sanctuary. One factor influencing wastewater discharges into waters of the sanctuary is average transit time. Large, commercial vessels complying with the ATBA (vessels >1,600 GT, and tugs with tank barges) would transit waters of the sanctuary only at the western approach to the Strait of Juan de Fuca (Figure 8). In OCNMS regulations, cruise ships are defined as vessels with 250 or more passenger berths for hire. However, the following analysis is based on categories of vessels used by the vessel traffic system under which cruise ships are classified as passenger vessels >1,600 GT. For cruise ships, the average transit time in OCNMS is 74 minutes (1.2 hours; Table 11). By comparison, commercial vessels of various sizes average about 170 minutes in OCNMS, and public vessels and tank vessels average roughly 200 minutes in OCNMS (Table 11). While the estimated potential wastewater discharge volumes from all ships represent a threat to water quality, actual discharges may not occur or impact OCNMS water quality because transit times provide relatively short windows of opportunity for wastewater discharges to occur in OCNMS.

Cruise Ship Wastewater Discharges

The cruise ship industry is rapidly expanding in the Pacific Northwest, with the number of passengers through the Port of Seattle increasing from 120,000 to nearly 900,000 between

2000 and 2009 (WDE 2010). In 2009, there were 280 cruise ship transits in OCNMS (VEAT 2009), representing 14 vessel days in sanctuary waters (see Passenger Vessels >1,600 GT in Table 6). If the passenger numbers on these cruises continue to increase, there will be a proportional increase in wastewater generation. The largest cruise ships are capable of carrying a combined population of about 4,000 passengers and crew (WDE 2009).

Estimates of potential wastewater discharges from cruise ships (i.e., passenger vessels >1,600 GT) presented in Table 6 and 7 assume an average of 2,921 passengers and crew on board, the average reported for cruise ships using the Port of Seattle (WDE 2009). Despite cruise ships spending relatively little cumulative time in the sanctuary compared to other large vessel classes, the potential sewage discharge volume from cruise ships is higher than that estimated for all other large vessel classes and represents 63% of all potential sewage discharges in the sanctuary (Table 6). The average graywater generation rate of 67 gallons/person/day (EPA 2008a) could potentially result in millions of gallons of graywater discharged from cruise ships into the sanctuary annually, which dwarfs potential discharges from all other vessel classes and represents 75% of the all potential graywater discharges in the sanctuary (Table 7).

The quality of potential blackwater and graywater discharges from cruise ships, hence risk to sanctuary resources, is difficult to characterize based on existing data. Data from the 2011 Washington Department of Ecology discharge status report (WDE 2011) indicate that fifteen cruise ships are scheduled to call on the Port of Seattle for a total of 195 port calls, corresponding to 390 transits through or near the sanctuary. Whereas more than half (9 of 15) of the cruise ships calling on the Port of Seattle have installed AWTS for blackwater and/or graywater treatment, 35% of the port calls will be completed by vessels that have traditional MSDs for blackwater treatment and no treatment system for graywater (WDE 2011). Furthermore, only 2 of the 15 vessels have met effluent standards and monitoring requirements set forth in the NWCCA MOU and have requested and gained authority to discharge while underway in Washington state waters (WDE 2011). Only vessels that are authorized to discharge per the NWCCA MOU are required to monitor and submit results, and are required to submit documentation that they have 24 hour continuous monitoring for treatment system performance and disinfection, as well as the ability and procedures to automatically shut down if continuous monitoring of treated effluent indicates high turbidity or a disinfection system upset. Therefore, it cannot be assured that the AWTS performance controls or effluent monitoring otherwise required by the VGP or NWCCA MOU are performed on most ships. Some vessels only operate their AWTS when in certain areas where it is required and use a traditional MSD for other discharges. Given the uncertainties in the type and performance (operational performance and frequency of system upset) of the treatment systems installed on board cruise ships, it is impossible to accurately estimate the quantity (i.e., mass load) of contaminants potentially deposited into the sanctuary.

In open waters of the sanctuary, concern for localized and acute effects of wastewater discharges from a cruise ship in transit is reduced by the free exchange of waters and dilution that occurs in the ship's wake. Rapid dilution of wastewater (blackwater and

graywater) discharged from MSDs has been documented to occur when discharged from cruise ships under way. Loehr et al. (2006) showed that under a worst case scenario (i.e., lowest dilution factor possible and high discharge rate) that the dilution factor for discharges from large cruise ships is 1:50,000 when traveling at 6 knots discharging at 200 cubic meters per hour. Loehr et al. (2006) further documented, based on sampled effluent concentrations from 21 cruise ships using traditional MSDs, that priority pollutants (metals and organics) were rapidly diluted to many times below Alaska water quality standards. In Washington State, mixing zones have not been applied to cruise ship discharges. Mixing zones are typically established for stationary discharges where a particular location and receiving water can be evaluated and applied with a discharge permit.

Commercial (non passenger) Vessels Wastewater Discharges

The typical composition of sewage and graywater discharges from non-passenger vessels has not been as extensively studied as cruise ship discharges. Most commercial, non-passenger vessels are equipped with Type I or Type II MSDs, so the composition of sewage discharges in terms of constituents and concentrations are likely to be similar to the cruise ship discharges evaluated by the EPA (2008a), except for cruise ships equipped with AWTS. The estimated total amount of sewage discharged in the sanctuary by non-passenger carrying, commercial vessels (including commercial fishing vessels, commercial vessels and tank vessels) is between 71,991 and 392,676 gallons per year (Table 6). In sum, these vessels produced about 20% of the potential sewage and 23% of the potential graywater discharges into the OCNMS in 2009.

Table 6 Potential Gallons of Sewage Discharges in Olympic Coast National Marine Sanctuary in 2009

Vessel Classification	*Number of Transits through OCNMS*	*Number of People Aboard*	*Vessel Days in OCNMS*	*Sewage Discharge Volume (low)* [a]	*Sewage Discharge Volume (avg)* [b]	*Sewage Discharge Volume (high)* [c]	*Percent contribution*
Commercial Fishing Vessel	3,006	4	1,577	34,694	94,620	189,240	9.5%
Charter Fishing Vessel	1,148	11	287	16,732	45,633	91,266	4.6%
Recreational Fishing Vessel	10,351	3	2,588	39,851	108,686	217,371	10.9%
Commercial Vessel < 300GT	249	4	34	752	2,052	4,104	0.2%
Commercial Vessel 300-1599 GT	65	12	10	653	1,782	3,564	0.2%
Commercial Vessel > 1600 GT	4,272	15	280	23,117	63,045	126,090	6.3%
Passenger Vessel < 300 GT	14	300	1	1,320	3,600	7,200	0.4%
Passenger Vessel 300-1599 GT	9	500	1	2,200	6,000	12,000	0.6%
Passenger Vessel > 1600 GT	280	2,921	14	231,343	630,936	1,261,872	63.3%
Public Vessel < 300 GT	16	2	2	23	63	126	0.0%
Public Vessel							0.1%

Vessel Classification	*Number of Transits through OCNMS*	*Number of People Aboard*	*Vessel Days in OCNMS*	*Sewage Discharge Volume (low)* [a]	*Sewage Discharge Volume (avg)* [b]	*Sewage Discharge Volume (high)* [c]	*Percent contribution*
300-1599 GT	75	8	10	458	1,248	2,496	
Public Vessel > 1600 GT	157	15	17	1,427	3,893	7,785	0.4%
Tank Vessel	1,401	15	145	11,996	32,715	65,430	3.3%
Tug with tank barge	189	4	35	779	2,124	4,248	0.2%
TOTAL	21,232	N/A	5,003	365,345	996,396	1,992,792	100%

a. Low sewage discharge volume estimate is based on a waste generation rate of 5.5 gallons/person/day.
b. The average sewage discharge volume estimate is based on a waste generation rate of 15 gallons/person/day.
c. The maximum sewage generation rate is based on a 30 gallon/person/day.

Although the number of transits and vessel days for non-passenger vessels are many times greater than that of cruise ships, the total combined discharge volume from non-passenger vessels is much less because these vessels have substantially fewer passengers.

Table 7 Potential Gallons of Graywater Discharges in OCNMS in 2009

Vessel Classification	*Number of Transits through OCNMS*	*Number of People Aboard*	*Vessel Days in OCNMS*	*Graywater Discharge Volume (low)* [a]	*Graywater Discharge Volume (avg.)* [b]	*Graywater Discharge Volume (high)* [c]	*Percent Contribution*
Commercial Fishing Vessel	3,006	4	1,577	227,088	422,636	750,652	11.2%
Charter Fishing Vessel	1,148	11	287	Graywater potential discharges were not estimated for charter and recreational fishing vessels, due to uncertainties about vessel equipment and practices.			
Recreational Fishing Vessel	10,351	3	2,588				
Commercial Vessel < 300GT	249	4	34	4,925	9,166	16,279	0.2%
Commercial Vessel 300-1599 GT	65	12	10	4,277	7,960	14,137	0.2%
Commercial Vessel > 1600 GT	4,272	15	280	151,308	281,601	500,157	7.5%
Passenger Vessel < 300 GT	14	300	1	8,640	16,080	28,560	0.4%
Passenger Vessel 300-1599 GT	9	500	1	14,400	26,800	47,600	0.7%
Passenger Vessel > 1600 GT	280	2,921	14	1,514,246	2,818,181	5,005,426	74.9%
Public Vessel < 300 GT	16	2	2	151	281	500	0.0%
Public Vessel 300-1599 GT	75	8	10	2,995	5,574	9,901	0.1%

Vessel Classification	Number of Transits through OCNMS	Number of People Aboard	Vessel Days in OCNMS	Graywater Discharge Volume (low) [a]	Graywater Discharge Volume (avg.) [b]	Graywater Discharge Volume (high) [c]	Percent Contribution
Public Vessel > 1600 GT	157	15	17	9,342	17,387	30,881	0.5%
Tank Vessel	1,401	15	145	78,516	146,127	259,539	3.9%
Tug with tank barge	189	4	35	5,098	9,487	16,850	0.3%
TOTAL	21,232	N/A	5,003	2,020,986	3,761,280	6,680,482	100%

a. Low graywater discharge volume estimate is based on a waste generation rate of 36 gallons/person/day.
b. The graywater average discharge volume estimate is based on a waste generation rate of 67 gallons/person/day.
c. The maximum graywater generation rate is based on a 119 gallon/person/day.

Charter and Personal Recreational Vessel Wastewater Discharges
OCMNS is a popular recreational fishing area in the Pacific Northwest spanning Washington Department of Fish and Wildlife marine management units 2, 3, 4 and 4B. Private and charter vessels using the sanctuary originate primarily from the ports of Neah Bay, La Push, and Westport. In 2009, there were over 40,000 angler trips to the sanctuary. Of these trips about half were conducted on small private or charter vessels typically carrying 6 or fewer passengers. The remaining trips were conducted on larger charter vessels that carried an average of 10-13 passengers. Reliable data regarding the type(s) of MSDs (if any) installed on these vessels is unavailable. The majority of these vessels are under 65 feet, so they could use any approved Type I, II, or III MSD, or could have no MSD of any type.

The annual sewage discharge estimates for recreational and charter fishing vessels are between 56,583 and 308,637 gallons based upon waste generation rates used for other vessel classes (Table 6). Thus, these vessel classes potentially could contribute as much as 15.5% of sewage discharged to sanctuary waters. This likely overestimates true sewage discharges because these vessels are typically on day trips and may hold waste using a Type III MSD until it can be discharged at a shore-side pump-out facility. Waste generation rates may also be substantially lower due to the estimated short duration of fishing trips (six hours). Graywater discharge estimates were not calculated for recreational fishing vessels, as most would not have galleys or sinks, and therefore would not generate sizeable volumes of graywater.

6.1.4. Climate/Meteorology

The maritime climate off the Olympic Coast is influenced by topography, location along the windward coast, prevailing westerly winds, and the position and intensity of high and low pressure centers over the North Pacific Ocean (Phillips and Donaldson 1972). The strong oceanic influence creates a climate of western Washington characterized by relatively mild winters and moderately dry, cool summers. In the late spring and summer, westerly to northwesterly winds associated with the North Pacific high pressure system

produce a dry season. In late fall and winter, southwesterly and westerly winds associated with the Aleutian low pressure system provide ample moisture and cloud cover for the wet season beginning in October. Moist air transported across the ocean rises and cools on the windward terrestrial slopes, giving rise to relatively high rainfalls in western Washington. Annual rainfall amounts greater than 100 inches (254 cm) per year on the western portions of the Olympic Peninsula contribute to seasonally high inputs of river waters to the marine system.

Large-scale oceanographic and atmospheric events across the Pacific basin also influence of Olympic Coast waters. For example, the El Niño-Southern Oscillation is primarily driven by sea surface temperatures along the equatorial Pacific Ocean and is a major source of inter-annual climate and ecosystem productivity variability in the Pacific Northwest, with events lasting 6 to 18 months. Likewise, the Pacific Decadal Oscillation, a long-term cycle in ocean temperature with warm or cool phases that can each last 20 to 30 years, influences the climate in the Pacific Northwest. Climatic cycles such as these are natural events and often are associated with strong fluctuations in weather patterns and biological resources.

6.1.5. Climate Change

Over the next century, climate change is projected to profoundly impact coastal and marine ecosystems on a global scale, with anticipated effects on sea level, temperature, storm intensity and current patterns. At a regional scale, we can anticipate significant shifts in the species composition of ecological communities, seasonal flows in freshwater systems, rates of primary productivity, sea level rise, coastal flooding and erosion, and wind-driven circulation patterns (Scavia et al. 2002). Rising seawater temperatures may give rise to increased algal blooms, major shifts in species distributions, local species extirpations, and increases in pathogenic diseases (Epstein et al. 1993, Harvell et al. 1999). A better understanding of ocean responses to global scale climatic changes is needed in order to improve interpretation of observable ecosystem fluctuations, such as temperature changes, hypoxic events and ocean acidification that may or may not be directly coupled to climate change.

6.2. BIOLOGICAL SETTING

Habitats are where organisms make their lives, where they survive, find food, water, shelter, and space. The collected habitats of an area create the place for the living ecosystem. Healthy marine habitats are the foundation of healthy communities of marine life.

OCNMS is comprised of a broad diversity of habitats, some we can see from land, others hidden beneath the water, including rocky shores, sandy beaches, nearshore kelp forests, sea stacks and islands, open ocean or pelagic waters, as well as the continental shelf seafloor and submarine canyons. In addition to aquatic habitats in the sanctuary, islands and pinnacles, or sea stacks, along the coast provide nesting and resting sites for California and Steller sea lions, harbor and elephant seals, and thousands of seabirds.

6.2.1. Intertidal Habitats

Most accessible to people is the intertidal zone, a habitat alternating between the dry and wet worlds where rock benches, tide pools and surge channels are formed amid boulders and rocky outcrops. These substrates provide both temporary and permanent homes for an abundance of “seaweeds” (e.g., macroalgae and seagrasses), invertebrates such as sea stars, hermit crabs, nudibranchs, snails, and sea anemones, and intertidal fish. Between rocky headlands are numerous sand-covered beaches and mixed rock/cobble benches hosting an array of intertidal invertebrates and fishes – food for both shorebirds and humans. Surf smelt spawn at high tide on sand-gravel beaches where surf action bathes and aerates the eggs.

Natural conditions in intertidal habitats of the Pacific Northwest challenge their inhabitants with extreme fluctuations in temperature, salinity and oxygen, along with powerful physical forces such as wave action and sand scouring. Yet, rocky shores of the Olympic Coast have among the highest biodiversity of marine invertebrates and macroalgae of all eastern Pacific coastal sites from Central America to Alaska (Suchanek 1979; Dethier 1992; PISCO 2002; Blanchette et al. in press). Macroalgae or seaweeds are highly diverse in the region, with an estimated 120 species thought to occur within the sanctuary rocky intertidal zone (Dethier 1988).

With limited exceptions, nearshore and intertidal habitats in the sanctuary are remarkably undisturbed by human use and development (e.g., armoring, wetlands alteration, dredging, and land-based construction) that have modified shorelines in more urbanized areas. The remote location, low levels of human habitation, protections provided by the wilderness designation of Olympic National Park’s coast, and restricted access to tribal reservations have allowed these coastal habitats to persist largely intact. At the few locations where shoreline armoring has been employed or where human visitation has focused on intertidal areas for food collection and recreation, impacts do not appear to be dramatic or widespread (Erickson and Wullschleger 1998; Erickson 2005).

Monitoring conducted by Olympic National Park since 1989 indicates these habitats are healthy and do not appear to be changing substantially in response to human influences. Large-scale disturbances related primarily to extreme winter weather cause periodic damage to mussel beds (Paine and Levin 1981) and other intertidal species. Coastal ecologists recently have designed studies to better detect changes resulting from effects of global climate change, such as sea level rise, increasing acidity and temperatures, and changes in storm frequency and magnitude. Local trends in these parameters are uncertain, however, and no definitive results have yet been published.

Relatively few nonindigenous or exotic species have been reported in the sanctuary, and, of those, only a few are invasive and therefore threatening to community structure and function (ONMS 2008). OCNMS-led rapid assessment intertidal surveys in 2001 and 2002 and a larvae settlement study (deRivera et al. 2005) identified a few nonindigenous species. One invasive species of concern, the green crab, has been found at sites both north and south of the sanctuary, but no green crab have be found through routine monitoring near the sanctuary. A program to prevent introduction and spread of invasive species is managed by Washington Department of Fish and Wildlife.

Degradation of intertidal habitats, in the form of marine debris, is visible to even the casual visitor to the shore. The majority of this debris is plastic ranging from large floats to beverage bottles to tiny fragments the size of sand particles. Much of the debris originates from commercial fisheries, both international and domestic.

6.2.2. Nearshore Habitats

In nearshore areas, canopy kelp beds form a productive, physically complex and protected habitat with a rich biological community association of fish, invertebrates and sea otters. Annual monitoring and quantification of the floating kelp canopy has been conducted since 1989 by the Washington Department of Natural Resources and in collaboration with OCNMS since 1995. Although the canopy changes every year, these kelp beds are generally considered stable, and the area covered by floating kelp has been increasing along the outer coast and western portion of the Strait of Juan de Fuca (Figure 5). This increase may be due in part to a growing population of sea otters and subsequent decline in grazing sea urchins or may be influenced by changes in oceanographic conditions. In contrast, extensive logging of the Olympic Peninsula, an area of very high rainfall, has markedly increased sediment loads in rivers in the past. Long-term residents along the coast have noted a reduction in kelp beds near river mouths, which may have been associated with siltation of nearshore habitat and reduced light penetration (Chris Morganroth III, personal communication in Norse 1994). Recently documented, widespread hypoxic, or low oxygen conditions in nearshore areas off Oregon and Washington coasts have stressed and killed marine life. Such hypoxic conditions appear to be increasing in severity and frequency and may result from anomalous weather and oceanographic patterns.

Figure 5 Kelp Distribution

Nearshore habitats off sand beaches occurring all along the outer Olympic Coast and dominate the southern shores of the sanctuary tend to be less diverse, lacking macroalgae and physically complex substrate. These are high energy environments where the inshore shelf is relatively shallow. Nutrients delivered by upwelling currents support phytoplankton biomass that is grazed and recycled by zooplankton. Wind and wave action support transport and retention of productive waters near shore, which sustains sand beach infaunal communities of amphipods, worms, and razor clams.

Relatively few exotic or nonindigenous species have been reported in the sanctuary and, of those, only a few are invasive and therefore threatening to community structure and function in the nearshore. Observations by coastal ecologists from Olympic National Park and OCNMS of increased amounts of the invasive brown algae *Sargassum muticum*, the documented range expansion of invasive ascidians (tunicates or sea squirts) (deRivera et al. 2005), and the encroachment of the invasive green crab to areas both south and north of the sanctuary all suggest negative impacts from nonindigenous species may increase in the future.

6.2.3. Pelagic (Water Column) Habitats

The pelagic habitat, or water column of the open ocean, is the most extensive habitat of the sanctuary. Many fish, seabird, and marine mammal species are pelagic and have relatively little association with seafloor or nearshore habitats. Phytoplankton at the base of the food web is most abundant in the euphotic, or sunlit, layer near the surface of the water column. This primary productivity supports a food chain based on grazing zooplankton, fish, and marine bacteria. Ocean productivity can be nutrient limited and is influenced by large-scale oceanographic currents and cycles. Seabirds can serve as indicators of productivity - poor survival of one year's young can indicate nutrient poor and low productivity cycles in the coastal marine system. Naturally occurring harmful algal blooms of plankton put humans and some marine wildlife at risk of biotoxin poisoning, either from plankton or from shellfish consumption.

In some marine areas of the world, pelagic habitats have been degraded by chemical contaminants and wildlife conflicts with vessel traffic and noise pollution. Whereas variability in contaminant concentrations complicates characterization of water column pollutants, contaminants in animal and plant tissues can provide an integrated measure of bioavailability of compounds present at low or variable levels in the marine system. In the sanctuary, chemical concentrations were recently measured in a variety of invertebrates and sea otters for a study of sea otter health (Brancato et al. 2009), the West Coast Environmental Monitoring and Assessment Program, and for NOAA's Status and Trends, Mussel Watch Program. Contaminant concentrations were found to be low in all organisms, with very few exceptions (ONMS 2008).

The potential for contamination of pelagic habitats by petroleum products is a concern reinforced by experience and justified by the volume of large vessel traffic at the western end of the Strait of Juan de Fuca. Four of the five largest oil spills in Washington state history have occurred in or moved into the area now designated as the sanctuary. In the

decade before sanctuary designation, two major oil spills released more than 325,000 gallons of petroleum products impacting marine ecosystems and human communities on the outer Washington coast.

Noise pollution, or the cumulative acoustic signature of human activities, is an aspect of the pelagic habitat of OCNMS not currently well characterized or evaluated for potential impacts on wildlife in the sanctuary.

6.2.4. Seafloor Habitats

The ocean floor of the sanctuary covers over 3,300 square miles and is comprised of a variety of physically and biologically complex habitats. These habitats are shaped by the geology and topography of the seafloor and enhanced by living organisms like corals and sponges. Prior to development of remote sensing techniques, water depth measurements and bottom samples provided spot data that was extrapolated to create crude seafloor maps. Modern exploration and detailed habitat mapping involves carefully planned and costly surveys from large vessels using sophisticated technology. Thus far, OCNMS has completed high resolution habitat mapping for about 25 percent of its seafloor, while information on remaining areas lacks resolution and specificity for development of accurate seafloor habitat maps (Figure 6). As a result, generalizations about the sanctuary's seafloor habitats and their biological communities are difficult to make.

Figure 6 Habitat Map

The northern portion of the sanctuary is dominated by the Juan de Fuca Canyon and trough (the shallower extensions of the canyon closer to the Strait of Juan de Fuca), which are complex, glacially carved features containing a mixture of soft sediments, with significant cobble and boulder patches and scattered large glacial erratics (boulders) deposited during ice retreat. High-relief, submerged topographic features serve as fish aggregation areas. Low-resolution surveys have revealed a generally wide and featureless continental shelf in the southern portion of the sanctuary dominated by soft substrates (sand and mud bottoms, to pebble and cobble) with scattered areas of rock outcrop and spires. The head of the Quinault Canyon also lies within the sanctuary boundary.

Detailed information on historic and current conditions in the sanctuary's seafloor habitats is limited because technological challenges and expense have limited the areas that have been directly viewed. Thus, to a large extent the current condition of seafloor habitats must be inferred. The most widespread anthropogenic impact to seafloor habitats is likely to have resulted from the bottom trawl fishery using gear known to reduce complexity, alter the physical structure of seafloor habitats, and damage biogenic habitat, or habitat formed by living organisms, such as corals and sponges (NRC 2002; Auster et al. 1996, Auster and Langton 1999, Norse and Watling 1999, Thrush and Dayton 2002). Bottom trawling and long-line fishing has occurred widely throughout OCNMS for several decades, likely over all but the roughest of seafloor habitats. Where biologically-structured habitats existed on the sanctuary seafloor, it is likely they have been altered by fishing practices, except perhaps in the roughest of terrain fishermen avoided. Recovery of biologically-structured habitats is expected to occur very slowly, even in the absence of future pressures, due to low growth and reproductive cycles of the habitat-forming organisms such as corals.

In recent years, fishery management measures restricting footrope gear size and limit areas open to bottom trawlers, and in some places long-line and pot gear, have mitigated widespread seafloor impacts of bottom trawling and focused trawl effort more toward soft seafloor substrates where gear impacts on the physical habitat are less of a concern.

Analysis of seafloor habitat data used for groundfish Essential Fish Habitat (EFH) designation indicates that approximately six percent of the sanctuary is hard substrate with potential to host biologically structured habitat. Of this, 29 percent lies within the Olympic 2 EFH conservation area (Figure 7). Recent surveys by OCNMS researchers have documented corals and other biologically-structured habitat in other areas (Brancato et al. 2007), which indicates this analysis may underestimate the historic or current distribution of biologically-structured habitat.

Figure 7 Potential historic distribution of biologically structured habitat associated with hard substrate overlaid on Olympic 2 EFH Conservation Area (data from Curt Whitmire, NOAA)

Submarine cable installations in OCNMS have been monitored and shown to cause acute and localized seafloor impacts, short-term habitat disturbance in soft sediments and more persistent physical disturbance in hard substrates (Brancato and Bowlby 2002). Cable trenching, however, impacts a very small portion of the sanctuary seafloor.

Sediment contaminant levels (i.e., heavy metals and organic pollutants) in OCNMS are generally low and do not appear to be increasing (ONMS 2008). Marine debris does compromise seafloor habitat quality, but its impacts in OCNMS are not well-documented. Rough waters and complex seabed features increase the potential for fishing gear entanglement and loss. Studies from Puget Sound and beyond reveal that abandoned fishing gear can remain for decades, potentially entangling and killing species encountering the gear (NRC Inc. 2008). Assessment of derelict fishing gear on the seafloor has been limited to coastal areas around Cape Flattery and sites viewed for characterization of seafloor habitat and seafloor community studies. These later studies have documented lost fishing gear, most commonly long-line gear entangled on seafloor features and corals (Brancato et al. 2007).

6.2.5. Benthic Invertebrates

The majority of the sanctuary's seafloor where bottom dwelling, or benthic invertebrates live is composed of sand and mud. This submerged habitat is home to a variety of invertebrates similar to those found in intertidal areas – brittle stars, sea urchins, worms, snails, and shrimp. Dungeness crab and razor clams have long sustained commercial and recreational harvest off the Olympic Coast.

Hard-bottom substrates harbor rich invertebrate assemblages, including deepwater coral and sponges (Brancato et al. 2007). These living organisms with branching, upright structure are, in turn, habitat where other invertebrates and fish find hiding places, attachment sites, food sources, and breeding and nursery grounds in relatively inhospitable and otherwise featureless environment (Whitmire and Clarke 2007). The distribution of such deepwater communities, as well as their species richness and basic biology, are not well documented but are currently under scientific investigation.

Human activities impacting seafloor habitats (described in section 6.2.4) can also harm benthic invertebrates. Submarine cable installation and buoy anchors can physically disturb and displace benthic invertebrates, but the cumulative area of impact is relatively small given small size of most anchors and the narrow path of disturbance and relatively few cables installed in the area (Brancato and Bowlby 2002). The most widespread human impact to benthic invertebrates likely results from bottom contact fishing gear, especially bottom trawl fisheries with footropes and roller gear repeatedly traversing relatively wide swaths of the seafloor.

6.2.6. Fishes

Among the many species of fish inhabiting OCNMS are commercially important ones including at least 30 species of rockfish, 15 or more species of flatfish, Pacific halibut, Pacific whiting (or hake), sablefish, and salmon. Five species of Pacific salmon (chinook,

sockeye, pink, chum and coho) occur along the outer coast of Washington and breed in the Olympic Peninsula's rivers and streams. Three similar salmonid species found in freshwater systems (sea-run cutthroat trout, bull trout, and steelhead) spend portions of their lives in nearshore marine waters. Nearshore habitats of the sanctuary presumably are important for salmon spawning in adjacent streams and rivers, but juvenile salmon use of nearshore habitats off the Olympic Coast is not well understood. The sanctuary also is part of the migration corridor of both juvenile and adult salmonids from California, Oregon, British Columbia, and Washington rivers beyond the Olympic Peninsula. Migratory species, such as sharks, albacore, sardines, mackerel, and anchovies, are important resources for tribal and non-tribal fishers that are found in the sanctuary seasonally.

Federal and Washington state listings of candidate, sensitive, threatened, or endangered species are definitive indicators that some fish populations are not healthy. Olympic Coast populations of Ozette sockeye and bull trout have been on the federal list of threatened species in 1999. Thirteen species of rockfish are identified as state species of concern, and three of these are also federal species of concern. In recent decades**,** West Coast groundfish stocks and fisheries were in crisis, with steep declines in commercial ex-vessel value, overcapitalization, and several groundfish stocks depleted by a combination of fishing and natural factors (NMFS 2002). Four species of rockfish found in the sanctuary have been classified as overfished by the NMFS Service (NMFS 2006a). And there have been increasing concerns about our limited ability to forecast groundfish production from single species investigations is missing important natural and fishery-induced changes in the ecosystem and will not be able to forecast truly sustainable harvest policies (NMFS 2002). For example, age structure, an important measure of population integrity, has been affected by fisheries. Some rockfish populations have been shown to have reduced numbers of larger, older fish, a factor that could affect their recovery rate (PFMC 2008a). Older rockfish produce more eggs and more robust juveniles (Berkeley et al. 2004). However, in most cases, the status of the larger, older fish within the population is unknown because it has not been determined whether the older fish are simply missing because they have been removed from the population, or are not fully represented in fishery or stock assessment surveys.

However, professional fisheries managers generally are optimistic sustainable fisheries off the outer coast of Washington are possible under new management regimes following these historical stock declines. Recent fishery management measures implemented to reduce fishing effort, monitor and minimize bycatch, and reduce impacts to habitat appear to have assisted initial recovery of some overfished groundfish stocks and provide evidence for an improving trend (ONMS 2008).

6.2.7. Seabirds

Seabirds are the most conspicuous members of the offshore fauna of the Olympic Coast. Sea stacks and islands provide critical nesting habitat for 19 species of marine birds and marine-associated raptors and shorebirds, including seven alcid species (including murres, puffins, and murrelets), three cormorant species, four gull and tern species, two storm-petrel species, two raptors and one shorebird, the Black Oystercatcher. Productive offshore

waters also attract large feeding aggregations of marine birds that breed in other regions of the world but travel great distances to "winter" in sanctuary waters. The Sooty Shearwater, for example, breeds off New Zealand and Chile in the austral summer and congregates along the Pacific coast in its non-breeding season. Black-footed and Laysan Albatross travel far from their breeding grounds in Hawaii and Japan to forage in the eastern Pacific. Nearer to shore, sand and gravel beaches are foraging areas for shorebirds, crows, gulls and a host of other birds. The coastline also forms an important migratory pathway for millions of birds that pass through each year, guiding waterfowl, cranes, shorebirds and raptors toward northern breeding areas during the spring and southward as winter approaches.

Seabirds are relatively numerous, conspicuous, and forage across multiple habitat types and trophic levels. For these reasons, they are often considered indicators of ocean conditions, and the status of their populations provides insight into ecosystem health (Parrish and Zador 2003, Piatt et al. 2007). Many feed on forage fish, a critical link in the food chain, which are difficult to quantify by direct observation or sampling. Populations of five species of marine birds breeding in the sanctuary are declining in the area, which has led to their inclusion on federal or state species of concern lists: Common Murre, Marbled Murrelet, Tufted Puffin, Cassin's Auklet, and Brandt's Cormorant. Trends and common concerns for these seabirds are long-term declines in their population sizes (Wahl and Tweit 2000, Wahl et al. 2005, Raphael 2006); vulnerability to human disturbances such as oil spills, habitat disruption and fisheries bycatch (Piatt et al. 2002, Raphael 2006); and susceptibility to natural disturbances such as ENSO events (Graybill and Hodder 1985, Wilson 1991, Piatt et al. 2002, Wahl et al. 2005). Although some population levels appear to be stabilizing at values lower than historical levels, a longer time series is needed to determine a trend (Lance and Pearson 2008).

A closer examination of the Common Murre population provides insight into some factors affecting the status of all seabirds on the Washington coast. The murre population declined dramatically in 1982 and 1983, coinciding with a severe El Niño-Southern Oscillation (ENSO), and has not recovered to pre-1983 levels since that time (Warheit and Thompson 2004). Aside from declines associated with ENSO events, it has been suggested the population has not recovered due to a combination of oil spills, disturbance at breeding colonies (e.g., historic Naval bombing practices), and gillnet mortality (Warheit and Thompson 2004). During the *Nestucca* spill in 1988 and *Tenyo Maru* spill in 1991, over 70% of bird carcasses recovered were Common Murres, mortalities that represented a sizable proportion of the total Washington state Common Murre population (The *Tenyo Maru* Oil Spill Natural Resource Trustees 2000). Although the Common Murre population showed signs of recovery through the 1990s, the number of birds has diminished greatly relative to pre-spill numbers, and modest declines have been found in recent years (Manuwal et al. 2001). At the breeding colony on Tatoosh Island, Common Murre populations have also been affected by an influx of avian predators, including Bald Eagles, Peregrine Falcons and nest-depredating Glaucous-winged Gulls (Parrish et al. 2001). These multiple stressors affecting the sluggish recovery of Common Murres may be indicative of the challenges facing the long-term recovery of other seabirds.

Age structure and mortality rates are also in question in some bird populations on the coast. Common Murres on Tatoosh Island have experienced documented breeding failures during recent years, partially attributed to oil spills and observed heavy predation by raptors and gulls, but also possibly due to low food supply during critical breeding periods (Parrish et al. 2001, Warheit and Thompson 2003). Because they are long-lived, an occasional year of poor productivity may not impact the population significantly, but multiple years or successive years of breeding failure would likely have future impacts on the population. Recent demographic studies of Marbled Murrelets in the region have indicated they have had low nesting success in recent years (Raphael and Bloxton 2008), which may inhibit their recovery or at least slow the rate of recovery.

6.2.8. Marine Mammals

Twenty-nine species of marine mammals have been sighted in Olympic Coast National Marine Sanctuary. Whales, because of their size, abundance and visibility, are commonly seen in the sanctuary. Sea otters, harbor and elephant seals, and Steller and California sea lions aggregate along the shore and haul out on land at many locations along the coast throughout the year. The humpback whale and the killer whale (also called orca) forage offshore, and some 20,000 gray whales travel through the sanctuary on their annual migrations between breeding and calving grounds off the Baja Peninsula and summer feeding grounds in the northern Pacific. Eleven marine mammal species are on either federal or state species of concern lists across their range (Washington Department of Fish and Wildlife 2008).

The sea otter is often considered a keystone species because of the strong top-down influence they have on the nearshore kelp ecosystem. Sea otters are of high scientific interest because they were extirpated from Washington state by commercial pelt hunters by 1911, then were reintroduced in 1969 and 1970 (Lance et al. 2004). This population has been counted annually since 1989 and has shown increases the past few years, with a peak of 1,121 animals in 2008 (Jameson and Jeffries 2008). The rate of population growth, however, has been slower than expected (Laidre et al. 2002; Lance et al. 2004). The sea otter remains a federal species of concern and an endangered species within Washington state, and the population remains vulnerable because of its small size, limited genetic diversity, existing exposure to pathogens, and extreme risks to oil spills.

Most wildlife populations in the sanctuary are relatively healthy and unburdened by contaminants, pathogens or related maladies. There are, however, notable exceptions. Although no negative health effects have been documented, the sea otter population has been shown to carry several potentially lethal pathogens- 80 percent of the otters tested positive for the distemper viral complex *Morbillivirus* and 60 percent tested positive for the protozoan *Toxoplasma gondii* (Brancato et al. 2009). Fat-soluble contaminants are generally considered to bioaccumulate or increase in concentration when moving up the food web (Cockcroft et al. 1989). Overall, tissue concentrations of assayed contaminants were relatively low in Washington sea otters (Brancato et al. 2009). However, other top predators in the region, such as killer whales, have been shown to carry high contaminant

loads (e.g., PCBs and PBDEs) in their blubber (Ross et al. 2000, Ross 2006), though the population effects of such high contaminant loads are unknown.

6.3. CULTURAL AND HISTORICAL SETTING

Olympic Coast National Marine Sanctuary has a rich maritime heritage where lives, languages, communities and cultures are continuously shaped by the sea. The native Makah, Quileute, Hoh and Quinault peoples traditionally lived at the water's edge, thriving on the riches of the ocean plants, fish, shellfish, seabirds and marine mammals. The waters off the Washington coast linked native peoples along the coast as they traveled by canoe. These waters were highways that were traversed by canoes and, more recently, ships supporting communities and industries along the shores of the Strait of Juan de Fuca and Puget Sound and beyond. Historically, local maritime activity ranged from fur hunting, whaling and fishing, to coastal trade with smaller coastal communities. The rugged Olympic Coast could be treacherous, especially during winter storms when high winds and strong currents pushed ships dangerously close to the rocky islands, reefs and shoreline. Fog, too, led to collisions with disastrous results. Over 180 ships were reported wrecked or lost at sea in or near sanctuary waters in the years between 1808 and 1972.

6.3.1. American Indian Cultural Resources

The modern shoreline of the Olympic Peninsula contains dozens of late prehistoric archaeological sites rich in materials documenting the character of the maritime environment and the use of this environment by the region’s native peoples. Nearshore coastal forests adjacent to the sanctuary contain mid-Holocene shorelines and older prehistoric archaeological sites. These older sites are rich in materials documenting the character of maritime paleo-environments, the history of environmental change, and the record of use of these environments by the region’s native peoples.

The earliest dated archaeological site on the Washington Coast occurs adjacent to the sanctuary on the Makah Indian Reservation, establishing human presence for the last 6,000 years. The recent investigation of paleoshoreline sites on the Makah Reservation reveals high sea-stand village sites inland along the Sooes and Waatch river valleys, in some cases greater than 10 meters above current sea level and kilometers from the current ocean shore (Wessen 2003). These sites indicate complex interactions with marine resources of the period and yield important clues to large-scale ocean and climate regimes, marine wildlife and fish populations, habitat distribution and cultural patterns of marine resource use. The Makah Cultural and Research Center in Neah Bay houses an extraordinary collection of artifacts from the Ozette archaeological site, a Makah village that was partially buried by a mudslide nearly 500 years ago and excavated in the 1970s.

Other tangible records of prehistoric human occupation include petroglyphs both above the intertidal zone and within it, middens of shells and other discarded domestic materials, and canoe runs, or channels cleared of boulders to facilitate landing of dugout watercraft. Research and preservation of coastal native languages, traditional cultural properties, and traditional practices of song, dance and activities like whaling also enhances awareness in native and non-native peoples of the region’s rich ocean-dependent heritage. The recent resurgence of the canoe culture in the annual “Tribal Journeys” celebration transfers knowledge and understanding of coastal culture to new generations.

6.3.2. Historical and Archaeological Resources

Historical-era resources are generally affiliated with archaeological remains of the western cultures that appeared in the region by the mid-nineteenth century.* A combination of fierce weather, isolated and rocky shores, and thriving ship commerce have made the Olympic Coast a graveyard for ships of many descriptions.

6.3.2.1. Historical Contexts

Early European-led visits to the Pacific Northwest were explorations to map the coast, assess marketable natural resources, and stake claim to lands. Juan Perez, a Spaniard, sailed from Mexico on the first European exploration of the Pacific Northwest in1774, an expedition that extended as far north as the Alaskan panhandle. In 1778, James Cook explored the coast between Oregon and Alaska. By the 1790s, Spain attempted to use the region as a buffer against encroaching Russian and English fur hunters. In 1792, the Spanish established a short-lived palisaded settlement known as Nunez Gaona near the mouth of the Strait of Juan de Fuca in Neah Bay to support their main base on Vancouver Island. This Spanish settlement lasted less than a year.

As the British settled Canada's Pacific Northwest, Americans also continued their westward migrations into the United States northwestern territories of Washington and Oregon. A need for timber to support the population explosion resulting from California's 1849 Gold Rush led to the settlement and exploitation of the timber resources around Puget Sound and the Olympic Peninsula. An increase in shipping around Cape Flattery resulted in an increase in ship losses. The U.S. Lighthouse Board built lighthouses at both Destruction Island and Tatoosh Island to reduce the hazards to the increased shipping.

The encroachment of settlers had a profound impact on the native tribes' traditional way of life. The United States pressured the tribes to move to reservations in order to make way for American settlement. In 1855, the Treaty of Neah Bay set aside land at Cape Flattery as a reservation for the Makah tribe. Tatoosh Island was appropriated for the lighthouse and was not returned to the tribe until 1984. In 1855-1856, the ancestors of the Hoh Tribe, Quileute Tribe and the Quinault Indian Nation signed the Treaty of Olympia with the U.S. Government. The Hoh and Quileute reservations were subsequently established by Executive Order.

Throughout the 1850s and 1860s, settlers moved onto lands formerly used by American Indians. The remoteness and lack of access roads to areas near the coast prevented an influx of large numbers of settlers, but small western communities, such as Port Angeles and Port Townsend began to appear near American Indian communities that persisted in Neah Bay, La Push, and Taholah. Grays Harbor, too, became a center of timber export. By the last quarter of the nineteenth century, small sailing vessels and steamers used for fishing, whaling and local commerce were commonly seen alongside native canoes.

* The term "historical" refers to cultures with written language.

Since the mid-1990s, NOAA's Office of National Marine Sanctuaries has compiled and periodically updated a database of historic ship and military aircraft losses that includes known archaeological resources in the vicinity of Olympic Coast National Marine Sanctuary. Approximately 207 historic ships have been documented as lost in what is now the sanctuary between the early-nineteenth and mid-twentieth centuries (Schwemmer 2008). As the rate of shipping increased with the growing regional economy and settlement, so too did the rate of shipwreck increase off the Olympic Peninsula. An assessment of the database indicates the majority of losses were weather-related, including founderings, collisions and groundings. Many ships simply vanished after sailing past Tatoosh lighthouse, their resting place never known.

Ship types ranged from clippers and multi-sail rigged windjammers, to steam freighters, small gasoline powered fishing boats and barges. There are a number of ships that have entered local lore and are still remembered by local citizens of the peninsula. Examples include:

SS *Skagway* - On December 16, 1929 the Dollar line steam freighter, *Skagway*, caught fire and drifted into the rocks around Fuca Pillar at Cape Flattery. The rocks where she went down have since been referred to as Skagway Rocks.

W.J. Pirrie - The five-masted iron ship *Pirrie* had been reduced to a sailing barge after almost forty years of sailing when it hit the rocks during a storm on November 11, 1920. Sixteen crew (including the captain's wife and young child) drowned and were washed ashore around Cape Johnson. Because the ship had Chilean registry at the time of its sinking, she became known as the "Chilean Wreck" and is so commemorated by a monument at the site where most of the bodies were recovered.

SS *Pacific* - Perhaps one of the greatest shipwreck mysteries of the Olympic Coast involves the sidewheel steamer *Pacific*, lost in 1851. The ship was steaming for Panama out of Victoria and reportedly carrying miners from the British Columbia gold fields when she collided with another ship. Only two of almost three hundred passengers survived. Treasure salvors have sought the ship in the past in the belief the miners on board may have been carrying unreported gold in their baggage and on their persons. The ship has not yet been located.

Two locally well-known wrecks (among several others) occurred in the vicinity of La Push. One of the earliest recorded local wrecks was the Russian brig *St. Nicholas* on Rialto Beach in 1808. Several of the crew were captured by Native Americans, and their ordeal was a well-told story. The earliest steam shipwreck in the sanctuary region was the *Southerner* in 1854. A wooden sidewheel steamer built in 1846, *Southerner* served as a passenger steamer when it sprang a leak and the captain was forced to run her ashore at First Beach at Quillayute (now La Push). The large island situated at the mouth of Quillayute River, originally called Alekistet Island by the Quileute tribe, was renamed James Island by the white settlers to honor Francis W. James who scaled it in order to watch over the remains of the ship and protect it from illegal salvage (Terrell no date).

6.3.2.2. Archaeological Resources

In compliance with Section 110 of the National Historic Preservation Act, OCNMS undertook five surveys to document historical shipwrecks between 1995 and 2001. Utilizing acoustic and magnetic remote sensing and diver target identification, the research design identified areas of high probability for finding historically-reported shipwrecks near the southern shore of the Strait of Juan de Fuca, the vicinity of Tatoosh Island, Cape Flattery to Portage Head, as well as select areas at Cape Alava, La Push/Quilleyute Needles and Destruction Island.

Often searching in difficult and dangerous nearshore areas, the teams were able to locate remains associated with at least eight historic shipwrecks. A draft final report was compiled and a draft manuscript is presently on file at OCNMS. The report concludes the majority of the wreck remains in nearshore waters have been severely degraded due to heavy storm and wave impact. Several of the sites, which were found using sidescan sonar, could not be safely dived or documented by marine archaeologists.

Thus far, two historic shipwreck sites have been documented by the OCNMS. The remains of the World War II/Korean War troopship *General M.C. Meigs* at Portage Head was examined by diving archaeologists in 1997. Although scattered and broken in half, much material remaining should be documented further. Also, in 1997 a team investigated the nearshore remains of a nineteenth-century bark, the *Austria* at Cape Alava. Almost all wooden remains have been destroyed by the environment, but the team was able to locate the orientation of the wreck by the locations of significant objects such as the ship's anchor, anchor chains and hawseholes. The site subsequently has been used as an educational tool to teach students about the maritime heritage resources of the sanctuary.

Final recommendations in the report included further study of several sites, and focus of OCNMS' future efforts towards locating historical shipwreck remains in deeper water. The lack of exposure to winter storms suggest a better probability of preservation of submerged archaeological remains (Terrell no date).

6.3.2.3. Maritime Cultural Landscape

The National Historic Preservation Act directs federal agencies like NOAA to inventory and manage heritage resources, and, if appropriate, to nominate those properties to the National Register of Historic Places. The act also recommends agencies interpret the cultural landscape of a region. A search of National Register listings indicate three properties adjacent to the OCNMS. They are:

- Ozette Indian Village Archaeological Site
- Tatoosh Island
- Wedding Rock Petroglyphs

In addition to archaeological remains exhibiting the tribes' relationship with the sea, the region's Indian cultural landscape may contain (among other things) such elements of culture as stories, dances, traditional knowledge and practices, traditional place names and

language. Even the tribe's renewed interest in canoe construction and navigation and whaling represent the prehistoric and tribal maritime cultural landscape.

So it is with historic maritime cultural landscapes. Archaeological remains of shipwrecks are but one component. Historic structures on land, while technically outside of sanctuary boundaries, remain as important tangible fragments of the past and provide insight into past human interactions with the ocean. These include historic lighthouses at Tatoosh and Destruction islands, lifesaving station remnants at Waadah Island and La Push, wartime defense sites at Cape Flattery and Anderson Point, and sites of coastal patrol cabins scattered along the Olympic Coast. Homesteads, resorts, graves, and memorials also reflect a human dimension to the coast now largely reclaimed by time, the forest, or the sea. The oral traditions, stories, fishing practices and local lore also are components of the historical maritime cultural landscape.

6.4. HUMAN/SOCIOECONOMIC SETTING

The Olympic Peninsula has a rich history supporting diverse commercial, recreational, cultural, research and education activities. Western and American Indian populations alike, including the Hoh, Makah, Quileute, and Quinault peoples, utilize plant, fish, and shellfish resources, as well as the access and transportation routes within and adjacent to the sanctuary as an integral part of economic and socioeconomic activities. This section describes the character of the sanctuary and adjacent areas, including the population, overall economy, employment and housing. For the purposes of this analysis, the discussion of the affected environment is focused on those areas immediately adjacent to the sanctuary. Additional discussion focuses on the commercial activity dependent on the sanctuary area.

6.4.1. Population, Housing, Income, and Employment

Table 8 shows information on population, housing, poverty and income in counties immediately adjacent to the sanctuary. Despite the recent economic recession, populations, housing and incomes in Clallam, Grays Harbor and Jefferson counties have increased over the last decade. However, the percentage of the population with an income below the poverty level in each county has also increased over same period.

Table 8 Population, Housing, Poverty, and Income[a]

	Clallam County		*Grays Harbor County*		*Jefferson County*	
	2000	2009	2000	2009	2000	2009
Population	64,525	71,413	67,194	71,797	25,953	29,676
Housing Units	30,683	33,972	32,489	34,692	14,144	16,291
Area in Square Miles	1,739	1,739	1,917	1,917	1,814	1,814
Total Population Density per sq. mi.	37.1	41.1	35.1	37.5	14.3	16.4
Median Household Income	$37,420	$47,537	$34,724	$41,787	$39,519	$50,463
Poverty Status (% below poverty level)	12.1%	13.6%	15.0%	15.9%	10.7%	12.4%

[a] Source: U.S. Census Bureau 2000; Washington State Office of Financial Management 2009.

Table 9 shows information from the 2000 census on population, housing, poverty and income in American Indian communities in the vicinity of the OCNMS. All Coastal Treaty Tribes have experienced, and in many cases still experience, high unemployment and poverty rates. Much of the tribal culture and economy is resource-based and focused on commercial fishing, timber, and tourism.

Table 10 shows information on 2008 employment in counties adjacent to OCNMS. The government service, wholesale/retail trade, manufacturing and healthcare sectors dominate employment in the three counties, providing 68 percent, 71 percent and 71 percent in Jefferson, Clallam, and Grays Harbor counties, respectively. By contrast, only 1 percent, 2.8 percent and 3.6 percent of employment relies on the agriculture, forestry, fishing, and hunting sector in Jefferson, Clallam and Grays Harbor, respectively. Tourism, driven by

the natural beauty and resources of the Olympic Peninsula, is a growing economic driver, and its impact is spread across several of the employment sectors shown, including fishing and hunting, retail trade, arts, entertainment and recreation and accommodation and food service.

Table 9 Population, Housing and Income for American Indian Tribes adjacent to OCNMS

Population, Housing and Income	*Makah Tribe*	*Quileute Tribe*	*Hoh Tribe*	*Quinault Nation*
Population	1,356	371	102	1,370
Housing Units	534	128	33	406
Area in Square Miles	47.0	1.6	0.7	316.3
Total Population Density	28.9	236.6	137.1	4.3
Median Household Income	$24,091	$21,750	$21,875	$26,488
Poverty Status (% below poverty level)	26.8%	34.5%	42.0%	31.5%

Employment opportunities on American Indian reservations are much less diverse, given the smaller populations, and cultural and geographic isolation from major population centers. Much of the mainland adjacent to the sanctuary consists of sparsely populated areas under federal or tribal management, as well as sizeable tracts of privately-owned timberlands. The public areas outside tribal reservations are managed by the National Park Service, or administered by state or county governments.

The Coastal Treaty Tribes are dependent economically, culturally and spiritually upon natural resources found on their reserved lands and within their usual and accustomed hunting, fishing and gathering areas. Much of the tribal economies are resource-based, focused on commercial fishing, timber and tourism. Commercial fishing is one of the mainstays of the tribal economies, with emphasis on Dungeness crab, groundfish, salmon and steelhead, blackcod (sablefish) and razor clams (see section 6.4.3).

As with the rest of the Olympic Peninsula, while natural resources continue to support the area economy, tourism is growing in importance for the Coastal Treaty Tribes, particularly recreational fishing, nature viewing and active water sports (surfing and kayaking; section 6.4.8). The Quinault Indian Nation runs a successful casino in Ocean Shores. The Quileute Tribe runs a very popular resort and marina, and more recently with the overwhelming success of the Twilight books and movies has become a popular tourist destination. The Makah Tribe also runs an important regional marina and one of the most popular museums in Washington state, the Makah Cultural and Historical Center.

The following sections describe the importance the resources within the boundaries of the sanctuary play in the economic and socioeconomic lives of the coast's residents, residents of Puget Sound, as well as the wider community dependent on sanctuary access. The potential for effects on the human/socioeconomic setting derive mostly from these activities.

Table 10 Employment in counties adjacent to OCNMS (2008)

	JEFFERSON COUNTY		CLALLAM COUNTY		GRAYS HARBOR COUNTY	
	Avg. # of Employees (Percent of Workforce)	*Wages Paid (Percent of Total)*	*Avg. # of Employees (Percent of Workforce)l*	*Wages Paid (Percent of Total)*	*Avg. # of Employees (Percent of Workforce)*	*Wages Paid (Percent of Total)*
Agriculture, Forestry, Fishing & Hunting	1.2%	1.0%	2.4%	2.8%	3.6%	3.6%
Mining	0.6%	0.8%	0.0%	0.1%	0.3%	0.3%
Utilities	0.7%	1.6%	0.1%	0.1%	0.0%	0.0%
Construction	6.9%	7.8%	5.7%	6.2%	5.8%	7.2%
Manufacturing	8.3%	11.9%	6.1%	8.2%	16.4%	20.6%
Wholesale/Retail Trade	12.6%	10.3%	16.7%	13.9%	14.0%	11.9%
Transportation & Warehousing	0.7%	0.6%	2.0%	2.1%	2.4%	2.4%
Information	1.6%	1.9%	1.3%	1.4%	0.9%	1.0%
Finance, Insurance, & Real Estate	3.9%	3.5%	3.4%	3.1%	3.5%	3.4%
Professional & Tech. Services	2.6%	2.7%	2.4%	2.6%	1.5%	1.8%
Management of Companies & Enterprises		0.0%	0.7%	1.4%	0.2%	0.3%
Administrative & Waste Services	1.7%	1.2%	1.9%	1.3%	2.0%	1.7%
Educational Services	1.7%	1.1%	0.3%	0.1%	0.0%	0.0%
Health Care & Social Assistance	15.7%	14.3%	11.2%	9.2%	9.0%	9.5%
Arts, Entertainment,& Recreation	1.3%	0.8%	1.0%	0.5%	0.9%	0.4%
Accommodation & Food Services	12.2%	5.2%	9.6%	4.0%	8.7%	3.5%
Other Services, except Public Administration	5.1%	3.7%	4.9%	3.0%	5.5%	2.7%
Government	23.3%	31.5%	30.3%	40.0%	25.2%	29.5%
Not Elsewhere Classified					0.1%	0.1%

6.4.2. Maritime Transportation

Maritime transportation within the sanctuary includes both vessels in transit, simply passing through the sanctuary under way to another destination, and vessels within the boundaries of the sanctuary for a particular purpose. An understanding of vessel activity is necessary for sanctuary management for a number of reasons, both from a perspective of potential impacts from vessel activities and also from a more general perspective of characterizing human activities within the sanctuary. In very broad terms most vessels found within the sanctuary can be described as large commercial vessels, commercial fishing vessels and recreational vessels.

The sanctuary lies at the entrance to the Strait of Juan de Fuca, a major international waterway linking the important North American ports of Seattle, Tacoma, and Vancouver, Canada, with trading partners all around the Pacific Rim. Every year, approximately 10,000 large commercial vessel transits occur at the western end of the Strait of Juan de Fuca. The uses of sanctuary waters for maritime transportation, along with commercial fishing, are the most significant commercial uses of the sanctuary. The total number of transits of vessels participating in the Cooperative Vessel Traffic Service (CVTS) off the Olympic Coast in 2009 are summarized in Table 11, along with the duration of their transit. These data were derived from observations by the Canadian Coast Guard Marine Communications and Traffic Services (MCTS) Tofino Radar facility. Public vessels are those engaged in work for the government or public institutions (e.g., Coast Guard, research, spill response).

Cruise ship operations generally utilize the sanctuary for purposes of transit, simply passing through the sanctuary inbound to the Ports of Seattle and Vancouver, Canada or outbound to Alaska and other cruise destinations in the Pacific or other U.S. or foreign ports. However, the economic impact of the cruise ship industry in the region is substantial, and includes spending and jobs related to ship supplies, repairs and maintenance, fuel, stevedoring, port costs, pilotage, hotel accommodations for passengers and crew, local tours and shopping, restaurants, buses, taxis and air transportation. The Port of Seattle estimates the cruise industry in 2008 produced 1,955 direct jobs, 1,125 induced jobs, and 701 indirect jobs in the Puget Sound area alone from ships transiting the sanctuary. The Port of Seattle also estimates the cruise industry generated $312.5 million in business revenue and $16.1 million of state and local taxes in the Puget Sound (POS 2009). The North West and Canada Cruise Association estimates in British Columbia alone, the estimated spending by the ships, passengers and crew is in excess of $500 million (Canadian) per year. The Association estimates similar numbers for Alaska, where recent studies cite more than $700 million (US) in annual economic benefits directly tied to the industry.

Vessel traffic in northern portion of the sanctuary is managed through a 1979 formal agreement between the Canadian and United States Coast Guards. This agreement created the Cooperative Vessel Traffic Service (CVTS). The purpose of the CVTS is to provide for the safe and efficient movement of vessel traffic while preventing collisions and groundings, and therefore minimizing the risk of environmental damage that would follow.

Table 11 All Cooperative Vessel Traffic Service (CVTS) Vessel Transits in 2009. For transits in OCNMS, the cumulative time and average transit time in OCNMS for all vessels of a given classification combined is provided for each vessel class.

Vessel Classification	*Total Transits*	*OCNMS Transits*	*Cumulative Time (minutes)*	*Cumulative Time (days)*	*Avg Time (hours)*
Commercial Vessel < 300 GT	354	249	49,272	34.2	3.3
Commercial Vessel 300-1599 GT	246	65	14,229	9.9	3.6
Commercial Vessel > 1600 GT	6,449	4,272	403,534	280.2	1.6
Fishing Vessel < 300 GT	915	243	37,927	26.3	2.6
Fishing Vessel 300-1599 GT	146	63	11,814	8.2	3.1
Fishing Vessel > 1600 GT	125	81	15,431	10.7	3.2
Passenger Vessel < 300 GT	15	14	1,208	0.8	1.4
Passenger Vessel 300-1599 GT	9	9	1,170	0.8	2.2
Passenger Vessel > 1600 GT	451	280	20,727	14.4	1.2
Public Vessel < 300 GT	42	16	3,064	2.1	3.2
Public Vessel 300-1599 GT	227	75	14,926	10.4	3.3
Public Vessel > 1600 GT	291	157	24,912	17.3	2.6
Recreational Vessel < 300	29	13	1,454	1.0	1.9
Recreational Vessel 300-1599	42	36	3,813	2.6	1.8
Tank Vessel	1,734	1,401	209,360	145.4	2.5
Tug with tank barge-laden	104	94	29,447	20.4	5.2
Tug with tank barge-unladen	100	95	21,568	15.0	3.8
TOTAL	11,279	7,163	863,856	599.9	2.0

As part of the agreement, Tofino Traffic in Canada provides CVTS coverage for the offshore approaches to the Strait of Juan de Fuca and along the Washington State coastline from 48 degrees north. Seattle Traffic in the U.S. provides CVTS coverage for both the Canadian and US waters of Strait of Juan de Fuca (http://www.uscg.mil/d13/cvts/purposeandobjective.asp). In addition to the marine communications and traffic services provided by the Canadian Coast Guard, the main features of the CVTS within the boundaries of the sanctuary are a number of International Maritime Organization (IMO) vessel routing measures. These include a traffic separation

scheme with western and south-western approaches, a recommended route for smaller, slower moving vessels that normally do not use the traffic separation scheme, and an Area to be Avoided (ATBA)(Figure 8).

When the sanctuary was designated in May 1994, NOAA worked with the U.S. Coast Guard to propose that the IMO approve and adopt an ATBA off the Olympic Coast. This ATBA, which went into effect in June 1995 and was updated in 2002, advises operators of vessels above 1600 gross tons and those carrying petroleum and hazardous materials as cargo to maintain a 25-mile buffer from the coast. This distance narrows as the vessel traffic lanes converge at the entrance to the Strait of Juan de Fuca. It is important to note that the boundaries of the ATBA and of the Sanctuary are not contiguous. The ATBA compliance rate has consistently been very high and was estimated to be 98.9% in 2009 (WDE 2010). OCNMS works with the USCG to notify non-compliant vessels with a formal letter requesting that they adhere to the ATBA in the future.

Just as marine transportation forms a vital economic link for Pacific Rim trade, the sanctuary forms a vital link among resource management agencies, enforcement organizations and the maritime transportation industry.

Figure 8 Vessel Traffic Management System

6.4.3. Commercial Fishing

Commercial fisheries within the sanctuary are major components of the coastal economy and provide valuable food resources to the Northwest and beyond. Commercial and tribal fishers, as well as the business supporting these fisheries, are significant stakeholders in the health of the fisheries.

The commercial fishing industry in Washington state is structured around a multi-species fishery. Groundfish, halibut, albacore, salmon and shellfish are all major species groups important to the industry. In 2006, non-tribal commercial fishing generated nearly $100 million in personal income and supported over 3,500 direct and indirect jobs in Washington state. These figures include only fisheries conducted off the coast of Washington and do not include commercial fishing by Coastal Treaty Tribes. When these segments are added, the harvest value is nearly $150 million. Though not directly correlated to the boundaries of the OCNMS, the Washington coast accounted for over 60% of the harvest value of commercial fisheries in 2006. Including in-state processing, the wholesale value of fishery products caught in Washington waters was an estimated $101 million in 2006 (WDFW 2008a).

Relative to uses of the OCNMS, commercial fishing activity can be described in two categories: commercial fishing vessels transiting through the area on way to their fishing grounds, home port or to another port for services; and those conducting operations in the sanctuary. Commercial fishing activity in the sanctuary includes both tribal and non-tribal

fleets. The Makah, Quileute and Quinault fishers work respectively from the ports of Neah Bay, La Push and Grays Harbor. The Hoh Tribe does not currently have an ocean fishing fleet. Non-tribal fishermen work out of both Oregon and Washington ports.

Some groundfish species have been depleted in the past and have recovered quickly (e.g., English sole, Pacific whiting, and lingcod), while others are rebuilding more slowly (e.g., Pacific ocean perch) (PFMC 2008a). For depleted species, rebuilding programs are in place, with anticipated stock recovery period from several to over 80 years for different species. All species considered depleted are on track to be rebuilt by their respective schedules, which take into account their different life histories. Recent fishery management measures implemented to reduce fishing effort, monitor and minimize bycatch, and reduce impacts to habitat appear to have assisted initial recovery of some overfished groundfish stocks and provide evidence for an improving trend.

There are some indications the biomass off Washington of several rockfish species is high (per unit area) compared to Oregon and California, and this information has been taken into account for the management of some stocks (e.g., black rockfish). Survey data collected during NMFS trawl surveys have not been quantitatively analyzed to determine if other groundfish stocks off Washington or in the sanctuary are more abundant than those off Oregon and California.

The commercial Dungeness crab fishery has over 200 Washington coastal commercial Dungeness crab license holders. Dungeness crab landing data back to 1950 shows a large fluctuation in landings, averaging 4,300 metric tons (9.5 million pounds) per year, with variability likely due to varying ocean conditions including water temperature, food availability and ocean currents. A fishery for pink shrimp off Washington peaked in 1988, with landings just over 18 million pounds and about 100 vessels involved. Within a few years, a dramatic decline in local abundance drove many fishers out of the fishery. Since 2000, the Washington coastal fishery has been stable, with landings of seven to eight million pounds annually and about 25 fishers participating. Most shrimp and crab fishing occurs off the central and southern coast of Washington.

The Pacific halibut female spawning biomass is estimated at three to four times above the historical minimum in the mid-1970s, indicating that the halibut population is in good condition (NMFS 2004). Catch limits in Area 2A (Washington, Oregon and California) for commercial, treaty and recreational halibut fishing are approximately double limits imposed in the early 1990s.

Chinook and coho salmon are the main salmon species managed by PFMC and American Indian tribes off Washington's outer coast. In odd-numbered years, fisheries are also conducted near the Canadian border for pink salmon, which are primarily of Frasier River origin. Managing ocean salmon fisheries is an extremely complex task, due to the wide oceanic distribution of the salmon, wide variability and difficulty in estimating population sizes, and significant differences between model estimates and actual returns. In the past decade, landings from the ocean troll fishery off Washington (excluding the area south of Willapa Bay) varied five-fold for chinook and nine-fold for coho between low and high

catch years, but no clear trends in landings are evident (PFMC 2008b). Salmon at all life history stages are affected by a wide variety of natural and human-caused factors in the ocean and on land, including ocean and climatic conditions, habitat degradation and loss, and predators (including humans). Other challenges to a sustainable salmon fishery off the Washington coast include judging the effects of different regional fisheries on salmon stocks, recovering salmon under the Endangered Species Act, dividing the harvest fairly, impacts from salmon aquaculture, competition between wild and hatchery salmon, and restoring freshwater habitat (PFMC 2008b).

Fisheries management policies enacted on the West Coast and within the sanctuary have been progressive steps to incorporate ecosystem-based fishery management concepts and improve trends toward restoring historical population levels. A variety of recent fishery management actions off the Washington coast, such as trawl footrope gear restrictions, low-rise nets that reduce bycatch, monitoring of bycatch, protection of Essential Fish Habitat, implementation of stock rebuilding plans, and establishment of temporary area closures (Rockfish Conservation Areas) to promote recovery of species under rebuilding plans, have provided early indications that depleted stocks can recover and these fisheries can be sustainably practiced. OCNMS' role in this management regime has been development of detailed seafloor habitat maps and participating in evaluation of essential fish habitat designations for groundfish.

6.4.4. Developed Environment

The shoreline and submerged lands of the sanctuary are largely undeveloped, but there are a number of manmade structures that do exist within or immediately adjacent to the sanctuary.

The La Push harbor at the mouth of the Quillayute River is the only port immediately adjacent to the sanctuary. The La Push marina is managed by the Quileute Tribe and supports their tribal fishers, as well as other non-tribal commercial and recreational fishers. The entrance to the harbor is maintained by the U.S. Army Corps of Engineers (USACE) as part of the Quillayute River Navigation Project. Activities related to this project include the maintenance of the entrance channel, the boat basin and a protective jetty (USACE 2009). OCNMS regulations include an exception to allow for continued harbor maintenance associated with this project (15 CFR 922.152(a)(4)(iv).

There are several submarine cables that have been installed within the sanctuary, many of which were in place at the time OCNMS was designated in 1994. Since 1994 three fiber optic cables have been installed in the sanctuary (Figure 9). When OCNMS was studying the recovery of the seafloor habitat following the 1999 installation of the two Pacific Crossing cables (PC-1), sections of the cables were found to be exposed and suspended above the seafloor. In response to concerns about long-term cable integrity and conflicts with fisheries, PC-1 cables were recovered throughout the sanctuary and reinstalled in 2006 in an effort to comply with permit conditions, minimize risk to the cables, and reduce conflicts with fisheries.

Figure 9 Location of the Alaska United and Pacific Crossing Fiber Optic Cables

There are several year round and seasonal buoys within OCNMS, primarily navigational aids and monitoring/research buoys. The U.S. Coast Guard maintains navigational aids within the sanctuary; the National Data Buoy Center maintains weather observation platforms; and various agencies and academic institutions deploy research moorings.

In today's world, there is evolving and expanding interest in development of coastal marine waters, supported by technological advancements and in response to emerging social and economic needs. While current managers may not be able to anticipate development that might be proposed a decade or two in the future, access to physical forces in the ocean has emerged as development feasible in the immediate future as a source of renewable energy from a domestic source, without combustion of fossil fuels and exacerbation of climate change impacts. In fact, Makah Bay in OCNMS was the site of the first federal license issued to an ocean energy project intended to supply the public electricity grid. Beginning in 2000, AquaEnergy sought partnerships for the Makah Bay Wave Energy Pilot Project and was successful in gaining interest and agreements with several groups, including the Clallam County Public Utility District in Washington State and the Makah Tribe. Finavera Renewables, Inc. acquired AquaEnergy in May 2007, and the Federal Energy Regulatory Commission issued the first ocean energy license in the U.S. to this project in December 2007. Finavera eventually rescinded this license, and the pilot project was never constructed. From a resource protection perspective, this project was a challenge to OCNMS during this FEC licensing process for several reasons. At the time when OCNMS was required to define environmental concerns and monitoring requirements to evaluate potential natural resource impacts, no functional wave energy buoys of similar design had ever been constructed and field tested. Data for environmental impacts of similar projects anywhere in the world was sparse. Specifications for design of anchors, cables and power transmission lines had not been developed. In addition, this project was a new example of tradeoffs between potential localized environmental impacts and development of the ocean for renewable energy and, perhaps, sustainable human habitation of the planet. It is likely that consideration of similar projects and similar tradeoffs will be in the future for ONMS.

6.4.5. Department of Defense Activities

In or adjacent to the sanctuary, the military has pre-established surface and subsurface ocean operating areas, including two warning areas (W-237A and W-237B) and two military operation areas (MOAs Olympic A and B) that are identified in OCNMS regulations (Figure 10). Military activities in these areas consist of subsurface, offshore surface, aerial training activities, and other military operations, which were described in general terms in the sanctuary's original environmental impact statement (NOAA 1993) and have been analyzed in more detail in recent Navy NEPA documents (U.S. Navy 2010a and b).

Whereas OCNMS regulations include several prohibited activities (15 CFR 922.152(d)), they also provide an exception for the following military activities within W-237A, W-237B, and MOAs Olympic A and B:

- Hull integrity tests and other deepwater tests
- Live firing of guns, missiles, torpedoes and chaff
- Activities associated with the Quinault Underwater Tracking Range, including the in-water testing of non-explosive torpedoes
- Anti-submarine warfare operations

Figure 10 Military Operating Areas

Navy activities associated with technology research, development, testing and evaluation conducted in the Quinault Underwater Tracking Range (QUTR), and fleet training exercises in the Northwest Training Range Complex (NWTRC) recently have been described in considerable detail, and their potential effects evaluated in separate environmental impact statements (EIS) via the National Environmental Policy Act (NEPA) process. The Navy's Underwater Warfare Center (NUWC) Division Keyport operates and maintains the QUTR located in Navy Operations Area W-237A. The Navy has conducted underwater testing at the QUTR since 1981 and maintains a control center at the Kalaloch Ranger Station. This range is instrumented to track and test surface vessels, submarines and various undersea vehicles. Research work involves testing of equipment and technologies, including mobile targets, torpedoes, underwater mine shapes, and autonomous vehicles. The Navy has proposed expansion of this range's area more than 50-fold to support existing and future needs in manned and unmanned vehicle programs development (U.S. Navy 2010a). The preferred alternative in the final EIS expands this range's boundaries to coincide with the existing W-237A Military Warning Area boundary and adds a surf-zone access site at Pacific Beach (Figure 10). To minimize cetacean disturbance, it is the policy of NUWC Division Keyport not to test when cetaceans are known to be present. The Navy was issued a Letter of Authorization under the Marine Mammal Protection Act (MMPA) for use of sound sources for Keyport activities in May 2011. The Navy does not plan to expand any permanent bottom-mounted instrumentation, but has proposed temporary (up to two years) installations on the seafloor. In its comments during EIS development in consultation with Navy representatives, OCNMS requested avoidance of hard substrate areas that might support biogenic habitat and minimization of military expendable materials use.

Navy fleet training activities were evaluated under a separate NEPA process that addressed the Northwest Training Range Complex that covers large areas of the ocean off Washington, Oregon and northern California (U.S. Navy 2010b). During scoping for these NEPA analyses, the OCNMS Advisory Council requested the NEPA analysis consider a wide variety of issues, including disturbance to birds, fish and mammals from increased activity and noise; damage to seafloor habitats and wildlife from cables, anchors, targets, torpedoes and unmanned undersea vehicles; accidental discharges of pollutants; interference with tribal fishing and subsistence harvest activities; and restrictions on the ability of sanctuary and affiliated scientists to conduct research. Within this area, the Navy

conducts a variety of training activities, including anti-surface warfare, anti-submarine warfare, electronic combat, mine warfare, strike warfare, and special forces training. The preferred alternative in the Navy's 2010 EIS included a relatively small percentage increase in use of various ordnances and expendables. In comments submitted during EIS development in consultation with Navy representatives, OCNMS raised concerns with impacts to disturbance-sensitive biogenic seafloor habitats and contributions to marine debris from military expendable materials, and requested development and use of biodegradable materials for expendable equipment. The Navy was issued a Letter of Authorization under the MMPA for use of sound sources for NWTRC activities in November 2010.

6.4.6. U.S. Coast Guard/Homeland Security Activities

The U.S. Coast Guard (USCG) protects U. S. coastlines by enforcing Federal law related to vessel safety, fishing, entry of illegal immigrants, drug trafficking and ocean dumping. The USCG also conducts search and rescue operations, assumes the lead in responding to spills of oil and hazardous waste into marine waters, and responds to complaints of improper conduct and vessel operation. USCG coverage of the sanctuary is shared by the 13th Coast Guard District's Sector Puget Sound and Sector Columbia River.

Sector organization allows complementary Coast Guard assets to be coordinated under one command, focused on the primary areas of prevention and response. Sector Commanders fulfill a number of functions, such as Captain of the Port, Federal Maritime Security Coordinator, Federal On-Scene Coordinator, Officer-in-Charge of Marine Inspection, and Search and Rescue Mission Coordinator. Sector Puget Sound combines the legacy Vessel Traffic Service, Group, and Marine Safety Office into one consolidated organization with missions that include maritime safety, maritime security, protection of natural resources, maritime mobility and national defense.

OCNMS also works closely with USCG Air Station/Sector Field Office Port Angeles, which is responsible for Neah Bay and Quillayute River Small Boat Stations; the 110-foot Patrol Boat USCGC Cuttyhunk; and seven 87-foot Patrol Boats. In addition, the Air Station/Sector Field Office Port Angeles maintains three MH-65C Dolphin short-range rescue helicopters. Certain activities carried out by the USCG necessary to respond to emergencies threatening life, property, or the environment, or necessary for law enforcement purposes are exempt from the prohibitions set forth in sanctuary regulations (15 CFR 922.152 (c) and (d)). However, other activities such as routine maintenance of aids to navigation and training exercises are not exempt from sanctuary regulations. Recognizing many of these routine activities as necessary to support OCNMS management objectives and ensure safe navigation at sea, the USCG and OCNMS have entered into a Memorandum of Agreement, which establishes a consultation process whereby USCG and OCNMS mutually agree upon procedures for conducting activities to support the sanctuary's mission that might otherwise be prohibited by sanctuary regulations.

6.4.7. Recreational Fishing

Recreational fisheries within the sanctuary are major components of the coastal economy, providing valuable recreational opportunity and food resources to the Northwest and beyond. Recreational fishers, as well as the business supporting these fisheries, are significant stakeholders in the health of the fisheries. Recreational fisheries in the sanctuary include shore-based (surf casting, razor clamming and intertidal collection) and vessel-based activities managed primarily by Washington Department of Fish and Wildlife and Olympic National Park. In the entire state of Washington, recreational fishing, including finfishing and shellfishing, supported nearly 12,000 direct and indirect jobs in 2006, producing over $390 million in personal income in 2006. In 2006, recreational fishing in Washington state produced about $355 million in trip-related spending and $549 million in equipment expenditures, which includes the personal income generated. Of the jobs supported by recreational fishers, state residents accounted for more than 90 percent of the spending supporting these jobs (WDFW 2008b).

Vessel-based recreational fishers typically operate in the sanctuary from marinas and boat launch ramps in La Push and Neah Bay, or farther afield in Westport and Seiku. The sanctuary overlaps WDFW marine management areas 2, 3, 4, and 4B. In 2009, nearly 100,000 angler trips were documented in these areas, of which about 60% were on private vessels and 40% on charter vessels (WDFW Ocean Sampling Program data).

6.4.8. Recreation and Tourism

Over three million visitors are drawn to the Olympic Peninsula each year, attracted by beautiful scenery, the wilderness character of the landscape, spectacle of wildlife and the opportunity to challenge themselves in a natural environment. Many of these visitors reach the 65 miles of coastline the sanctuary shares with Olympic National Park. Nature viewing, hiking, camping and surfing are popular pursuits along this coastal wilderness strip. Wildlife watching is superb, with rewarding birding and whale watching opportunities available year round. In addition, Cape Flattery, on the Makah Indian reservation is the northwestern-most point in the lower 48 United States, and a spectacular and very popular destination.

Most recreational boating in the sanctuary is sport fishers conducting day trips from the Neah Bay and La Push marinas. Other marinas supporting smaller vessels frequenting the sanctuary include Westport, Seiku and Snow Creek. Other recreational boating activity is associated with the non-consumptive uses such as diving, kayaking, wildlife viewing and sightseeing. Most recreational activity takes place during summer months, with recreational fishing largely concentrated around limited fishery openings managed by the Washington Department of Fish and Wildlife. Active water sports include sea and surf kayaking and surfing. Recreational use of OCNMS is not well characterized, but due to the remoteness and occasionally harsh conditions along the Olympic Coast, these recreational uses are relatively less common than in other coastal areas. A few dive charter operators serve the Olympic Coast, but ocean conditions and isolation require advanced skills and open-water experience.

Another recreational activity in the sanctuary is overflight from private pilots. An overflight is broadly defined as an aircraft (helicopter, plane, or other type of aircraft) that flies over sanctuary waters. Low overflights have the potential to cause wildlife disturbance. In order to protect nesting seabirds and marine mammals from disturbance from low flying aircraft, OCNMS has a regulation prohibiting aircraft from flying below 2,000 feet within one nautical mile of the shoreline or the offshore islands (15 CFR § 922.152(a)(6). Low overflights are the most frequently observed violation of sanctuary regulations.

The socioeconomic importance of recreation and tourism on Washington's coastal communities is substantial. Statewide in Washington in 2008, travel and tourism generated over $14 billion in direct spending and over 145,000 tourism-related jobs, approximately 3 percent of all jobs and 2 percent of all earnings in the state. Over 80 percent of 2008 traveler trips had some form of leisure or recreation as the main purpose of the trip, and over half of those trips focused on something other than visiting relatives or friends. While direct correlation of recreation and tourism spending to the national marine sanctuary cannot be determined, it is known travel and tourism generated over $1 billion in direct spending in the coastal region of the state. In addition, travel and tourism represent a much higher proportion of overall spending and employment in Washington's rural counties, including the coastal counties adjacent to OCNMS, than in urban counties (DOC 2009).

6.4.9. Research and Monitoring

Characteristics identifying the Olympic Coast National Marine Sanctuary as a candidate for sanctuary designation also make it an important resource and site for scientific investigations. These characteristics include relatively undeveloped shoreline, high ecosystem productivity and high biodiversity. Research in the sanctuary is conducted by numerous governments, tribes, agencies and academic institutions for a variety of purposes. Much of this research is "basic" research to gain understanding of marine populations and systems, yet some efforts relate to resource management issues, such as fishery management. Emergent issues, such as hypoxic conditions and ocean acidification, are receiving increased attention, for which the sanctuary may become a focus area for research.

OCNMS' research program focuses on and supports scientific investigations to improve our understanding of the sanctuary's marine ecosystems and historical and cultural resources in order to provide managers with the information necessary to make informed decisions. In 2002, OCNMS staff and members of the Sanctuary Advisory Council drafted a Science Framework document intended to guide the sanctuary in prioritizing and implementing a sound research and monitoring strategy.

OCNMS promotes and helps coordinate research programs in partnership with federal and state agencies, academia and tribal governments across multiple habitat ecosystems and geographic/oceanographic features. This includes accessible areas such as intertidal sites

to more difficult monitoring locations, such as deep-sea environments and pelagic environments.

OCNMS support for research and monitoring ranges from limited financial support to access to research vessels, either OCNMS or NOAA ships. Expertise from sanctuary staff is available, and logistical support is made available on a case-by-case basis.

6.4.10. Education and Outreach

OCNMS is an important regional educational asset. It is used as a living classroom by many regional school groups and a training ground for many local educators. Part of the Sanctuary's mission is to organize and present educational resources reflecting what we know about this place. We strive to improve the understanding of future generations of citizens - students - now in school classrooms. We assist teachers educating tomorrow's scientists and endeavor to help people in local communities and around the globe see their role in enjoying and protecting the Sanctuary.

Education is essential in protecting marine sanctuaries. We teach the science of protecting marine resources. We encourage people who live both near and far from the ocean to take appropriate actions. We introduce young people to the skills required to become ocean citizens, perhaps even to pursue ocean–related careers.

Olympic Coast National Marine Sanctuary regularly conducts unique education events and programs as well as ongoing outreach events in communities throughout the region. Each OCNMS staff has expertise in some aspect of science, education and marine protection that is regularly shared through informative and current presentations on topics of local interest.

Olympic Coast Sanctuary education programs use a wide range of media to present information. We offer our services to teachers and students of all ages; we use the Internet, print media, video and other high-tech ways of presenting our messages. We also assist others, offering training to naturalists and accurate information to print and broadcast media. It has been said the greatest threat is not what we put into the ocean or take out of the ocean. The greatest threat to the seas is our ignorance, and our brightest hopes hinge on expanding our understanding.

6.4.11. Passive Users

Economists have long recognized a special class of non-market economic values for natural resources and the environment referred to generally as nonuse or passive use economic value. These values are widely accepted as legitimate values to include in benefit-cost analyses of environmental regulations and in damage assessment cases. The term passive use, instead of nonuse, has become more popular because it is recognized that for people to have value for something they must have some knowledge about what they are valuing. People learn about natural resources or the environment they are asked to value through books, newspapers, magazines, newsletters, radio, television and other media sources. The people do not actually visit the sites and directly use the resources protected themselves, they consume them passively through the many indirect sources. The values have been

referred to in the literature as option value, bequest value and existence value to clarify people's underlying motives for their willingness to pay. In other words, people have been shown to place a value on the ecological status and "health" of places they only know indirectly through various media and other channels, not through direct visitation or consumptive use.

7. DESCRIPTION OF ALTERNATIVES

OCNMS staff has worked over the past 24 months with its Advisory Council (AC), the Olympic Coast Intergovernmental Policy Council (IPC) and the public to review and consider revisions to the current management plan for OCNMS. During this time, the IPC, AC and OCNMS staff held public meetings, formed working groups and held workshops to consider a variety of topics that needed to be addressed in the revised management plan. The AC, IPC and OCNMS staff reviewed and analyzed all of the recommendations that emerged. This detailed analysis resulted in the development of three alternatives to the proposed action. These alternatives are:

1. A no-action alternative (alternative A)
2. An alternative containing the strategies and activities (the Final Management Plan presented in section 5.0) that OCNMS staff, the AC and the IPC agree are priorities to meet the need for this action (alternative B)
3. An alternative containing several additional or modified activities to those presented in section 5.0 (alternative C).

The preferred alternative (alternative B) is presented in full in section 5 as the final management plan. A summary of each alternative is provided in Table 12.

Regulatory changes ONMS proposed in alternatives B and C were included as activities in relevant action plans, and the environmental consequences of these regulatory changes are analyzed, as required under NEPA, in section 8 of this document. These changes to OCNMS regulations involved a federal rulemaking process separate from the adoption of a revised management plan but these processes ran concurrently. Proposed regulatory changes were published in a *Federal Register* notice with its own public comment period (76 FR 2611 and 76 FR 6368).

Table 12 Summary of three alternatives analyzed

Alternative	*Description*
alternative A (no action)	• No revisions or changes to original OCNMS 1994 management plan • No changes to original OCNMS goals (there were no objectives identified in the 1994 management plan) • No changes to OCNMS regulations • No action plans or performance measures • Continuation of existing OCNMS programs
alternative B (preferred)	• Set of 20 action plans presented in section 5 (Final Management Plan) • Includes the revised goals and objectives presented in section 1.3 • Includes activities describing changes to regulations being proposed concurrent with the management plan review process
alternative C	• Set of 20 action plans presented in section 5 (Final Management Plan) • Includes the revised goals and objectives presented in section 1.3 • Includes the regulatory changes described in alternative B, as well as the following actions: - Evaluate options to make compliance with the ATBA mandatory, - A regulatory ban of all large ship discharges (including cruise ships), excepting 1) vessels lacking sufficient holding capacity for sewage and graywater, and 2) specific routine discharges necessary for vessel operation. - A regulatory ban on the discharge of invasive species in the sanctuary - A regulatory change that would reduce the overflight floor over the sanctuary from 2000 feet to 1000 feet

7.1. ALTERNATIVE A (NO-ACTION ALTERNATIVE)

The no-action alternative (alternative A) would be to adopt the current OCNMS management plan – without revision – as OCNMS' management plan for the next five to ten years. This management plan (OCNMS1993) was published in 1993 and officially adopted in 1994 at the time of sanctuary designation (it is therefore referred to as the 1994 management plan). It was OCNMS' first management plan and dates from the time of sanctuary designation. Under the no action alternative, there would be no changes made to the 1994 management plan: no changes to existing OCNMS regulations, no changes to the existing OCNMS goals (there are no objectives in the 1994 management plan), and no inclusion of any additional information (such as the performance measures, cost estimates, budgets, action plans included in alternatives B and C).

The 1994 management plan broadly outlines the resource protection, research, education, administrative and visitor services necessary at the time of the sanctuary's designation. The focus of this management plan was on the initiation of sanctuary research, education and protection programs. Because this management plan was written at the time of sanctuary designation when OCNMS staff and programs were emerging, the guidance provided in the 1994 management plan is purposefully general in nature. It does not specifically address cultural resources, local and customary knowledge or the socioeconomic values of resources in the sanctuary, but it does not prohibit work on these topics.

Because the 1994 management plan is written so broadly, any of the non-regulatory actions (administrative, resource protection, research, education and outreach, visitor services, maritime heritage) detailed under alternatives B and C (i.e., in the 20 action plans) could conceivably be implemented under alternative A (no action) – even though alternative A does not include these action plans. ONMS does not believe the no-action alternative would adequately address the purpose and need for revising the management plan. Because extensive efforts in collaboration with multiple partners were made through the management plan review process to evaluate OCNMS programs and more clearly define future priorities, it is likely that non-regulatory actions in alternative B would be implemented under the no action alternative. Thus, in the Environmental Consequences discussion (section 8.0), the environmental and human effects of non-regulatory actions in alternative A are addressed through analysis of alternatives B and C.

The environmental and socioeconomic consequences of alternative A are analyzed in section 8.0 of this document.

7.2. ALTERNATIVE B (PREFERRED ALTERNATIVE)

The preferred alternative (alternative B) is adopted as the Final Management Plan (FMP) presented in section 5.0 of this document in place of the 1994 OCNMS management plan. The FMP is comprised of 20 action plans organized under five of the six priority issues

described in section 4.0 (priority management need one – treaty trust responsibility – does not encompass action plans per se, but is discussed in detail in section 2.0):

1. Treaty Trust Responsibility
2. Achieve Effective Collaborative and Coordinated Management
3. Conduct Collaborative Research, Assessments and Monitoring to Inform Ecosystem-Based Management
4. Improve Ocean Literacy
5. Conserve Natural Resources in the Sanctuary
6. Understand the Sanctuary's Cultural, Historical and Socioeconomic Significance

The action plans describe the work OCNMS staff would undertake over the next five to ten years, which includes both regulatory and non-regulatory activities. There are several regulatory changes associated with alternative B, and they will be issued in the same time frame as the FMP. These regulatory changes, which include technical clarifications to the OCNMS regulations and a ban on cruise ship discharges, are noted in the relevant action plans and their impacts are analyzed in section 8.0 (Environmental Consequences). All regulatory changes are proposed as a separate rulemaking process and will be announced in the *Federal Register*. OCNMS is synchronizing the rulemaking and management plan review processes to streamline these efforts; and this EA will be used to support both processes.

Each action plan is comprised of a series of strategies and activities both regulatory and non-regulatory in nature. In addition to the 20 actions plans, the FMP contains cost estimates for each strategy, a suite of performance measures by which OCNMS would evaluate its effectiveness in implementing the management plan, and an implementation table showing the level of priority (high, medium, low) for each strategy under three budget scenarios: a level-funded budget, a moderately-increased budget and a substantially-increased budget. Alternative B provides substantially more detail about the work OCNMS will undertake than does the no action alternative A, which provides only broad descriptions of OCNMS program areas. Moreover, by including performance measures, cost estimates and an implementation plan, alternative B will create a high level of accountability not provided under alternative A.

Alternative B, in addition to encompassing all the actions proposed in section 5.0 (Final Management Plan), also includes the revised OCNMS goals and objectives presented in section 1.3. These goals and objectives replace the goals in the original 1994 management plan.

Alternative B (preferred) is the alternative that best meets the purpose and need for revising the OCNMS management plan. Alternative B and the 20 action plans it encompasses address all of the primary needs identified, including:

- Updating an out-of-date management plan
- Addressing recent changes in regional ocean governance
- Filling data gaps

- Incorporating new technologies
- Addressing issues that have emerged over the past 16 years

Moreover, the suite of regulatory and non-regulatory activities in alternative B address these needs in a manner best complementing the existing programs, policies and regulations of OCNMS' key ocean management and conservation partners in the region. Over 100 regional experts were involved in developing and refining the action plans presented in alternative B. These action plans identify a clear and precise role for OCNMS in each of the 20 topic areas they cover – a role that would not duplicate the efforts of others and would provide for the most effective use of OCNMS' limited resources.

The environmental and socioeconomic consequences of alternative B are analyzed in section 8.0 of this document.

7.3. ALTERNATIVE C (NOT PREFERRED)

Alternative C is based on alternative B (preferred) by adopting the FMP (and 20 its action plans) presented in section 5.0, but with modifications to specific action plans and strategies. The modifications included in alternative C follow:

1. In the Spills Prevention, Preparedness, Response and Restoration Action Plan, **Strategy SPILL1: ATBA Management, Compliance and Monitoring would be modified to include the following new *non-regulatory* activity**:

   "Work collaboratively with other Federal agencies and the International Maritime Organization (IMO) to evaluate options to make compliance with the ATBA mandatory."

   Currently, the Olympic Coast ATBA is an International Maritime Organization (IMO) voluntary vessel routing measure. Under alternative B (preferred), it would remain voluntary and ONMS would work with the USCG to prepare a proposal to the International Maritime Organization Subcommittee on Safety of Navigation to pass implementing legislation requiring that "restrictions apply to all vessels required to prepare a response plan pursuant to Section 311(j) of the Federal Water Pollution Control Act (33 U.S.C. 1321(j)) (other than fishing or research vessels while engaged in fishing or research within the area to be avoided)" (Section 704, Coast Guard Authorization Act for Fiscal Years 2010 and 2011). The ATBA does not apply to public vessels, or vessels owned or chartered and operated by the United States, or by a State or political subdivision thereof, or by a foreign nation, except when the vessel is engaged in commerce.

   Currently, compliance with the ATBA is voluntary and, under Alternative B (preferred), it would remain voluntary. Under alternative C, ONMS would work with its partners over the next five to ten years to evaluate options to make the ATBA mandatory. Options considered included both domestic federal regulations under the authority of the USCG (i.e., Port and Waterways Safety Act) and the

ONMS (i.e., National Marine Sanctuaries Act), and IMO vessel routing measures under the authority of the United Nations Convention on the Law of the Sea.

Under Alternative C, ONMS would not immediately pursue domestic or international regulatory changes, but would work during the management plan implementation process (i.e., over the next five to ten years) to develop a new regulation(s) that mandates compliance with the ATBA. Once a proposed regulatory change is agreed upon, it would go through its own separate process.

Interest in strengthening the ATBA has come up repeatedly since its original adoption in 1994. In 2002 ONMS, working with the USCG and the IMO, modified the original provisions based on the results of a USCG Port Access Routes Study completed in 2000 (USCG 2000). This study evaluated the need for modifications to vessel routing and traffic management measures in the Strait of Juan de Fuca and adjacent waters, including the sanctuary. Recommendations included three that applied to sanctuary waters: (1) a proposal to amend the IMO-adopted ATBA off the Washington Coast to increase its size and extend its applicability to commercial ships of 1,600 gross tons and above; (2) a proposal for recommended routes in the United States waters of the Strait of Juan de Fuca for smaller, slower moving vessels that normally do not use the traffic separation scheme; and (3) a proposal amending the existing traffic separation schemes (TSSs) in the Strait of Juan de Fuca and its approaches (66 F.R. 6514). All 3 proposals were approved by the International Maritime Organization in May 2002 (67 F.R. 70933).

Interest in strengthening the ATBA was also expressed during the public scoping comment period for MPR and by a member of the public during a public comment period at an AC meeting. In 2007 the Washington State Oil Spill Advisory Council requested that OCNMS consider extending ATBA applicability to cover unladen oil barges (which carry some residual oil). Similar concerns recently led Senator Maria Cantwell (WA-D) to include provisions in legislation to strengthen the ATBA through expansion of the vessels covered by this voluntary measure (Section 704, Coast Guard Authorization Act for Fiscal Years 2010 and 2011). Given a hazardous spill is perhaps the most significant threat to resources in the sanctuary, it is reasonable to consider an alternative that strengthens the ATBA.

The Advisory Council working group focused on Spills Prevention, Preparedness, Response and Restoration did not consider a recommendation to strengthen the ATBA because the current voluntary ATBA has such a high compliance rate (98.9% compliance in 2009, WDE 2010). For this reason the alternative to consider mandatory compliance to the ATBA was not included in OCNMS' preferred alternative.

2. In the Wildlife Disturbance Action Plan, **Strategy WD2: Overflight Restriction Zone would be modified to include the following *regulatory* activity**:

"During the management plan review process, modify OCNMS regulations to reduce the overflight floor over the sanctuary from 2,000 feet to 1,000 feet."

This new activity would represent a change to OCNMS regulations not proposed under alternative B (preferred). Under alternative B (preferred) the overflight floor (minimum altitude) would remain at 2,000 feet.

Of the four West Coast sanctuaries with overflight regulations, OCNMS is the only one with a 2,000 foot overflight regulation; the other three sanctuaries have a 1,000 foot overflight regulation. Existing literature suggests a 1,000 foot restriction is generally adequate to protect wildlife. However, the Federal Aviation Administration (FAA) has a policy for noise-sensitive areas recommending a 2,000 foot minimum altitude over national parks and wildlife refuges (FAA AC 91-36d), such as Olympic National Park (ONP) and the Washington Maritime National Wildlife Refuge Complex (WMNWRC), the jurisdictions of which overlap with the sanctuary. This FAA policy is advisory in nature and is not enforceable. The current OCNMS regulation was established for consistency with this advisory. In recent years, OCNMS staff has been considering the possibility of reducing the overflight regulation from 2,000 to 1,000 feet because it is less restrictive to the public and could still meet the objective of protecting wildlife in the sanctuary.

This alternative is not preferred because, while lowering the elevation is not expected to have significant adverse impacts on wildlife in the sanctuary, it is not expected to improve resource protection for wildlife. In addition, the aesthetic climate of the wilderness coastline of ONP could be degraded by lowering the enforceable minimum altitude for overflights. Moreover, changing OCNMS' overflight regulation in this way would make it inconsistent with overflight advisories over adjacent National Park Service and U.S. Fish and Wildlife lands, which might lead to confusion for pilots.

3. In the Water Quality Protection Action Plan, **Strategy WQP1: Vessel Discharges, Activity B** (cruise ship discharge regulatory ban) **would be *revised* to state:**

   Activity B: During the management plan review process, modify OCNMS regulations to prohibit:
   - all discharges from cruise ships into waters of the sanctuary except clean vessel engine cooling water, clean vessel generator cooling water, clean bilge water, anchor wash. (existing language for alternative B)
   - all discharges (except when limited by sewage or graywater holding capacity) from vessels 300 gross tons and above into waters of the sanctuary, except clean vessel engine cooling water, clean vessel generator cooling water, clean bilge water, anchor wash.

   Under alternative B (preferred), this activity would be directed solely toward prohibiting cruise ship discharges. Under alternative C, this regulatory action

would be expanded to address all vessels 300 gross tons and above for all discharges, with noted exceptions required for operations and vessels lacking sufficient holding tank capacity for sewage or graywater to hold effluent while within the sanctuary.

Interest in water quality and the effects of vessel discharges (including cruise ship discharges) in the sanctuary were expressed during the MPR public scoping period and during subsequent public comment periods at AC meetings. The Living Resource Conservation Working Group's findings to the Advisory Council recommended a regulatory prohibition on cruise ship discharges in OCNMS and several non-regulatory activities to address other discharge concerns. OCNMS staff considered a broader prohibition of discharges from additional vessel classes. Prohibiting all discharges from large vessels in the sanctuary would be consistent with the NMSA's primary objective of resource protection and could meet the need to update the 1994 management plan to reflect the development of issues since the publication of the 1994 management plan. A discharge ban on all large vessels would reduce the volume of wastewater discharged to the sanctuary and would avoid singling out one industry (i.e., cruise ship) in the analysis.

This is not the preferred alternative for addressing vessel discharges because vessels other than cruise ships generate a proportionally smaller discharge volume relative to that generated by cruise ships. Cruise ships carry many passengers, whereas most other large vessels traversing or working in the sanctuary have relatively small crews and thus do not generate nearly the volume of discharges that cruise ships do.

Given the current knowledge on vessel discharge impacts to the marine environment and the existing state of Washington regulation prohibiting all vessel discharges within three miles of the shoreline, NOAA believes eliminating discharges from cruise ships in the sanctuary would provide ample protection of sanctuary resources at this time. Additionally, there are specific, non-regulatory actions proposed in the actions plans under alternative B addressing additional discharges.

4. In the Habitat Protection Action Plan, **Strategy HP3: Invasive Species would be modified to include the following new activity**:

   "During the management plan review process, modify OCNMS regulations to ban the discharge of invasive species in the sanctuary."

   ONMS defines the term "invasive species" according to the state of Washington Invasive Species Council definition, "*invasive species include non-native organisms that cause economic or environmental harm and are capable of spreading to new areas of the state. Invasive species does not include domestic livestock, intentionally planted agronomic crops, or non-harmful exotic organisms*." The Washington Invasive Species Council maintains an updated list of invasive species

(aquatic and terrestrial) for the state of Washington. OCNMS would implement this regulation according to the most current version of this list.

It should be noted several of the national marine sanctuaries in California implemented similar regulatory bans, but these sanctuaries banned introduction of introduced (not invasive) species and defined introduced species as, "any species (including but not limited to any of its biological matter capable of propagation) that is non-native to ecosystems of the sanctuary; or any organism into which altered genetic matter, or genetic matter from another species, has been transferred in order that the host organism acquires the genetic traits of the transferred genes." ONMS has chosen to use the Washington Invasive Species Council definition of invasive species so an OCNMS discharge ban on invasive species would complement and be consistent with state of Washington efforts toward invasive species. Additionally, the Washington Invasive Species Council has formal, established and scientifically supported procedures for identifying which species meet their definition. This Council regularly updates and refines this list as necessary. Thus, OCNMS, in using the council's definition, would also be able to use and refer sanctuary users to the State's list of invasive species. Using the state's list of invasive species would reduce confusion for sanctuary users trying to adhere to both state and OCNMS invasive species regulations.

This new management plan activity would represent an additional change to OCNMS regulations that is not proposed under alternative B (preferred). Under alternative B there would be no regulatory changes related to the discharge of invasive species.

Concern about preventing the introduction of invasive species was expressed during the MPR public scoping period. In particular, there was concern about the potential culture of invasive species in the sanctuary, such as Atlantic salmon, which is defined as a regulated invasive species by the Washington Invasive Species Council. While cultured species are regulated and have been managed in Washington waters for many decades, some cultured species, such as Atlantic salmon, are known to have escaped culture pens and caused impacts to native species (Naylor et al. 2005).

The Living Resources Conservation Working Group and the Collaborative Research, Assessments and Monitoring Working Group of the Advisory Council both considered recommending actions to address the issue of invasive, non-native species. However, the Living Resources Conservation Working Group, after reviewing existing state and regional regulations and policies related to invasive species, concluded an OCNMS regulation related to invasive, non-native species was unnecessary. However, a regulation to prevent the introduction of invasive, non-native species would be consistent with the NMSA's primary objective of resource protection, and it could meet the need to update the 1994 management plan to reflect issues arising since the publication of the 1994 management plan.

This alternative is not preferred, however, for several reasons:

- One of the primary vectors for invasive species introductions in the sanctuary is ballast water. The state of Washington has extensive ballast water regulations, the aim of which is to prevent the introduction of invasive species (http://wdfw.wa.gov/fish/ballast/ballast.htm). These regulations are some of the strongest in the nation. These state regulations prevent the exchange of ballast water in or near sanctuary waters because vessels traveling into the U.S. from another country are required to exchange ballast water more than 200 nmi from shore, and vessels traveling along the U.S. coast must exchange ballast water further than 50 nmi from shore. OCNMS believes existing state regulations are an effective way to address this issue and banning the discharge of non-native species would not strengthen protections already provided by WA state ballast water regulations.

- The other primary vector for non-native species invasions into the sanctuary is the potential spread of invasive species from populations adjacent to the sanctuary (i.e., European green crab). A regulation would not address the potential movement or range expansion of existing invasive species into the sanctuary (unless a person was caught carrying a European green crab into the sanctuary, which is highly unlikely). The most effective strategy to address a range expansion of an invasive species is monitoring for their presence and working with partners to establish eradication plans.

- Another potential vector for introduction of invasive species would be an aquaculture facility within the sanctuary. However, there are currently no aquaculture facilities in the sanctuary, nor are any foreseen at this time. Any development of aquaculture within the sanctuary is unlikely due to dynamic ocean conditions of the outer Washington coast. Further, an aquaculture operation, which required a sanctuary permit due to seabed disturbance, discharge, or otherwise, would allow OCNMS to consider all the potential impacts of the operation, including potential impacts from the culture of invasive species. Thus, it is not necessary for OCNMS to enact a specific invasive species regulation of this nature. That being said, OCNMS should continue to stay abreast of aquaculture technology developments and, if necessary, revisit this issue during the next management plan review process.

In addition to these four modifications, alternative C also encompasses the revised OCNMS goals and objectives presented in section 1. Should alternative C be selected, these goals and objectives would replace the goals in the original 1994 management plan.

The environmental and socioeconomic consequences of these modifications are analyzed in section 8 of this document.

8. ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

This section evaluates the environmental consequences of the proposed action of revising the Olympic Coast National Marine Sanctuary (OCNMS) management plan. Because each management plan alternative (described in section 7) is comprised of numerous smaller actions, the term "action(s)" is used in this section not only to reference the overall proposed action of revising the management plan but also to reference the smaller individual actions comprising each alternative.

The environmental effects of the no-action alternative (alternative A), the proposed management plan revision (alternative B-preferred), and alternative C are summarized (Table 13) and then evaluated within the context of the physical, biological, historic and cultural, and human and socioeconomic sanctuary setting. Information about the biological, physical, historic, cultural and socioeconomic sanctuary setting can be found in the Affected Environment discussion (section 6).

Alternative A (no action) includes only non-regulatory actions (i.e., no changes to OCNMS regulations are proposed). Alternatives B and C are comprised of both non-regulatory and regulatory actions (i.e., they include proposed changes to existing OCNMS regulations). Both the regulatory and non-regulatory actions associated with alternatives B and C are analyzed in sections 8.1 through 8.4. Section 8.4 (effects to the historic and cultural setting) serves a dual purpose, fulfilling OCNMS' compliance requirements both under the National Environmental Policy Act (NEPA) and the National Historic Preservation Act (NHPA). Section 8.5 discusses the cumulative effects of the three alternatives within the context of other known activities occurring within the sanctuary region.

Characterizing Effects

NEPA requires consideration of the effects of major federal actions on the quality of the human environment (42 U.S.C. 4332 (c)). Effects are characterized as negligible, less than significant or significant, and are also characterized by type (adverse or beneficial), context, intensity, duration (short- or long-term). Effects can be further characterized by whether they affect resources directly or indirectly. The following definitions and characterizations were used for this analysis:

- **Negligible effects** –effects for which virtually no effect to a resource can be detected (whether beneficial or adverse).
- **Less than significant effects** – effects that do not rise to the level of "significant" as defined below.
- **Significant effects** – effects resulting in an alteration in the health of a physical, biological, historic/cultural or socioeconomic resource. Long-term (see below) or permanent effects with a high intensity of alteration to a resource, whether beneficial or adverse, would be considered significant. The significance threshold is evaluated on a case-by-case basis, taking into consideration the context and intensity of each action. Context normally refers to the setting (e.g., the local and

regional status of the resource being affected), and intensity refers to the severity of the effect. Significant effects can be adverse or beneficial, and direct or indirect. Consideration of the accumulation of several individually less than significant effects could result in a determination of significance for cumulative effects.

- **Adverse effects** – effects negatively affecting the health of a resource.
- **Beneficial effects** –effects positively affecting the health of a resource.
- **Short-term effects** – effects lasting one year or less.
- **Long-term effects** – effects lasting longer than one year and/or potentially permanent.
- **Direct effects** – effects occurring at the same time and place as the action.
- **Indirect effects** – effects occurring later in time or farther removed from the place where the action occurs, but reasonably foreseeable.
- **Cumulative effects** – effects resulting from the incremental impact of an action when added to other actions in the past, present, or foreseeable future, regardless of who undertakes such action.

Analysis of the environmental consequences of the three alternatives is based largely on review of existing literature and studies, information provided by experts, and best professional judgment. Environmental consequences of the proposed actions are considered within the context of the revised management plan's five- to ten-year planning horizon. Thus, when assessing the effects of an action, the action is presumed to occur for, at most, ten years. In instances where the duration of effects for a specific action potentially repeated within the five- to ten-year planning horizon may be longer than one year, the effects of the action(s) are analyzed as long-term effects.

Action Plan (AP) Abbreviations:

CCM – Collaborative and Coordinated Management AP
COM – Community Involvement in Sanctuary Management AP
OPS – Sanctuary Operations AP
MAP – Habitat Mapping and Classification AP
OCEO – Physical and Chemical Oceanography AP
ECO – Populations, Communities and Ecosystems AP
DAT – Data Management, Sharing and Reporting AP
ED – K-12 Education AP
HED – Higher Education AP
VISIT – Visitor Services AP
OUT – Community Outreach AP
SPILL – Spills Prevention, Preparedness, Response and Restoration AP
CLIM – Climate Change AP
MD – Marine Debris AP
WD – Wildlife Disturbance AP
WQP – Water Quality Protection AP
HP – Habitat Protection AP
ROP – Marine Spatial Planning AP
MH – Maritime Heritage AP
SOCIO – Socioeconomic Values of Resources in the Sanctuary

Table 13 Summary of Analyzed Actions

Action	*Alternative(s) That Contain This Action*	*Relevant Action Plans*	*Effect of Action*	*Resources Affected*
Structural changes to the format of the OCNMS management plan, and revisions to OCNMS goals and objectives	B, C	All 20 Action Plans	Negligible	None
Routine office activities, including meetings, education, visitor and training programs that take place in existing OCNMS or other facilities	A, B, C	All 20 Action Plans	Negligible	None
Use of Information Technology (includes internet technology, data management technology)	A, B, C	All 20 Action Plans	Negligible	None
Routine outreach activities that do not occur in the sanctuary (fair booths, community events)	A, B, C	All 20 Action Plans	Negligible	None
Routine education, outreach and visitor activities	A, B, C	ED, OUT, VISIT, HED, CLIM, MD, WD	Less than Significant, Beneficial, Indirect, Short-term	Biological, Physical, Historic and Cultural, Socioeconomic
Routine research activities	A, B, C	MAP, OCEO, ECO, DATA, SOCIO	Less than Significant, Beneficial, Indirect, Short-term	Biological, Physical, Socioeconomic
Routine maritime heritage activities	A, B, C	MH	Less than Significant, Beneficial, Indirect, Short-term	Historic and Cultural, Socioeconomic
Routine resource protection and stewardship activities	A, B, C	SPILL, MD, CLIM, HP, WQP, ROP, WD	Less than Significant, Beneficial, Indirect, Short-term	Biological, Physical, Historic and Cultural, Socioeconomic
Routine administrative activities (enforcement of regulations and permitting)	A, B, C	CCM, OPS, WD, WQP, HP, MH	Less than Significant, Beneficial, Indirect, Short-term	Biological, Physical, Historic and Cultural, Socioeconomic

Action	*Alternative(s) That Contain This Action*	*Relevant Action Plans*	*Effect of Action*	*Resources Affected*
Sediment sampling (for habitat mapping and community characterization)	A, B, C	MAP, ECO	Less than Significant, Adverse, Direct, Short-term	Biological, Physical, Historic and Cultural
Operating sonar (for hydrographic surveying)	A, B, C	MAP	Less than Significant, Adverse, Direct, Short-term	Biological, Physical
			Less than Significant, Beneficial, Indirect, Long-term	Historic and Cultural
Anchoring research buoys	A, B, C	OCEO	Less than Significant, Adverse, Direct, Short-term	Biological, Physical, Historic and Cultural
Operating vessels in sanctuary	A, B, C	OPS, MAP, OCEO, ECO,	Less than Significant, Adverse, Direct and Indirect, Short-term	Biological, Physical
			Less than Significant, Beneficial, Indirect, Short-term	Socioeconomic
Conducting wildlife research, monitoring and assessments	A, B, C	ECO	Less than Significant, Adverse, Direct, Short-term	Biological
Beach and intertidal activities (student field trips, beach debris removal)	A, B, C	ED, OUT, MD	Less than Significant, Adverse, Direct, Short-term	Biological, Physical
			Less than Significant, Beneficial, Indirect, Short-term	Socioeconomic
Encouraging visitor use of beaches and intertidal areas	A, B, C	VISIT	Less than Significant, Adverse, Direct, Short-term	Biological, Physical
			Less than Significant, Beneficial, Indirect, Short-term	Socioeconomic

Action	*Alternative(s) That Contain This Action*	*Relevant Action Plans*	*Effect of Action*	*Resources Affected*
Evaluate options to make compliance with the ATBA mandatory	C	SPILL	Less than Significant, Beneficial, Indirect, Long-term	Biological, Physical,
			Less than Significant, Adverse, Direct, Long-term	Socioeconomic
Replace the term “traditional fishing” with “lawful fishing”	B, C	OPS	Negligible	None
Technical clarifications to OCNMS regulations	B, C	OPS	Negligible	None
Modification of the tribal welfare permit provision	B, C	OPS	Negligible	None
Alteration of overflight regulation (reducing overflight floor from 2,000 feet to 1,000 feet	C	WD	Less than Significant, Adverse, Direct, Long-term	Physical, Socioeconomic
Including a new regulation to ban discharge of invasive species	C	HP	Less than Significant, Beneficial, Indirect, Long-term	Biological, Physical
			Less than Significant, Adverse, Direct, Short-term	Socioeconomic
Expanding discharge regulation to include ban on cruise ship discharge	B, C	WQP	Less than Significant, Beneficial, Indirect, Long-term	Biological, Physical
			Less than Significant, Beneficial, Direct, Long-term	Socioeconomic
Expanding discharge regulation to include ban on large vessel discharges	C	WQP	Less than Significant, Beneficial, Indirect, Long-term	Biological, Physical,
			Less than Significant, Adverse, Direct, Short-term	Socioeconomic

8.1. PHYSICAL SETTING

The purpose of this section is to discuss the effects of all three alternatives on physical resources in the sanctuary. An overview of the sanctuary's physical setting and the resources encompassed within it is provided in the Affected Environment discussion (section 6.1).

8.1.1. Actions with Negligible Effects to the Physical Setting

There are several actions that would occur under all three alternatives expected to have a negligible effect on the physical setting. These actions include:

- Structural changes to the format of the OCNMS management plan, and revisions to OCNMS goals and objectives
- Routine office and classroom activities, including meetings, visitor, education and training programs taking place in existing OCNMS or other facilities
- Use of Information Technology resources, including internet technology, data management programs, phone and e-mail technology
- Routine outreach activities not occurring in the sanctuary, including staffing fair booths and attending community events
- Routine maritime heritage activities
- Conducting wildlife research, monitoring and assessments

These actions are expected to have a negligible effect on physical resources because these actions all occur within existing facilities, or no construction or physical development is anticipated to be required to conduct these actions. Additionally, these actions would not involve any direct or indirect interaction between the people and physical resources within the sanctuary.

Another action proposed under alternatives B and C involves modifications to OCNMS regulations and also would have negligible effects on physical resources:

- Replace the term "traditional fishing" with "lawful fishing"
- Modifications to the tribal welfare permit provision in the OCNMS regulations
- Technical clarifications to OCNMS regulations as outlined in the Sanctuary Operations Action Plan (strategy OPS 9, activity H)

The current OCNMS regulations define the term "traditional fishing" as "using a fishing method that has been used in the sanctuary before the effective date of sanctuary designation (July 22, 1994), including the retrieval of fishing gear" and provide an exception for traditional fishing operations to three of the regulatory prohibitions – prohibitions on discharge of certain fishing-related materials, disturbance to historical resources and disturbance to the seabed. OCNMS regulations could be interpreted to mean fishing methods or operations not falling within the definition of "traditional fishing" are not allowed to discharge materials mentioned above, or disturb historical resources or the seabed. The precise language of these three exceptions is as follows:

- "Discharging or depositing, from within the boundary of the Sanctuary, any material or other matter except… fish, fish parts, chumming materials or bait used in or resulting from *traditional fishing* operations in the Sanctuary." (15 CFR 922.152(2)(i))
- "Moving, removing or injuring, or attempting to move, remove or injure, a Sanctuary historical resource. This prohibition does not apply to moving, removing or injury resulting incidentally from *traditional fishing* operations." (15 CFR 922.152(3))
- "Drilling into, dredging or otherwise altering the seabed of the Sanctuary; or constructing, placing or abandoning any structure, material or other matter on the seabed of the Sanctuary, except as an incidental result of… *Traditional fishing* operations." (15 CFR 922.152(4)(ii))

As part of this action, NOAA is replacing the term "traditional fishing" with the term "lawful fishing" in these three places to: 1) use a term that is more clearly understood; and 2) eliminate the distinction between fishing methods used before OCNMS designation from those that have since been authorized. Despite the definition provided in the current OCNMS regulations, and because of its varied connotation, the term "traditional" in OCNMS regulations may be incorrectly interpreted (e.g., equating traditional fishing with Native American fishing techniques). Additionally, there is ambiguity associated with the extent of gear modification or uniqueness of design or practice constituting a new or non-traditional fishing method. By replacing the word "traditional" with "lawful" NOAA would unambiguously recognize fishing activities authorized by governmental fisheries management authorities. This change would also be consistent with terms used in the regulations for other national marine sanctuaries on the West Coast.

In recent decades, findings of overfishing and habitat damage from fisheries in U.S. waters have led to gear modifications, mandated stock rebuilding plans, and emergence of an ecosystem approach to fishery management. Before they are authorized, new fishing techniques, gear modifications, or targeted species proposed to federal, tribal and state authorities are evaluated for habitat and ecosystem impacts. This work occurs on a regular basis. While many of the new fishery practices (e.g. gear modifications, rebuilding measures, etc.) are anticipated to have fewer impacts to sanctuary resources, it is possible that a new, lawful fishery or fishery practice may have a negative impact on sanctuary resources (e.g., a test fishery that has unanticipated impacts). In such cases, the proper way to address any concerns related to potential new fisheries or fishing methods within the sanctuary would be through the interagency consultation process pursuant to Section 304(d) of the NMSA (16 U.S.C. 1434(d)).

This change is expected to have a negligible effect because Federal, state, tribal and regional fishery management authorities currently analyze and attempt to mitigate impacts associated with lawful fishing, including fisheries that have occurred traditionally in the sanctuary, and those authorities are expected to do the same in the future. Since the scope and impacts of any such future management actions are speculative at this point, it is not possible, and would be inappropriate, to speculate on any additional impact analysis of this change in this document.

Additional changes to OCNMS regulations identified in strategy OPS 9, activity H would not affect the physical resources within the sanctuary because the changes are language clarifications that do not alter the meaning or intent of the regulations.

Under the current regulations, ONMS can issue a permit to conduct an activity that would otherwise be prohibited if it finds that the activity will meet criteria identified in the regulations. The first criterion is the requirement that NOAA finds that the activity will not substantially injure Sanctuary resources and qualities. The second criterion is related to the purpose of the proposed activity. One of these purposes is the promotion of the welfare of any Indian tribe adjacent to the sanctuary. This provision is ambiguous and could be interpreted as allowing an entity not affiliated with a tribe to apply for a permit that it alleges could promote the welfare of an Indian tribe adjacent to the sanctuary. The concept of "promote the welfare of any Indian tribe" is not defined or explained further in the regulations, the terms of sanctuary designation, or the 1993 Final EIS. In the proposed rule (76 FR 2611), NOAA had further clarified the regulation by replacing the phrase "to promote the welfare of any Indian tribe adjacent to the Sanctuary" with "to promote or enhance tribal self-determination, tribal government functions, the exercise of treaty rights or tribal economic development."

Based on government-to-government consultations with the Makah Tribe, NOAA has made further changes to the rule modification. NOAA clarified the ambiguity created by the proposed rule (76 FR 2611), making clear that either a Coastal Treaty Tribe (i.e. Hoh, Makah, and Quileute Indian Tribes and the Quinault Indian Nation) or its designee may apply for or be a co-applicant for a permit to promote or enhance tribal self-determination. The final rule language further clarifies that the governing body of the tribe must certify the tribal designee as applicant or co-applicant for a permit, but the tribe need not itself be the applicant or co-applicant. It is not the intent of this language to limit the persons or entities who may apply for a permit under this provision or to require an agency relationship between a tribe and its designee. Rather, it is the intent of this language to create a procedure for the OCNMS Superintendent to be assured that at least one person or entity among the co-applicants, or the applicant itself, has been formally designated by the tribe to apply for the permit as a means to advance the interests of the tribe. Certification from the governing body of the tribe that the person or entity, whether an applicant or co-applicant, has been formally designated by the tribe to apply for the permit could be provided in various forms, the most obvious of which is a resolution adopted by the governing body of the tribe. There may be other forms of providing the official position of the tribal government depending upon the procedures and processes of each tribe.

Modifications to the tribal welfare permit are expected to have a negligible effect on OCNMS's physical setting. The modifications being made were developed through consultation with the Olympic Coast Intergovernmental Policy Council and the Coastal Treaty Tribes. The goal of the modifications is to clarify the role of the tribal welfare permit, more properly referred to as the "tribal self-determination permit", and the circumstances under which it can be issued. These clarifications ensure that these permits will only be issued under appropriate circumstances and also ensure that inappropriate uses of the permit are avoided (e.g., cases wherein an organization not affiliated or working with a tribe attempts to obtain a tribal welfare permit by claiming some benefit to a tribe). By modifying the tribal welfare permit language, ONMS is clarifying the

intent of its regulations to ensure it is used to promote or enhance tribal self-determination and not to be used by outside parties. Because this regulatory change does not alter the availability of this permit category to American Indian tribes adjacent to the sanctuary, nor change the requirement that the permitted activity will not substantially injure Sanctuary resources and qualities, this modification to the permitting regulations is expected to have a negligible effect on the physical setting.

Alternatives B and C also contain some structural changes to the management plan not included in alternative A. Under alternatives B and C, the management plan would contain performance measures, cost estimates and an implementation table. Alternatives B and C would also include a revised suite of goals and objectives for OCNMS. While these structural modifications do provide additional clarity and detail to the alternatives, they would have a negligible effect on physical resources in the sanctuary.

8.1.2. Actions with Beneficial Effects to the Physical Setting

There are several actions occurring under one or more of the alternatives expected to have a beneficial effect on physical resources within the sanctuary. These actions include:

- Routine activities conducted as part of OCNMS' resource protection, research, visitor services, outreach, education and administrative program areas (alternatives A, B and C)
- A regulatory ban on discharges from cruise ships (alternatives B and C)
- A regulatory ban on discharges from large vessels (alternative C)
- Evaluate (and possibly implement) options to make compliance with the Area-to-be-Avoided mandatory (alternative C)
- A regulatory ban on the discharge of invasive species (alternative C)

8.1.2.1. Routine Activities - Effects to the Physical Setting

Many of the routine and general education, outreach, research, resource protection, administrative, and visitor services actions taking place under all three alternatives would have an indirect, short-term, and less than significant, beneficial effect on physical resources within the sanctuary. These routine actions involve the continuation of OCNMS' primary program areas, including:

- Routine resource protection activities (e.g., marine debris removal)
- Routine research activities (e.g., water quality monitoring)
- Operating sonar (for hydrographic surveying)
- Routine outreach activities (e.g., citizen science programs)
- Routine education activities (e.g., phytoplankton identification classes)
- Routine visitor services activities (e.g., operating Olympic Coast Discovery Center)
- Routine administrative activities (e.g., enforcement of regulations and permitting)

These routine activities are described in greater detail in the 20 action plans presented in section 5. All of these program areas have less than significant, indirect, and beneficial effects on physical resources because they promote ocean literacy, improved understanding and protection of resources, and improved ocean stewardship. By expanding our knowledge base and

promoting ocean stewardship principles with partners, local communities and the general public, ONMS has the opportunity to influence the behavior and decision-making of individuals, communities, organizations and agencies in ways that could indirectly benefit physical resources. For example, if a citizen visits an OCNMS fair booth and learns about the importance of marine debris removal, s/he may be more likely to participate in a beach clean-up activity. In turn, increased participation in beach clean-ups could result in less trash on the beach.

While all of these routine actions are beneficial, it is not expected their effects would be significant because the anticipated intensity of effects associated with these actions is low. Thus, it is not likely a significant improvement in physical resources could be achieved as a result of these types of indirect beneficial actions over the five to ten year implementation period for the management plan.

8.1.2.2. Cruise Ship Wastewater Discharges - Effects to the Physical Setting

Under alternative A, no regulatory modifications are proposed and no additional beneficial effect to the physical setting would be expected. Alternative B proposes a regulatory ban on all discharges within OCNMS from cruise ships (except clean vessel deck wash down, clean vessel engine cooling water, clean vessel generator cooling water, clean bilge water or anchor wash) that would have a direct, long-term, beneficial, less-than-significant impact on physical resources (i.e., water quality) because it would prohibit potentially harmful discharges by introduction of pollutants, such as bacteria, viruses, solids, pharmaceuticals, organics, nutrients, and metals. This regulatory change is discussed in the Water Quality Action Plan in section 5.2. For the purpose of this regulation and consistency with regulations for other West Coast national marine sanctuaries, cruise ships are considered to be vessels with 250 or more passenger berths for hire.

Cruise ships generate a variety of wastewater discharges on the scale of a small municipality with potential , particularly if discharged without treatment, to harm the marine environment. The discharges of highest concern in OCNMS based on volume and potential contaminant loading are sewage, graywater, and bilge water. Sewage discharges from ships, particularly those not using Advanced Water Treatment Systems (AWTS), contain nutrients that create biological and chemical oxygen demand and could contribute to algae blooms that, in turn, could intensify low dissolved oxygen levels known to occur in the sanctuary. Pathogens from sewage have the potential to contaminate commercial or recreational shellfish beds (a human health risk) and to harm wildlife and humans directly.

Properly functioning marine sanitation devices (MSDs; described in section 6.1.3 and Appendix K) decrease nutrient concentrations in sewage through chemical or biological or other treatment technologies. Current federal regulations require all cruise ships treat sewage wastes using a Type II MSD. An initial study conducted in 2000 in Alaska of cruise ship waste water discharges showed high rates of failure in the ability of conventional MSDs to meet legal discharge standards (EPA 2008a). Most cruise ships that transit through OCNMS operate in Alaskan waters. Since this study, significant improvements in treatment and monitoring have been implemented in some vessels supporting Alaska-Washington routes. AWTS have been installed on about 60% of cruise ships transiting through OCNMS. Routine monitoring of these systems has been implemented on vessels discharging to Alaska waters, and these systems have

generally performed well at treating effluent monitored by Alaska Department of Environmental Conservation and the US Coast Guard since 2001 (ADEC 2010a). Monitored parameters include fecal coliform bacteria (an indicator of potential pathogens), pH, chlorine, biological oxygen demand, total suspended solids and other chemical constituents. In 2009, exceedance of discharge standards applied to cruise ships occurred most commonly with ammonia, less frequently for nickel, copper and zinc, and rarely or never for other tested contaminants (ADEC 2010a). However, some of the installed AWTS have experienced equipment and operating challenges, and are not being used; traditional (Type II) MSDs are used instead. For vessels approved to discharge in Washington State waters per the NWCCA MOU, they have the ability and procedures to automatically shut down if continuous monitoring of treated effluent indicates high turbidity or a disinfection system upset. When upsets or failures happen, there is a short lag time between when the upset occurs, the system acknowledges it and the discharge is stopped, which allows a period when ineffectively treated effluents are discharged (Amy Jankowaic, WDE, personal communication).

In general, the dynamic physical, chemical and biological interactions that occur within marine ecosystems are not precisely understood, which makes it difficult to determine the amount of contaminant loading a system can tolerate, under differing naturally variable conditions, without upsetting what may be a delicate natural balance supporting a “healthy” ecosystem. Naturally low availability of nutrients in summer months may limit primary productivity in areas off the Washington coast (Partridge 2007), and significant nutrient inputs, such as nitrogen in ammonia, during summer months could have ecosystem-level effects through alteration of natural primary production cycles. In northern waters of the sanctuary, the Juan de Fuca Eddy is an area of high primary productivity, as well as an initiating location for harmful algal blooms impacting the Washington coast. This eddy lies off the western entrance to the Strait of Juan de Fuca where large vessel traffic is most concentrated due to the ATBA and vessel traffic lanes (Figures 8 and 11). The only opportunity for cruise ship discharges into sanctuary waters occurs in this area, and vessels could focus discharge in this portion of the sanctuary immediately before entering Washington state waters where discharges are limited by the VGP and NWCCA MOU. Even with rapid dilution that occurs while vessels are in transit, increased supply of nutrients to the Juan de Fuca Eddy area, with its retentive circulation pattern, could stimulate plankton growth and enhance initiation of harmful algal bloom events. Moreover, transfer of organic materials generated via algal blooms toward the seafloor and subsequent decay can lead to depletion of dissolved oxygen (DO) in deep waters creating hypoxic (low DO) conditions, which can stress or kill organisms such as invertebrates and fish. Because cruise ship traffic through the sanctuary is highest in summer months when initiation of harmful algal blooms and low oxygen conditions are most prevalent, there is cause for concern about intensification of these phenomena given the volume of nutrient rich wastewaters potentially discharged by cruise ships.

Another water quality concern is discharges from properly functioning MSDs also can contain high concentrations of formaldehyde or chlorine (which are typically used as sterilizing agents) and other chemicals from ship activities, including cleaning chemicals. Although they serve to reduce the pathogenicity of discharges, these chemicals themselves pose a threat to water quality (NOAA 2008). Other than chlorine, there is limited analytical data on such chemical parameters in effluents. Given these complexities, it is difficult to determine the degree to which wastewater

discharges from cruise ships are or have potential to be compromising water quality of the sanctuary.

Graywater discharges, including water from galley, laundry and baths or showers, also have potential to degrade water quality. EPA (2008a) evaluated graywater discharges from various sources on cruise ships and compared the concentrations of a wide range of constituents to untreated domestic wastewater or sewage. Most graywater discharges from cruise ships had constituent levels in a similar range to untreated domestic waste water, yet levels for nutrients, biological oxygen demand, and fecal coliforms were many times higher than typical domestic graywater. Nutrients in graywater could negatively impact water quality in the same manner and in combination with discharges of treated sewage from cruise ships. At least 3 of the cruise ships that transit the sanctuary have no graywater treatment system, and they constitute over 30% of transits in 2010 and 25% of the transits scheduled for 2011 (WDE 2011)

Discharge of bilge water from cruise ships has the potential to introduce oils, detergents, degreasers, solvents and other harmful chemicals into the marine environment that can harm water quality and generate oxygen demand.

Analysis of time in OCNMS and wastewater generation rates indicates a worst-case potential for an estimated 0.2 to 1.3 million gallons of treated sewage and 1.5 to 5.0 million gallons of graywater (either untreated or treated) to have been discharged by cruise ships (passenger vessels >1,600 GT) into the sanctuary in 2009 (Tables 6 and 7). As discussed in section 8.4.2.2, the volume of wastewater actually discharged from cruise ships in the sanctuary is uncertain. Moreover, the nutrient and chemical concentrations in both untreated and treated wastewater varies depending on the waste streams and performance of wastewater treatment system used. Thus, it is difficult to quantify specific reductions in individual nutrients or chemicals that would be achieved under any proposed alternative. While industry representatives have stated cruise ships currently avoid all discharges in the sanctuary, this has not been verified. Under alternative B, all sewage, graywater, bilge and ballast water discharges would be prohibited from cruise ships (except clean vessel deck wash down, clean vessel engine cooling water, clean vessel generator cooling water, clean bilge water or anchor wash), and potential water quality impacts from these discharges would be eliminated.

The water quality of the sanctuary is generally considered to be good and influenced primarily by natural processes (ONMS 2008). Implementing alternative B would result in less than significant improvement of water quality over the next 10 years. Elimination of nutrient contributions from cruise ship discharges would ensure water quality conditions are not degraded by the inputs of additional nutrients, chemical contaminants, and biological and chemical oxygen demand associated with these wastewater discharges.

As discussed in section 6.1.3.1, ballast water discharges within the OCNMS have the potential to introduce potentially harmful invasive species. Although alternative B would ban ballast water discharges from cruise ships operating in the sanctuary, this aspect of alternative B could have negligible effects on water quality because the U.S. federal, Washington and Canadian rules currently prohibit all ballast water discharges in OCNMS except for ballast water that

was exchanged more than 50 nmi from shore. Open ocean ballast water provides a significantly reduced risk of introduced species.

Discharge of any bilge water other than clean bilge water from cruise ships would also be prohibited under alternative B. Untreated bilge water discharges can harm water quality and the marine environment through the introduction of oils, solvents, and other harmful chemicals, with oils being the contaminant of most consistent concern. Because OCNMS regulations currently ban oily bilge water discharges, limiting bilge water discharges from cruise ships to clean bilge water (i.e., treated bilge water that does not leave a visible sheen) would have little to no impact because the standing and final regulations are consistent.

8.1.2.3. Wastewater Discharges from Vessels over 300 gross tons - Effects to the Physical Setting

Under alternative C, wastewater discharges from large vessels over 300 gross tons (GT) would be banned (except clean vessel engine cooling water, clean vessel generator cooling water, clean bilge water, anchor wash), in addition to prohibitions on discharges from cruise ships proposed in alternative B. Thus, alternative C encompasses a greater range of vessel classes but does not regulate any additional types of discharges beyond those covered in alternative B. OCNMS regulations under both alternatives B and C would eliminate discharge of all ballast water in OCNMS from cruise ships and large vessels even if an open ocean exchange had occurred. These regulations also might alter the quality of bilge water discharged in the OCNMS as existing OCNMS regulations allow discharge of bilge water that does not include “oily waste”, and new regulations would allow discharge only of “clean bilge water”, which is interpreted to mean treated bilgewater that does not leave a visible sheen and can be considered more restrictive than the existing OCNMS regulatory language.

It is estimated the more inclusive discharge ban proposed under alternative C could result in a potential reduction of sewage discharges of roughly 74%, a 11% reduction (by volume) over alternative B (Table 14). Under Alternative C, graywater discharges could potentially be reduced by 88%, a 13% reduction over alternative B (Table 14). The same beneficial effects expected by implementing alternative B (discussed above) would be realized under alternative C. Due to reduced volumes of discharge in the sanctuary, the magnitude of the positive effects could potentially be greater under alternative C than under alternative B. However, alternative C is still expected to have less than significant effects on the overall water quality of OCNMS because the sanctuary’s water quality is already considered good and, given the sanctuary’s large size, the discharge reduction achieved under alternative C would not likely result in a substantial improvement of water quality (i.e., from ‘good’ to ‘excellent’).

Table 14 Comparison of estimated potential discharges (in gallons) under alternatives A, B and C

Vessel Classification	*Alternative A*		*Alternative B*		*Alternative C*	
	Sewage Discharge Volume (avg)	*Graywater Discharge Volume (avg)*	*Sewage Discharge Volume (avg)*	*Graywater Discharge Volume (avg)*	*Sewage Discharge Volume (avg)*	*Graywater Discharge Volume (avg)*
Commercial Fishing Vessel	94,620	422,636	94,620	422,636	94,620*	422,636 *
Charter Fishing Vessel	45,633	not estimated	45,633	not estimated	45,633	not estimated
Recreational Fishing Vessel	108,686	not estimated	108,686	not estimated	108,686	not estimated
Commercial Vessel < 300GT	2,052	9,166	2,052	9,166	2,052	9,166
Commercial Vessel 300-1599 GT	1,782	7,960	1,782	7,960	prohibited	prohibited
Commercial Vessel > 1600 GT	63,045	281,601	63,045	281,601	prohibited	prohibited
Passenger Vessel < 300 GT	3,600	16,080	prohibited	prohibited	3,600	16,080
Passenger Vessel 300-1599 GT	6,000	26,800	prohibited	prohibited	prohibited	prohibited
Passenger Vessel > 1600 GT	630,936	2,818,181	prohibited	prohibited	prohibited	prohibited
Public Vessel < 300 GT	63	281	63	281	63	281
Public Vessel 300-1599 GT	1,248	5,574	1,248	5,574	prohibited	prohibited
Public Vessel > 1600 GT	3,893	17,387	3,893	17,387	prohibited	prohibited

Vessel Classification	*Alternative A*		*Alternative B*		*Alternative C*	
	Sewage Discharge Volume (avg)	*Graywater Discharge Volume (avg)*	*Sewage Discharge Volume (avg)*	*Graywater Discharge Volume (avg)*	*Sewage Discharge Volume (avg)*	*Graywater Discharge Volume (avg)*
Tank Vessel	32,715	146,127	32,715	146,127	prohibited	prohibited
Tug with tank barge	2,124	9,487	2,124	9,487	2,124	9,487
TOTAL DISCHARGE	996,396	3,761,280	365,460	943,099	256,778	457,650
DECREASE from Status Quo	-	-	630,936	2,818,181	739,619	3,303,629
Percent reduction in potential discharge from Status Quo	0%	0%	63%	75%	74%	88%

** A number of Commercial Fishing Vessels transiting the sanctuary are > 300 GT and would also be affected by Alternative C. These are not included because the data used in the analysis does not provide tonnage.*

8.1.2.4. Area-to-be-Avoided - Effects to the Physical Setting

Currently, the Olympic Coast Area to be Avoided (ATBA) is an International Maritime Organization (IMO) voluntary vessel routing measure for vessels 1,600 gross tons and above. The ATBA has been in place since 1994, and its compliance rate has been high, estimated to be 98.9% in 2009 (WDE 2010). To maintain the high compliance rate, ONMS works with the USCG to notify non-compliant vessels, then send a formal letter requesting vessel owners or operators to adhere to the ATBA in the future.

Under alternatives A and B, the ATBA would remain voluntary and continue to apply to all ships and barges carrying cargoes of oil or hazardous materials and all ships 1,600 gross tons and above solely in transit. It would also apply to additional classes of vessels based on recent legislation. The Coast Guard Authorization Act for Fiscal Years 2010 and 2011 calls on NOAA to work with the USCG to revise the ATBA so existing restrictions apply to additional vessels. This change would apply to vessels between 400 GT and 1,600 GT, other than fishing or research vessels while engaged in fishing or research within the ATBA.

Thus, under alternatives A and B, the ATBA is expected to continue to have a less than significant, beneficial, indirect, long-term effect on physical resources by keeping ships posing a spill risk (i.e., potentially large-scale shoreline impacts of a fuel or materials spill) further offshore. The effect is considered less than significant because, while it reduces the risk of a spill occurring in the sanctuary and increases the response time between a spill and when oil would impact the shore, the ATBA does not directly prevent spills from occurring. Another impact of vessel traffic on the physical environment, underwater noise, also is not addressed under alternatives A and B. Effects of vessel noise (and effects of noise pollution, in general) are discussed in section 8.5, Cumulative Effects.

Under alternative C, ONMS would work with its partners to evaluate options to make compliance with the ATBA mandatory. Mandatory ATBA compliance could have an additional beneficial effect (beyond alternatives A and B) on physical resources.

In order to understand the extent and potential significance of this beneficial effect, ONMS evaluated ATBA compliance rates and identified the population of vessels not voluntarily complying with the ATBA. ONMS further evaluated responses from the ATBA Monitoring and Outreach program to evaluate response from the industry on reasons for non-compliance.

The transits of vessels for which the ATBA applied off the Olympic Coast in 2009 are summarized in Table 15. In 2009, 8,849 transits (vessels for which the ATBA applies) were tracked by CVTS monitoring, which extends south to approximately 48 degrees North. Of these transits, 6,128 entered OCNMS (Figure 11), with a total of 68 transiting within the ATBA (Figure 12). In 2009 the ATBA voluntary compliance rate was estimated at near 99%.

Figure 11 CVTS Radar Coverage - OCNMS 2009 transit track lines (6,128 transits)

Table 15 All Cooperative Vessel Traffic Service (CVTS) Vessel Transits in 2009

Vessel Type	*Transits in and out of the Strait of Juan de Fuca recorded by the CVTS*[1]	*Transits passing through the Sanctuary*[2]	*Transits passing through the ATBA within the Sanctuary*[3]	*Estimated ATBA Compliance Rate*[4]
Articulated Tank Barges	265	257	1	99.6%
Bulk Carriers	2747	1776	19	98.9%
Cable Layers	23	10	0	100.0%
Chemical Tankers	325	240	1	99.6%
Container Ships	2412	1575	15	99.0%
Cruise Ships	450	280	2	99.3%
Fishing Vessels (in transit)	111	81	4	95.0%
General Cargo Ships	487	366	5	98.6%
Heavy Load Carriers	15	14	1	92.9%
Hopper Dredger	2	2	0	100.0%
Liquefied Petroleum Gas Carriers (LPG) and Liquefied Natural Gas (LNG) Carriers	6	3	0	100.0%
Non-oil Tankers	73	57	1	98.2%
Oil Tankers	1056	838	7	99.2%
Ore-Bulk-Oil Vessels (OBO)	12	7	0	100.0%
Refrigerated Ships	6	4	0	100.0%
Roll-on Roll-off Vessels (RORO)	353	201	2	99.0%
Vehicle Carriers	402	323	1	99.7%
Tugs with Chemical Barges	3	3	1	66.7%
Tugs with Oil Barges	101	91	8	91.2%
	8849	6128	68	98.9%

In 2009, there were a total of 68 non-compliant transits, representing 59 different vessels, through OCNMS (Figure 12). This is the population of vessels to which the potential mandatory ATBA provisions would have applied if in effect in 2009. The change from voluntary to

[1] The vessel transits in this column were provided by the CVTS and include commercial vessels greater than 1600 gross tons, or tugs with laden oil or chemical barges.
[2] This column includes a subset of the CVTS vessel transits through the sanctuary.
[3] This column includes a subset of the sanctuary vessel transits that also go through the ATBA. These are vessels potentially not complying with the provisions of the ATBA. These are identified both by CVTS radar and by Seattle Marine Exchange AIS.
[4] This column shows the percentage of vessels transiting through the Sanctuary that stayed out of the ATBA {Column 4 = 1 – (Column3/Column2)}. This is used as an estimate of compliance with ATBA provisions.

mandatory would only increase resource protection to the sanctuary if it results in increased compliance to the ATBA provisions. In 2009 37 letters were sent to non-compliant vessels, this accounted for 54% of the 68 non-compliant vessels. In some instances tracking data may show a vessel just inside the boundaries of the ATBA, in some of these cases letters are not sent. Of letters sent out in 2009, ONMS received 14 replies from vessel owners or agents. In all but a single case, the responses acknowledged the ATBA incursion, and replied that they had taken action to educate their vessel(s) and committed to future compliance. In the single case where the vessel's master did not agree with the determination that their vessel was in the ATBA, they responded they approached, but did not enter the ATBA. A review of the vessel track shows the vessel entered, but only for a very short period of time. Even in this instance the vessel owners agreed to take action to ensure all the vessels in their fleet would avoid the ATBA in the future.

ONMS has concluded changing the ATBA provisions from voluntary to mandatory would have negligible effects on physical resources in the sanctuary, based on the level of observed cooperation by the maritime community and the lack of documented cases where mariners have elected to ignore the voluntary nature of the ATBA. In addition, modification of the ATBA would require submitting a U.S. government proposal to the Marine Safety Committee of the IMO. When considering vessel routing measures used for the purposes of environmental protection, the IMO balances the need for natural resource protection with the protection of traditional freedoms of navigation. Given the current high rate of compliance, NOAA does not believe a request to change the ATBA from voluntary to mandatory would be favorably received. For these reasons, changing the voluntary nature of the ATBA is not included in OCNMS' preferred alternative.

Figure 122 CVTS Radar Coverage – ATBA 2009 transit track lines
(68 transits)

8.1.2.5. Invasive Species Discharge Regulation - Effects to the Physical Setting

Under alternative C, ONMS would establish a new regulation banning the discharge of invasive species in the sanctuary, in addition to conducting a series of non-regulatory actions to address invasive species. Under alternatives A and B, this regulation would not be pursued, and invasive species would be addressed solely through non-regulatory actions (e.g., monitoring).

Banning the direct discharge or release of invasive species in the sanctuary would have a beneficial, long-term effect on physical resources in the sanctuary.

Invasive species can affect physical resources in several ways. Some invasive species, such as certain invasive tunicates, are sedentary for at least part of their lives and affix to substrates, thus altering the physical environment. Invasive species also can also affect water quality (e.g., by altering nutrient levels or turbidity). By prohibiting the discharge of invasive species in the sanctuary, ONMS would be complementing and expanding the area addressed by state of Washington regulations developed to prevent the introduction of invasive species into state waters. In most cases, the effects of this new regulation on physical resources would be indirect

because the regulation would prohibit discharge of organisms, effects of which would likely occur at locations and times removed from the initial introduction of the organism.

The beneficial effect of this action on physical resources is assumed to be less than significant because the state of Washington already implements ballast water regulations that reduce the risk of invasive species introductions within the sanctuary. Ballast water is a primary invasive species transport vector in marine environments. Over 80 percent of the world's commodities are transported via ships, and these ships results in an annual transfer of an estimated 10 to 12 billion tons of ballast water across the globe (Global Ballast Water Programme 2003). The World Resources Institute estimates 3,000 aquatic species are transported around the globe every day in the ballast water of ships (IMO 2010).

The current Washington state regulations require vessels travelling to Washington from outside of the United States exchange their ballast water at a distance greater than 200 nmi from shore and in waters greater than 2000 meters. Vessels traveling between U.S. ports on the West Coast must exchange ballast water at a distance greater than 50 nmi from shore and in waters at least 200 meters deep. Because the sanctuary, at its widest, extends 40 nmi from shore, no ballast water exchanges should be occurring in the sanctuary.

Thus, it is assumed an OCNMS invasive species discharge ban would have an added beneficial effect primarily on invasive species introductions occurring through vectors other than ballast water. These vectors could include people disposing of exotic aquarium fish or carrying an invasive species on their boats. Current Washington state regulations prohibit release of any classified aquatic nuisance species (lists were developed for the state’s administrative code) or any unclassified aquatic species with potential to be a nuisance species. These types of introductions often occur unintentionally and due to a lack of understanding and awareness of invasive species concerns. Thus, an OCNMS regulation prohibiting invasive species introductions alone would complement state regulations but likely not have a significant beneficial effect. It is likely the routine, non-regulatory resource protection activities occurring under all three alternatives and would be focused on invasive species monitoring, education and outreach would be as effective in preventing these types of invasive species introductions (e.g., by educating people about the threats posed by invasive species) than would an invasive species regulation.

8.1.3. Actions with Adverse Effects to the Physical Setting

One regulatory change proposed under alternative C could have an adverse effect to the physical setting - reducing the OCNMS overflight regulation from 2,000 feet to 1,000 feet.

Several non-regulatory actions being considered under alternatives A, B and C would result in some adverse effects to physical resources in the sanctuary. Alternative A (i.e., continued management using the 1994 OCNMS management plan) does not define many of these actions with the level of detail provided in alternatives B and C. However, because the original 1994 OCNMS management plan is so broad and general in nature, this analysis assumes any adverse effects associated with these activities would occur under alternative A.

8.1.3.1. Overflight Floor Reduction – Effects to the Physical Setting

A lowering of the overflight floor would not likely alter the number or type of planes flying over the sanctuary, but this regulatory change could affect the physical setting of the sanctuary by increasing the noise detectable and visual impact to visitors to the shoreline adjacent to the sanctuary, much of which is designated wilderness within Olympic National Park. Federal wilderness lands are characterized as areas of undeveloped land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed to preserve its natural conditions, and where the imprint of man's work is substantially unnoticeable and there are outstanding opportunities for solitude. The 2,000 foot FAA advisory that applies to national parks and wildlife refuges mitigates the visual and acoustic impact to wildlife as well as visitors. Based on its effect to the aesthetic value of the ONP wilderness shoreline, this alternative would have an adverse, direct, and long-term effect on physical resources.

8.1.3.2. Seabed Disturbance from Research Activities - Effects to the Physical Setting

Alternatives A, B and C consider research, monitoring and assessment actions related to habitat mapping, and water quality and oceanographic monitoring that may necessitate disturbance of the seafloor in the sanctuary. Seafloor disturbance typically would occur when:

- Anchoring water quality and oceanographic monitoring buoys
- Collecting benthic sediment samples to support habitat mapping and characterization efforts and to identify infaunal communities

In regards to anchoring monitoring buoys, in recent years there have been 13 buoys seasonally deployed by ONMS in the sanctuary. These OCNMS buoys are conducted under the OCNMS Superintendent's Permit that covers activities by OCNMS directly related to management of the sanctuary. Like other permitted activities within the sanctuary, activities conducted under the Superintendent's Permit must not substantially injure sanctuary resources and qualities. There are additional research buoys permitted and installed by other entities in the sanctuary, but the environmental effects of these buoys are evaluated when permit applications to install them are evaluated. The effects of these non-OCNMS buoys are therefore only considered within the context of cumulative effects (section 8.5).

OCNMS buoys are anchored with two steel blocks (120 pounds each; approximately 30cm x 30cm x 10cm) sitting on less than 0.5 m^2 of seafloor and approximately 2m of iron chain linked to ropes and floats. The adverse effect caused by these weights and chain is direct but less than significant because the anchors are relatively small in size and few in number, so they impact a miniscule percentage of sanctuary seafloor; anchors are deployed on soft rather than rocky seafloor (soft seafloor habitats are more disturbance tolerant and recover more quickly than hard seafloor habitats); moorings have a subsurface float designed to keep chain orientation vertical and off the seafloor; and weights generally remain in place without dragging. The effects are short-term because the anchors are retrieved, and it is expected the habitats where the anchors sit recover relatively quickly (within a year) following this physical disturbance. If the connection to the mooring floats is broken, there is a risk weights could be abandoned, which would cause

localized but longer-term effects where the weights sit on the seafloor. This occurs infrequently, and the steel used in the anchors is not acutely toxic to biota.

For habitat characterization work, benthic sediment sampling is performed for each unique benthic habitat type to verify, or ground-truth, and refine interpretations of remotely-collected data. Benthic sediment samples are collected using grab samplers with a footprint impacting less than 0.5 m^2 of seabed and a physical sample removed from an area 0.1m^2 or less. Samples are collected at intervals of approximately 2000 meters until that sediment type can be reliably identified with remotely-collected data. In addition, benthic samples from sedimentary areas occasionally are collected from subtidal areas to identify the community of animals living in the sediments. Sampling may affect the seafloor by physical removal of samples (sediment grabs or ROV sampling) or inadvertent contact with the seafloor (video sleds or ROV/AUV equipment).

The adverse effects to the seafloor from benthic sediment sampling are expected to be direct and less than significant because the sampling devices impact a small area of the seafloor (generally 0.5m^2 or less) in areas of sedimentation (not hard substrate), disturbance is limited to the upper few centimeters of sediment, and sampling is done at wide spatial and temporal intervals, therefore, the intensity of effect is low. The effects of this sediment sampling are short-term given the area impacted and substrates targeted. If seafloor sampling activities inadvertently impacts hard substrate, long-term effects may result if coral/sponge habitat is damaged because this biogenic habitat recovers slowly. However, this is not a planned activity, the damage is not anticipated, and the extent is expected to be de minimis.

Currently, approximately 25% of the OCNMS seafloor has been mapped and characterized. Under alternatives A, B and C habitat mapping and characterization efforts as well as benthic research would continue and efforts may increase (dependent upon resources). Therefore, additional localized, short-term effects to physical resources would be anticipated; however, the intensity of the effects is low as described above. To the extent that the level of effort increases, there is potential for additional adverse effects to physical resources; however, these are less than significant.

8.1.3.3. Operating Vessels in Sanctuary - Effects to the Physical Setting

Several actions being considered under alternatives A, B and C involve the operation of vessels in the sanctuary, which has the potential to cause adverse effects to physical resources. Actions involving the operation of OCNMS vessels (or vessels operating on behalf of OCNMS) include:

- On-water enforcement activities
- Research, monitoring and assessment activities
- Outreach and education activities

OCNMS staff operates a 38’, diesel powered research vessel and a rigid-hull inflatable boat. OCNMS research and monitoring projects also involve the use of other NOAA or contracted vessels. OCNMS’ RV *Tatoosh* (Figure 13) is occasionally used (no more than five times per year) for training, outreach and education activities (e.g., trips in the sanctuary for OCNMS

volunteers). Additionally, the OCNMS vessels are occasionally used to investigate potential regulatory violations (less than five times per year, on average).

During a typical calendar year, OCNMS research vessels are operating in the sanctuary about 300 hours total. The exact number of hours varies from year to year based upon funding and operational and vessel repair needs. In some years, non-OCNMS vessels operate in the sanctuary on behalf of OCNMS in order to conduct research or enforcement activities but the number of hours varies considerably from year to year. Vessel operations contribute to temporary, localized noise and air pollution in the sanctuary, may collide with marine life, and pose a risk of hazardous materials spills or of sinking.

The effects of operating OCNMS research vessels in the sanctuary are direct, adverse and less than significant. Vessels are maintained and operated according to rigorous NOAA safety guidelines, have a good safety record, and carry relatively small amounts of hazardous materials. Thus, the risk of a hazardous materials spill or vessel sinking is low. ONMS ensures any research or enforcement vessels operating in the sanctuary on its behalf are maintained and operated by qualified organizations (often other government agencies).

Because OCNMS vessels and those acting on behalf of ONMS operate in the sanctuary an average of a few hundred hours per year, their presence is temporary and use is distributed over a large area, it is expected the effects of noise and air pollution from these activities is less than significant. Noise pollution and the presence of a vessel can alter the physical environment of the sanctuary and cause both direct effects (e.g., distract an organism from its current path) and indirect effects (e.g., alter travel paths in a way that steers organisms away from necessary food sources) to biological resources (discussed in section 8.2). If noise from human activities is elevated to levels considered “pollution” or chronic disturbance, it is more likely to result from the cumulative effect of all the vessels operating in the sanctuary, including the numerous vessels not operating on behalf of OCNMS. The cumulative effects of noise pollution are discussed in section 8.5.

Figure 13 The OCNMS Research Vessel *Tatoosh*

8.1.3.4. Conducting Activities in Intertidal Areas - Effects to the Physical Setting

Alternatives A, B and C also consider actions potentially causing adverse effects to shore and intertidal physical resources. These actions include:

- Beach and intertidal educational and interpretive programs
- Intertidal monitoring surveys
- Marine debris removal projects
- Encouraging visitation to beaches and intertidal areas

OCNMS actions in the intertidal zone are expected to have direct, but less than significant, adverse effects on physical resources. Interpretive efforts that encourage visitation to beaches and intertidal zones can cause trampling. Intertidal educational and interpretive programs

typically involve small groups traversing intertidal habitat and can trample invertebrates and algae on rocky surfaces. In intertidal habitats, biological organisms are considered elements of the physical habitat. OCNMS-led intertidal survey teams also can cause trampling damage. Marine debris removal on beaches sponsored by OCNMS and its partners can cause trampling disturbance of intertidal habitats and also result in debris being dragged along the shore, thus causing physical disturbance.

These adverse effects are less than significant because the habitat disturbance occurring is widely distributed in space and time, and generally caused by small groups of people. Therefore, the effects are low intensity and short-term. Moreover, participants in OCNMS stewardship, interpretive, educational and research programs typically are instructed on proper beach etiquette and ways to minimize their impacts on intertidal habitats. The purpose of these actions is to improve ocean literacy, educate people on becoming better stewards of ocean ecosystems, reduce the impacts of marine debris, and improve our understanding of intertidal community ecology – all of which are outcomes beneficially influencing long-term efforts to protect these resources. The overwhelmingly beneficial effects of these activities outweigh the less than significant, adverse effects that may occur.

8.1.4. Summary of Effects to Physical Setting

In general, the majority of actions being considered under alternatives A, B and C would have a primarily beneficial, less than significant effect on physical resources in the sanctuary. This is because many of the actions, while important to achieving OCNMS' goals and objectives, are relatively small in scale and are not expected to cause a significant improvement to physical resources over the life of the management plan (five to ten years). There is not a significant difference between the beneficial effects to physical resources of the three alternatives. Alternative C would have a greater overall beneficial effect on physical resources, due to the several additional actions it considers; but, as discussed above, this effect would not be significant.

Water quality in the sanctuary, according to the 2008 OCNMS Condition Report, is "good". It is unlikely the proposed reductions in discharges would cause a substantial improvement in water quality over the next 10 years. However, reducing wastewater discharges would reduce the risk of water quality impacts associated with wastewater discharges and could alleviate stress on sanctuary ecosystems. Thus, reducing wastewater discharge in the sanctuary could have a less than significant, beneficial effect by helping maintain the high water quality in the sanctuary into the future.

Regarding adverse effects to physical resources, several are associated with the actions being considered under the three alternatives, but none of these adverse effects would be significant. There is not a significant difference between the adverse effects to physical resources of the three alternatives.

8.2. BIOLOGICAL SETTING

8.2.1. Actions with Negligible Effect to Biological Setting

There are several actions occurring under all three alternatives that are expected to have a negligible effect on biological resources within the sanctuary. These actions include:

- Structural changes to the format of the OCNMS management plan, and revisions to the OCNMS goals and objectives
- Routine office and classroom activities, including meetings, visitor, education and training programs that take place in existing OCNMS or other facilities
- Use of Information Technology resources, including internet technology, data management programs, phone and e-mail technology
- Routine outreach activities not occurring in the sanctuary, including staffing fair booths and attending community events
- Routine maritime heritage activities

These actions are expected to have a negligible effect on biological resources for various reasons – they are administrative in nature, occur within existing facilities, do not involve any direct or indirect interaction between the people conducting the actions and biological resources, or no construction or physical development is required to conduct these actions.

There are several actions proposed only under alternatives B and C involving modifications to OCNMS regulations with negligible effects on biological resources. These include:

- Technical clarifications to OCNMS regulations as outlined in the Sanctuary Operations Action Plan (strategy OPS 9, activity H)
- Replace the term “traditional fishing” with “lawful fishing”
- Modifications to the tribal welfare permit provision in the OCNMS regulations
- Reducing the OCNMS overflight regulation from 2,000 feet to 1,000 feet (alternative C)

The technical clarifications to OCNMS regulations would not affect the biological resources within the sanctuary because the changes are language clarifications that do not alter the meaning or intent of the regulations.

The current OCNMS regulations define the term “traditional fishing” as “using a fishing method that has been used in the sanctuary before the effective date of sanctuary designation (July 22, 1994), including the retrieval of fishing gear” and provide an exception for traditional fishing operations to three of the regulatory prohibitions – prohibitions on discharge of certain fishing-related materials, disturbance to historical resources, and disturbance to the seabed. OCNMS regulations could be interpreted to mean that fishing methods or operations that do not fall within the definition of “traditional fishing” are not allowed to discharge materials mentioned above, or disturb historical resources or the seabed.

As part of this action, NOAA is replacing the term “traditional fishing” with the term “lawful fishing” in these three places to: 1) use a more clearly understood term; and 2) eliminate the

distinction between fishing methods that were used before OCNMS designation from those that have since been authorized. By replacing the word "traditional" with "lawful" NOAA would unambiguously recognize fishing activities authorized by governmental fisheries management authorities. This change is expected to have a negligible effect because Federal, state, tribal and regional fishery management authorities currently analyze and attempt to mitigate impacts associated with lawful fishing, including that which has occurred traditionally in the sanctuary, and those authorities are expected to do the same in the future. Since the scope and impacts of any such future management actions are speculative at this point, it is not possible, and would be inappropriate, to speculate on any additional impact analysis in this document. See section 8.1.1 for more discussion on the regulatory change to replace the phrase "traditional fishing" with "lawful fishing".

Under the current regulations, ONMS can issue a permit to conduct an activity otherwise prohibited if it finds that the activity will meet criteria identified in the regulations. One of the criteria listed for permit issuance is to "promote the welfare of any Indian tribe adjacent to the sanctuary." This provision is ambiguous and could be interpreted as allowing an entity not affiliated with a tribe to apply for a permit that it alleges could promote the welfare of an Indian tribe adjacent to the sanctuary. By modifying the tribal welfare permit language, ONMS is clarifying the intent of its regulations to ensure it is used to promote or enhance tribal self-determination and not to be used by outside parties. Because this regulatory change does not alter the availability of this permit category to American Indian tribes adjacent to the sanctuary, nor change the requirement that the permitted activity will not substantially injure Sanctuary resources and qualities, this modification to the permitting regulations is expected to have a negligible effect on the biological setting. See section 8.1.1 for more discussion on the regulatory change to clarify the permitting language.

A lowering of the overflight floor from 2,000 feet to 1,000 feet would not affect biological resources because there is evidence wildlife disturbance from overflights occurs primarily at elevations below, but not above, 1,000 feet. Low overflights in OCNMS pose a risk of harmful disturbance to marine mammals and seabirds. Examples of harmful disturbance include movement and evacuation in response to low overflights where the young (pups, chicks, eggs) are crushed during an evacuation or exposed to predation as a consequence of loss of parental protection. Studies of overflights have confirmed low altitude overflights do cause wildlife disturbance, but effects vary with plane type, elevation, flight pattern and wildlife species (Parrish et al. 2005). For example, helicopters tend to cause more disturbance than fixed wing planes; repeated passes cause more disturbance than a single pass. Based on observed disturbance caused by overflights, various authors have recommended a buffer (or distance aircraft should stay from wildlife) ranging from 500 to 5,000 feet, depending on the species under consideration (Parrish et al. 2005). Existing altitude restrictions from various locations for protection of various species from aircraft disturbance range from 500 to 2,000 feet (ONMS 1997).

Wildlife biologists and pilots who regularly conduct surveys off the coast of Washington typically request an OCNMS permit to fly between 600 and 1,000 feet altitude to optimize their capabilities for census and behavioral observations. Because the purpose of these flights is to observe undisturbed wildlife (seabirds and marine mammals) for census counts, disturbance

would be counterproductive to their purposes. Their personal observations over several decades of work are that wildlife disturbance does not commonly occur with species found off the Olympic Coast for flights above 1,000 feet. It is assumed a lowering of the overflight floor to 1,000 feet, as proposed in alternative C, would not increase the number of low altitude (<1,000 feet) flights over the sanctuary, and that flights at or above 1,000 feet do not normally cause observable disturbance to wildlife. Therefore, modification of the OCNMS overflight regulation to 1,000 feet would have negligible effects on biological resources within the sanctuary.

In addition, alternatives B and C also contain some structural changes not included in alternative A. Under alternatives B and C, the management plan would contain performance measures, cost estimates and an implementation table. Alternatives B and C also would include a revised suite of goals and objectives for OCNMS. While these structural changes would have a negligible effect on biological resources, these modifications do provide additional clarity and detail to alternatives B and C.

8.2.2. Actions with Beneficial Effects to the Biological Setting

There are several actions occurring in one or more of the alternatives expected to have a beneficial effect on biological resources within the sanctuary. These actions include:

- Routine activities conducted as part of OCNMS' resource protection, research, visitor services, outreach, education and administrative program areas
- A regulatory ban on cruise ship discharge (alternatives B and C)
- A regulatory ban on discharges from large vessels (alternative C)
- Evaluate (and possibly implement) options to make compliance with the Area-to-be-Avoided mandatory (alternative C)
- A regulatory ban on the discharge of invasive species (alternative C)

8.2.2.1. Routine activities - Effects to the Biological Setting

Many of the routine and general education, outreach, research, resource protection, administrative and visitor services actions would take place under all three alternatives. These routine actions (detailed throughout the 20 action plans in section 5) involve the continuation of OCNMS' primary program areas, including:

- Routine resource protection activities (e.g., marine debris removal)
- Routine research activities (e.g., intertidal and water quality monitoring)
- Routine outreach activities (e.g., citizen science programs)
- Routine education activities (e.g., teacher training classes)
- Routine visitor services activities (e.g., operating the Olympic Coast Discovery Center)
- Routine administrative activities (e.g., enforcement of regulations and permitting)

All of these program areas have less than significant, short-term, indirect, and beneficial effects on biological resources because they promote ocean literacy, improved understanding and protection of natural resources, and improved ocean stewardship. By promoting these principles with partners, local communities and the general public, OCNMS has the opportunity to influence the behavior and decision-making of individuals, communities, organizations and

agencies in ways benefiting biological resources. For example, if a citizen visits an OCNMS fair booth and learns about the importance of marine debris removal, he/she may be more likely to participate in a beach clean-up activity and less likely to dispose of trash in or near the ocean. In turn, increased participation in beach clean-ups could result, over time, in less trash on the beach, which could result in fewer impacts of marine debris to wildlife.

While all of these routine actions are beneficial, it is not expected their effects would be significant. The expected implementation period of the management plan is no more than 10 years; thus, for the purposes of this analysis, the actions proposed within all three management plan alternatives are not projected to last longer than 10 years. It is not likely a significant improvement in biological resources could be achieved on such a short time frame as a result of these types of indirect, beneficial actions.

8.2.2.2. Vessel Discharges - Effects to the Biological Setting

Alternatives B and C both contain modifications to OCNMS vessel discharge regulations. Under alternative A, none of these regulatory modifications would be made and thus, no additional beneficial effect to the biological setting would be expected. Alternative B proposes a regulatory ban on discharges from cruise ships, with specific types of clean discharges allowed. Alternative C proposes a ban on discharges from large vessels (over 300 gross tons) along with the same cruise ship discharge ban as Alternative B, with specific types of clean discharges allowed. In addition, alternatives B and C also contain non-regulatory strategies in the Water Quality Protection Action Plan related to reducing impacts from vessel discharges (e.g., work with partners to improve availability of sewage pump-out facilities). Section 8.2.1 reviews the expected effects of these non-regulatory actions on biological resources. It is presumed these non-regulatory activities could take place under alternative A, though alternative A does not identify them explicitly.

By reducing the amount of wastewater being discharged into the sanctuary through regulatory modifications, both alternatives B and C would have a beneficial and long-term effect on biological resources in the sanctuary. The effect would be long-term because the changes to regulations would presumably remain in place for the foreseeable future (i.e., beyond one management plan cycle). The reduction in wastewater discharge volumes potentially achieved under alternatives B and C is documented in detail in section 8.1.2. It is estimated that alternative B potentially could result in wastewater discharge reductions of up to 3.4 million gallons (sewage and graywater combined) from cruise ships per year (Table 14). Alternative C potentially could result in a reduction of up to 4.0 million gallons of wastewater discharged in the sanctuary per year (Table 14). It is important to note estimated reductions in discharge volumes are based on estimated wastewater generation rates for the known time intervals that vessels are in the sanctuary, not on actual practice or knowledge of where wastewaters are discharged.

Sewage and graywater discharges can negatively affect biological resources in a variety of ways. Wastewater can contain harmful bacteria, protozoa, and viruses. These pathogens have the potential to contaminate commercial or recreational shellfish beds (a human health risk) and to harm wildlife and humans directly. Analysis of graywater discharges from cruise ships revealed

levels of nutrients, biological oxygen demand and fecal coliforms were many times higher than typical domestic graywater (EPA 2008a). Nutrients and biological oxygen demand in graywater could negatively impact water quality in the same manner and in combination with discharges of treated sewage from cruise ships. Fecal coliforms are an indicator of pathogens. In general, pathogen concentrations are not currently a concern in the sanctuary (ONMS 2008), yet there are clear indications sea otters have been exposed to pathogens that have compromised the health in sea otter populations off California and elsewhere (Brancato et al. 2009). Pathogens can also affect human health through consumption of contaminated shellfish. Whereas AWTS may be highly effective at reducing bacterial contamination, they may not be as effective in elimination of pharmaceuticals and viruses, and fecal coliforms are not a good indicator of wastewater treatment effectiveness for viruses (WDH 2007). As a result, Washington Department of Health recommended and the NWCCA MOU adopted a provision that no cruise ship discharges will occur within 0.5 nmi of harvested shellfish beds. Prohibiting the introduction of pathogens from cruise ship and large vessel sewage and graywater discharges in a more comprehensive area could help reduce further pathogen exposure and prevent health impacts to humans and wildlife in the sanctuary.

Wastewater discharges from vessels can also indirectly affect biological resources. Wastewater contains nutrients with potential to stimulate algal blooms, including species harmful to humans. Transfer of organic materials generated via algal blooms toward the seafloor and subsequent decay can lead to depletion of dissolved oxygen (DO) in deep waters. Hypoxic (low DO) conditions can stress or kill organisms such as invertebrates and fish. Naturally low availability of nutrients in summer months may limit primary productivity in areas off the Washington coast (Partridge 2007), and significant nutrient inputs during summer months could have ecosystem-level effects through alteration of natural primary production cycles. In northern waters of the sanctuary, the Juan de Fuca Eddy is an area of high primary productivity as well as an initiation area for harmful algal blooms impacting the Washington coast. This eddy lies off the western entrance to the Strait of Juan de Fuca where large vessel traffic is most concentrated due to the ATBA and vessel traffic lanes (Figures 8 and 11). The only opportunity for cruise ship discharges into sanctuary waters occurs in this area, and vessels could focus discharge in this portion of the sanctuary immediately before entering Washington state waters where discharges are limited by the VGP and NWCCA MOU. Even with rapid dilution that occurs while vessels are in transit, increased supply of nutrients to this area, with its retentive circulation pattern, could alter productivity patterns and have ecosystem-level effects on the marine life that benefits from this productivity. In addition, an increased occurrence of harmful algal blooms could impact wildlife and human populations of the area.

While there is a risk wastewater discharges could affect the biological setting, it is difficult to determine what volume or content of wastewater would trigger effects. No significantly adverse effects attributable to wastewater discharge in the sanctuary have been documented, and the 2008 Condition Report rated water quality in the sanctuary as “good” (ONMS 2008). Because the reduction in wastewater discharge that would be achieved under alternatives B and C can be considered relatively small when compared to the total volume of water in the sanctuary (i.e., this wastewater becomes diluted once it is discharged), it is unlikely that this reduction in wastewater discharge would result in a significant improvement in water quality or biological

resource health (i.e., an elevation from "good" to "excellent" rating for water quality in future condition reports). Thus, the beneficial effects to biological resources of modifying OCNMS discharge regulations under alternatives B and C would be less than significant. While the effects of changing the vessel discharge regulations under alternatives B and C may not be significant within the context of this NEPA analysis, these regulatory changes are still beneficial to biological resources. The goal of more stringent vessel discharge regulations under alternatives B and C would be a precautionary approach, which is fitting of a marine protected area designated for its national significance, to reduce overall stress on sanctuary ecosystems, maintain existing good water quality conditions in the sanctuary, and prevent the future degradation of water quality that could occur should wastewater discharge increase in the sanctuary region.

8.2.2.3. Area-to-be-Avoided- Effects to the Biological Setting

Currently, the Olympic Coast Area to be Avoided (ATBA) is an International Maritime Organization (IMO) voluntary vessel routing measure. Under alternatives A and B, it would remain voluntary and continue to apply to all ships and barges carrying cargoes of oil or hazardous materials, and all ships 1,600 gross tons and above solely in transit. It would also apply to additional classes of vessels based on recent legislation. The Coast Guard Authorization Act for Fiscal Years 2010 and 2011 calls on NOAA to work with the USCG to revise the ATBA so existing restrictions apply to additional vessels. This change would apply to vessels between 400 GT and 1,600 GT, other than fishing or research vessels while engaged in fishing or research within the area to be avoided.

Because the ATBA would continue as a monitored, voluntary measure without changes to the existing program, ATBA activities under alternatives A and B are expected to have a less than significant, beneficial, indirect, long-term effect on biological resources by keeping ships further offshore and shifting vessel traffic noise away from the continental shelf and much of the sanctuary. The effect is considered less than significant because, while the ATBA reduces the risk of a spill occurring in the sanctuary, it does not directly prevent spills from occurring and does not eliminate vessel traffic noise from the sanctuary.

Under alternative C, OCNMS would work with its partners to evaluate options to make compliance with the ATBA mandatory. This could have an additional beneficial effect (beyond alternatives A and B) on physical resources.

In order to understand the extent and potential significance of this beneficial effect, OCNMS evaluated ATBA compliance rates and identified the population of vessels not voluntarily complying with the ATBA. OCNMS further evaluated responses from the ATBA Monitoring and Outreach program to evaluate response from industry on reasons for non-compliance. This analysis is discussed in 8.1.2.4.

This analysis concluded changing the ATBA provisions from voluntary to mandatory would have negligible effects on physical resources in the sanctuary, based on the level of observed cooperation by the maritime community and the lack of documented cases where mariners have elected to ignore the voluntary nature of the ATBA. In addition, modification of the ATBA

would require submitting a U.S. government proposal to the Marine Safety Committee of the IMO. When considering vessel routing measures used for the purposes of environmental protection the IMO balances the need for natural resource protection with the protection of traditional freedoms of navigation. Given the current high rate of compliance NOAA does not believe a request to change the ATBA from voluntary to mandatory would be favorably received. For these reasons, the ATBA expansion is not included in OCNMS' preferred alternative.

8.2.2.4. Invasive Species Discharge Regulation - Effects to the Biological Setting

Under alternative C, ONMS would establish a new regulation banning the discharge of invasive species in the sanctuary, in addition to conducting a series of non-regulatory actions to address invasive species (detailed in the Habitat Protection Action Plan). Under alternatives A and B, this regulation would not be pursued, and the issue of invasive species would be addressed solely through non-regulatory actions. Section 8.2.2.1 provides analysis of the environmental consequences of these non-regulatory strategies.

Banning the introduction of invasive species in the sanctuary could have a beneficial, long-term, indirect effect on biological resources in the sanctuary. Invasive species can adversely impact other organisms in a number of ways, including outcompeting native species for habitat and food sources; spreading diseases to native species; altering the chemistry or physical structure of the environment in a way that inhibits the growth and health of native species; breeding with native species and thus causing alterations in native species genetics; and/or preying aggressively upon native species and thus causing reductions in native species populations. Different invasive species cause different, often unpredictable, effects in different ecosystems.

By prohibiting the discharge of invasive species in the sanctuary, ONMS would be complementing state of Washington regulations aiming to prevent the introduction of invasive species into state waters. In most cases, the effects on biological resources of this new OCNMS regulation would be indirect because the regulation would prohibit discharge of organisms, effects of which would likely occur at locations and times removed from the initial introduction of the organism.

The beneficial effect of this action on biological resources is assumed to be less than significant because the state of Washington already implements comprehensive ballast water and aquatic nuisance (invasive species) programs that dramatically reduce the risk of invasive species introduction within the sanctuary. Because of Washington state regulations outlined in section 8.1.2.5, no ballast water discharges or exchanges should be occurring in the sanctuary (except of mid-ocean exchanged ballast water), and no release of potentially invasive species should be occurring in state waters within three miles of shore. Because an OCNMS regulation banning discharge of invasive species would not increase protections provided by existing state, federal, and Canadian regulations related to invasive species, this regulation was not included in the preferred management plan alternative (alternative B).

8.2.3. Actions with Adverse Effects to the Biological Setting

Several non-regulatory actions being considered under alternatives A, B and C would result in some adverse effects to biological resources. Alternative A (i.e., continued management using the 1994 OCNMS management plan) does not define these actions in the level of detail provided under alternatives B and C. However, because the original 1994 OCNMS management plan is so broad and general in nature, this analysis assumes the adverse effects discussed below could occur under the alternative A.

8.2.3.1. Conducting Wildlife Research, Assessments and Monitoring - Effects to the Biological Setting

Alternatives A, B and C consider a variety of wildlife research, assessment and monitoring actions in order to collect data on species, community and population status, health and trends. This information is critical to effective ecosystem management decision making by OCNMS and others. Wildlife research, assessments and monitoring actions in the sanctuary (under all three alternatives) could affect biota in the water column, as well as in benthic, intertidal and subtidal habitats.

In many cases, conducting research, assessments and monitoring does not cause any adverse or beneficial effect to biological resources (e.g., using binoculars to count sea otters at a distance of 100 – 200 yards). However, in some cases, actions taken while studying biota can cause direct, adverse impacts such as disturbance, minor injury or death. For example, seafloor habitat studies may require collection of organisms for species identification or age analysis. Flying over marine bird colonies for census purposes can disturb the birds. Research may involve tagging organisms, which causes minor, temporary injury to the organism.

Most wildlife studies in the sanctuary are designed and led by entities other than ONMS. OCNMS personnel assist with these efforts and, when appropriate, issue research permits for studies in the sanctuary. The primary exceptions to this are intertidal monitoring, deep sea coral investigations, and oceanographic monitoring buoys in the sanctuary, all efforts OCNMS staff routinely lead. Adverse effects of these activities are discussed in greater detail below.

When applying for a sanctuary research permit, applicants must document how they will comply with all applicable federal and state laws, such as the Endangered Species Act and the Marine Mammal Protection Act. OCNMS staff reviews permit applications on a case-by-case basis and ensures adequate NEPA analysis (by the applicant or OCNMS) is conducted prior to permit issuance. In all cases, ONMS and its partner agencies ensure wildlife studies are designed to minimize the adverse impacts to biota. Particularly with studies of marine birds and mammals, researchers avoid or minimize wildlife disturbance to the greatest extent possible. In order to get an accurate census, aircraft are operated in a manner minimizing the intensity and duration of disturbance to the animals being studied. Thus, the adverse effects of these actions are assumed to be direct, but less than significant and short-term.

8.2.3.2. Operating Hydrographic Sonar in the Sanctuary - Effects to the Biological Setting

All three alternatives (A, B and C) consider actions utilizing sonar in support of hydrographic surveying (seafloor mapping) of the sanctuary. Hydrographic survey data collection in the sanctuary uses active sonar in varying frequency ranges to map the seafloor. These systems are typically either hull-mounted multibeam or towed side-scan sonar systems. Active sonar devices emit pulses of sound waves that travel through the water, reflect off objects, and return to a receiver on the ship. Recent, comprehensive analyses of impacts of anthropogenic underwater noise on marine mammals (e.g., Southall et al. 2007) address sound sources likely to be more egregious, such as explosions, pile driving, seismic air guns, and military low- and mid-frequency sonar, but do not specifically address of sonar systems used for seafloor mapping.

Anthropogenic underwater sounds can adversely affect marine animals in several ways. Response effects on marine mammals are manifest in behavioral changes, such as alteration of their foraging, diving or vocalization patterns. More intense sound sources can cause physical damage to marine animals, such as damage to sound receiving tissues.

Evaluation of the potential for hydrographic survey sonar to impact marine animals must consider 1) exposure to the sound waves, 2) ability to detect the sound frequency, and 3) intensity of sound exposure. The echosounders most frequently used for coastal surveys within OCNMS are high-frequency echosounders operating at 100-500 kHz (Table 16). One multibeam system (Reson Seabat 8160) used for mapping deep areas operates at a lower frequency (50 kHz), which is considered high-frequency sonar (i.e., >10 kHz). The Reson 8101 multibeam echosounder is installed on OCNMS' RV *Tatoosh* and the Reson 7125 is installed on Office of Coast Survey launches conducting the majority of multibeam survey work in OCNMS.

There is a low probability of marine mammal exposure to sonar from a side-scan "fish" because during operation the instruments are towed near the seafloor, typically 10-20 m off the bottom, with sound directed downward. To intersect with a side-scan's zone of sonification, a marine mammal would have to swim under the side scan "fish" very near the seafloor. Multibeam sonar systems are typically hull mounted and have a wide beam width (Table 16), so their sonar transmits throughout the water column over a sizeable area underneath the survey vessel; therefore, the area of potential exposure is significantly larger for multibeam than with sidescan sonar. Both systems emit relatively low intensity sound in comparison to underwater detonations or military low- and mid-frequency sonar used to traverse long distances under water. High-frequency sonar attenuates through scattering and absorption in water, an effect that increases with sonar frequency. Thus, these higher frequency sonar systems have potential to expose animals to low intensity sound in a limited area between the instrument and the seafloor.

Marine mammals have been categorized into low-, mid-, and high-frequency functional hearing groups (Southall et al. 2007). Mid-frequency cetaceans have an upper limit of sound detection of 160 kHz. High-frequency cetaceans can detect up to 180 kHz. Pinnipeds in water cannot detect sounds above 75 kHz. In a recent and comprehensive analysis of potential impacts to marine mammals of sonar and underwater noises, the U.S. Navy (2010b) did not model impacts of sonar systems operating above 180 kHz because marine mammals have functional hearing ranging

from 10 hertz (Hz) to 180 kHz, and they are most sensitive to sound sources well below 180 kHz. Marine fish generally have hearing capability at frequencies of 4 kHz or lower (U.S. Navy 2010b), well below frequencies used for hydrographic surveys.

Because sound generated by hydrographic survey equipment has a low intensity level, occurs over a limited area, attenuates quickly, and is at frequencies out of peak hearing ranges for most marine mammals, the likelihood of adverse effects to marine life is very low.

Table 16 Echosounder specifications for equipment most commonly used by OCNMS for hydrographic surveys

Echosounder	*Frequency (kHz)*	*Transmit Beam width Across Track*
L-3 Klein 3000 (towed dual frequency side scan sonar)	100/500	40°
Reson 7125 (multibeam sonar)	200/400	150°
Klein 5000 (towed side scan sonar)	455	~
Reson Seabat 7111 (deep water multibeam sonar)	100	150°
Reson Seabat 8101 (deep water multibeam sonar)	240	150°
Reson Seabat 8160 (deep water multibeam sonar)	50	150°
Kongsberg Simrad EM1002 (deep water multibeam sonar)	95	150°

NOAA continues to refine its understanding of each species' sensitivity to sound with the goal of minimizing adverse effects to marine organisms. ONMS believes its use of sonar in support of hydrographic surveying has a less than significant, short-term, direct adverse effect on organisms (particularly marine mammals) in the sanctuary.

In general, the ocean is becoming a much noisier place and concern about the cumulative effects of underwater noise pollution is increasing. The potential cumulative effects of noise pollution in the sanctuary are discussed in section 8.5.

8.2.3.3. Seabed Disturbance from Research Activities - Effects to the Biological Setting

Alternatives A, B and C consider research, monitoring and assessment actions related to habitat studies and mapping and oceanographic monitoring that may necessitate disturbance of the seafloor in the sanctuary. Because virtually all seafloor substrates in the sanctuary host some living organisms, disturbing the seafloor can adversely affect biological resources. Seafloor disturbance would occur when:

- Anchoring water quality and oceanographic monitoring buoys
- Collecting benthic sediment samples to support habitat mapping and characterization efforts and to identify infaunal communities

Similar to adverse effects to the physical setting, adverse effects to the biological resources caused by buoy anchors are direct but less than significant, for several reasons. The anchors are

relatively small in size (Figure 14) and few in number, so they impact a miniscule percentage of sanctuary seafloor. Anchors are deployed on soft rather than rocky seafloor, and soft seafloor habitats are more disturbance tolerant and biological resources there would likely recover more quickly than hard seafloor habitats. Moreover, the anchors generally remain in place without dragging and disturbing a large area of seafloor. Surface dwelling organisms may be crushed when the weights are deployed, and subsurface organisms may be blocked from access to overlying water. Most macrofauna inhabiting seafloor substrate is located in the upper, oxygenated layer of sediment. These effects are short-term because the anchors are retrieved, and it is expected the soft seafloor habitats where the anchoring occurs are repopulated with biological organisms relatively quickly (within a year) following this disturbance. If the connection to the mooring floats is broken, there is a risk that weights could be abandoned, which would cause long-term effects. These effects are less than significant because the area impacted is small, the anchors are constructed of non-toxic materials for the anchor weights, and anchors are lost infrequently.

Similar to adverse effects to the physical setting, the adverse effects to biological resources caused by benthic sediment sampling are expected to be direct and less than significant because the sampling devices impact a small area of the seafloor (generally $0.1m^2$ or less) in areas of sedimentation (not hard substrate), and sampling is conducted at wide spatial and temporal intervals. The organisms inhabiting the sediment sample normally are collected and analyzed, and they do not survive. While a few organisms may die, the overall populations of these organisms are not likely to be affected adversely because a minuscule area of the seafloor is sampled on an occasional basis.

Figure 144 Picture of OCNMS mooring anchor

Collection of sediment samples allows ONMS to refine its habitat mapping and classification methods to rely less on physical sediment sampling in the future. This work also improves understanding of organism distribution relative to different sediment types or areas. The effects of this sediment sampling are short-term given the limited area impacted and types of substrates targeted. If seafloor sampling activities inadvertently impact hard substrate, long-term effects may result – particularly if coral/sponge habitat is damaged because this habitat recovers slowly. However, this is not a planned activity, the damage is not anticipated, and the extent is expected to be de minimis.

8.2.3.4. Operating Vessels in Sanctuary - Effects to the Biological Setting

Several actions being considered under alternatives A, B and C involve the operation of vessels in the sanctuary, which has the potential to cause direct and indirect adverse effects to biological resources. These actions include:

- On-water enforcement activities
- Research, monitoring and assessment activities
- Outreach and education activities

OCNMS vessel operations are described in section 8.1.3. OCNMS vessels contribute to noise and air pollution in the sanctuary, can collide with marine life, and pose a risk of hazardous materials spills or of sinking, all of which could affect biological resources. In addition, operation of vessels has the potential to adversely affect marine life through vessel strikes or disturbance to animals.

The release of hazardous materials from an OCNMS vessel sinking would have the potential to adversely affect the biological environment through compromised water quality. The risk of a hazardous materials spill or vessel sinking is low because these vessels are maintained and operated according to rigorous NOAA safety guidelines, have a good safety record, and carry relatively small amounts of hazardous materials (fuels and fluids). Since OCNMS designation, no OCNMS-owned or contracted vessel has been responsible for a hazardous materials spill.

Noise pollution can cause both direct biological effects (e.g., distract an organism from its current path) and indirect effects (e.g., alter behavior paths in a manner that reduces access to food sources). If noise from human activities is elevated to levels considered “pollution” or chronic disturbance, it is more likely to result from the cumulative effect of all vessels operating in the sanctuary, including the numerous vessels not operating on behalf of ONMS. The cumulative effects of noise pollution are discussed in section 8.5.

Vessel captains operate with sensitivity to avoid disturbance or injury to marine life. Given the relatively small size of OCNMS vessels, vessel captains are acutely concerned about collisions with floating objects (i.e., logs, floats), seabirds (which can be sucked into the engine water intakes or clog the propulsion jets), and marine mammals. On water visibility from OCNMS vessels is excellent, and operations are limited to daylight in moderate seas, which provides better marine mammal sighting conditions. Moreover, vessel captains are trained to watch for marine mammals and seabirds and maneuver the vessel away from them. All of these conditions support a low risk of vessel strikes. The severity of vessel strikes, the conservation status of the species hit and the number of vessel strikes in a given year are all factors influencing the significance of vessels strikes as a potential adverse effect. Twenty-nine species of marine mammal have been sighted in the sanctuary, eight of which are listed on the Endangered Species List. In its 16-year history, no OCNMS owned or contracted vessel has struck a marine mammal or been responsible for a hazardous materials spill.

Because OCNMS vessels and those acting on behalf of OCNMS operate in the sanctuary an average of a few hundred hours per year with operations widely distributed in space and time, it

is expected that the effects on biological resources of vessel operations is less than significant. Under all three alternatives, the potential effects of operating OCNMS research vessels on biological resources would be considered less than significant, direct (a vessel strike or fuel spill) and indirect adverse effects on the population of the species affected.

8.2.3.5. Conducting Activities in Intertidal Areas - Effects to the Biological Setting

Alternatives A, B and C also consider actions potentially causing adverse effects to shore and intertidal biological resources. These actions include:

- Beach and intertidal educational and interpretive programs
- Intertidal monitoring surveys
- Marine debris removal projects
- Encouraging visitation to beaches and intertidal areas

Actions in the intertidal zone may have direct, but less than significant, adverse effects on biological resources. Intertidal educational and interpretive programs typically involve small groups traversing intertidal habitat and can trample invertebrates and algae on rocky surfaces. Interpretive efforts encouraging visitation to beaches and intertidal zones can also lead to trampling. Intertidal survey teams also can cause trampling damage. Marine debris removal sponsored by OCNMS and its partners can cause disturbance of intertidal habitats, or result in debris being dragged along the shore, thus causing disturbance.

These adverse effects are less than significant because the disturbance to biological organisms occurring is widely distributed in space and time and generally limited because there are small groups of people. Moreover, participants in OCNMS stewardship, interpretive, educational and research programs generally are instructed on proper beach etiquette and ways to minimize their impacts on intertidal habitats. The purpose of these actions is to improve ocean literacy, educate people on becoming better stewards of ocean ecosystems, reduce the impacts of marine debris, and improve our understanding of intertidal community ecology – all of which are outcomes beneficially influencing long-term efforts to protect these resources. These overwhelmingly beneficial effects of these activities outweigh the minimal adverse effects that may occur.

8.2.4. Summary of Effects to Biological Resources

Within the context of this NEPA analysis, the majority of actions being considered under alternatives A, B and C would have a primarily beneficial, less than significant effect on biological resources in the sanctuary. This is because many of the actions, while important to achieving OCNMS' goals and objectives, are relatively small in scale and are not expected to cause a significant improvement to biological resources over the life of the management plan (five to ten years). There is not a substantive difference in the beneficial effects to biological resources of the three alternatives. Alternative C would have a greater overall beneficial effect on biological resources, due to the several additional regulatory and non-regulatory actions it considers, but this effect would not be significant.

Several adverse effects to biological resources are associated with the actions being considered under the three alternatives, but none of the effects would be significant. There is not a

substantive difference between the adverse effects to biological resources of the three alternatives.

8.3. HISTORICAL/CULTURAL SETTING

8.3.1. Actions with Negligible Effect to the Historical/Cultural Setting

There are several actions occurring under all three alternatives expected to have a negligible effect on the historical/cultural setting. These actions include:

- Structural changes to the format of the OCNMS management plan, and revisions to OCNMS goals and objectives
- Routine office and classroom activities, including meetings, visitor, education and training programs that take place in existing OCNMS or other facilities
- Use of Information Technology resources, including internet technology, data management programs, phone and e-mail technology
- Routine outreach activities that do not occur in the sanctuary, including staffing fair booths and attending community events
- Evaluate options to make compliance with the ATBA mandatory
- Including a new regulation to ban discharge of invasive species
- Expanding discharge regulation to include ban on cruise ship discharge
- Expanding discharge regulation to include ban on large vessel discharge
- Operating vessels in sanctuary
- Encouraging visitor use of beaches and intertidal areas
- Routine research activities
- Conducting wildlife research, monitoring and assessments
- Beach and intertidal activities (student field trips, beach debris removal)

These actions are expected to have a negligible effect on the historical/cultural because they involve no direct or indirect interaction between people or equipment and historical/cultural resources, are administrative in nature, occur within existing facilities, or include no construction or physical development. The actions identified above that could potentially occur in the vicinity of historical/cultural resources – research activities, wildlife monitoring, beach/intertidal activities - are conducted by (or under the supervision of) sanctuary staff with sensitivity to their responsibility under the National Historic Preservation Act. Activities involving physical disturbance to the terrestrial or marine substrate are evaluated in advance for proximity to locations in the SHPO's database, and they are not conducted in the immediate vicinity of documented historical/cultural resources. If an undocumented resource is identified or suspected, sanctuary staff would cease operations and consult with the SHPO and THPO before additional disturbance would be allowed. Furthermore, in Strategy MH1 of the management plan OCNMS has identified as a high priority the development of a programmatic agreement that will clarify and formalize procedures for consultation with other historical/cultural resource managers and avoidance of impacts to these resources.

There are several actions proposed under alternatives B and C involving modifications to OCNMS regulations which also have negligible effects on the historical/cultural setting. These include:

- Technical clarifications to OCNMS regulations as outlined in the Sanctuary Operations Action Plan (strategy OPS 9, activity H)
- Replace the term "traditional fishing" with "lawful fishing"
- Modifications to the tribal welfare permit provision in the OCNMS regulations
- Reducing the OCNMS overflight regulation from 2,000 feet to 1,000 feet (alternative C only)

The technical clarifications to OCNMS regulations would not affect historical/cultural resources within the sanctuary because the changes are language clarifications not altering the meaning or intent of the regulations.

The current OCNMS regulations define the term "traditional fishing" as "using a fishing method that has been used in the sanctuary before the effective date of sanctuary designation (July 22, 1994), including the retrieval of fishing gear" and provide an exception for traditional fishing operations to three of the regulatory prohibitions – prohibitions on discharge of certain fishing-related materials, disturbance to historical resources, and disturbance to the seabed. OCNMS regulations could be interpreted to mean that fishing methods or operations that do not fall within the definition of "traditional fishing" are not allowed to discharge materials mentioned above, or disturb historical resources or the seabed.

As part of this action, NOAA proposes to replace the term "traditional fishing" with the term "lawful fishing" in these three places to: 1) use a more clearly understood; and 2) eliminate the distinction between fishing methods used before OCNMS designation from those authorized after designation. By replacing the word "traditional" with "lawful" NOAA would unambiguously recognize fishing activities authorized by governmental fisheries management authorities. This change is expected to have a negligible effect because Federal, state, tribal and regional fishery management authorities currently analyze and attempt to mitigate impacts associated with lawful fishing, including that which has occurred traditionally in the sanctuary, and those authorities are expected to do the same in the future. Since the scope and impacts of any such future management actions are speculative at this point, it is not possible, and would be inappropriate, to speculate on any additional impact analysis in this document. See section 8.1.1 for more discussion on the regulatory change to replace the phrase "traditional fishing" with "lawful fishing".

Under the current regulations, OCNMS can issue a permit to conduct an activity otherwise prohibited if it finds that the activity will meet criteria identified in the regulations. One of the criteria listed for permit issuance is to "promote the welfare of any Indian tribe adjacent to the sanctuary." This provision is ambiguous and could be interpreted as allowing an entity not affiliated with a tribe to apply for a permit that it alleges could promote the welfare of an Indian tribe adjacent to the sanctuary. By modifying the tribal welfare permit language, OCNMS is clarifying the intent of its regulations to ensure it is used to promote or enhance tribal self-

determination and not to be used by outside parties. Because this regulatory change does not alter the availability of this permit category to American Indian tribes adjacent to the sanctuary, nor change the requirement that the permitted activity will not substantially injure Sanctuary resources and qualities, this modification to the permitting regulations is expected to have a negligible effect on the historical/cultural setting. See section 8.1.1 for more discussion on the regulatory change to clarify the permitting language.

A lowering of the overflight floor from 2,000 feet to 1,000 feet would not affect historical/cultural resources within the sanctuary because this change in regulation would not affect the number or type of aircraft flying over the sanctuary and flights will not have physical interaction with maritime heritage resources.

Finally, alternatives B and C also contain some structural changes to the management plan not included in alternative A. Under alternatives B and C, the management plan would contain performance measures, cost estimates and an implementation table. Alternatives B and C also would include a revised suite of goals and objectives for OCNMS. While these structural modifications to the document would have a negligible effect on the historical/cultural setting, they are important to note because these modifications do provide additional clarity and detail to alternatives B and C.

8.3.2. Actions with Beneficial Effects to the Historical/Cultural Setting

There are several activities occurring in one or more of the alternatives expected to have a beneficial effect on historical/cultural resources within the sanctuary. These actions include:

- Routine education, outreach visitor service, resource protection and administrative program activities
- Operating sonar (for hydrographic surveying)
- Routine maritime heritage activities

8.3.2.1. Routine Education, Outreach, Visitor Services, Resource Protection and Administrative Program Activities – Effects to the Historical/Cultural Setting

Many of the routine education, outreach, visitor services, resource protection and administrative actions taking place under all three alternatives would have an indirect, short-term, and less than significant, beneficial effect on historical/cultural resources within the sanctuary. These routine actions involve the continuation of OCNMS' primary program areas, including:

- Routine resource protection activities (e.g., beach cleanups)
- Routine outreach activities (e.g., public events)
- Routine education activities (e.g., maritime heritage presentations)
- Routine visitor services activities (e.g., operating Olympic Coast Discovery Center)
- Routine administrative activities (e.g., enforcement of regulations and permitting)

All of these program areas have less than significant, indirect and beneficial effects on historical/cultural resources because they promote ocean and cultural resource literacy, improved understanding and protection of heritage resources, and improved ocean stewardship.

By promoting these principles with partners, local communities and the general public, OCNMS has the opportunity to influence the behavior and decision-making of individuals, communities, organizations and agencies in ways benefiting historical/cultural resources. For example, if a citizen visits an OCNMS fair booth and learns about the importance of not disturbing archaeological remains, s/he may be more likely to act responsibly near historic/cultural resources. They might also share that perspective with others, which could result in better protection of resources, such as shipwreck remains or shoreline midden sites.

While these routine actions are beneficial, it is not expected their effects would be significant within the context of NEPA. The expected implementation period of the management plan is not expected to be more than 10 years. It is not likely that a substantial improvement in historical/cultural resources could be achieved on such a short time frame as a result of these types of indirect, beneficial actions.

8.3.2.2. Operating Sonar for Hydrographic Surveying – Effects to the Historical/Cultural Setting

Section 110 of the National Historic Preservation Act (NHPA) directs federal agencies managing public bottomlands to inventory the historical and archaeological resources within the management areas and to assess the significance of those resources for possible inclusion onto the National Register of Historic Places. Under all three alternatives considered, operating sonar for hydrographic surveying would be conducted to identify and map habitats, as well as biological and historical resources. This activity would have a beneficial, indirect, and less than significant effect on historical/cultural resources because they would improve understanding of what historic and cultural resources exist in the sanctuary. Improved understanding of resources alone may not directly affect these resources in a beneficial way. However, subsequent actions resulting from this research, such as listing on the National Register of Historic Places, would benefit the resources in the long term. The beneficial effect of these research activities is expected to be less than significant because there is no assurance that resources will be found or that they can be effectively protected in the harsh sanctuary environment.

8.3.2.3. Routine Maritime Heritage Activities – Effects to the Historical/Cultural Setting

As noted above, Section 110 of the NHPA requires agencies to inventory historical and archaeological properties. ONMS is also directed by the National Marine Sanctuaries Act to comply with the Federal Archaeology Program which includes laws, regulations and guidelines administered by the Department of the Interior. The Secretary of Interior's Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716) recommend the following activities to inventory historical and archaeological properties:

- Identification of the resources through:
    - Archival Research - the OCNMS database contains much of this research
    - Field Survey - beach surveys and remote sensing of submerged sanctuary environment
    - Reporting of Results - results should be reported upon to professional communities and the public

- Evaluation of identified resources to determine the historical significance of the resource
- Registration of significant resources to the National Register of Historic Places and, if appropriate, as a National Historic Landmark

Actions outlined in section 5.2 in Strategy MH1 – Cultural Resource Conservation are expected to have a beneficial effect on historic and cultural resources because they will improve knowledge and understanding of these resources and thus indirectly improve OCNMS' ability to protect and interpret these resources. Additionally, should resources be identified and eligible for the National Register of Historic Places, this designation would provide added protections for the resources. OCNMS expects the effects of these actions on cultural resources to be less than significant because they consist exclusively of planning and low-impact survey activities for beneficial conservation purposes. As part of the implementation of the final management plan, OCNMS will work with the State Historic Preservation Office (SHPO), Makah Tribal Historical Preservation Office (THPO), and other partners to develop a programmatic agreement under section 106 of the National Historic Preservation Act. This process is likely to provide NOAA with a better understanding of the current status of historic resources within the sanctuary. Should significant historic resources be found in the sanctuary, OCNMS will work with the same partners to develop appropriate management plans for these resources in accordance with NEPA and NHPA.

8.3.3. Actions with Adverse Effects to the Historical/Cultural Setting

Several actions being considered under alternatives A, B and C could result in adverse effects to historical/cultural resources in the sanctuary. These include the following actions that may necessitate disturbance of the seafloor in the sanctuary:

- Anchoring water quality and oceanographic monitoring buoys
- Collecting benthic sediment samples to support habitat mapping and characterization efforts and to identify infaunal communities

These actions are described in section 8.1.3. Both actions have the potential for damaging historical/cultural resources on the seabed. The impacts described in section 8.1.3 (impacts to physical setting) apply here. These activities could cause adverse effects to historic/cultural resources by physically damaging historic resources resting on the seafloor of which OCNMS is unaware. Because these operations impact only the upper few centimeters in a very limited area on the seafloor and the total area subject to these operations is small over a 5- to 10-year period, these effects would be less than significant.

It should be noted these two actions (sediment sampling and anchoring buoys) refer to OCNMS efforts only. It is possible an outside party could apply for an OCNMS permit to conduct sediment sampling, anchor research buoys or conduct some other seafloor disturbance activity in the sanctuary on a scale larger than work conducted by OCNMS. Permit applications of this kind will be analyzed for potential impacts to historic and cultural resources (as well as biological and physical resources). OCNMS might deny or place specific restrictions on a permit in order to ensure the protection of resources (see 8.5 Cumulative Effects, Actions for Future Analysis).

8.3.3.1. Compliance with Section 106 of the NHPA - Effects to the Historical/Cultural Setting

On April 27, 2010, ONMS published a *Federal Register* notice (Appendix B) notifying the public of ONMS' intent to coordinate its responsibilities under Section 106 of NHPA with its ongoing NEPA process, including the use of NEPA documents and public and stakeholder meetings to meet the NHPA Section 106 requirements. Section 8.3 of this document addresses the "Historical/Cultural Setting" and is intended to fulfill NHPA Section 106 requirements for the revised OCNMS management plan. It should be noted that Section 106 of NHPA addresses only historic properties and resources as defined in the NHPA. The analysis in this document encompasses additional cultural resources that are included in order to satisfy NEPA analysis requirements.

In the process of developing this document, ONMS identified consulting parties and requested information about historic properties and resources in the sanctuary to be considered in this impacts analysis. No information was provided by the SHPO, THPO or others during the EA drafting process. Should more information on the effects of revising the management plan on historic resources and properties come to light once the FMP/EA is published, OCNMS will consult with the SHPO and THPO and conduct its operations consistent with NHPA requirements.

8.3.4. Summary of Effects to Historical/Cultural Setting

In general, the majority of actions being considered under alternatives A, B and C would have a primarily beneficial, less than significant effect on historical/cultural resources in the sanctuary. The effects are expected to be less than significant because many of the actions, while important to achieving OCNMS' goals and objectives, are relatively small in scale and are not expected to cause a significant improvement to historical/cultural resources over the life of the management plan (five to ten years). There is not a significant difference between the beneficial effects to historical/cultural resources of the three alternatives.

Regarding adverse effects to historical/cultural resources, some are associated with actions being considered under the three alternatives, but none of these adverse effects would be significant. There is not a significant difference between the adverse effects to historical/cultural resources of the three alternatives.

8.4. HUMAN/SOCIOECONOMIC SETTING

The purpose of this section is to discuss the socioeconomic effects of all three alternatives on human activities. An overview of the sanctuary's human/socioeconomic setting and the activities encompassed within this setting is provided in the Affected Environment discussion.

If the no action alternative (alternative A) were selected, ONMS could choose to implement the non-regulatory aspects of alternatives B and C, which would have unique implications on the human/socioeconomic setting. Because the extensive efforts in collaboration with multiple partners were made through the management plan review process to evaluate OCNMS programs and more clearly define future priorities, an expectation has developed amongst collaborators

that most all of the action plans will be implemented. Given the lack of specificity in the current management plan, which represents the no action alternative, it is likely that OCNMS would seek to implement many non-regulatory actions in alternative B under the no action alternative. Yet implementation of these action plans without officially adopting them through revision to the management plan would undermine the trust developed through this process and transparency that ONMS aims to achieve with the management plan review process. Implementing the action plans without incorporating them into an OCNMS management plan would reduce ONMS' accountability and most likely confuse members of the public interested in understanding ONMS' structure and work efforts. Moreover, because the 20 action plans in the FMP do not correspond directly to the structure of the original 1994 management plan, it would be difficult for the public and ONMS partners to understand how the action plans and original management plan relate to one another.

8.4.1. Actions with Negligible Effects to the Human/Socioeconomic Setting

There are several actions occurring under all three alternatives that are expected to have a negligible effect on the human/socioeconomic setting within or around the sanctuary. These actions include:

- Structural changes to the format of the OCNMS management plan, and revisions to OCNMS goals and objectives
- Routine office and classroom activities, including meetings, visitor, education and training programs that take place in existing OCNMS or other facilities
- Use of Information Technology resources, including internet technology, data management programs, phone and e-mail technology
- Routine outreach activities that do not occur in the sanctuary, including staffing fair booths and attending community events

None of these actions would have a direct impact on human activities within the sanctuary. These actions are either administrative in nature or do not involve any direct or indirect interaction between the people conducting the actions and human activities within the sanctuary.

Other actions proposed under alternatives B and C involving modifications to OCNMS regulations would also have negligible effects on the historical/cultural setting. These include:

- Technical clarifications to OCNMS regulations as outlined in the Sanctuary Operations Action Plan (strategy OPS 9, activity H)
- Replacing the term "traditional fishing" with "lawful fishing"
- Modifications to the tribal welfare permit provision in the OCNMS regulations

The technical clarifications to OCNMS regulations proposed in alternatives B and C would have negligible effects on the human/socioeconomic setting within or around the sanctuary because the changes are language clarifications that do not alter the meaning or intent of the regulations.

The current OCNMS regulations define the term "traditional fishing" as "using a fishing method that has been used in the sanctuary before the effective date of sanctuary designation (July 22,

1994), including the retrieval of fishing gear" and provide an exception for traditional fishing operations to three of the regulatory prohibitions – prohibitions on discharge of certain fishing-related materials, disturbance to historical resources, and disturbance to the seabed. OCNMS regulations could be interpreted to mean fishing methods or operations not falling within the definition of "traditional fishing" are not allowed to discharge materials mentioned above, or disturb historical resources or the seabed.

As part of this action, NOAA proposes to replace the term "traditional fishing" with the term "lawful fishing" in these three places to: 1) use a more clearly understood term; and 2) eliminate the distinction between fishing methods used before OCNMS designation from those authorized after designation. By replacing the word "traditional" with "lawful" NOAA would unambiguously recognize fishing activities authorized by governmental fisheries management authorities. This change is expected to have a negligible effect because Federal, state, tribal and regional fishery management authorities currently analyze and attempt to mitigate impacts associated with lawful fishing, including that which has occurred traditionally in the sanctuary, and those authorities are expected to do the same in the future. Since the scope and impacts of any such future management actions are speculative at this point, it is not possible, and would be inappropriate, to speculate on any additional impact analysis in this document. See section 8.1.1 for more discussion on the regulatory change to replace the phrase "traditional fishing" with "lawful fishing".

Under the current regulations, OCNMS can issue a permit to conduct an activity otherwise prohibited if it finds that the activity will meet criteria identified in the regulations. One of the criteria listed for permit issuance is to "promote the welfare of any Indian tribe adjacent to the sanctuary." This provision is ambiguous and could be interpreted as allowing an entity not affiliated with a tribe to apply for a permit that it alleges could promote the welfare of an Indian tribe adjacent to the sanctuary. By modifying the tribal welfare permit language, OCNMS is clarifying the intent of its regulations to ensure it is used to promote or enhance tribal self-determination and not to be used by outside parties. Because this regulatory change does not alter the availability of this permit category to American Indian tribes adjacent to the sanctuary, nor change the requirement that the permitted activity will not substantially injure Sanctuary resources and qualities, this modification to the permitting regulations is expected to have a negligible effect on the human/socioeconomic setting. See section 8.1.1 for more discussion on the regulatory change to clarify the permitting language.

Alternative C would include a ban on the discharge of invasive species in the sanctuary. ONMS is unaware of any current human activities in the sanctuary involving or in any way requiring the discharge of invasive species other than open ocean aquaculture, which is addressed in section 8.4.3.4. Ballast water discharge in the sanctuary is already prohibited by the state of Washington ballast water discharge regulations (except mid-ocean exchanged ballast water). Thus, an OCNMS invasive species discharge ban would have no additional socioeconomic effect on the shipping industry. Moreover, an OCNMS invasive species discharge ban would not require ship operators to conduct any additional vessel inspections or ballast water analyses. Thus, it is assumed there would be no socioeconomic effect on commercial or recreational fishing operations in the sanctuary from the enactment of an invasive species discharge ban.

Finally, alternatives B and C also contain some structural changes not included in alternative A. Under alternatives B and C, the management plan would contain performance measures, cost estimates and an implementation table. Alternatives B and C also would include a revised suite of goals and objectives for OCNMS. While these structural modifications would have a negligible effect on the human/socioeconomic setting in the sanctuary, they are important to note because these modifications do provide additional clarity and detail to alternatives B and C.

8.4.2. Actions with Beneficial Effects to the Human/Socioeconomic Setting

There are several actions occurring in one or more of the alternatives expected to have a beneficial effect on human/socioeconomic setting within and around the sanctuary. These actions include:

- Routine activities conducted as part of OCNMS' resource protection, research, visitor services, outreach, education, vessel operations, maritime heritage and administrative program areas
- Beach and intertidal activities (student field trips, beach debris removal)
- Encouraging visitor use of beaches and intertidal areas
- A regulatory ban on cruise ship discharge (alternatives B and C)

8.4.2.1. Routine activities, Beach and Intertidal Activities, and Encouraging Visitor Use - Effects to the Human/Socioeconomic Setting

Many of the routine and general education, outreach, research, resource protection, administrative, maritime heritage and visitor services actions taking place under all three alternatives would have an indirect, short-term, less than significant and beneficial effect on the human/socioeconomic setting within the sanctuary. These routine actions involve the continuation of OCNMS' primary program areas, including:

- Routine resource protection activities
- Routine research activities, including anchoring research buoys
- Operating sonar and sediment sampling (for hydrographic surveying)
- Routine outreach activities, including encouraging visitor use of the shoreline
- Routine education activities
- Vessel operations
- Maritime heritage activities
- Routine visitor services activities
- Routine administrative activities

These program areas are expected to have less than significant, indirect, and beneficial effects on the human/socioeconomic setting because they would advance regional ocean governance through improved coordination and collaboration, and improve the value of the sanctuary for educational and research activities. Providing education programs and curricula to schools in disadvantaged communities on the outer coast could provide an economic benefit to those

communities, which otherwise might have to fund development of such education programs or curricula. Additionally, providing signage and interpretive programs about the sanctuary could provide an economic benefit to local communities by enhancing tourism opportunities. While all of these routine actions would be beneficial, it is not expected their effects would be significant. The expected implementation period of the management plan is no more than 10 years; thus, the actions proposed within all three management plan alternatives are not projected to last longer than 10 years. It is not likely a significant improvement on the human/socioeconomic setting would be achieved on such a short time frame as a result of these types of indirect beneficial actions.

Additionally, it should be noted the very existence of the sanctuary and its routine work programs have a beneficial and intangible effect on the human environment not measurable in dollars without conducting a complex and costly economic study of the non-use values of the sanctuary. This was deemed unnecessary by NOAA given the expected low negative impact of the proposed actions on the human/socioeconomic setting. In simple terms, OCNMS has both ecological and aesthetic values. The ecosystem provides ecological services that benefit human beings (e.g., primary productivity at the base of the marine food web). In addition, the sanctuary is a place where people can visit and experience a marine environment in a relatively undeveloped condition, with terrestrial wilderness at their back and the vast Pacific Ocean stretching beyond the horizon. Such experiences have an unquantifiable intrinsic value. Under all three alternatives, the intrinsic societal benefit of maintaining the sanctuary's programs, while difficult to quantify, is an important consideration.

For nonconsumptive users and passive users, ecosystem conditions are important for determining benefits. Resource protection is known to change the status of the habitats protected and often results in positive changes to community structure and increased biodiversity. One of the main benefits is protection of a naturally functioning ecosystem (i.e., a more natural system minimally influenced by human beings) that is expected to have benefits for passive and nonconsumptive users. Naturally functioning marine ecosystems composed of diverse biological assemblages are hypothesized to be more likely to adapt to the increasingly acidic ocean conditions expected as a result of climate change, and are perhaps less likely to develop hypoxic conditions. Should this hypothesis be correct, the socioeconomic benefits to passive and nonconsumptive users of protecting naturally functioning marine ecosystems such as OCNMS would be substantial. Additionally, the resulting resilience of the sanctuary ecosystem, in combination with greater public awareness of this resilience through OCNMS education and outreach programs, can be expected to further increase benefits flowing to passive and non-consumptive users over time. Passive and nonconsumptive user groups may even have a willingness to pay for these increased benefits. Even if the per capita socioeconomic benefit to passive and nonconsumptive users of these ecosystem services is relatively small, the overall magnitude of these benefits is still potentially large. The probable size of the passive user community is in the order of many millions of users throughout Washington State and the nation, and the cost of passive use is generally small relative to other use costs.

8.4.2.2. Cruise Ship Discharges - Effects to the Human/Socioeconomic Setting

Representatives from the North West & Canada Cruise Association polled participating cruise ship lines and found represented vessels currently do not discharge to OCNMS waters for several reasons (John Hansen, former president NWCCA, personal communication). The opportunity to discharge in the sanctuary is limited by a short transit time (mean of 1.2 hours; Table 11), as well as a complex suite of voluntary and regulatory provisions in the NWCCA MOU, MARPOL, the CWA, and the VGP. In order to avoid discharges within the sanctuary, holding tank capacity of about 800 to 4,500 gallons for treated sewage and 5,000 to 18,000 gallons for graywater would be required. According to the EPA, cruise ship capacity to hold sewage (untreated or treated) ranges from 0.5 to 170 hours, with an average holding capacity of 62 hours (EPA 2008). According to the EPA, cruise vessel capacity to hold graywater varies significantly. According to responses to EPA's 2004 cruise ship survey, graywater holding capacity ranges from 5 to 90 hours, with an average holding capacity of 56 hours (EPA 2008). Based on comparison of transit times through OCNMS with EPA's estimates, it is assumed all cruise ships currently operating in Washington state waters have sufficient holding tank capacity to retain sewage and graywater while within the sanctuary. Therefore, avoidance of wastewater discharges during this small time window would not negatively impact vessel operations.

As reviewed in section 6.1.3.1 and outlined in Table 17, there are several regulations and guidelines governing sewage (blackwater), graywater and other discharges to the sanctuary from large vessels, including cruise ships. Foreign flagged cruise ships from countries that have ratified MARPOL annex IV (probably the majority of the cruise ship fleet that transits the sanctuary) are subject to MARPOL Annex IV regulations. Even vessels not subject to MARPOL regulations (i.e., flagged from countries that have not ratified MARPOL Annex IV) are subject to CWA regulation. Washington State water quality regulations prohibit the discharge within state waters of treated effluents from any vessel that do not meet state water quality standards. The VGP addresses discharge of graywater, or sewage mixed with graywater, and numerous other effluents within 3 mi from shore. Members of the NWCCA are subject to the NWCCA MOU, a voluntary measure with measures that apply within the sanctuary.

Table 17 Regulatory framework governing graywater and (sewage) blackwater discharges from vessels over 300 GT into OCNMS

Regulation or Agreement	Waste type	Discharge Conditions
MARPOL Annex IV	Comminuted and disinfected sewage using an approved system	• > 3 nmi from shore
MARPOL Annex IV	Sewage stored in holding tanks (untreated and treated sewage)	• > 12 nmi from shore; and • Discharged while underway
MARPOL Annex IV	Treated sewage effluent discharged through an IMO approved sewage treatment plant (STP), also integrated system where the STP includes • graywater input • food processing input	• Allowed any distance from shore if the following conditions are met; • Effluent not to produce visible floating solids nor cause discoloration of surrounding water
Clean Water Act	Untreated sewage	• > 3 mi from shore

Clean Water Act	Sewage treated by a USCG approved MSD	• Any distance from shore
Vessel General Permit	Sewage	• Not covered by VGP
Vessel General Permit	Untreated or traditional MSD treated graywater, or graywater mixed with sewage	• >3 mi from shore
Vessel General Permit	AWTS treated graywater or graywater mixed with sewage	• Any distance from shore if effluent limits are achieved and documented through monitoring
Washington State Water Quality Standards (WQS) (per Chapter 90.48 RCW and Chapter 173-201A WAC)	Traditional MSD treated sewage	• In State waters* • Must meet marine WQS at point of discharge
Washington State Water Quality Standards (WQS)	AWTS treated sewage and graywater	• In State waters • Only allowed outside 0.5 mile from shellfish beds • Must meet terms outlined in NWCCA MOU
NWCCA MOU	Untreated sewage	• Outside of State waters
NWCCA MOU	Residual Solids from Type II MSD or AWTS	• > 12 nmi from shore • Outside of State waters and OCNMS boundaries
NWCCA MOU	Traditional MSD treated sewage	• Outside of State waters
NWCCA MOU	AWTS treated waste (blackwater and graywater)	• >1 mi from shore and >6 knots if certain requirements are met and effluent is continuously monitored; and • Not within 0.5 miles from shellfish beds

*State waters include the Puget Sound and the Strait of Juan de Fuca south of the international boundary with Canada; and for off the west coast, the belt of seas measured from the line of ordinary low water along that portion of the coast which is in direct contact with open sea and the line marking the seaward limit of inland waters, and extending seaward a distance of three nautical miles.

OCNMS is a defined marine jurisdiction identified on nautical charts with unique regulations governing discharges and other aspects of vessel operations. The complex suite of regulations and agreements governing wastewater discharges in OCNMS make it difficult for vessel operators to be sure where within the sanctuary it is appropriate to discharge various treated and untreated wastewater effluents. Moreover, the four national marine sanctuaries off California have regulations prohibiting discharge of wastewater from large vessels that apply to cruise ships. The discharge prohibition proposed for cruise ships provides regulatory clarity and eliminates ambiguity associated with various wastewater discharges at various distances from shore under various conditions.

Because cruise ships in the sanctuary typically are in transit to other locations and would already be spending the fuel and time necessary to traverse the sanctuary, no additional fuel costs are anticipated as a result of the proposed regulations. Furthermore, for vessel captains, regulatory

consistency between national marine sanctuaries on the West Coast may be desirable as it reduces the complexity of operations that span multiple jurisdictions with diverse regulatory requirements and limitations (John Hansen, former president NWCCA, personal communication). In sum, restrictions on discharges from cruise ships under alternatives B and C could be considered to have a less than significant effect on the human/socioeconomic setting. In addition, NOAA does not expect there to be any significant effect on employment, incomes, or housing due to the cruise ship discharge regulations proposed under alternatives B and C. As a result, NOAA expects less than significant, beneficial, direct, short term or long-term effects on the socioeconomics of the regulated community.

8.4.3. Actions with Adverse Effects to the Human/Socioeconomic Setting

There are some actions being considered under alternatives B and C potentially resulting in adverse effects to the human/socioeconomic setting, including:

- Reducing the OCNMS overflight regulation from 2,000 feet to 1,000 feet (alternative C)
- A regulatory ban on discharges from large vessels (alternative C)
- Evaluate options to make compliance with the Area-to-be-Avoided mandatory (alternative C)
- Regulatory ban on the discharge of invasive species (alternative C)

For purposes of this analysis, adverse effects to the human/socioeconomic setting are those negatively affecting the overall economy, business activity, employment, incomes, or housing for those populations adjacent to or dependent on the sanctuary. Adverse effects could result if these regulations caused the communities described in section 6 to:

- Experience reduced employment levels
- Experience decreased wages to cover potential increased costs of regulatory compliance
- Experience a decrease in business activity in or near coastal communities
- Incur increased operational costs by altering routes to avoid discharges in the sanctuary

The significance of any adverse socioeconomic effects must be carefully considered. There exist some administrative definitions of significance. Presidential Executive Order 12866 defines a significant impact for Federal Regulations as any impact of $100 million or more. When the impact of a Federal Regulation is expected to have impacts of $100 million or more, then the requirement is the Federal agency proposing the regulation must conduct a benefit-cost analysis of the regulation. None of the actions proposed under any of the three alternatives considered here would cause this level of socioeconomic impact.

Frequently, a threshold of $1 million is used to define the socioeconomic significance of an action. If the action causes an economic loss of $1 million or more then it is considered significant. If it causes an economic loss of less than $1 million then it is not considered significant. Within the context of this analysis, a $1 million threshold makes sense and is applied when considering the effects of actions on large industries (e.g., the cruise ship industry). However, this threshold does not necessarily make sense when considering economic effects on the small rural communities adjacent to the sanctuary, which have high poverty and unemployment rates. An economic loss of less than $1 million dollars could be significant in these communities.

The National Marine Fisheries Service (NMFS) considers impacts of five percent or more of a fishing community's income or employment to be significant. Fishing communities are defined as Census Designated Places or cities depending directly or indirectly on the recreational and commercial fisheries for at least 20 percent of either their income or employment, or in which 20 percent of the population living in the community is directly or indirectly dependent on the fisheries. When evaluating socioeconomic effects specifically to fishing communities, OCNMS

has considered the NMFS significance standard of five percent or more of a fishing community's income or employment. For the purposes of this analysis, the communities directly adjacent to the sanctuary are considered to be fishing communities. Neah Bay, La Push and Westport (which is not directly adjacent to the sanctuary but is a community close to the sanctuary) have been identified by NMFS as fishing communities (NMFS 2007). Taholah, WA is not identified in NMFS's Community Profiles for West Coast and Pacific Fisheries as a fishing community; however, for the purposes of this analysis, OCNMS considers Taholah to be a fishing community given the importance of fishing to the Quinault Indian Nation.

8.4.3.1. Regulatory Reduction in Overflight Floor (alternative C only) - Effects to the Human/Socioeconomic Setting

A modification of the OCNMS overflight regulation to lower the floor from 2,000 feet to 1,000 feet would provide regulatory consistency between national marine sanctuaries on the West Coast but simultaneously create an OCNMS regulation inconsistent with the FAA advisory for the same air space that applies to the national park and national wildlife refuges off the outer coast of Washington. ONMS believes a lower flight floor would not alter the number or type of planes flying over the sanctuary, but it could affect the socioeconomic setting of the sanctuary by increasing the noise detectable and visual impact to visitors on the shoreline adjacent to the sanctuary, much of which is designated wilderness within Olympic National Park. Federal wilderness lands are characterized as areas of undeveloped land retaining its primeval character and influence, without permanent improvements or human habitation. Designated wilderness is protected and managed so as to preserve its natural conditions, and where the imprint of man's work is substantially unnoticeable, and there are outstanding opportunities for solitude. The 2,000 foot FAA advisory applying to national parks and wildlife refuges mitigates the visual and acoustic impact to wildlife as well as human visitors. Based on inconsistency between this proposed regulation and FAA advisory for the same area as well as its affect to the aesthetic value of the ONP wilderness shoreline, this alternative would have a less than significant, adverse, direct, and long-term effect on human/socioeconomic resources because potential confusion concerning overflight regulations and advisories may be introduced and the wildness aesthetic may be compromised. Because this alternative is unlikely to cause socioeconomic impacts to Olympic National Park, local communities or the aviation industry on the order of $1 million or greater, the socioeconomic effects are considered less than significant.

8.4.3.2. Changes to Vessel Discharge Regulation (alternative C) - Effects to the Human/Socioeconomic Setting

Alternative A (no action) does not propose additional discharge regulations on vessels in the sanctuary. As a result, no significant adverse short-term or long-term direct or indirect impacts on the human/socioeconomic setting are expected to occur from alternative A. Alternative B does propose a ban on cruise ship discharges, but this action is expected to have a beneficial, long-term, direct effect on the human/socioeconomic setting and thus is not discussed within the context of adverse effects.

The large commercial vessel discharge regulation proposed under alternative C has potential to cause some adverse effects to the human/socioeconomic resources. Alternative C proposes an expansion of discharge regulations to include a ban on all discharges from large vessels (over

300 gross tons), with the exception of some clean discharges required for vessel operation and an exception for vessels not able to comply based on their existing design, i.e., sewage or graywater holding capacity. Affected vessels 300 gross tons and above could include public vessels, commercial vessels, passenger vessels (other than cruise ships), fishing vessels and tank vessels. These vessels operate throughout the OCNMS and conduct a wide range of the activities described in section 6 (Human/Socioeconomic Setting).

Some large vessel operators could incur additional costs, resulting from changes in operating procedures, required for compliance with OCNMS vessel discharge regulations under alternative C in order to continue their activities in the sanctuary. These effects would be applicable to:

- Large commercial vessels using the sanctuary for transit
- Commercial fishing vessels using the sanctuary for transit or for fishing operations
- Defense-related vessels using the sanctuary for transit or for training
- Research-related vessels using the sanctuary for transit or for research

Impacts to U. S. Navy vessels should be negligible. The Navy's current policy is "While transiting National Marine Sanctuaries, ships and submarines shall avoid any adverse impacts on Sanctuary resources and qualities. Ships and submarines shall minimize, to the maximum extent practicable, any solid waste, sewage, or bilge water discharges" (Section 22-922-2.2.10 Prohibited Discharge Zones for U.S. Navy Shipboard Wastes, of OPNAVINST 5090.1C, U.S. Navy 2007). Moreover, OCNMS regulations include an exception to the discharge prohibition for identified military activities performed by the Department of Defense in operations areas W-237A, W-237B, and MOAs Olympic A and B that cover the majority of OCNMS (Figure 10).

Alternative C would have a minimal effect on the operation of large commercial vessels transiting OCNMS en route to and from Puget Sound and Canadian Ports with respect to sewage and graywater management. Most large commercial vessels traversing the sanctuary are expected to have adequate sewage and graywater holding capacity to avoid discharging during the typically short 1.2 to 3.6 hour (Table 11) transit of the OCNMS. Most large commercial vessels have relatively small crews (e.g., 4 - 15 people), and thus do not generate sewage or graywater in volumes comparable to cruise ships. In order to avoid sewage discharges within the sanctuary, an estimated holding tank capacity of between 5 and 30 gallons would be required; and most large vessels have this capacity. Likewise the volume of graywater generated and potentially discharged in the sanctuary is relatively small. Although there is significant variation among vessels, most large commercial vessels have sufficient storage capacity for graywater to allow vessel operations for 20 to 48 hours without discharge (Pruitt 2004). Although sewage and graywater holding capacity likely exists on most ships, operational procedures for securing overboard discharges would need to be developed and implemented.

For all vessels, no additional costs related to fuel and transit time are expected to occur with implementation of alternative C. Since the practice of calling on Puget Sound and Canadian ports is expected to continue compliant with the CVTS and ATBA, with or without implementation of alternative C, impacts to vessels currently complying with the ATBA (vessels

>1,600 GT) would be negligible. Rather, alternative C would simply prompt large commercial vessels to hold their sewage until they are outside the sanctuary boundary.

Vessels operating in the OCNMS for substantial lengths of time are potentially more affected by the provisions of Alternative C than large commercial vessels. Vessels such as public research vessels and commercial fishing vessels may remain in the sanctuary to perform their allowed functions. These vessels may not have adequate capacity to retain sewage and graywater while within OCNMS. However, under Alternative C, exceptions to this rule are allowed based on a vessel's existing design and holding tank capacity. As an example the NOAA Ship *McArthur II*, a 224 foot 1,914 GT research vessel, occasionally conducts research cruises within OCNMS. The *McArthur II* has a combined sewage and graywater holding tank of 4,000 gallons, which for a typical crew of 37 provides a wastewater holding capacity of approximately 2 days. Without the exception for vessels not able to comply based on their existing design, the *McArthur II* would be required to break from research operations every other day to transit to an area where discharge of sewage and graywater were legal. With this exception, under this alternative, there would be an allowance for the vessel's existing design and holding tank capacity.

Some commercial fishing vessels operating in OCNMS are greater than 300 GRT and would therefore be regulated under Alternative C. The NOAA Vessel Monitoring System (VMS) data analyzed by OCNMS, which includes participating commercial fishing vessels, does not include the tonnage of the vessel, so the number of commercial fishing vessels 300 GT or above (those affected by alternative C) is unknown. However, the CVTS data set does include tonnage. Of the fishing vessels documented in CVTS data, 23% were 300 GT or above (Table 11; see Appendix K for a description of VMS and CVTS data.). For commercial fishing vessels, time spent in the sanctuary is a combination of transit and fishing time. Table 11 estimates the average duration of commercial fishing vessel transits (vessels not actively fishing) ranges from 2.6 to 3.2 hours. Holding tank capacity of about 3 to 14 gallons for sewage and 17 to 56 gallons for graywater would be required in order to avoid discharges while in the sanctuary during transits. However, fishing vessels actively fishing could spend a significantly longer period of time in the sanctuary. Based on VMS data, there were 153 fishing trips, or approximately 5% of fishing trips in 2009, exceeding two days. Based on this information it is reasonable to conclude there are fishing vessels greater than 300 GT in the sanctuary for a period of time that would exceed their holding tank capacity. Again, the exemption for existing vessel design would mitigate the impact of this alternative.

While the exemption for existing vessel design greatly mitigates the financial impact from this regulation, there would be some minimal costs involved in complying with the regulation. Large commercial vessel operators, in particular, would need to establish procedures for securing overboard sewage and graywater discharge. These costs would vary based on vessel design and operations. The adverse effects of this alternative would be less than significant, direct and long-term. The effects are considered less than significant because, given the exception for existing vessel design and the existing capacity of most vessels to adhere to the proposed regulation without major modifications to their structures or routes, it is unlikely this regulatory change would cause a loss of $1 million or more to any industry.

8.4.3.3. Area-to-be-Avoided - Effects to the Human/Socioeconomic Setting

Currently, the Olympic Coast Area to be Avoided (ATBA) is an International Maritime Organization (IMO) voluntary vessel routing measure for vessels 1,600 gross tons and above. The ATBA has been in place since 1994, and its compliance rate has been high, estimated to be 98.9% in 2009 (WDE 2010). To maintain the high compliance rate, OCNMS works with the USCG to notify non-compliant vessels with a formal letter requesting they adhere to the ATBA in the future.

Under alternative C, OCNMS would work with its partners to evaluate options to make compliance with the ATBA mandatory. In order to understand the extent and potential significance of changing the voluntary nature of the ATBA, OCNMS evaluated ATBA compliance rates and identified the population of vessels not voluntarily complying with the ATBA. OCNMS further evaluated responses from the ATBA Monitoring and Outreach program to evaluate response from industry on reasons for non-compliance.

The transits of vessels for which the ATBA applies off the Olympic Coast in 2009 are summarized in Table 15. In 2009, 8,849 transits (vessels for which the ATBA applies) were tracked by Cooperative Vessel Traffic Service (CVTS) monitoring. Of these transits, 6,128 entered OCNMS (Figure 11), with a total of 68 transiting within the ATBA (Figure 12). In 2009 the ATBA voluntary compliance rate was estimated at near 99%.

To better understand the reasons for non-compliance for these 68 transits ONMS reviewed responses from these vessels (see 8.1.2.4). The sanctuary has concluded changing the ATBA provisions from voluntary to mandatory would have a minimal impact in the behavior of shipping in the sanctuary. There would be some increased costs to both the government and the maritime industry in implementing a mandatory ATBA provision. The effect of this alternative would be less than significant, adverse and long-term. The effect is expected to be less than significant because, given the nearly perfect compliance rate with the ATBA that already exists, there is no indication this change to the ATBA would lead to a loss of $1 million or more to the shipping industry.

8.4.3.4. Regulatory Ban on Invasive Species Discharge - Effects to the Human/Socioeconomic Setting

Alternative C would include a ban on the discharge of invasive species in the sanctuary. It is assumed this action could have some adverse effect on the human setting because it would restrict people from farming invasive species (e.g., Atlantic salmon) in the sanctuary, although ONMS could consider granting a permit for an aquaculture project on a case-by-case basis. An OCNMS permit would be required for any aquaculture project in the sanctuary because such a project would trigger OCNMS' discharge or seafloor disturbance regulations. Therefore, potential impacts of invasive species would be an additional consideration for OCNMS permitting if such a project were proposed. It is assumed the adverse socioeconomic effect of this regulation would be less than significant because ONMS has never received an application from any entity seeking to farm an invasive species in OCNMS and knows of no plans under development at this time. Thus, ONMS, through this regulatory change, would not expect to

cause any significant (>$1 million) economic losses to the aquaculture industry. It is also important to note a ban on discharging invasive species in the sanctuary would not be equivalent to a ban on aquaculture in the sanctuary. Farming operations involving native species would be considered but, as noted above, likely would require an OCNMS permit.

8.4.4. Summary of Effects to Human/Socioeconomic Setting

In general, the majority of actions being considered under alternatives A, B and C would have some beneficial, less than significant effects on the human/socioeconomic setting in the sanctuary. There is not a substantial difference in the beneficial effects expected from the three alternatives.

The actions under both alternatives A and B are expected to have solely beneficial effects on the human/socioeconomic setting. The actions under alternative C are expected to have primarily beneficial effects on the human/socioeconomic setting, but also may have some less than significant, adverse effects.

The beneficial effects of all three alternatives are considered less than significant because, while the actions under these alternatives are critical to achieving OCNMS' goals and objectives, they are relatively small in scale and are not expected, to cause a large and measurable improvement to the socioeconomic health of local communities over the life of the management plan (five to ten years). That is not to say revising the OCNMS management plan will not *contribute* positively to local and regional socioeconomic improvements by promoting tourism on the Olympic Peninsula, providing resources to local school systems for educational programs etc.

Regarding adverse effects to human/socioeconomic setting, the additional actions being considered under alternative C would have a less than significant adverse, direct, short and long-term effects on the socioeconomics of local communities. These effects could include minor increases in operating costs or foregone economic opportunities. No significant macroeconomic or fiscal impacts are expected. It is important to note, while significant effects on local economies are not expected as the result of any of the three management plan alternatives, that does not necessarily mean there would or wouldn't be significant effects on certain individuals or groups. Certainly if a person were among those who are impacted it could feel significant to that person. OCNMS has no basis for judging significance in this context. This analysis simply provides OCNMS' best estimates of the extent of potential effects on communities overall.

8.5. CUMULATIVE EFFECTS

The National Environmental Policy Act and the White House Council on Environmental Quality (CEQ) require federal agencies consider the cumulative environmental effects of the action(s) they propose. The cumulative effect of the proposed action is the incremental environmental effect the proposed action has when added to other past, present and future actions in the affected environment. Cumulative effects are critical to explore because it is often the combined effect of many actions in one area or region that causes the most significant adverse effects.

Analyzing cumulative effects and assessing their significance can be challenging. OCNMS considers cumulative effects to be significant if they exceed the capacity of a resource (socioeconomic, biological, physical, historic and/or cultural) to sustain itself and remain productive. In order to analyze cumulative effects, OCNMS followed informal CEQ guidelines as documented in *Considering Cumulative Effects Under the National Environmental Policy Act* (CEQ 1997). In these guidelines, CEQ presents an 11-step process for reviewing and assessing cumulative impacts.

Actions identified under alternatives A, B and C as causing any beneficial or adverse effects to resources were reviewed to identify potential cumulative issues. The geographic scope and time frame for the cumulative effects analysis are the same as for the management plan review, i.e., the existing boundaries of OCNMS and a 5-10 year time frame. In conducting this analysis OCNMS utilized the findings from the 2008 Condition Report as a baseline (ONMS 2008).

Process for Reviewing and Assessing Cumulative Impacts (CEQ 1997)

Step 1 – Identify the potentially significant cumulative effects issues associated with the proposed action and define the assessment goals.
Step 2 – Establish the geographic scope for the analysis
Step 3 – Establish the time frame for the analysis
Step 4 – Identify other actions affecting the resources, ecosystems, and human communities of concern
Step 5 – Characterize the resources described in the affected environment in terms of their response to change and capacity to withstand stresses.
Step 6 – Characterize the stresses affecting these resources and their relation to regulatory thresholds
Step 7 – Define a baseline condition for the resources
Step 8 – Identify the important cause-and-effect relationships between human activities and the resources
Step 9 – Determine the magnitude and significance of cumulative effects
Step 10 – Modify or add alternatives to avoid, minimize or mitigate significant cumulative effects.
Step 11 – Monitor the cumulative effects of the selected alternative and adapt management.

The analysis of cumulative effects considers the present effects of past actions to the extent they are relevant and useful in analyzing whether the reasonably foreseeable effects of the Proposed Action and future projects would collectively result in a significant effect on the environment. The following projects include only those with some potential to contribute to the cumulative effects:

- Seafloor disturbance
- Noise pollution
- Vessel operations
- Trampling
- Invasive species regulations
- Vessel discharge regulations
- Climate change
- Marine Resource Protection

8.5.1.1. Cumulative Effects of Seafloor Disturbance

There are two primary types of OCNMS operations disturbing the seafloor - anchoring of research moorings and bottom grab samples. Analysis of these actions has found them to be less than significant, adverse, direct and short-term to the biological, physical and historic and cultural setting of the sanctuary. Other non-OCNMS actions within the boundaries of the sanctuary that also disturb the seafloor and which contribute to the cumulative impacts to these resources include the installation of cables, bottom contact fishing gear, the Quillayute River Harbor Project, the abandonment of sunken vessels, some Naval operations, and the conduct of non-OCNMS research activities.

The 2008 Condition Report concluded selected habitat loss or alteration has taken place from human activities, and the most significant impact likely has resulted from bottom contact fisheries conducted for years over broad areas (ONMS 2008). The area of the seafloor disturbed by OCNMS actions is miniscule compared other activities. Therefore, the actions of OCNMS do not significantly contribute to the cumulative effects of seafloor disturbance.

8.5.1.2. Cumulative Effects of Noise Pollution

OCNMS operations under all three alternatives would contribute to noise in the sanctuary include vessel and survey operations. However, OCNMS activities are small in scope and intensity compared with existing traffic. Additional sources of noise pollution in the sanctuary include commercial shipping and military operations. The primary source of low-frequency ocean noise is commercial shipping (NRC 2003). In 2009 there were approximately 7,000 transits of large vessels (over 300 GT) in the sanctuary (Table 11). An additional source of noise pollution in the sanctuary is military operations, for which there are exceptions to OCNMS regulations provided in 15 CFR 922.152(d). Both the Northwest Training Range Complex and the Quinault Underwater Test Range overlap with the boundaries of OCNMS. Both of these military operating areas have been subject to recent NEPA analysis and MMPA permitting requirements. While the cumulative effects of noise pollution within the sanctuary have not been documented, ONMS believes its contribution to these the cumulative effect would be less than significant, adverse, direct and short-term under all three alternatives, due to the separation in

time and space from these vessel operations and the large areas of the sanctuary excluding large vessel transits, e.g., the ATBA.

8.5.1.3. Cumulative Effects of Vessel Operations

In addition to noise pollution, the operation of vessels within the sanctuary can have an effect on physical and biological setting by providing a potential source of water pollution. Additional effects can occur through harassment of wildlife and/or ship strikes. Current level of OCNMS operations is at approximately 12.5 vessel days (300 hours of operations). This is out of an approximate total of 5,000 vessel days occurring annually in the sanctuary (Table 6). The nature of these operations is generally disbursed with some concentrations occurring at harbor entrances, popular fishing grounds, and in vessel traffic lanes. The 2008 Condition Report concluded water quality in the sanctuary is in good condition (ONMS 2008). Therefore, the cumulative effects of OCNMS vessel operations under all three alternatives would be less than significant, adverse, direct and short-term.

8.5.1.4. Cumulative Effects of Trampling

Actions occurring in the intertidal zone with potential to have an adverse effect through trampling include:

- Beach and intertidal educational and interpretive programs
- Intertidal surveys
- Marine debris removal projects
- Encouraging visitation to beaches and intertidal areas

Other actions contributing to this type of impact include Olympic National Park and school group interpretive activities, and impacts from the general public's visitation to intertidal areas.

The 2008 Condition Report found that while selected habitat loss or alteration has taken place from human activities, these impacts are unlikely to cause substantial or persistent degradation to living resources (ONMS 2008). Therefore, the cumulative effects of intertidal activities under all three alternatives would be less than significant, adverse, direct and short-term.

8.5.1.5. Cumulative Effects of Invasive Species Regulations

Alternative C includes a new regulation, which would ban the discharge of invasive species in the sanctuary. Other actions impacting the cumulative effect of this regulation include current state of Washington regulations restricting the introduction of invasive species in state waters. Because the addition of an OCNMS invasive species discharge ban 1) would be largely redundant with state of Washington regulations and 2) would likely not add any significant additional protections for resources in the sanctuary, the cumulative effects of the invasive species regulation would be beneficial, indirect, long-term and less than significant.

8.5.1.6. Cumulative Effects of Vessel Discharges

Alternatives B and C both contain regulations which would prohibit certain discharges from different classes of vessels in order to support efforts to maintain water quality in the sanctuary. Other actions effecting water quality in the sanctuary include an existing Washington State and

Northwest CruiseShip Association Memorandum of Understanding (MOU) that restricts cruise ship discharges in state waters, state of Washington ballast water regulations that restrict vessel discharges in and adjacent to state waters, the IMO Area-to-be-Avoided, and federal (EPA) water quality regulations (e.g., Clean Water Act).

The 2008 Condition Report found water quality in the sanctuary to be in "good" condition (ONMS 2008). Furthermore, preceding analyses of potential OCNMS vessel discharge regulation changes indicate these potential regulatory changes would have only a small added benefit to water quality in the sanctuary because existing regulations (state, federal and IMO) already provide substantial protection of water quality in most of the sanctuary. The cumulative effect of potential changes to OCNMS vessel discharge regulations in conjunction with existing state and federal water quality protection regulations would be beneficial, indirect, long-term and less than significant.

8.5.1.7. Cumulative Effects of Climate Change

Climate change is, by nature, a cumulative effects issue. No single point source or event has caused climate change. Rather, the changing climate is cumulatively affected by many actions all over the globe. The United States government has identified climate change as a significant problem of national and international concern. The White House Council on Environmental Quality is currently developing guidelines federal agencies can use to address the issue of climate change in the NEPA process. Through the management plan review process, ONMS has addressed the issue of climate change in detail by developing a Climate Change Action Plan and Sanctuary Operations Plan to be implemented under alternatives B and C. Both of these action plans discuss ways in which ONMS would reduce its carbon footprint and work with local communities in the sanctuary region to understand and address the issue of climate change.

The burning of fossil fuels contributes to the build-up of greenhouse gases in the atmosphere. The build-up of greenhouse gases in the environment in turn influences climate. Alternatives A, B and C contain actions requiring the burning of fossil fuels to support the operation of sanctuary vessels and vehicles. Additionally, there is a significant volume of marine shipping and vessel operations occurring in the sanctuary. Insufficient data exist to characterize the specific effect or contribution of fossil fuel burning in the sanctuary region on or to global climate change. However, given the small scale of OCNMS activities involving fossil fuel burning, it is unlikely OCNMS greenhouse gas contributions under alternatives A, B or C would cause a significant change in the cumulative effect of fossil fuel burning in the sanctuary region. Under all three alternatives, ONMS would continue to maintain a small staff, a small fleet of vehicles and vessels, and would engage in no commercial or industrial-scale fossil fuel burning activities. Thus, the cumulative effects of all three alternatives on climate change are assumed to be adverse, but less than significant.

8.5.1.8. Cumulative Effects of Marine Resource Protection

Alternatives A, B and C consider actions providing protection for marine resources in the sanctuary. The National Park Service and the U.S. Fish and Wildlife Service also provide protections for marine resources in and adjacent to the sanctuary through the management of Olympic National Park and the Washington Maritime Wildlife Refuge Complex. Thus, there is a

less than significant, beneficial, cumulative effect of having multiple federal protection structures (park, refuge and sanctuary) for marine resources in the sanctuary. This cumulative effect under all three alternatives is assumed to be less than significant because the combined park/refuge/sanctuary area represents a relatively small area of the Pacific Ocean in which these types of protections for marine resources are provided.

8.5.1.9. Actions for Future Analysis

Many of the actions and strategies under all three alternatives provide broad management direction. Where actions are specific and adequately defined, the environmental consequences have been analyzed. Conversely, actions that are broad and general in nature would be analyzed in future environmental and cultural compliance documents, once sufficiently specific actions are proposed and defined. Examples of actions that may be analyzed in the future include:

- Construction of visitor centers, storage facilities, staff offices, interpretive signage and vessels
- Potential maritime archeological investigations
- Potential discovery of maritime archeological sites requiring development of preservation and protection plans
- Potential submerged marine debris removal projects (e.g., removing buried crab pots, abandoned vessels, etc.)
- Potential OCNMS permit applications to conduct a variety of human development activities in the sanctuary (e.g., fiber optic cable installations, alternative energy projects etc.)

Alternatives B and C both provide guidance for future expansion of OCNMS programs. Specific details for how these programs may expand would not be developed until the resources to support such expansions are available. At that time, appropriate environmental and cultural review and compliance documentation would be developed in accordance with NEPA, NHPA, NOAA guidelines, as well as Endangered Species Act (ESA), CWA, and other federal laws. Additionally, ONMS cannot anticipate the nature of permit applications it may receive to conduct prohibited activities in the sanctuary. Permit applications must be analyzed on a case-by-case basis, and an appropriate level of environmental and cultural compliance documentation would be determined on a case-by-case basis.

8.6. SUMMARY OF EFFECTS

Effects to the physical, biological, historical/cultural, and human/socioeconomic settings were analyzed for each of the three alternatives being considered (Table 18). Effects were classified as beneficial or adverse, direct or indirect, short-term or long-term and significant or less than significant (terms all of which are defined in the introduction to section 8.0). The types of actions analyzed (Table 13) included, but were not limited to:

- Routine OCNMS resource protection, research, education, outreach, visitor services, maritime heritage, administration activities
- Potential changes to OCNMS regulations (related to vessel discharges, invasive species etc.)
- OCNMS vessel operations
- Research and monitoring activities causing seafloor and wildlife disturbance and disturbance to the intertidal zone
- Continuation and potential expansion of the Area-to-be-Avoided

Additionally, the cumulative effects of the actions proposed under all three alternatives were analyzed within the context of other federal and non-federal activities occurring in the sanctuary. In all cases, the effects of all three alternatives were found to be less than significant (Table 18).

Table 18 Comparison of effects of the three alternatives on physical, biological, historic/cultural and socioeconomic resources

Setting	*Effects of Alternative A*	*Effects of Alternative B*	*Effects of Alternative C*
Physical	Less than significant, adverse and beneficial	Less than significant, adverse and beneficial	Less than significant, adverse and beneficial
Biological	Less than significant, adverse and beneficial	Less than significant, adverse and beneficial	Less than significant, adverse and beneficial
Historic/Cultural	Less than significant, adverse and beneficial	Less than significant, adverse and beneficial	Less than significant, adverse and beneficial
Human/ Socioeconomic	Less than significant, adverse and beneficial	Less than significant, adverse and beneficial	Less than significant, adverse and beneficial
Cumulative	Less than significant, adverse and beneficial	Less than significant, adverse and beneficial	Less than significant, adverse and beneficial

As the environmental consequences analysis demonstrates, revision of OCNMS' management plan (under all three alternatives) would have an overall beneficial effect on resources in the sanctuary (biological, physical, historic/cultural and socioeconomic). Because the management plan is a broad, guidance document, these beneficial effects would in many cases be indirect, occurring as ONMS takes actions to improve 1) public understanding of marine conservation issues, 2) scientific understanding of sanctuary ecosystems and historic and cultural resources, 3) marine stewardship and maritime heritage programs, 4) OCNMS regulations in order to reduce potential stressors on marine resources (e.g., vessel discharges, oil spills and potential invasive

species introductions). These effects would be less than significant because they alone are not likely to result in a substantial, measurable improvement of resource health over the relatively short life of the management plan (five to ten years).

Measurable changes in the health of resources in the sanctuary will likely occur over a longer period of time, and as the result of incremental changes in human behavior that ONMS hopes to influence through the continuation and development of its research, resource protection, education, outreach, visitor and maritime heritage programs. To say these beneficial effects are less than significant is not to say they are not critical to OCNMS' mission or to resource protection efforts in the sanctuary. Revising the management plan, particularly as discussed under the preferred alternative B, would provide a strategic and detailed path forward for OCNMS and its partners to achieve more effective management and protection of resources in the sanctuary. However, within the context of NEPA, these beneficial effects do not meet the criteria of "significant".

In addition to these beneficial effects, some actions proposed under all three alternatives would cause direct and indirect adverse effects on resources. These adverse effects include, for example, disturbance to wildlife in order to monitor and understand the health of species in the sanctuary, disturbance to the seafloor in order to install water quality monitoring buoys. In all cases, adverse effects were found to be less than significant because ONMS conducts these activities on a small scale, in a manner that substantially minimizes impacts to resources, and in a manner minimizes costs for sanctuary users.

Cumulative effects of actions under all three alternatives were also found to be less than significant. For the most part, this is because the effects of OCNMS actions (beneficial and adverse) are small in scale. Thus, the addition of these effects to those of other similar activities occurring in the sanctuary would not significantly alter the cumulative effects of these activities overall. In some cases, there was little information available to assess the effects of other entities' activities in the sanctuary. In such cases, the information available suggested the cumulative effects would be less than significant. Should additional information about these activities become available in the future, it would be incorporated into future OCNMS NEPA cumulative effects analyses.

9. PERSONS AND AGENCIES CONTACTED

This list includes all people and agencies that assisted OCNMS in developing the action plans in the Final Management Plan or in reviewing aspects of the environmental effects analysis.

Olympic Coast National Marine Sanctuary Advisory Council

Bob Boekelheide
Bob Bohlman (former Vice Chair)
Chip Boothe (Chair)
Captain Scott Bornemann
Ginny Broadhurst
Diane Butorac
John Calambokidis
Al Carter
Mike Doherty
Kevin Duffy
Steve Fradkin
Doug Fricke
Caroline Gibson
Joe Gilbertson
Garth Griffin
Mike Gurling
Karen Gustin
Jennifer Hagen
George Hart
Frank Holmes
Dave Hudson
Phil Johnson
Ed Johnstone
Steve Joner
Joel Kawahara
Jody Kennedy
Dr. Terrie Klinger
Fayette Krause
Katie Krueger
Ellen Matheny (Secretary)
John Miller
Mel Moon, Jr.
Roy Morris
Corey Niles
Meri Parker
Captain Scott Pollock
Rebecca Post
David Price
David Roberts
Kevin Ryan
Dana Sarff
Joe Schumacker
Brady Scott (Vice Chair)
Teresa Scott
Fan Tsao
Lee Whitford
Gene Woodwick

Olympic Coast Intergovernmental Policy Council

Citizen

Nancy Messmer

Coastal Maritime Archeological Resources

Carl Harrington

Ecotrust

Charles Steinbeck

Feiro Marine Life Center

Betsy Wharton
Deborah Moriarty
David Morris

Friends of the Earth

Marcie Keever
Fred Felleman

Forks High School

John Hunter

Foss Maritime

Bruce Reed

Grays Harbor College
Lorena Marchant
Sarah Shaw

Hoh Tribe
Warren Scarlett
Joe Gilbertson
David Hudson

Hoh River Residents' Association
John Richmond

Holland America Line
Jon Turvey

Makah Tribe
Micah McCarty
Steve Joner
Sue Wolf
Dana Sarff
Greg Arnold
Chad Bowechop
Janine Bowechop
Meri Parker

Marine Exchange of Puget Sound
Bob Bohlman
John Veentjer

Marine Spill Response Corporation
John Bowles
Craig Cornell

NOAA Office of Response and Restoration
Doug Helton

National Marine Fisheries Service, Northwest Region
Kevin Duffy
Garth Griffin
Frank Lockhart
Brent Norberg
Yvonne deReynier

Natural Resources Consultants, Inc.
Jim Riedel
Tim Gallo
Jeff June

North Pacific Coast Marine Resources Committee
Rich Osbourne

North Pacific Fishing Vessel Owners' Association
Leslie Hughes

Northwest Fisheries Science Center
Jason Cope
Phil Levin
Vera Trainer

North West and Canada Cruise Association
Donna Spalding
John Hansen

Northwest Indian Fisheries Commission
Rob Jones
Eric Wilkins
Craig Bowhay
Debbie Preston

Olympic Coast Alliance
John Woolley

Oceana
Ben Enticknap

Ocean Shores Interpretive Center
Gene Woodwick

Ocean Shores School District
Karen Rasmussen
Beth Rockey

Olympic National Park
Steve Fradkin
Judy Lively
Dean Butterworth
Dave Conca
Paul Gleeson
Colin Smith
Kathy Steichen
Karen Gustin
Jacilee Wray

Olympic Park Institute
Kent Chapple
Shannon Walz
Randall Walz

Pacific Fishery Management Council

Pacific Merchant Shipping
Mike Moore

Port Angeles School District
Dan Lieberman

Quileute Tribe
Jennifer Hagen
Katie Krueger
Mel Moon
Chris Morganroth III

Quinault Indian Nation
Tom Gibbons
Ed Johnstone
Joe Schumacker

Reef Environmental Education Foundation
David Jennings

Seattle Aquarium
Karen Matsumoto

Surfrider Foundation
Jody Kennedy
Shannon Serrano

The Nature Conservancy
Jacques White

Tombolo Institute
Gary Greene

U.S. Coast Guard
Scott Bornemann
Scott Knutsen

U.S. Fish and Wildlife Service
Deanna Lynch
Sue Thomas
Kevin Ryan

U.S. Geological Survey
Sam Johnson

University of Washington
Dr. Barbara Hickey
Dr. Jan Newton
Dr. Julia Parrish

Washington Department of Fish and Wildlife
Greg Bargmann
Michele Culver
Dan Doty
Steve Jeffries
Allen Pleus
Heather Reed

Washington Department of Ecology
Chip Boothe
Diane Butorac
Jennifer Hennessey
Amy Jankowiac
Rebecca Post
Spencer Reeder

Washington State Historic Preservation Office
Rob Whitlam

Washington State Maritime Cooperative
Tom Callahan

Washington State Oil Spill Advisory Council
Jerry Joyce

Washington State University
Katherine Baril

Westport Historical Seaport
Les Bolton

Wright Brothers Aviation
Jeff Wells

Western Washington University
Nancy Bluestein-Johnson

10. REFERENCES

ADEC (Alaska Department of Environmental Conservation). 2000. 2000 Cruise ship initiative Part 2 Report. http://www.dec.state.ak.us/water/cruise_ships/pdfs/acsireport2.pdf (accessed July 14, 2010).

ADEC (Alaska Department of Environmental Conservation). 2010a. Alaska DEC Large Cruise Ship 2009 Wastewater Sampling Results. May 10 2010 http://www.dec.state.ak.us/water/cruise_ships/pdfs/2009_Large_Sampling_Report.pdf (accessed October 26, 2010).

ADEC (Alaska Department of Environmental Conservation). 2010b. 2010 Large Commercial Passenger Vessel Wastewater Discharge General Permit Information Sheet. http://www.dec.state.ak.us/water/cruise_ships/pdfs/2010_Cruise_Ship_Info_Sheet_FINAL.pdf (accessed April 22, 2010.)

Airame, S., J.E. Dugan, K.D. Lafferty, H. Leslie, D. A. McArdle, and R.R. Warner. 2003. Applying ecological criteria to marine reserve design: a case study from the California Channel Islands. Ecol. App. 13(1): S170-184.

Au, W.W.L. and M.C. Hastings. 2008. *Principles of Marine Bioacoustics*. New York: Springer.

Auster, P.J., R.J. Malatesta, R.W. Langton, L. Watling, P.C. Valentine, C.L.S. Donaldson, E.W. Langton, A.N. Shepard and I.G. Babb. 1996. The impacts of mobile fishing gear on seafloor habitats in the Gulf of Maine (Northwest Atlantic): implications for conservation of fish populations. Reviews in Fisheries Science 4: 185-202.

Auster, P.J., and R.W. Langton. 1999. The effects of fishing on fish habitat. In: Benaka, L. (ed), pp. 150-187. Fish Habitat: Essential Fish Habitat and Rehabilitation. American Fisheries Society, Bethesda, Maryland.

Berkeley, S.A., C. Chapman, S.M. Sogard. 2004. Maternal age as a determinant of lavral growth and survival in a marine fish, *Sebastes melanops*. Ecology Letters 85: 1258-1264.

Brancato, M.S., J.W. Davis, R. Jameson. C.E. Bowlby and L. Milonas. 2009. Chemical Contaminants, Pathogen Exposure and General Health Status of Live and Beach-Cast Washington Sea Otters (*Enhydra lutris kenyoni*). Lacy, WA, Department of Interior, U.S. Fish and Wildlife Service Region 1: 175.

Brancato, M.S., C.E. Bowlby, J. Hyland, S.S. Intelmann, and K. Brenkman. 2007. Observations of Deep Coral and Sponge Assemblages in Olympic Coast National Marine Sanctuary, Washington. Cruise Report: NOAA Ship *McArthur II* Cruise AR06-06/07. Marine Sanctuaries Conservation Series NMSP-07-03. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Sanctuary Program, Silver Spring, MD. 48 pp.

Chan, F., J.A. Barth, J. Lubchenco, A. Kirincich, H. Weeks, W.T. Peterson, and B.A. Menge. 2008. Emergence of anoxia in the California Current large marine ecosystem. Science 319: 920.

Cockcroft V.G., A.C. Kock, D.A. Lord, G.J.B. Ross. 1989. Organochlorines in bottlenose dolphins *Tursiops truncatus* from the east coast of South Africa. South African Journal of Marine Science 8: 207-217.

deRivera, C.E., G.M. Ruiz, J. Crooks, K. Wasson, S. Lonhart, P. Fofonoff, B. Steves, S. Rumrill, M.S. Brancato, S. Pegau, D. Bulthuis, R.K. Preisler, C.G. Schoch, C.E. Bowlby, A. DeVogelaere, M. Crawford, S.R. Gittings, A.H. Hines, L. Takata, K. Larson, T. Huber,

A.M. Leyman, E. Collinetti, T. Pascot, S. Shull, M. Anderson and S. Powell. 2005. Broad-scale non-indigenous species monitoring along the west coast in national marine sanctuaries and national estuarine research reserves. Report to National Fish and Wildlife Foundation. Smithsonian Institute, National Estuarine Research Reserve System, National Marine Sanctuary Program, Washington, D.C. 125 pp.

Dethier, M.N. 1988. A Survey of Intertidal Communities of the Pacific Coastal Area of Olympic National Park, Washington: Final Report. Final Report, National Park Service, Friday Harbor.

DOC. 2009. Washington State Travel Impacts, 1991-2009p. Prepared for the Washington State Department of Commerce by Dean Runyan Associates, Portland, Oregon, January 2009.

EPA (U.S. Environmental Protection Agency). 1999. Phase 1 Final Rule and Technical Development Document of Uniform Discharge Standards. Graywater: Nature of Discharge. http://www.epa.gov/owow/oceans/regulatory/unds/TDDdocuments/appAgraywater.pdf. (accessed July 14, 2010).

EPA (U.S. Environmental Protection Agency). 2006. MARPOL 73/78 Overview. http://www.epa.gov/owow/OCPD/marpol.html. (accessed July 14, 2010).

EPA (U.S Environmental Protection Agency). 2008a. Cruise Ship Discharge Assessment Report. EPA842-R-07-005. U.S. EPA Office of Water, Washington, D.C. http://www.epa.gov/owow/oceans/cruise_ships/pdf/0812cruiseshipdischargeassess.pdf . (accessed July 1, 2010).

EPA (U.S. Environmental Protection Agency). 2008b. National Pollutant Discharge Elimination System (NPDES) Vessel General Permit (VGP) for Discharges Incidental to the Normal Operation of Vessels Fact Sheet. http://www.epa.gov/npdes/pubs/vessel_vgp_factsheet.pdf . (accessed July 14,2010).

EPA (U.S. Environmental Protection Agency). 2010a. Evaluation of Improved Type I Marine Sanitation Devices. http://www.epa.gov/nrmrl/pubs/600r10008/600r10008.pdf. (accessed June 22, 2010).

EPA (U.S. Environmental Protection Agency). 2010b. Draft Report to Congress: Study of Discharges Incidental to Normal Operation of Commercial Fishing Vessels and Other Non-Recreational Vessels Less than 79 Feet. http://cfpub.epa.gov/npdes/vessels/reportcongress.cfm. (accessed July 14, 2010).

Epstein, P.R., T.E. Ford, and R.R. Colwell. 1993. Health and climate change: Marine ecosystems. The Lancet 342:1216-1219.

Erickson, A. and J.G. Wullschleger 1998. A preliminary assessment of harvest on the Olympic Coast. Port Angeles, WA, Olympic National Park: 15 pp.

Erickson, A. 2005. Effects of human trampling in the barnacle zone along a gradient of use in Olympic National Park. Master's Thesis. University of Washington Seattle, WA. 50 pp.

Global Ballast Water Programme. 2003. Global Project Task Force (GPTF), Fourth Meeting, Beijing, China. 28-30 October 2002 Proceedings. IMO London.

Graybill, M.R. and J. Hodder. 1985. Effects of the 1982-83 El Nino on Reproduction of six species of seabirds in Oregon. Pp. 205-210 in: Wooster, W.S., and D. L. Fluharty. Eds., El Niño North. Washington Sea Grant Program, University of Washington, Seattle.

Harvell, C.D., K. Kim, J.M. Burkholder, R.R. Colwell, P.R. Epstein, D.J. Grimes, E.E. Hofmann, E.K. Lipp, A.D.M.E. Osterhaus, R.M. Overstreet, J.W. Porter, G.W. Smith, G.R. Vasta. 1999. Diseases in the ocean: emerging pathogens, climate links, and anthropogenic factors. Science 285: 1505-1510.

Intelmann, S.S. 2006. Habitat mapping effort at the Olympic Coast National Marine Sanctuary – current status and future needs. Marine Sanctuaries Conservation Series. National Oceanic and Atmospheric Administration, National Marine Sanctuary Program, Silver Spring, MD, U.S. Department of Commerce. 29 pp.

IMO (International Maritime Organization). 2002. Prevention of Pollution by Sewage From Ships. http://www.imo.org/environment/mainframe.asp?topic_id=237. (accessed July 1, 2010).

IMO (International Maritime Organization). 2004. International Convention for the Control and Management of Ships' Ballast Water and Sediments. (accessed July 14, 2010).

IMO (International Maritime Organization). 2006. Alien flotillas: the expansion of invasive species through ship ballast water. http://earthtrends.wri.org/features/view_feature.php?fid=67&theme=7 (accessed July 14, 2010).

Laidre, K., R.J. Jameson, S.J. Jeffries, R.C. Hobbs, C.E. Bowlby, and G.R. VanBlaricom. 2002. Estimates of carrying capacity for sea otters in Washington state. Wildlife Society Bulletin 30: 1172-1181.

Lance, M.M., S.F. Pearson, and M.G. Raphael. 2008. 2007 at-sea marbled murrelet population monitoring Research Progress Report WA Department of Fish and Wildlife, Wildlife Science Division, Olympia, WA. 24 pp.

Lance, M.M., S.A. Richardson and H.L. Allen. 2004. Washington state recovery plan for the sea otter. Washington Department of Fish and Wildlife, Olympia. 91 pp.

Loehr, L.C., C.J. Beegle-Krause, K. George, C.D. McGee, A.J. Mearns, M.J. Atkinson. 2006. The Significance of Dilution in Evaluating Possible Impacts of Wastewater Discharges From Large Cruise Ships. Marine Pollution Bulletin 52: 681-688.

Malakoff, D. 2010. Changing Oceans: A push for quieter ships. Science 328: 1502-3.

Manuwal, D.A., H.R. Carter, T.S. Zimmerman, and D.L. Orthmeyer, editors. 2001. Biology and Conservation of the Common Murre in California, Oregon, Washington, and British Columbia. Volume 1: Natural history and populations trends. U.S. Geological Survey, Biological Resources Division, Information and Technology Report, Washington, D.C.

McGregor, B.A. and T.W. Offield. 1986. The Exclusive Economic Zone: An Exciting New Frontier. U.S. Department of the Interior, U.S. Geological Survey.

Naylor, R., Hindar, K, Fleming, IA, Goldburg, R, Williams, S, Volpe, J, Whoriskey, F, Eagle, J, Kelso, D. 2005. Fugitive Salmon: Assessing the Risks of Escaped Fish from Net-Pen Aquaculture. Bioscience 55(5): 427-437.

NMFS (National Marine Fisheries Service). 2002. Research Plan for West Coast Groundfish. Seattle, WA.

NMFS (National Marine Fisheries Service). 2004. Pacific halibut fisheries; catch sharing plan. Final rule: annual management measures for Pacific halibut fisheries. *Federal Register* 69(39): 9231-9241.

NMFS (National Marine Fisheries Service). 2006a. Report on the Status of the U.S. Fisheries for 2006. Report to Congress., NOAA, National Marine Fisheries Service, Washington, D.C.

NOAA (National Oceanic and Atmospheric Administration). 1993. Olympic Coast National Marine Sanctuary Final Environmental Impact Statement/Management Plan Vol. 1 FEIS. Department of Commerce, National Oceanic and Atmospheric Administration, Sanctuaries and Reserves Division, Washington, D.C.

NOAA (National Oceanic and Atmospheric Administration). 2004. Final Report of the NOAA International Symposium: "Shipping Noise and Marine Mammals: A Forum for Science, Management and Technology," 18-19 May 2004, Arlington, VA.

NOAA (National Oceanic and Atmospheric Administration). 2008. Channel Islands National Marine Sanctuary, Supplemental Draft Environmental Impact Statement. March 2008. U.S. Department of Commerce.

NOAA (National Oceanic and Atmospheric Administration). 2011. National Oceanic and Atmospheric Administration Marine Aquaculture Policy. June 2011. http://aquaculture.noaa.gov/pdf/noaa_aquaculture_policy_2011.pdf. (accessed August 12, 2011).

Norse, E. (ed). 1994. Global marine biological diversity: a strategy for building conservation into decision making. Center for Marine Conservation. Island Press. 383 pp.

Norman, K., J. Sepez, H. Lazrus, N. Milne, C. Package, S. Russell, K. Grant, R.P. Lewis, J. Primo, E. Springer, M. Styles, B. Tilt, and I. Vaccaro. 2007. Community profiles for West Coast and North Pacific fisheries–Washington, Oregon, California, and other U.S. states. U.S. Deptartment of Commerce NOAA Technical Memo. NMFS-NWFSC-85, 602 p.

NRC (National Research Council). 2002. Effects of Trawling and Dredging on Seafloor Habitat. Washington, D.C., National Academy Press: 126 pp.

NRC (National Research Council). 2003. *Ocean Noise and Marine Mammals*. Washington, D.C.: National Academy Press.

NRC, Inc. (Natural Resources Consultants, Inc.). 2008. Rates of marine species mortality caused by derelict fishing nets in Puget Sound, Washington. Prepared for Northwest Straits Initiative. May 15, 2009. 14pp.

ONMS (Office of National Marine Sanctuaries). 2008. Olympic Coast National Marine Sanctuary Condition Report 2008. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries, Silver Spring, MD. 72 pp.

ONMS (Office of National Marine Sanctuaries). 2005. Our National Marine Sanctuaries Strategic Plan, 2005 – 2015. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries, Silver Spring, MD. 20 pp.

PFMC (Pacific Fishery Management Council). 2008a. Status of the Pacific Coast Groundfish Fishery. Stock Assessment and Fishery Evaluation, Volume 1. March 2008. Pacific Fisheries Management Council, Portland, OR.

PFMC (Pacific Fishery Management Council). 2008b. Review of 2007 Ocean Salmon Fisheries. February 2008 Pacific Fisheries Management Council, Portland, OR.

Paine, R.T. and S.A. Levin. 1981. Intertidal Landscapes: Disturbance and the Dynamics of Pattern. Ecological Monographs, Vol. 51, No. 2, pp. 145-178.

Parrish, J.K. and S.G. Zador. 2003. Seabirds as Indicators: An Exploratory Analysis of Physical Forcing in the Pacific Northwest Coastal Environment. Estuaries 26(4): 1044-1057.

Parrish, J.K., M. Marvier, and R.T. Paine. 2001. Direct and indirect effects: interactions between bald eagles and common murres. Ecological Applications 11:1858-1869.

Parrish, J.K., P. Ayers, K. Litle, and J. Dolliver. 2005. Overflight Monitoring in the West Coast National Marine Sanctuaries. Report to the West Coast National Marine Sanctuaries. University of Washington, Seattle, WA.

Partridge, V. 2007. Condition of coastal waters of Washington State, 2000-2003, a statistical summary. WA State Department of Ecology, Environmental Assessment Program. Publication No. 07-03-051.

PISCO (Partnership for Interdisciplinary Studies of Coastal Oceans). 2002. PISCO Coastal Connections, vol. 1.

Piatt, J.F., K.J. Kuletz, A.E. Burger, S.A. Hatch, T.P. Birt, M.L. Arimitsu, G.S. Drew, A.M.A. Harding, and K.S. Bixler. 2007. Status Review of the Marbled Murrelet (*Brachyramphus marmoratus*) in Alaska and British Columbia. Anchorage, AK, U.S. Geological Survey.

Pirhalla D.E., V. Ransibrahmanakul, R. Clark, A. Desch, T. Wayne, and M. Edwards. 2009. An Oceanographic Characterization of the Olympic Coast National Marine Sanctuary and Pacific Northwest: Interpretive Summary of Ocean Climate and Regional Processes through Satellite Remote Sensing. NOAA Technical Memorandum NOS NCCOS 90. Prepared by NCCOS's Coastal Oceanographic Assessments, Status and Trends Division in cooperation with the National Marine Sanctuary Program. Silver Spring, MD. 53 pp.

POS (Port of Seattle). 2009. Seattle sets new record for cruise ships in 2009. http://www.portseattle.org/news/press/2009/10_26_2009_01.shtml (accessed July 1, 2010).

Pruitt R. 2004. Celebrity Cruises. Personal communication with Paul Sorenson of BST Associates. October, 2004. Referenced in NOAA, Cordell Bank, Gulf of the Farallones, and Monterey Bay National Marine Sanctuaries Draft Environmental Impact Statement: Prepared as part of the Joint Management Plan Review (JMPR), Vol. IV: U.S. Department of Commerce, NOAA, National Ocean Service, National Marine Sanctuary Program, October, 2006.

Raphael, M.G. 2006. Conservation of the Marbled Murrelet under the Northwest Forest Plan. Conservation Biology 20: 297-305.

Raphael, M.G. and T.D. Bloxton. 2008. Breeding ecology of the marbled murrelet in Washington State. Project update 2004-2007. Report. U.S.D.A. Forest Service, Pacific Northwest Research Station. Olympia, WA. 32 pages.

Ross, P.S., G.M. Ellis, M.G. Ikonomou, L.G. Barrett-Lennard, and R.F. Addison. 2000. High PCB concentrations in free-ranging Pacific killer whales, *Orcinus orca*: Effects of age, sex and dietary preference. Marine Pollution Bulletin 40(6): 504-515.

Ross, P.S. 2006. Fireproof killer whales (*Orcinus orca*): flame-retardant chemicals and the conservation imperative in the charismatic icon of British Columbia, Canada." Canadian Journal of Fisheries and Aquatic Sciences 63(1): 224-234.

Scavia, D., J.C. Field, D.F. Boesch, R.W. Buddemeier, V. Burkett, D.R. Cayan, M. Fogarty, M.A. Harwell, R.W. Howarth, C. Mason, D.J. Reed, T.C. Royer, A.H. Sallenger and J.G. Titus. 2002. Climate change impacts on U.S. Coastal and Marine Ecosystems. Estuaries and Coasts 25: 1559-2723.

Schwemmer, R. 2008. Olympic Coast National Marine Sanctuary Historic Shipwreck Database. National Oceanic and Atmospheric Administration. Mss. Santa Barbara: Channel Islands National Marine Sanctuary.

Suchanek, T.H. 1979. The *Mytilus californianus* community: studies on the composition, structure, organization, and dynamics of a mussel bed. PhD thesis, University of Washington.

The *Tenyo Maru* Oil Spill Natural Resource Trustees. 2000. Final restoration plan and environmental assessment for the Tenyo Maru oil spill. Restoration Plan Cooperating Agencies: Makah Indian Tribe; U.S. Fish and Wildlife Service, Lacy, WA. 70 pages.

Terrell, B. n.d. Western Olympic Peninsula Maritime Archaeological Survey; a Synthesis of Five Surveys. Unpublished manuscript on file at Olympic Coast National Marine Sanctuary offices.

Thrush, S.F. and P.K. Dayton. 2002. Disturbance to marine benthic habitats by trawling and dredging: implications for marine biodiversity. Annual Review of Ecology and Systematics 33: 449-479.

Transport Canada. 2010. A guide to Canada's Ballast Control and Regulations. http://www.tc.gc.ca/eng/marinesafety/tp-tp13617-preface-2086.htm#a3a (accessed July 14, 2010).

USACE (U.S. Army Corps of Engineers). 2009. U.S. Army Corps of Engineers, Fiscal Years 2009 – 2014, Biennial Quillayute River Navigation Project Maintenance Dredging, La Push, Washington. Public Notice, Reference: CENWS-OD-TS-NS-31. April 29, 2009.

USCG (U.S. Coast Guard). 2000. Port Access Route Study Strait of Juan de Fuca and Adjacent Waters. USCG Thirteenth District, Seattle, Washington. Docket # USCG-1999-4974. November 2000.

USCG (U.S. Coast Guard). 2009. Marine Sanitation Device. http://www.uscg.mil/hq/cg5/cg5213/msd.asp. (accessed July 14, 2010).

U.S. Department of Commerce. National Oceanic and Atmospheric Administration. National Marine Sanctuary Program. 2008. Channel Islands National Marine Sanctuary Final Management Plan / Final Environmental Impact Statement. Silver Spring, MD.

U.S. Navy 2007. Navy Environmental and Natural Resources Program Manual. OPNAVINST 5090.1C. Washington, D.C. U.S. Navy 2008.

U.S. Navy. 2010a. NAVSEA NUWC Keyport Range Complex Extension, Final Environmental Impact Statement/ Overseas Environmental Impact Statement. May 2010.

U.S. Navy. 2010b. Northwest Training Range Complex, Final Environmental Impact Statement/ Overseas Environmental Impact Statement. September 2010.

Urick, R.J. 1983. Principles of Underwater Sound (3rd Edition). Los Altos, CA: Peninsula Publishing.

Wahl, T.R., and B. Tweit. 2000. Seabird abundances off Washington, 1972-1998. *Western Birds* 31:69-88.

Wahl, T.R., B.Tweit, and S.G. Mlodinow (eds). 2005. Birds of Washington, Status and Distribution, 1st Ed. edition. Oregon State University Press, Corvallis, OR.

Warheit, K.I., and C.W. Thompson. 2003. Common Murre Uria aalge. Pages 12-11 - 21-13 in E. M. Larsen, J. M. Azerrad, and N. Norstrom, editors. Management Recommendations for Washington's Priority Species - Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia, WA.

Wartzok, D. and D.R. Ketten. 1999. Marine Mammal Sensory Systems. In Biology of Marine Mammals, eds. J.E. Reynolds and S.A. Rommel, 117-175. Washington, D.C.: Smithsonian Institutional Press.

WDE (Washington Department of Ecology). 2009. 2008 Assessment of Cruise ship Environmental Effects in Washington. http://www.ecy.wa.gov/pubs/0910047.pdf (accessed July 14, 2010).

WDE (Washington Department of Ecology). 2010. VEAT 2009 - Vessel Entry and Transits for Washington Waters. http://www.ecy.wa.gov/biblio/1008004.html (accessed September 7, 2010).

WDE (Washington Department of Ecology). 2011. 2011 Commercial Passenger Vessels Discharge Status and Wastewater Treatment. Washington Department of Ecology. http://www.ecy.wa.gov/programs/wq/wastewater/cruise_mou/Washingtondischargestatus2011.pdf (accessed March 14, 2011).

WDFW (Washington Department of Fish and Wildlife). 2008. Final Report: Economic Analysis of the Non-Treaty Commercial and Recreational Fisheries in Washington State, December 2008. Prepared for Washington Department of Fish and Wildlife by TCW Economics, Sacramento, California, December 2008.

WDFW (Washington Department of Fish and Wildlife). 2008b. (recreational fishing reference from Heather Reed)

WDFW (Washington Department of Fish and Wildlife). 2009. Chapter 220-150: Washington State Ballast Water Management rules. http://wdfw.wa.gov/fish/ballast/2009_rules/wac_220-150_ballast_water_rules_072609.pdf (accessed July 14, 2010).

WDH (Washington Department of Health). 2007. Report to the Legislature. Assessment of Potential Health Impacts of Virus Discharge from Cruise Ships to Shellfish Growing Areas in Puget Sound. DOH Publication 332-062. November 2007. Olympia, WA.

Wessen, G.C. 2003. An assessment and plan for a program of studies addressing prehistoric archaeological sites associated with paleoshorelines on the Olympic Coast of Washington. Neah Bay, WA. The Makah Cultural and Research Center. 56pp.

Whitmire, C.E. and M.E. Clarke. 2007. State of deep sea coral ecosystems in the U.W. Pacific Coast: California to Washington. In: S. E. Lumsden, T. F. Hourigan, A. W. Bruckner and G. Dorr. (eds). The State of Deep Coral Ecosystems in the United States. Silver Spring, MD. NOAA Technical Memorandum CRCP-3: 109-154.

Wilson, U.W. 1991. Responses of three seabird species to El Niño events and other warm episodes on the Washington Coast, 1979-1990. The Condor. 93: 853-858.

APPENDIX A – TERMS OF DESIGNATION

ABOUT THIS DOCUMENT

On May 11, 1994 the National Oceanic and Atmospheric Administration (NOAA) published the final Olympic Coast National Marine Sanctuary Regulations (59 FR 24586). This official government document also served as the notice of the Sanctuary's designation, the culmination of long and involved public process. The following excerpt from the complete documents is the "Designation Document". You find a complete copy of the original 1994 document at http://sanctuaries.noaa.gov/management/fr/59_fr_24586.pdf or http://olympiccoast.noaa.gov.

Designation Document for the Olympic Coast National Marine Sanctuary

Under the authority of Title III of the National Marine Sanctuaries Act of 1972, as amended (the ``Act"), 16 U.S.C. 1431 et seq., the waters off the Olympic Coast of Washington State including the U.S. portion of the Strait of Juan de Fuca west of Koitlah Point, and the submerged lands thereunder, as described in Article II, are hereby designated as the Olympic Coast National Marine Sanctuary for the purposes of protecting and managing the conservation, ecological, recreational, research, educational, historical and aesthetic resources and qualities of the area.

Article I. Effect of Designation

The Act authorizes the issuance of such final regulations as are necessary and reasonable to implement the designation, including managing and protecting the conservation, recreational, ecological, historical, research, educational, and aesthetic resources and qualities of the Olympic Coast National Marine Sanctuary. Section 1 of Article IV of this Designation Document lists activities that either will be regulated on the effective date of designation or may have to be regulated at some later date in order to protect Sanctuary resources and qualities. Listing does not necessarily mean that a type of activity will be regulated; however, if an activity is not listed, it may not be regulated, except on an emergency basis, unless Section 1 of Article IV is amended to include the type of activity by the same procedures by which the original designation was made.

Article II. Description of the Sanctuary Area

The Olympic Coast National Marine Sanctuary boundary encompasses approximately 2500 square nautical miles (approximately 8577 sq. kilometers) of coastal and ocean waters, and the submerged lands thereunder, off the central and northern coast of the State of Washington. The Sanctuary boundary extends from Koitlah Point due north to the United States/Canada international boundary seaward to the 100 fathom isobath. The seaward boundary of the Sanctuary approximates the 100 fathom isobath in a southerly direction from the U.S./Canada

international boundary to a point due west of the Copalis River, cutting across the heads of Nitnat, Juan de Fuca, and Quinault Canyons.
The shoreward boundary of the Sanctuary is the mean lower low water line when adjacent to Indian reservations and State and county lands. When adjacent to Federally managed lands, the coastal boundary extends to the mean higher high water line. The coastal boundary cuts across the mouths of all rivers and streams. The precise boundary of the Sanctuary is set forth in Appendix A of this Designation Document.

Article III. Characteristics of the Sanctuary Area That Give It Particular Value

The Sanctuary is a highly productive, nearly pristine ocean and coastal environment that is important to the continued survival of several ecologically and commercially important species of fish, seabirds, and marine mammals. Its rugged and undeveloped coastline makes the region one of the more dramatic natural wonders of the coastal United States, paralleling the majestic splendor of such terrestrial counterparts as Yosemite National Park and the Grand Tetons. The region's high biological productivity is fueled by seasonal enhanced upwelling along the edge of the continental shelf, especially at submarine canyons, during periods of high solar radiation.

The diversity of habitats that make up the Sanctuary support a great variety of biological communities. This unusually large range of habitat types include offshore islands and rocks; some of the most diverse kelp beds in the world; intertidal pools; erosional features such as rocky headlands, seastacks, and arches; interspersed exposed beaches and protected bays; submarine canyons and ridges; the continental shelf, including a broad shallow plateau extending from the mouth of the Juan de Fuca canyon; and continental slope environments. The numerous seastacks and rocky outcrops along the Sanctuary shoreline, coupled with a large tidal range and wave splash zone, support some of the most diverse and complex intertidal zones in the United States.

The Sanctuary provides an essential habitat for a wide variety of marine mammals and birds, and is of particular interest due to the presence of endangered and threatened species that live or migrate through the region. Twenty seven species of marine mammals are reported to breed, rest within, or migrate offshore of the Olympic Peninsula. Of particular interest is the migration route of the endangered California gray whale, the threatened northern sea lion, the occasional presence of the endangered right, fin, sei, blue, humpback, and sperm whales, and the reintroduced resident population of sea otters.

In addition, the seabird colonies of Washington's outer coast are among the largest in the continental United States and include a number of species listed as endangered or threatened including the short-tailed albatross, peregrine falcon, brown pelican, Aleutian Canada goose, marbled murrelet, and one of the largest populations of bald eagles in the continental United States.

The high biological productivity of the coastal and offshore waters in the Sanctuary support valuable fisheries that contribute significantly to the State and tribal economies. The commercially important species of fish include five species of salmon, groundfish, and shellfish.

In addition to the Sanctuary's value with respect to its biological resources, the region encompasses significant historical resources including Indian village sites, ancient canoe runs, petroglyphs, Indian artifacts, and numerous shipwrecks.

The diversity and richness of marine resources suggests that the marine sanctuary designations will provide exceptional opportunities for scientific research in the areas of species interactions, population dynamics, physiological ecology, linkages between terrestrial and aquatic ecosystems, and marine anthropology. The scientific research encouraged by the Sanctuary management plan will, in turn, help support an intensive public education and awareness program that will address the diverse, complex, and sensitive ecosystems in Washington's coastal and oceanic environments.

Article IV. Scope of Regulations

Section 1. Activities Subject to Regulation
The following activities are subject to regulation, including prohibition, to the extent necessary and reasonable to ensure the protection and management of the conservation, ecological, recreational, research, educational, historical and aesthetic resources and qualities of the area:

a. Exploring for, developing, or producing oil, gas or minerals (e.g., clay, stone, sand, metalliferous ores, gravel, non-metalliferous ores or any other solid material or other solid matter of commercial value) within the Sanctuary;
b. Discharging or depositing from within the boundary of the Sanctuary, any material or other matter;
c. Discharging or depositing, from beyond the boundary of the Sanctuary, any material or other matter;
d. Taking, removing, moving, catching, collecting, harvesting, feeding, injuring, destroying or causing the loss of, or attempting to take, remove, move, catch, collect, harvest, feed, injure, destroy or cause the loss of, a marine mammal, sea turtle, seabird, historical resource or other Sanctuary resource;
e. Drilling into, dredging, or otherwise altering the seabed of the Sanctuary; or constructing, placing, or abandoning any structure, material or other matter on the seabed of the Sanctuary;
f. Possessing within the Sanctuary a Sanctuary resource or any other resource, regardless of where taken, removed, moved, caught, collected or harvested, that, if it had been found within the Sanctuary, would be a Sanctuary resource;
g. Flying a motorized aircraft above the Sanctuary;
h. Operating a vessel (i.e., watercraft of any description in the Sanctuary;
i. Interfacing with, obstructing, delaying or preventing an investigation, search, seizure or disposition of seized property in connection with enforcement of the Act or any regulation or permit issued under the Act.

Section 2. Emergencies
Where necessary to prevent or minimize the destruction of, loss of, or injury to a Sanctuary resource or quality, or minimize the imminent risk of such destruction, loss or injury, any and all activities, including those not listed in Section 1 of this Article, are subject to immediate temporary regulation, including prohibition.

Article V. Effect on Leases, Permits, Licenses, and Rights

Pursuant to section 304(c)(1) of the Act, 16 U.S.C. 1434(c)(1), no valid lease, permit, license, or other authorization issued by any Federal, State, or local authority of competent jurisdiction, or any right of subsistence use of access, may be terminated by the Secretary of Commerce or designee as a result of this designation. The Secretary of Commerce or designee, however, may regulate the exercise (including, but not limited to, the imposition of terms and conditions) of such authorization or right consistent with the purposes for which the Sanctuary is designated.

In no event may the Secretary or designee issue a permit authorizing, or otherwise approve: (1) Exploration for, development or production of oil, gas or minerals within the Sanctuary; (2) the discharge of primary treated sewage (except for regulation, pursuant to section 304(c)(2) of the Act, of the exercise of valid authorizations in existence on the effective date of Sanctuary designation and issued by other authorities of competent jurisdiction); (3) the disposal of dredged material within the Sanctuary other than in connection with beach nourishment projects related to harbor maintenance activities; or (4) bombing activities within the Sanctuary. Any purported authorizations issued by other authorities after the effective date of Sanctuary designation for any of these activities within the Sanctuary shall be invalid.

Article VI. Alteration of This Designation

The terms of designation, as defined under Section 304(a) of the Act, may be modified only by the same procedures by which the original designation is made, including public hearings consultation with interested Federal, State, and local agencies, review by the appropriate Congressional committees and the Governor of the State of Washington, and approval by the Secretary of Commerce or designee.

APPENDIX B – NOTICE OF INTENT FOR INITIATION OF MANAGEMENT PLAN REVIEW

APPENDIX C – INITIATION OF SECTION 106 CONSULTATION

APPENDIX D –ENHANCING THE INTERGOVERNMENTAL PARTNERSHIP (EO 12875)

APPENDIX E – EXECUTIVE ORDER 12898

APPENDIX F – SECRETARIAL ORDER 3206

SECRETARIAL ORDER NO. 3206

SIGNATURE DATE: June 5, 1997

Subject: American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act

Sec. 1 **Purpose and Authority**. This Order is issued by the Secretary of the Interior and the Secretary of Commerce (Secretaries) pursuant to the Endangered Species Act of 1973, 16 U.S.C. '1531, as amended (the Act), the federal-tribal trust relationship, and other federal law. Specifically, this Order clarifies the responsibilities of the component agencies, bureaus and offices of the Department of the Interior and the Department of Commerce (Departments), when actions taken under authority of the Act and associated implementing regulations affect, or may affect, Indian lands, tribal trust resources, or the exercise of American Indian tribal rights, as defined in this Order. This Order further acknowledges the trust responsibility and treaty obligations of the United States toward Indian tribes and tribal members and its government-to-government relationship in dealing with tribes. Accordingly, the Departments will carry out their responsibilities under the Act in a manner that harmonizes the Federal trust responsibility to tribes, tribal sovereignty, and statutory missions of the Departments, and that strives to ensure that Indian tribes do not bear a disproportionate burden for the conservation of listed species, so as to avoid or minimize the potential for conflict and confrontation.

Sec. 2 **Scope and Limitations**. (A) This Order is for guidance within the Departments only and is adopted pursuant to, and is consistent with, existing law.

(B) This Order shall not be construed to grant, expand, create, or diminish any legally enforceable rights, benefits or trust responsibilities, substantive or procedural, not otherwise granted or created under existing law. Nor shall this Order be construed to alter, amend, repeal, interpret or modify tribal sovereignty, any treaty rights, or other rights of any Indian tribe, or to preempt, modify or limit the exercise of any such rights.

(C) This Order does not preempt or modify the Departments' statutory authorities or the authorities of Indian tribes or the states.

(D) Nothing in this Order shall be applied to authorize direct (directed) take of listed species, or any activity that would jeopardize the continued existence of any listed species or destroy or adversely modify designated critical habitat. Incidental take issues under this Order are addressed in Principle 3(C) of Section 5.

(E) Nothing in this Order shall require additional procedural requirements for substantially completed Departmental actions, activities, or policy initiatives.

(F) Implementation of this Order shall be subject to the availability of resources and the requirements of the Anti-Deficiency Act.

(G) Should any tribe(s) and the Department(s) agree that greater efficiency in the implementation of this Order can be achieved, nothing in this Order shall prevent them from implementing strategies to do so.

(H) This Order shall not be construed to supersede, amend, or otherwise modify or affect the implementation of, existing agreements or understandings with the Departments or their agencies, bureaus, or offices including, but not limited to, memoranda of understanding, memoranda of agreement, or statements of relationship, unless mutually agreed by the signatory parties.

Sec. 3 **Definitions**. For the purposes of this Order, except as otherwise expressly provided, the following terms shall apply:

(A) The term "Indian tribe" shall mean any Indian tribe, band, nation, pueblo, community or other organized group within the United States which the Secretary of the Interior has identified on the most current list of tribes maintained by the Bureau of Indian Affairs.

(B) The term "tribal trust resources" means those natural resources, either on or off Indian lands, retained by, or reserved by or for Indian tribes through treaties, statutes, judicial decisions, and executive orders, which are protected by a fiduciary obligation on the part of the United States.

(C) The term "tribal rights" means those rights legally accruing to a tribe or tribes by virtue of inherent sovereign authority, unextinguished aboriginal title, treaty, statute, judicial decisions, executive order or agreement, and which give rise to legally enforceable remedies.

(D) The term "Indian lands" means any lands title to which is either: 1) held in trust by the United States for the benefit of any Indian tribe or individual; or 2) held by any Indian tribe or individual subject to restrictions by the United States against alienation.

Sec. 4 **Background**. The unique and distinctive political relationship between the United States and Indian tribes is defined by treaties, statutes, executive orders, judicial decisions, and agreements, and differentiates tribes from other entities that deal with, or are affected by, the federal government. This relationship has given rise to a special federal trust responsibility, involving the legal responsibilities and obligations of the United States toward Indian tribes and the application of fiduciary standards of due care with respect to Indian lands, tribal trust resources, and the exercise of tribal rights.

The Departments recognize the importance of tribal self-governance and the protocols of a government-to-government relationship with Indian tribes. Long-standing Congressional and Administrative policies promote tribal self-government, self-sufficiency, and self-determination, recognizing and endorsing the fundamental rights of tribes to set their own priorities and make decisions affecting their resources and distinctive ways of life. The Departments recognize and respect, and shall consider, the value that tribal traditional knowledge provides to tribal and federal

land management decision-making and tribal resource management activities. The Departments recognize that Indian tribes are governmental sovereigns; inherent in this sovereign authority is the power to make and enforce laws, administer justice, manage and control Indian lands, exercise tribal rights and protect tribal trust resources. The Departments shall be sensitive to the fact that Indian cultures, religions, and spirituality often involve ceremonial and medicinal uses of plants, animals, and specific geographic places.

Indian lands are not federal public lands or part of the public domain, and are not subject to federal public land laws. They were retained by tribes or were set aside for tribal use pursuant to treaties, statutes, judicial decisions, executive orders or agreements. These lands are managed by Indian tribes in accordance with tribal goals and objectives, within the framework of applicable laws.

Because of the unique government-to-government relationship between Indian tribes and the United States, the Departments and affected Indian tribes need to establish and maintain effective working relationships and mutual partnerships to promote the conservation of sensitive species (including candidate, proposed and listed species) and the health of ecosystems upon which they depend. Such relationships should focus on cooperative assistance, consultation, the sharing of information, and the creation of government-to-government partnerships to promote healthy ecosystems.

In facilitating a government-to-government relationship, the Departments may work with intertribal organizations, to the extent such organizations are authorized by their member tribes to carry out resource management responsibilities.

Sec. 5 **Responsibilities**. To achieve the objectives of this Order, the heads of all agencies, bureaus and offices within the Department of the Interior, and the Administrator of the National Oceanic and Atmospheric Administration (NOAA) within the Department of Commerce, shall be responsible for ensuring that the following directives are followed:

Principle 1. THE DEPARTMENTS SHALL WORK DIRECTLY WITH INDIAN TRIBES ON A GOVERNMENT-TO-GOVERNMENT BASIS TO PROMOTE HEALTHY ECOSYSTEMS.

The Departments shall recognize the unique and distinctive political and constitutionally based relationship that exists between the United States and each Indian tribe, and shall view tribal governments as sovereign entities with authority and responsibility for the health and welfare of ecosystems on Indian lands. The Departments recognize that Indian tribes are governmental sovereigns with inherent powers to make and enforce laws, administer justice, and manage and control their natural resources. Accordingly, the Departments shall seek to establish effective government-to-government working relationships with tribes to achieve the common goal of promoting and protecting the health of these ecosystems. Whenever the agencies, bureaus, and offices of the Departments are aware that their actions planned under the Act may impact tribal trust resources, the exercise of tribal rights, or Indian lands, they shall consult with, and seek the participation of, the affected Indian tribes to the maximum extent practicable. This shall include providing affected tribes adequate opportunities to participate in data collection, consensus seeking, and associated processes. To facilitate the government-to-government relationship, the

Departments may coordinate their discussions with a representative from an intertribal organization, if so designated by the affected tribe(s).

Except when determined necessary for investigative or prosecutorial law enforcement activities, or when otherwise provided in a federal-tribal agreement, the Departments, to the maximum extent practicable, shall obtain permission from tribes before knowingly entering Indian reservations and tribally-owned fee lands for purposes of ESA-related activities, and shall communicate as necessary with the appropriate tribal officials. If a tribe believes this section has been violated, such tribe may file a complaint with the appropriate Secretary, who shall promptly investigate and respond to the tribe.

Principle 2. THE DEPARTMENTS SHALL RECOGNIZE THAT INDIAN LANDS ARE NOT SUBJECT TO THE SAME CONTROLS AS FEDERAL PUBLIC LANDS.

The Departments recognize that Indian lands, whether held in trust by the United States for the use and benefit of Indians or owned exclusively by an Indian tribe, are not subject to the controls or restrictions set forth in federal public land laws. Indian lands are not federal public lands or part of the public domain, but are rather retained by tribes or set aside for tribal use pursuant to treaties, statutes, court orders, executive orders, judicial decisions, or agreements. Accordingly, Indian tribes manage Indian lands in accordance with tribal goals and objectives, within the framework of applicable laws.

Principle 3. THE DEPARTMENTS SHALL ASSIST INDIAN TRIBES IN DEVELOPING AND EXPANDING TRIBAL PROGRAMS SO THAT HEALTHY ECOSYSTEMS ARE PROMOTED AND CONSERVATION RESTRICTIONS ARE UNNECESSARY.

(A) The Departments shall take affirmative steps to assist Indian tribes in developing and expanding tribal programs that promote healthy ecosystems.

The Departments shall take affirmative steps to achieve the common goals of promoting healthy ecosystems, Indian self-government, and productive government-to-government relationships under this Order, by assisting Indian tribes in developing and expanding tribal programs that promote the health of ecosystems upon which sensitive species (including candidate, proposed and listed species) depend.

The Departments shall offer and provide such scientific and technical assistance and information as may be available for the development of tribal conservation and management plans to promote the maintenance, restoration, enhancement and health of the ecosystems upon which sensitive species (including candidate, proposed, and listed species) depend, including the cooperative identification of appropriate management measures to address concerns for such species and their habitats.

(B) The Departments shall recognize that Indian tribes are appropriate governmental entities to manage their lands and tribal trust resources.

The Departments acknowledge that Indian tribes value, and exercise responsibilities for, management of Indian lands and tribal trust resources. In keeping with the federal policy of promoting tribal self-government, the Departments shall respect the exercise of tribal sovereignty over the management of Indian lands, and tribal trust resources. Accordingly, the Departments shall give deference to tribal conservation and management plans for tribal trust resources that: (a) govern activities on Indian lands, including, for the purposes of this section, tribally-owned fee lands, and (b) address the conservation needs of listed species. The Departments shall conduct government-to-government consultations to discuss the extent to which tribal resource management plans for tribal trust resources outside Indian lands can be incorporated into actions to address the conservation needs of listed species.

(C) The Departments, as trustees, shall support tribal measures that preclude the need for conservation restrictions.

At the earliest indication that the need for federal conservation restrictions is being considered for any species, the Departments, acting in their trustee capacities, shall promptly notify all potentially affected tribes, and provide such technical, financial, or other assistance as may be appropriate, thereby assisting Indian tribes in identifying and implementing tribal conservation and other measures necessary to protect such species.

In the event that the Departments determine that conservation restrictions are necessary in order to protect listed species, the Departments, in keeping with the trust responsibility and government-to-government relationships, shall consult with affected tribes and provide written notice to them of the intended restriction as far in advance as practicable. If the proposed conservation restriction is directed at a tribal activity that could raise the potential issue of direct (directed) take under the Act, then meaningful government-to-government consultation shall occur, in order to strive to harmonize the federal trust responsibility to tribes, tribal sovereignty and the statutory missions of the Departments. In cases involving an activity that could raise the potential issue of an incidental take under the Act, such notice shall include an analysis and determination that all of the following conservation standards have been met: (i) the restriction is reasonable and necessary for conservation of the species at issue; (ii) the conservation purpose of the restriction cannot be achieved by reasonable regulation of non-Indian activities; (iii) the measure is the least restrictive alternative available to achieve the required conservation purpose; (iv) the restriction does not discriminate against Indian activities, either as stated or applied; and, (v) voluntary tribal measures are not adequate to achieve the necessary conservation purpose.

Principle 4. THE DEPARTMENTS SHALL BE SENSITIVE TO INDIAN CULTURE, RELIGION AND SPIRITUALITY.

The Departments shall take into consideration the impacts of their actions and policies under the Act on Indian use of listed species for cultural and religious purposes. The Departments shall avoid or minimize, to the extent practicable, adverse effects upon the noncommercial use of listed sacred plants and animals in medicinal treatments and in the expression of cultural and religious beliefs by Indian tribes. When appropriate, the Departments may issue guidelines to accommodate Indian

access to, and traditional uses of, listed species, and to address unique circumstances that may exist when administering the Act.

Principle 5. THE DEPARTMENTS SHALL MAKE AVAILABLE TO INDIAN TRIBES INFORMATION RELATED TO TRIBAL TRUST RESOURCES AND INDIAN LANDS, AND, TO FACILITATE THE MUTUAL EXCHANGE OF INFORMATION, SHALL STRIVE TO PROTECT SENSITIVE TRIBAL INFORMATION FROM DISCLOSURE.

To further tribal self-government and the promotion of healthy ecosystems, the Departments recognize the critical need for Indian tribes to possess complete and accurate information related to Indian lands and tribal trust resources. To the extent consistent with the provisions of the Privacy Act, the Freedom of Information Act (FOIA) and the Departments' abilities to continue to assert FOIA exemptions with regard to FOIA requests, the Departments shall make available to an Indian tribe all information held by the Departments which is related to its Indian lands and tribal trust resources. In the course of the mutual exchange of information, the Departments shall protect, to the maximum extent practicable, tribal information which has been disclosed to or collected by the Departments. The Departments shall promptly notify and, when appropriate, consult with affected tribes regarding all requests for tribal information relating to the administration of the Act.

Sec. 6 **Federal-Tribal Intergovernmental Agreements**. The Departments shall, when appropriate and at the request of an Indian tribe, pursue intergovernmental agreements to formalize arrangements involving sensitive species (including candidate, proposed, and listed species) such as, but not limited to, land and resource management, multi-jurisdictional partnerships, cooperative law enforcement, and guidelines to accommodate Indian access to, and traditional uses of, natural products. Such agreements shall strive to establish partnerships that harmonize the Departments' missions under the Act with the Indian tribe's own ecosystem management objectives.

Sec. 7 **Alaska**. The Departments recognize that section 10(e) of the Act governs the taking of listed species by Alaska Natives for subsistence purposes and that there is a need to study the implementation of the Act as applied to Alaska tribes and natives. Accordingly, this Order shall not apply to Alaska and the Departments shall, within one year of the date of this Order, develop recommendations to the Secretaries to supplement or modify this Order and its Appendix, so as to guide the administration of the Act in Alaska. These recommendations shall be developed with the full cooperation and participation of Alaska tribes and natives. The purpose of these recommendations shall be to harmonize the government-to-government relationship with Alaska tribes, the federal trust responsibility to Alaska tribes and Alaska Natives, the rights of Alaska Natives, and the statutory missions of the Departments.

Sec. 8 **Special Study on Cultural and Religious Use of Natural Products**. The Departments recognize that there remain tribal concerns regarding the access to, and uses of, eagle feathers, animal parts, and other natural products for Indian cultural and religious purposes. Therefore, the Departments shall work together with Indian tribes to develop recommendations to the Secretaries within one year to revise or establish uniform administrative procedures to govern the possession, distribution, and transportation of such natural products that are under federal jurisdiction or control.

Sec. 9 **Dispute Resolution**. (A) Federal-tribal disputes regarding implementation of this Order shall be addressed through government-to-government discourse. Such discourse is to be respectful of government-to-government relationships and relevant federal-tribal agreements, treaties, judicial decisions, and policies pertaining to Indian tribes. Alternative dispute resolution processes may be employed as necessary to resolve disputes on technical or policy issues within statutory time frames; provided that such alternative dispute resolution processes are not intended to apply in the context of investigative or prosecutorial law enforcement activities.

(B) Questions and concerns on matters relating to the use or possession of listed plants or listed animal parts used for religious or cultural purposes shall be referred to the appropriate Departmental officials and the appropriate tribal contacts for religious and cultural affairs.

Sec. 10 **Implementation**. This Order shall be implemented by all agencies, bureaus, and offices of the Departments, as applicable. In addition, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service shall implement their specific responsibilities under the Act in accordance with the guidance contained in the attached Appendix.

Sec. 11 **Effective Date**. This Order, issued within the Department of the Interior as Order No. 3206, is effective immediately and will remain in effect until amended, superseded, or revoked.

This Secretarial Order, entitled "American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act," and its accompanying Appendix were issued this 5th day of June, 1997, in Washington, D.C., by the Secretary of the Interior and the Secretary of Commerce.

/s/ Bruce Babbitt
Secretary of the Interior

/s/ William M. Daley
Secretary of Commerce

Date: June 5, 1997

APPENDIX G – EXECUTIVE ORDER 13084

APPENDIX H – PRESIDENTIAL MEMORANDUM OF NOVEMBER 5, 2009

APPENDIX I – EXECUTIVE ORDER 13175

APPENDIX J – DEPARTMENT OF COMMERCE AMERICAN INDIAN AND ALASKA NATIVE POLICY

APPENDIX K – DISCHARGE ESTIMATION METHODOLOGY

Information regarding vessel transits, including distance and time in the sanctuary was obtained from three different sources of information:

- Cooperative Vessel Traffic Service (CVTS) radar data
- NMFS Vessel Monitoring System (VMS) satellite data
- WDFW Recreational Fishing Data, collected by Port Sampling Staff

This information was used to develop estimates on vessel discharges in the sanctuary in 2009. 2009 was chosen for analysis because it was the most recent period for which complete information existed for each of the three data sources. While each of these data sources collects data for different purposes and contains different information, they have in common information that lends itself to an overall assessment of vessel usage with the sanctuary. In order to develop discharge estimates certain data was estimated.

Table 19 Comparison of Vessel Data Sources

Data Source	*Type of Vessel*	*# of Transits*	*Spatial Information*	*Time in Sanctuary*	*# of Passengers*
CVTS	Vessels participating in vessel traffic system - mostly large commercial vessels	YES – each transit has a unique ID	YES	YES– needed to be calculated based on point data	NO – estimated
NMFS	Commercial fishing vessels required by fisheries management plan to carry VMS system	NO– estimated number of transits was calculated	YES	YES– needed to be calculated based on point data	NO – estimated
WDFW	Washington State recreational fishers (includes charter vessels)	YES – summarized by boat trip	PARTIALLY – reported by Marine Areas, estimated % time within OCNMS.	NO – time per trip was estimated	YES – summarized by angler trips

Cooperative Vessel Traffic Service (CVTS) Radar Data

This data is collected by the Canadian Coast Guard Marine Communications and Traffic Services (MCTS) and includes all vessels participating in the Cooperative Vessel Traffic (CVTS). This data is forwarded to OCNMS, which imports the information into a Geographic Information System (GIS) system. For each class of vessel class, the number of "vessel days per year" (the total combined time all vessels within a given class spent within OCMNS waters in 2009) was calculated from CVTS data. The range of the CVTS radar does not cover the whole sanctuary (Figure 15) but it does cover the northern portion of the sanctuary where vessels complying with the ATBA (estimated at >98% of vessels) are transiting sanctuary waters. Vessels in compliance with the ATBA can traverse a small portion of the sanctuary in the south,

so the time estimates calculated by this method can provide a small underestimate of time in sanctuary, which in turn could result in an underestimate of total discharge. This is the sanctuary's primary source of vessel traffic data. This data was used for the following Vessel Classes (Table 6 and Table 7):

- Commercial Vessels < 300 GT
- Commercial Vessels 300-1599 GT
- Commercial Vessels > 1600 GT
- Passenger Vessels < 300 GT
- Passenger Vessels 300-1599 GT
- Passenger Vessels > 1600 GT
- Public Vessels < 300 GT
- Public Vessels 300-1599 GT
- Public Vessels > 1600 GT
- Tank Vessels < 1600 GT
- Tank Vessels > 1600 GT
- Tug with Tank Barge

Figure 155 Extent of the Canadian Coast Guard Radar Coverage on the West Coast of Vancouver Island

NMFS Vessel Monitoring System (VMS) satellite data

National Marine Fisheries Service Northwest Region and the Pacific Fisheries Management Council have a vessel monitoring program to monitor compliance with areas closed to fishing. The program utilizes a satellite based Vessel Monitoring System (VMS) that reports the position of participating vessels. NMFS provided OCNMS with point data for VMS participating vessels within the sanctuary during 2009. There were 52,015 points, representing 171 individual vessels that met these criteria. Not all information from the VMS database was provided for the analysis, e.g., while unique vessel ID's were provided they cannot be used to identify the vessel's name. The data points were sorted by time, then boat ID. Transit ID's were then added, incrementing the transit ID number any time the boat ID changed, or the boat ID was the same but the time jumped by more than 6 hours. Each transit ID contains a continuous set of points for one boat with no more than 6 contiguous hours of missing points. Therefore, for the purposes of this analysis a transit is defined by time in the sanctuary, not the duration of time between port calls. If a fishing vessel is fishing part time in the sanctuary and part time out, then their fishing trip might be broken into multiple transits. This analysis resulted in an estimate of 3,006 fishing transits in the sanctuary for a total of 1,577 vessel days for 2009. This information was used for the Commercial Fishing Vessel Class (Table 6 and Table 7):

WDFW Recreational Fishing Data

As part of their Port Sampling Program, WDFW collects information on recreational fishing activity. This data is reports both boat trips and angler trips, by WDFW Marine Areas (Figure 16). The sanctuary boundaries include all of Marine Areas 3 and 4 and approximately 28% on 4B and 29% of Marine Area 2. For the purpose of this analysis we assumed boat trips and angler trips were equally distributed throughout the reporting area, and each boat trip lasted an estimated six hours. Actual distribution will vary according to the location of preferred fishing areas, distance from port and weather conditions.

Figure 166 WDFW Marine Areas and OCNMS Boundary

After estimating the number of boat trips in OCNMS in 2009 (10,351 private and 1,148 charter) (Table 20) an average was calculated for number of anglers per trip (2.8 private and 10.6 charter) (Table 21). This information was used to for the following Vessel Class (Table 6 and Table 7):

- Charter Fishing Vessel
- Recreational Fishing Vessel

Table 20 Recreational Fishing Boat Trips, within OCNMS, for 2009

2009	*Marine Area*	*Boat Trips in entire Marine Area*			*Boat Trips in OCNMS*			
		Private	Charter	Total	% of area in OCNMS	Private	Charter	Total

Neah Bay-straits	4B	6,401	34	6,435	28%	1,792	10	1,802
Neah Bay -coast	4	3,607	120	3,727	100%	3,607	120	3,727
La Push	3	2,760	343	3,103	100%	2,760	343	3,103
Westport	2	7,556	2,329	9,885	29%	2,191	675	2,867
Total		20,324	2,826	23,150		10,351	1,148	11,498

Table 21 Recreational Fishing Angler Trips, within OCNMS, for 2009

Marine Area	*Angler Trips in entire Marine Area*			*Angler Trips in OCNMS*				*Average anglers/vessel in OCNMS*	
	Private	Charter	Total	% of area in OCNMS	Private	Charter	Total	Private	Charter
4B	16,905	127	17,032	28%	4,733	36	4,769	2.6	3.7
4	10,497	742	11,239	100%	10,497	742	11,239	2.9	6.2
3	7,832	2,157	9,989	100%	7,832	2,157	9,989	2.8	6.3
2	20,869	31,814	52,683	29%	6,052	9,226	15,278	2.8	13.7
Total	56,103	34,840	90,943		29,114	12,161	41,275	2.8	10.6

Annual discharge volume (ADV) Calculation

Annual discharge volume (ADV) estimates for each vessel class was calculated using **Equation 1** based on the number of vessel days per year in the OCNMS, the number of people aboard (including passengers and crew), and the average wastewater generation rate per person. It is difficult to estimate the exact quantity of sewage generated per person per day because variable volumes of water are used to flush different types of toilets. Product information for three popular type II MSDs (The Tank MSD®, Ahead Tank®, and Orca®) suggest wastewater generation rates of 5.5, 9.2, and 30 gallons of blackwater generated per person per day, respectively. Measured sewage wastewater generation rates of cruise ships in Alaska in 2004 ranged from 1.1 gallons to 27 gallons per person per day (EPA 2008a), indicating the wastewater generation rate estimates provided by MSD manufacturers fall within a reasonable range. Because of the potential variability in waste generation rate, a minimum, average, and high estimate, based on hypothetical sewage generation rates of 5.5, 15 and 30 gallons of waste per person per day are reported in Table 6. The average waste generation rate was calculated as the mean of the MSD product information rates identified above.

Equation 1

where:

ADV: Annual Discharge Volume
VDY: Vessel Days per Year
N: Number of passengers aboard vessel
WGR: Waste generated per person per day

Some vessels have the ability to hold treated sewage effluent for a period of hours to days, depending holding tank size. However, even with these systems, the overall average discharge rate must equal the waste generation rate. For this reason, the discharge rate used in calculations is assumed to equal the waste generation rate. Because recreational fishing vessels, in general, have minimal kitchen and showering capacity and are day use only, this vessel class was not included in estimates of graywater discharges.

The volume of graywater generated on vessels less than 79 feet varied widely depending on type of vessel, ranging from a few to several hundred gallons/vessel/day. Estimated graywater generation rates of 36, 67, and 119 gallons/person/per day (U.S. EPA 2008a) are reported in Table 7.

Wastewater Treatment System Descriptions

The Federal Water Pollution Control Act, also informally called the Clean Water Act or CWA (33 U.S.C.1251 et seq.), requires any vessel with installed toilet facilities must also have an operable MSD. Three general types of MSDs are available and in use. Type I and II MSDs treat the wastewater before its discharge or transfer. Type III MSDs are storage tanks which retain waste until it can be disposed of at an appropriate pump-out facility or at sea.

- Type I MSDs rely on maceration and chemical disinfection for treatment of the waste prior to its discharge into the water, and are only legal in vessels under 65 feet in length (U.S. EPA 2010a). USCG regulations dictate that effluent from Type I MSDs may not have a fecal coliform count greater than 1,000 per 100 milliliters, nor visible floating solids (USCG 2009).

- Type II MSDs provide an advanced form of the same type of treatment used by Type I MSDs and have a greater capacity to reduce fecal coliform counts and suspended solids. Different from Type I MSDs which rely solely on maceration to break down solid waste, Type II MSDs utilize aeration and aerobic bacteria in addition to maceration for the breakdown of solids. As with Type I MSDs, the waste is chemically disinfected, typically with chlorine, ammonia or formaldehyde, prior to discharge. Type II MSDs are legal in any size class of vessel, and there are a variety of different types (U.S. EPA 2008b). USCG regulations prohibit discharge of effluent from Type II MSDs with fecal coliform counts greater than 200 per 100 milliliters or suspended solids greater than 150 milligrams per liter (USCG 2009).

- Advanced wastewater treatment systems (AWTS) are an advanced form of Type II MSD utilizing techniques such as reverse osmosis and UV sterilization to provide more effective treatment. The performance of these units far surpasses the standards for fecal coliform bacteria, as well as other pollutants, set forth for Type II MSDs. In addition, AWTS typically produce ‘clean’ discharge waste containing substantially lower concentrations of hazardous treatment chemicals (U.S. EPA 2008a).

- Type III MSDs, commonly called holding tanks, flush sewage from the marine head into a tank that may contain deodorizers and other chemicals, predominantly chlorine. The contents of the holding tank are stored until they can be properly disposed of at a shore-side pump-out facility, or discharged off shore. Storing wastewater in holding tanks can increase fecal coliform counts and total suspended solids (ADEC 2000). Type III MSDs can be equipped with a discharge option, usually called a Y-valve, which directs the sewage into either the holding tank or directly overboard.

[Page intentionally left blank]