

Developing a Network of Marine Protected Areas in Puget Sound

A Synthesis Report on Challenges, Opportunities, & Policy Options

Prepared for the Puget Sound Partnership

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Puget Sound MPA Network
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EXECUTIVE SUMMARY

The waters of Puget Sound historically have sustained both abundant marine life, and many economically and culturally important human activities that depend on those resources. Beginning in the 1930s, residents have sought to preserve important places in the Sound from overuse or exploitation by designating **marine protected areas** – locations where human uses are formally restricted to ensure their long-term preservation.

There currently are 110 officially designated marine protected areas (MPAs) in Puget Sound, encompassing 366,503 acres and nearly 600 miles of shoreline. These MPAs offer different levels of protection, and are managed under various authorities to meet an assortment of conservation, research, and recreation-related goals. Despite this extensive, and often confusing, tangle of regulatory tools, many marine species and habitats have continued to degrade. The idea for a *network* of MPAs arises from two distinct motivations: first, the prospect drawn from recent research and examples from the field that the benefits of marine protection can be greater if single MPAs are ecologically linked across large areas; and second, the desire to coordinate and streamline the administration of our current suite of MPAs to ensure they are contributing collectively to conservation goals.

Developing a regional network of MPAs is a significant undertaking that will require substantial resources and the collaboration of many agencies, organizations, and individuals with competing needs and interests. This report outlines some of the political, technical, and social obstacles that may arise over the course of planning and implementing such a network, as well as the opportunities that may exist to draw on the experience and resources of existing groups engaged in marine resource issues. The issues identified include:

Political and Institutional Challenges

1. **Lack of a Clear Mandate for a Network.** An executive or legislative mandate that sets clear authorities and expectations can provide essential support and motivation for developing a network of MPAs. Although Washington has many legal tools for creating individual MPAs, it does not have an overarching mandate similar to those that have catalyzed MPA network processes in other states and regions.
2. **Fragmented Management and Enforcement Authority.** Authority over marine areas in Puget Sound is divided among federal, state, local, and tribal authorities, each with their own priorities and limited jurisdictions. The result is that despite having 12 types of MPAs, no single tool offers comprehensive protection. A potential complication at the federal level is that while EPA has guided large-scale estuary restoration, such as that

underway in Puget Sound, NOAA typically is the federal agency that supports MPA network planning in coastal states.

3. **Diverse Goals and Objectives for Single Sites and MPA Programs.** The overarching goals chosen for a network determine the objectives, indicators, and monitoring practices for both individual MPAs and the network as a whole. Although current MPAs have a common conservation focus, a network must further specify what success would mean, and additional overarching goals should address the economic and social aspects of the network.
4. **Uncoordinated Monitoring Programs.** Current monitoring in MPAs is limited and usually targeted to agency- or project-specific goals. Monitoring will need to be better coordinated across sites and agencies, and designed to address the overarching goals and objectives of the network.
5. **Sustainable Funding.** Developing a regional network requires a different set of financing tools than those that may work for a single MPA. The short-term and long-term success of an MPA network in Puget Sound will depend on the ability to meet both initial and recurring costs with a comprehensive financial strategy.

Scientific and Technical Challenges

1. **Lack of Scaled, Regional Scientific Guidance.** Researchers have developed general principles for designing networks of MPAs, but these will need to be adapted so that they are grounded in the specific physical, geographic, biological, and social dynamics of Puget Sound.
2. **Current Data Gaps.** Access to high-quality, local spatial information is essential to a network planning process, but we currently lack data in some priority areas, including human use patterns and benthic habitat distribution.
3. **Areas of Scientific Uncertainty.** While extensive available scientific information can help inform the design and management of an MPA network, there remain many areas of uncertainty that make it difficult to offer accurate predictions about the effectiveness of the network.
4. **Data Management.** Planning an MPA network will require capacity for compiling and storing a considerable amount of existing and new data, and policies for making that data accessible to many participants throughout the planning process.
5. **Decision Support.** Participants will need to understand the complex data gathered throughout the planning process, and the trade-offs of different decisions. A wide array of software and web-based decision support tools could assist the planning of a network of MPAs in Puget Sound.

Social and Cultural Challenges

1. **Balancing Top-down and Bottom-up Governance.** Washington currently employs an array of top-down, regulatory MPA tools, as well as some bottom-up stakeholder-driven MPA tools. A network will require the integration of both approaches, and a clear delineation of the leadership roles for government agencies and local community representatives.

2. **Diverse Constituencies.** Different areas around the Sound have different authorities, economies, user groups, and concerns, and it will be important to incorporate this diverse local context within the regional process.
3. **Public Participation and Process Fatigue.** Broad participation by diverse members of the public will be key to the success of a network, but this will require a guiding plan for public input, and adequate resources to facilitate that participation. Input into this process must be coordinated with other ongoing processes, to ensure the best use of limited time and resources. Many potential stakeholders are involved in other regional planning efforts, and may have limited time and interest in another process.
4. **Tribal Rights.** Puget Sound tribes must be closely involved in every stage of the network planning process. Although there is a general tribal policy statement on MPAs, marine sanctuaries, and fishery conservation areas in Washington, individual tribes have different perspectives and different jurisdictions that should be considered in that process.
5. **Public Awareness and Outreach.** In Puget Sound, public awareness of the existing MPAs is almost universally low. The success of an MPA network will depend on the engagement of local communities and user groups in the long-term management of protected areas.

Having considered these challenges and opportunities, this report presents five process options for developing a network of MPAs in Puget Sound. The options respond to a range of potential goals and motivations for a network, and consider available resources, including political will and funding. They do not represent the full spectrum of possible network options. Three options, if pursued, would address the 2009 Washington State MPA Work Group's recommendation for "the establishment of an ecologically meaningful network of MPAs;" of these, two options would address the 2008 Action Agenda's call for a network that "contributes to conserving the biological diversity and ecosystem health in marine areas of Puget Sound."

Option Zero: No Process and No Change to Current MPA Status

This option lays out the choice to not move forward with planning or implementing an MPA network in Puget Sound.

- *Rationale:* Current efforts offer sufficient protection to marine resources of interest at this time; there is insufficient interest or funding to pursue any planning process; or those resources are better devoted to other priorities.

Option One: Administrative MPA Network

This option envisions the creation of a social or administrative network, in which MPA managers are brought together to facilitate information sharing and collaboration. This group may set overarching goals to frame their collaboration, but those goals would be limited in scope, and the process would not involve additional information gathering or analysis.

- *Rationale:* There is insufficient interest or resources to pursue a comprehensive MPA network, but the region and MPA managers can benefit from greater connectedness and opportunities to share experiences.
- *Result:* This option would not create a comprehensive network of ecologically significant MPAs, but would improve coordination over the status quo and would require limited resources.

Option Two: Single-Species MPA Network

This option envisions the creation of a network designed to protect a single species or small, related set of species, such as rockfish. Pursuing this option would require considerable information gathering and analysis, and some stakeholder involvement and group facilitation.

- *Rationale:* A species of concern (for example: ESA-listed rockfish species, canary, yelloweye, and bocaccio) could benefit immediately from a network of no-take reserves. A more comprehensive process that considers multiple species and habitats would be protracted, while providing less protection specific to these target species.
- *Result:* This option would create an ecologically meaningful network of MPAs, but not a comprehensive network that links existing MPA programs.

Option Three: Comprehensive Network A – Sound-wide Focus

This option envisions the development of a comprehensive network of MPAs in Puget Sound through a single process that identifies goals and protection gaps for the entire Sound. This approach would involve establishing multiple managing and advisory bodies, extensive data gathering and analysis, data management, as well as outreach and stakeholder participation. It would require strong political support and adequate funding that extends throughout the length of the process.

- *Rationale:* There is sufficient interest, political will, and funding to create a comprehensive network, using a single, Sound-wide process.
- *Result:* This option would create a coordinated, comprehensive, and ecologically meaningful network of MPAs.

Option Four: Comprehensive Network B – Regional Focus

This option envisions the development of a comprehensive network of MPAs in Puget Sound through a process that divides the Sound into smaller sections, and tackles each in succession. This approach would involve establishing multiple managing and advisory bodies, local stakeholder groups for each area, as well as extensive data gathering and analysis, data management, and outreach. It would require strong political support and adequate funding that extends throughout the length of the process. Building this type of network would likely require the most resources and time of all options presented.

- *Rationale:* There is sufficient interest, political will, and funding to create a comprehensive network, as well as a desire to fully scale that process to local context and incorporate local information.

- *Result:* This option would create a coordinated, comprehensive, and ecologically meaningful network of MPAs.

This report does not recommend a particular option as the preferred route to developing an MPA network in Puget Sound. Instead, it provides information and context to decision makers that will enable them to consider and compare different planning choices, and adapt those options in light of current and future conditions, such as available funding or scientific assessments. Whatever next steps are chosen, it will be important to work with all partners, and include local communities, managing agencies, and tribes in discussions and decisions about how to improve protection in the marine areas of Puget Sound.

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INTRODUCTION

The waters of Puget Sound historically have sustained both abundant marine life, and many economically and culturally important human activities that depend on those resources. Beginning in the 1930s, residents have sought to preserve important places in the Sound from overuse or exploitation by designating marine protected areas (MPAs) – locations where human uses are formally restricted to ensure their long-term preservation.

Today, Puget Sound contains a patchwork of more than 100 MPAs designated and managed under different authorities to meet an assortment of conservation, research, and recreation-related goals (Van Cleve et al. 2009). Despite this trend toward greater protection, marine habitats and species increasingly are degraded and threatened. The idea for a *network* of MPAs arises from two distinct motivations: first, the prospect drawn from recent research and examples from the field that the benefits of marine protection can be greater if single MPAs are ecologically linked across large areas; and second, the desire to coordinate and streamline the administration of our current suite of MPAs to ensure they are contributing collectively to conservation goals.

The 2008 *Action Agenda* called for a strategic network that “contributes to conserving the biological diversity and ecosystem health in marine areas of Puget Sound,” and a 2009 report by the MPA Work Group to the Washington State Legislature identified the need for a “coordinated strategy to guide the establishment of an ecologically meaningful network of MPAs” in Puget Sound. These were not the first calls for the development of such a network (Murray and Ferguson 1998, Gaydos et al. 2005), yet despite long-term interest in the idea of a network – and isolated management responses – marine protection remains fragmented. Meanwhile, efforts elsewhere have led to MPA network designations in California, British Columbia, and Oregon.

This report aims to synthesize some of the major issues and challenges that may arise in implementing a functioning network of MPAs in Puget Sound, and to identify opportunities to address those challenges through a coordinated planning process.

A. BACKGROUND

A.1 MPAs & MPA Networks: Benefits, Limitations, and Best Practices

Marine protected areas are recognized as one tool for managing fragile marine resources and habitats; a tool that can be most effective when considered within a larger framework of ecosystem-based management (Halpern 2003, Norse 2010, Pitcher and Lam 2010, Halpern et al. 2010). While MPAs cannot replace traditional, single-species management, they can complement and enhance these other approaches.

The umbrella term “MPA” can describe areas under various levels of protection: from *no-access* and *no-take marine reserves* that prohibit, respectively, all entry or all extractive activities, to *multiple-use* areas that may allow limited fishing and recreation. The effectiveness of any single MPA or MPA network can depend on a range of interconnected social and ecological factors, including the size and siting of the MPA, the needs and life history of the species being protected, the level of activity restricted, the enforcement of regulations, and the impact of pressures external to the MPA, such as pollution and climate change (Pollnac et al. 2010, Babcock et al. 2010).

Washington State law defines a **marine protected area** as:

A geographical marine or estuarine area designated by a state, federal, tribal, or local government in order to provide long-term protection for part or all of the resources within that area. (SSB 6231, effective 6/12/2008)

When properly implemented, individual MPAs have been shown to offer significant benefits to both human and marine communities. In particular, no-take reserves typically result in significant increases in biomass, density, size of individuals, and species richness (Lester et al. 2009). In temperate reserves, researchers have noted overall increases in the density of algae, increases in the size and density of fishes, with mixed results among invertebrates (Babcock et al. 2010). The impact of reserve protection is likely to become apparent most quickly for heavily exploited species that are fast-growing and relatively sedentary, but improvements in species biomass and density have been observed across many taxonomic groups (Kaplan 2009, Lester et al. 2009). On average, the effects of protection on targeted species were noted after an average of 5 years, while the effects on nontarget species, through food web interactions or other indirect effects, may become apparent after 13 years or more (Babcock et al. 2010) – for species with longer or more complicated reproduction and life cycles, the impact of an MPA designation can take an even longer time to manifest. The documented social benefits of MPAs include increased food security, reduced user conflicts, and enhanced environmental awareness in situations where the local community is effectively engaged in management (Fox et al. 2011).

However, many well-intentioned MPAs fail to achieve their long-term goals of protection. Often they are too small or poorly sited to have an impact, or they merely displace harvest activities that continue apace just outside the bounds of the protected area. Some MPAs suffer from an extinction debt – initially showing improved results that falter as habitat outside the area continues to be degraded (Mora and Sale 2011). Depending on how it is established and managed, an MPA may be viewed as illegitimate in the eyes of the community where it is set, may distribute its benefits unequally and cause greater conflict, or may require ongoing financial and other support to continue functioning (Fox et al. 2011). In addition, while many studies reflect the benefits from no-take reserves that are well enforced,

The International Union for the Conservation of Nature (IUCN) defines a **network of marine protected areas** as:

A collection of individual marine protected areas that operates cooperatively and synergistically, at various spatial scales, and with a range of protection levels, in order to fulfill ecological aims more effectively and comprehensively than individual sites could alone.

these results cannot be extended to more permissive MPAs or to areas where poaching reduces the effectiveness of the regulation (Sethi and Hilborn 2008, Lester et al. 2009). Given all the factors that must happen together for an MPA to be successful, the failure of an individual MPA may be more the rule than the exception (Mora and Sale 2011).

Even a successful single MPA provides only limited benefits – most MPAs are too small in relation

to the total geographic ranges of the species they aim to protect to provide more than localized benefits. In all but a few situations, most of them in remote locations, it is politically unfeasible to create an MPA large enough to offer full protection. An alternative to creating very large MPAs is to locate multiple smaller MPAs that are linked together by circulation patterns, habitat types, or other criteria into a network that collectively provides greater benefits than the sum of its individual sites.

The potential ecological benefits of an MPA network (Laffoley et al. 2008) include:

- Increased biodiversity
- Protection of widely dispersing populations
- Protection of genetic diversity
- Protection across a full range of life cycles (spawning areas, feeding grounds, nurseries, and more)
- Protection of the full range of regional habitat types
- Buffer against catastrophic events

While research on individual MPAs has documented numerous empirical examples of their effectiveness, to date, the benefits of extended networks have been gleaned largely from theoretical modeling experiments (Botsford et al. 2003, Baskett et al. 2007, Blowes and Connolly 2011). More recent research has backed up these claims: for example, genetic testing of an exploited population of coral reef fish in Hawaii has provided empirical evidence of larval connectivity and recruitment among a network of nine MPAs established in 1999 (Christie et al. 2010).

One real-world example of an ecologically functional network comes from Australia, which in 2004 began implementing the Great Barrier Reef Zoning Plan, a large-scale spatial strategy that placed 32 percent of the area surrounding the reef in a no-take area and regulates the rest as multi-use. Researchers have observed a 20 percent

increase in biomass in reserves, when compared to areas that permit trawling, and an overall reduction in outbreaks of reef-eating starfish. The network protection has also provided critical, though insufficient, support to threatened species with large migration ranges (McCook et al. 2010).

General guidelines for the design and spacing of MPA networks that maximize conservation benefits suggest designing no-take reserves that cover approximately one-third of a region, with individual sites that range in size from several to 10s of kilometers in length and are spaced 10km to 100s km apart (Gaines et al. 2010). However, local parameters depend on the specifics of both the species being protected, including factors such as mean larval dispersal distance, and the dynamics of the region itself. The IUCN recommends the following five ecological principles for designing and implementing MPA networks (Laffoley et al. 2008):

1. Include full range of biodiversity present in the biogeographic region
2. Ensure that ecologically significant areas are incorporated (including unique or vulnerable habitats, foraging, and breeding grounds)
3. Maintain long-term protection
4. Ensure ecological linkages
5. Ensure maximum contributions of individual MPAs to the network

It is important to remember that biological factors are not the only, or necessarily even the most important, considerations when developing a network of MPAs. In addition to functioning as an ecological network that links species and habitats across spatial and temporal scales, it can serve as a social network, connecting people with complementary or conflicting ties to coastal and marine areas, and as an economic network, enabling the efficient use of limited resources across the span of individual areas.

MPA networks, like individual MPAs, should be thought of as linked social-ecological systems (Pollnac et al. 2010), and to achieve the full range of these benefits, the IUCN has identified six best practices for network planning (Laffoley et al. 2008):

1. Clearly defined goals and objectives
2. Legal authority and long-term political commitment
3. Incorporate stakeholders
4. Use of available information and precautionary approach
5. Integrated management
6. Adaptive management measures

Although achieving these principles and best practices is a challenge, developing a network of MPAs can prove a crucial step in the long-term protection and recovery of marine ecosystems.

A.2 MPAs in Puget Sound

There are currently 110 officially designated marine protected areas in Puget Sound, encompassing 366,503 acres and nearly 600 miles of shoreline.¹ Of these MPAs, 24 are members of the National System of MPAs and an additional four are eligible for inclusion in this system.

An estimated 15 percent of area in Puget Sound currently falls within some form of MPA, though sites are not evenly distributed throughout the Sound (Table 1). The legislation that created the Puget Sound Partnership divided the Sound into seven Action Areas, and the 2009 MPA Work Group Inventory considers the distribution of MPAs within these boundaries and two additional action areas created for the outer coast. While 57 percent of the San Juan-Whatcom Action Area is included within an MPA, just 1 percent of marine areas in Hood Canal and North Central Puget Sound have some level of protection. Although all existing MPAs in Puget Sound restrict human use to some extent, less than 0.1 percent of Puget Sound is protected at the highest levels of restriction, either as no-take or no-access (Table 3). These proportions fall well below those recommended by recent research, both modeled and empirical; one frequently cited estimate recommends that at a minimum, 33 percent of a region should be protected as a no-take reserve (Gaines et al. 2010).

Table 1. Distribution of MPAs in Puget Sound

| Action Area | Number of MPAs (% of Total MPAs) | | Size in Acres (% of AA Total Area²) | | Shoreline in Thousands of Ft (% of AA total shoreline²) | |
|---------------------------|---|-------|---|--------------|---|--------------|
| Strait of Juan de Fuca | 6 | (6%) | 29,813 | (6%) | 107 | (10%) |
| San Juan-Whatcom | 26 | (24%) | 290,088 | (57%) | 2,205 | (74%) |
| Whidbey | 19 | (17%) | 20,244 | (6%) | 349 | (14%) |
| North Central Puget Sound | 7 | (6%) | 814 | (1%) | 26 | (2%) |
| South Central Puget Sound | 15 | (14%) | 5,835 | (5%) | 19 | (1%) |
| South Puget Sound | 18 | (16%) | 18,183 | (17%) | 316 | (14%) |
| Hood Canal | 19 | (17%) | 1,526 | (1%) | 93 | (6%) |
| TOTAL | 110 | | 366,503 | (15%) | 3,115 | (19%) |

As previous reports have noted, management of MPAs in Puget Sound is fractured and uncoordinated. MPAs have been established or managed by 10 different local,

1. This count includes all areas identified in the 2009 inventory conducted by the MPA Work Group, as well as additional areas identified in the National MPA Inventory and the Nisqually Reach Aquatic Reserve, which was designated in 2011. This count differs from the MPA Work Group Inventory by counting Brackett's Landing and Edmonds Underwater Park as a single MPA, and Saltwater Underwater Park and State Park as a single MPA. This count does not include the proposed Port Susan Marine Stewardship Area.

2. Estimates for total acreage and total shoreline feet for each Action Area taken from MPA Work Group Inventory (Van Cleve et al. 2009).

state, and federal agencies. This patchwork exists in part because management authority over the marine ecosystem is divided (see Figure 1). One state agency, the Washington State Department of Natural Resources (DNR), is charged with managing the habitat associated with subtidal bedlands; a second, the Washington Department of Fish and Wildlife (WDFW), manages creatures living in the water column and their habitat; while a third, the Washington Department of Ecology (ECY), oversees water quality concerns. Unlike some other coastal states, which maintain public ownership of shorelines, between 60 to 70 percent of Washington's tidelands and beaches are in private ownership. An intertidal area, depending on its location, may be owned by one of several state agencies, a local government, or a private entity.

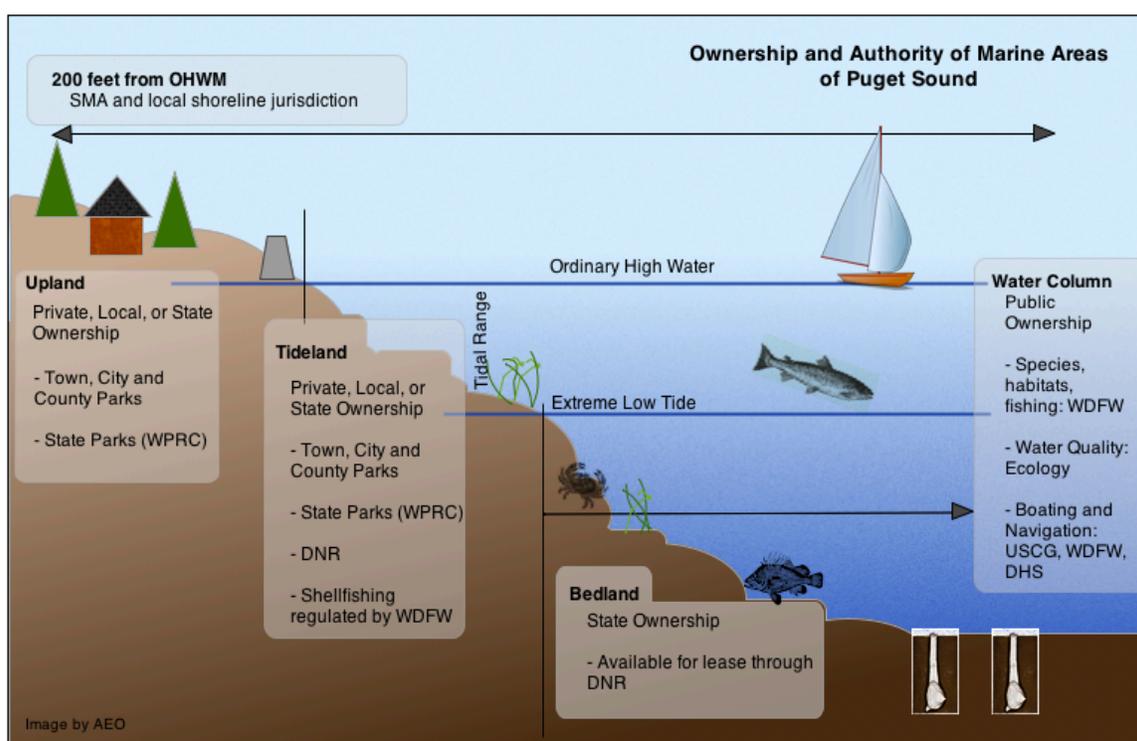


Figure 1: Ownership and Authority of Marine Areas of Puget Sound

In turn, these managing agencies use a variety of regulatory tools to designate protected areas within their authority – there are 12 different types of MPA designated in Puget Sound, as well as additional regulatory tools and private closures (see Appendix 1 for a detailed description of MPA types). As shown in Table 2, the University of Washington manages the largest MPA in Puget Sound, the San Juan County/Cypress Island Marine Biological Preserve at Friday Harbor Labs. Of the remaining MPAs, DNR manages the greatest area (60%), while the Parks and Recreation Commission manages the largest number of individual sites (61).

Table 2. Management Authority for MPAs in Puget Sound

| Agency | Number of MPAs | Size (Acres) | (% of non-UW Total) | Shoreline (Thousands of Feet) |
|--------------------------|----------------|------------------------------------|---------------------|-------------------------------|
| Tacoma | 2 | 13 | Less than 1% | 1 |
| Clallam County | 1 | 25 | Less than 1% | 9 |
| Seattle | 6 | 108 | Less than 1% | 11 |
| USFWS | 4 | 1,531 | 3% | 178 |
| NPS | 1 | 1,752 | 3% | 37 |
| WDFW | 24 | 1,946 | 4% | 129 |
| WPRC | 61 | 3,045 | 6% | 513 |
| ECY | 1 | 12,075 | 24% | 151 |
| DNR | 9 | 30,177 | 60% | 396 |
| UW | 1 | 292,414 | (85% of total) | 2,251 |
| TOTAL³ | 110 | 343,086 (50,672 without UW) | | 3,676 |

The actual uses and activities restricted within an individual MPA differs dramatically among the various managing agencies and MPA types. An assessment of the protection levels in existing Washington state MPAs conducted by The Nature Conservancy found that most MPAs in Puget Sound offer low to medium protection (Smith et al. 2012). Of the 102 Puget Sound MPAs considered by this study, only seven were identified as having a high level of protection, and these accounted for just 0.01% of the total area. The gap assessment also mapped the spatial extent of different closures and regulation, and in some cases found extensive overlap in restrictions – a high mark of 14 regulations cover a single area in Hood Canal (Smith et al. 2012).

Table 3. Protection Level of MPAs in Puget Sound (Acres)

| Action Area | No Access | No Take | Zoned w/ No Take Areas | TOTAL ³ |
|---------------------------|---------------|------------|------------------------|--------------------|
| Strait of Juan de Fuca | 527 | 0 | 0 | 527 |
| San Juan-Whatcom | 0 | 0 | 379 | 379 |
| Whidbey | 0 | 11 | 0 | 11 |
| North Central Puget Sound | 0 | 104 | 0 | 104 |
| South Central Puget Sound | 0 | 56 | 108 | 164 |
| South Puget Sound | 96 | 5 | 1 | 102 |
| Hood Canal | 0.02 | 250 | 0 | 250.02 |
| TOTAL³ | 623.02 | 426 | 488 | 1537.02 |

³ The acreage and shoreline totals for Tables 2 and 3 do not exclude overlapping protected areas, as is the case in Table 1.

MPAs in Puget Sound have been designed to meet a variety of environmental, recreation, and educational goals. The 2009 MPA Work Group identified a common goal of conservation across all MPA managing agencies, but did not go further to establish specific goals for a network approach. Instead, the group recommended that managing agencies work with the Puget Sound Partnership and tribes to identify marine conservation concerns and develop goals and objectives that align with goals to recover Puget Sound by 2020 (Van Cleve et al. 2009).

The MPA Work Group also recommended that managing agencies evaluate the effectiveness of existing MPAs, and that the first step of this evaluation be a review of the goals and objectives of the current MPAs identified as having a conservation focus. A review of management plans for individual Puget Sound MPAs conducted as part of this report found that the existing areas aim to protect a wide range of species and habitats, including more than 30 types of fish, 20 species of birds, and four species of marine mammals, as well as many types of algae and marine invertebrates⁴. Currently, we do not know how well different habitat types and species are represented within the current suite of MPAs, though this step could be completed as part of a future assessment.

The inventories completed to date do not include unofficial, or de facto, marine protected areas: areas that were established for purposes other than conservation that may have secondary conservation benefits (i.e., military use areas that restrict access and harvest). They also do not identify areas where tribal fishing and other use may be restricted through custom, official or otherwise.

MPAs and Marine Spatial Planning

Marine spatial planning (MSP) is a planning process and a decision tool that aims to identify and coordinate human activities in marine areas in ways that support multiple ecological, economic, and social goals, and reduce conflict between different uses. In 2010, the Washington State Legislature enacted a new law (SSB 6350) that charged the state to pursue MSP and incorporate it into existing regional management plans, including the Puget Sound Action Agenda, when funding became available. An amendment to that law in 2012 has allowed initial MSP work to move forward on Washington's outer coast.

Some states and regions, including California, have used marine spatial planning to assist in the design and evaluation of their networks of MPAs. A 2010 report on implementing MSP in Washington recommends that any statewide spatial plan focus on renewable ocean energy projects, but notes that the plan could also address additional concerns including aquaculture, protection of sensitive habitats, new fisheries, and other issues that might relate to the development of a network of MPAs in Puget Sound (Hennessey 2010).

Depending on the ultimate goals identified for an MPA network and the progress of MSP in the region, it may prove helpful to further develop that network using an MSP approach that emphasizes spatial assessment of resources and uses, as well as extensive public participation; to integrate the planning of MPAs into a larger MSP framework.

B-D. CHALLENGES and OPPORTUNITIES

Developing a regional network of marine protected areas in Puget Sound is a significant undertaking that will require substantial resources and the collaboration of many agencies, organizations, and individuals with competing needs and interests. Although the idea of a network approach to marine protection in Puget Sound has been raised many times in different forums over the past two decades, there are substantial challenges to actually implementing such an idea. The following three sections identify some of the political, technical, and social challenges that will likely arise during any effort to develop a network of MPAs. Agencies or organizations that decide to move forward in implementing such a network should carefully consider these issues, and evaluate whether support for the project is substantial and focused enough to overcome potential difficulties.

Although the challenges identified here are formidable, it must also be recognized that much work has been done that could support such a process. The Puget Sound region, which has a well-deserved reputation as a leader in creative conservation solutions, also has considerable social capital in the form of the many individuals and groups that are interested and engaged in marine resource issues. Each description of a *Challenge* is followed by an *Opportunities* section that outlines ongoing work or local groups that could be integrated into a network planning process. This list of challenges and opportunities is not exhaustive, but covers a range of issues gleaned from reviewing literature on MPA best practices, challenges encountered in developing other MPA networks, and issues particular to Washington or Puget Sound observed in past processes.

B. Political and Institutional Challenges and Opportunities

B.1 Lack of Clear Mandate for a Network

Challenge:

One commonly cited best practice for developing an MPA network is to clearly define the legal authorities, roles, and responsibilities of the various agencies, organizations, and stakeholders involved (Laffoley et al. 2008, Gleason et al. 2010). In many cases, this involves a legislative or executive mandate that articulates the foundation for the prospective network, including its goals and boundaries, as well as the role of science and stakeholders in the process to follow.

California's Marine Life Protection Act (MLPA), which passed in 1999, directed the state to redesign its existing MPA system to function as a network, and to establish a greater proportion of no-take marine reserves within that system (see Appendix G3.3). The MLPA set six overarching goals for the network, and directed the state Department of Fish and Game to develop a master plan that included

recommendations on the species and habitats that should be represented in the MPA network, and proposed alternative networks of MPAs, including no-take reserves, for each biogeographical region. Although MLPA alone was not sufficient for the creation of the current network, having a strong mandate that included provisions for protecting network-scale ecological criteria, including migration and recruitment patterns, provided essential support throughout the process (Gleason et al. 2010).

In Oregon, a 2008 Executive Order by Governor Ted Kulongoski directed the state's Ocean Policy Advisory Council (OPAC) to work with the Oregon Department of Fish and Wildlife (ODFW) to develop recommendations for up to nine marine reserve sites using a public nomination process. The Executive Order provided clear roles and divisions of authority among the different state agencies involved in developing the recommendations, and set deadlines for various stages of the project. In fulfilling the order, OPAC had to go beyond general recommendations to making site-specific ones, and the order also included provisions for public education and engagement. The Oregon Legislature codified OPAC's recommendations in 2012 (SB 1510), a move that provided substantial additional support to implementing agencies (C. Don, pers. comm).

While a legislative or executive mandate can provide essential support for the development of an MPA network, it is no panacea. In California, two initial attempts to implement MLPA failed because of insufficient stakeholder involvement and funding, while in Oregon, the mandated deadlines led some stakeholders and members of the public to feel the process was conducted too quickly (Corley 2008). Legislation can prove polarizing, and may overburden agencies if not supported with sufficient funding.

Although Washington has a number of legal tools for establishing individual MPAs, it does not have an overarching mandate similar to those that catalyzed the processes in Oregon and California. The 2008 bill that established the MPA Work Group (SSB 6231) required the production of an inventory of MPAs in Washington and a report with recommendations, but once these tasks were complete, the group disbanded. A companion bill that failed during the same session (SSB 6307) would have required the Puget Sound Partnership to coordinate and prepare a management plan for "a strategic network of marine managed areas that contribute to conserving the biological diversity and ecosystem health of Puget Sound." Lacking an overarching mandate, it is unclear how far the state can move forward in developing a regional network of MPAs.

Opportunities:

Legislation that sets clear authorities and expectations, as well as a timeline and funding path for developing a network of MPAs in Puget Sound could prove an essential tool to support that process. Such legislation should set realistic, but firm deadlines to ensure the effort progresses. A comprehensive mandate may not be

necessary if the different managing agencies and other interested parties can collaborate to establish goals and objectives for the network, and a process for evaluating and designating sites.

B.2 Fragmented Management and Enforcement Authority

Challenge:

As depicted above in background section A.2, authority in the marine areas of Puget Sound is dispersed among 10 different federal, state, local, and tribal authorities. The result is that although Washington has implemented 12 different types of MPA in Puget Sound, no single MPA offers comprehensive coverage or protection to habitats and species.

As an example, WDFW has authority over the take of wildlife, fish, and shellfish in state waters, including the authority to enforce regulations on-site with staff officers (WAC 220-20-100, RCW 77). DNR, by contrast, is mandated to steward state-owned lands, including all subtidal lands, a charge it wields by issuing or rejecting permits for certain uses; this authority does not usually extend to on-site enforcement (WAC 332-30, RCW 79.105). A DNR Aquatic Reserve designation implies a level of protection to habitats and species associated with the sea floor, by restricting new subtidal modifications, but no additional protection to fish or other creatures in the water column. A WDFW Marine Preserve restricts some fishing activity, but offers no specific protection to the sea floor. Thus, a species whose life cycle takes it from sea floor to water column and back, such as some species of rockfish, would not experience full protection in either MPA.

As a second example, local governments, through their shoreline master programs, have the authority to regulate uses waterward of the ordinary high water mark (OHWM) within their boundaries, in addition to uses that occur up to 200 feet inland (RCW 90.58). This allows the potential for protective areas that connect nearshore and offshore areas, however, most local plans opt to apply a basic “Aquatic” classification for all marine locations, rather than classify some marine areas as better suited to conservation-appropriate uses (WAC 173-26-211). Instead, local governments interested in creating MPAs have often designated areas by working with the Washington Parks and Recreation Commission, which has the authority to regulate or prohibit take of fish and shellfish, or by working with their local parks department to designate areas.

Such a tangle of authorities is a very common challenge encountered when establishing a new network, particularly in countries with a stable government presence and a history of environmental stewardship. Yet, it can be a difficult challenge to resolve. The legislative mandate established in California by MLPA was enhanced by the California Marine Managed Areas Improvement Act (2000), which overhauled and streamlined MPA management and authority by reducing the

number of MPA classifications from 18 to just six, clearly identifying the level of restriction associated with each MPA, and identified the agencies with designation or management authority. This move significantly increased the clarity and public understanding of where activities were allowed or restricted, even before the full MLPA process was completed (See Appendix G3.3).

An additional potential challenge concerns the alignment of restoration work in Puget Sound with federal priorities. To date, much of the work toward recovery in the region has been driven by the priorities set and funding provided by the Environmental Protection Agency (EPA), which is the lead federal agency charged with overseeing the restoration of large-scale estuaries. The push toward developing a network of MPAs at the national level has been lead by the National Oceanic and Atmospheric Administration (NOAA), through the National MPA Center. The Center was established by Executive Order in 2000 and has provided technical and financial support to MPA programs in various areas of the country.

To date, most of the MPA networks developed in the United States are located on outer coasts, in areas traditionally aligned with NOAA, rather than in estuaries, which fall under the EPA's National Estuary Program. One exception is the system of 28 National Estuarine Research Reserves, which is managed by NOAA. In developing a network of MPAs, it will be important to make sure the goals and outcomes of the network align with those set by both federal agencies.

Opportunities:

One method to reduce the existing regulatory overlap would be to pursue legislation similar to that passed in California, and limit the kinds of MPA designations to a handful of clearly defined types. An alternative to a drastic overhaul might involve identifying the level of protection associated with each existing MPA type, independent of its managing agency, and applying that level of protection where it makes the most sense for the resource targeted for protection. One way to apply this approach might be to designate a WDFW no-fishing Marine Preserve within an Aquatic Reserve, which would ensure more complete protection within the preserve. Monitoring and enforcement responsibilities could then be shared among the agencies over the entire extent of the protected area.

B.3 Varying Goals and Objectives for Single Sites and MPA Programs

Challenge:

To be successful, a network of MPAs must be guided by clear goals and measurable objectives. The 2009 MPA Work Group report found that while natural resource managing agencies have different authorities and mandates related to the marine environment, they share a goal of conservation. The report recommends that agencies "clearly articulate conservation needs and the ultimate conservation goals of MPAs" (Van Cleve et al. 2009).

Ecosystem-scale conservation is frequently listed as a primary goal for MPAs and MPA networks, often to complement human use goals like recreation or managing fisheries. However, conservation is a broad term that encompasses fundamentally different approaches: conservation-related goals include preserving biodiversity, protecting rare and threatened species, maintaining genetic diversity, increasing resilience, restoring degraded habitat, recovering ecosystem functions, and more (Roberts et al. 2003, Pomeroy et al. 2004). The specific type of conservation goal chosen will determine the objectives, indicators, and monitoring practices for both individual MPAs and the network as a whole. While these different conservation goals can be complementary within an MPA network, they also imply tradeoffs – such as between selecting sites that represent all habitat types, sites that are close enough to ensure larval connectivity, and sites that are separated enough to insure against a catastrophic event.

A recent challenge reported in Hawaii exemplifies both the importance and the difficulty of setting specific goals for marine protected areas. Researchers studying the Papahānaumokuākea Marine National Monument (PMNM), one of the largest no-take reserves in the world, found that numbers of endangered Hawaiian monk seals were declining within the boundaries of the reserve, while monk seal populations were increasing in nearby unprotected areas (Gerber et al. 2011). The authors proposed several possible explanations, including increased predation by a growing shark population protected within the reserve. Speaking of the research in *Nature News*, lead author Leah Gerber posed this question about the overall goal of the PMNM: “It depends how you define success... Is it about saving endangered species, or preserving a functioning ecosystem?” (Jones 2011) This is a fundamental question that must be answered early in the process of designing a network of marine protected areas in Puget Sound.

A survey of the conservation-related goals and objectives addressed by current Puget Sound MPAs found that these areas have been set up to protect a wide variety of species, habitats, and ecosystem functions and features (see Appendix G.2). These management plans identified more than 30 types of fish, 20 species of birds, and four species of marine mammals, as well as many types of algae and marine invertebrates. The range of goals includes species of current conservation concern (yelloweye and canary rockfish), as well as habitats that support ecological functions (eelgrass beds) and species that are important to the Puget Sound food web (forage fish). The list also includes many species that are not threatened, or that are less likely to benefit directly from typical MPA restrictions. Many sites listed as part of the MPA inventory lack management plans or specific goals, and currently there are no overarching goals that apply to all MPAs in Puget Sound.

Oregon’s marine reserve system has been shaped by its primary goal to “conserve marine habitats and biodiversity” and its focus on using the reserve network as a framework for scientific research (see Appendix G3.2). In its early planning phase, OPAC identified key types of marine habitat to be considered during the nomination

process, and those proposing sites had to identify the percent of each habitat represented within the area, as well as species diversity and abundance. California's network established a range of goals, including ones directed to protecting natural diversity, sustaining and rebuilding species of economic value, improving recreation and educational opportunities, and protecting natural heritage. The National MPA Network operates under three goals: natural heritage, cultural heritage, and sustainable production. In each case, the goals set initially helped determine the scope and scale of the network, and frame the process of developing the network and evaluating its success.

Opportunities:

Establishing overarching goals is an important first step in developing a network of MPAs in Puget Sound. These goals should serve to answer the question: How could MPAs, collectively, contribute to the recovery of Puget Sound? While ecological and conservation-related goals are essential, it also will be important to consider economic and social objectives for the network.

The MPA Work Group did not identify specific goals for a network of MPAs, but did make several suggestions that could support the development of a vision and goals for a network of MPAs in Puget Sound:

- Ensure long-term sustainability of populations
- Reduce socioeconomic impacts without compromising conservation and fisheries benefits
- Maintain ecosystem processes and connectivity
- Improve resilience
- Improve cooperation and collaboration among MPA managers

The MPA Work Group also recommended that establishment criteria for new MPAs should include the following considerations:

- biogeographical
 - habitat rarity
 - regionally representative
- ecological
 - high species diversity
- socioeconomic
 - accessibility to users
 - manageability

A new multi-stakeholder group, comprised of managing agencies, tribes and other interested parties, could use this information as a starting point for developing goals of the network. The group could also consider the habitats and species protected by existing MPAs in Puget Sound to develop a list of key species and habitats, similar to that developed in Oregon. Such a list would help direct efforts to evaluate, monitor, and manage MPAs.

B.4 Uncoordinated Monitoring Programs

Challenge:

The 2009 MPA Work Group identified monitoring as a key challenge for improving the management of MPAs – barriers to effective monitoring include the large area to cover, lack of funding and staff to conduct field work and analysis, the expense of some survey techniques (such as monitoring by ship or aircraft), as well as lack of experience with monitoring among some managing agencies. Monitoring that does occur tends to focus on local resource management issues within the monitoring agency's mandate, rather than on monitoring across all MPAs or comparing the effectiveness of MPAs to sites without similar protections. There is no current monitoring program known that focuses on socioeconomic or governance questions, although this information is essential in judging the effectiveness of MPAs.

One option to increase the scale of monitoring across the MPA network is to incorporate citizen involvement. In California, the Collaborative Fisheries Research Program monitors fish biodiversity in four MPAs in Central California using local charter boats and volunteer anglers. The program, which is run by Cal State, allows anglers to fish (and keep their catch) in areas that are otherwise closed, and creates partnerships between researchers and the sportfishing community. A similar program has been established in Oregon's reserve system.

Opportunities:

There are many existing citizen science and volunteer programs that focus on Puget Sound that, with some additional coordination, could be tapped to help monitor MPAs across the network. There also are monitoring programs that extend Soundwide that do not currently consider MPAs as part of their program, but could be targeted to help answer these questions. This work could be coordinated by the Puget Sound Ecosystem Monitoring Program (PSEMP).

- Structure monitoring to answer questions about the effectiveness of different types of MPA, so that data are comparable across sites managed by different agencies.
- Ensure baseline monitoring is conducted before the designation of any new sites, including monitoring socioeconomic indicators.
- Work with citizen science and volunteer monitoring programs – such as those run by Soundwatch, Citizens for a Healthy Bay, REEF, Beachwatchers, Washington Sea Grant, among others – to conduct monitoring both on the ecological resources of different areas, and human use patterns within those areas.
- Consider whether the Washington Department of Ecology's Eyes over Puget Sound program, which flies regular aerial surveys to monitor for water quality, could be used to also monitor for human use patterns in MPAs.

- Partner with colleges and universities to conduct data analysis.

B.5 Sustainable Funding

Challenge:

Both the short-term and long-term success of an MPA network in Puget Sound will depend on the ability to meet both initial and recurring costs with a smart financial strategy. While the consolidation of many MPA programs into one coordinated network can provide many opportunities to share costs and resources, ongoing monitoring, enforcement, and public awareness programs can be costly. Developing a regional network requires a different set of financing tools than those that may work for a single MPA (Laffoley et al. 2008).

Finding the right balance of funds can be complicated. In California, a public/private partnership with the Resources Legacy Fund Foundation allowed the state to plan and implement the MLPA process after an earlier effort stalled due to lack of funding. This partnership allowed for significant investment in scientific guidance and stakeholder outreach. However, the use of private foundation funding has caused controversy throughout the process, with some groups interpreting the effort as the privatization of public resources. This has led to the perception among some sectors of the public that the network lacks legitimacy. Lack of funding for sufficient ongoing enforcement has prompted some to refer to the established MPAs as “Marine Poaching Areas” (Byers and Noonburg 2007, Sethi and Hilborn 2008). Planning for the fifth and final region, the San Francisco Bay Area, has stalled in part because a major funder in other regions has offered less support for this region (B. Ota, pers. comm).

In Oregon, funding for the implementation of marine reserves has been covered by the settlement from a 1999 oil spill caused by the shipwreck of the freighter *New Carissa*. This stable funding source allowed the reserve planning process to proceed during a period otherwise characterized by budget reductions. The ongoing costs of reserve implementation and management will be covered by lottery funds.

Opportunities:

One key step in the development of a network of MPAs must be the creation of a comprehensive funding strategy. This strategy should include a diverse range of federal, state, and local funding mechanisms, and should be updated every few years as conditions and needs change.

- Potential federal sources for funding include NOAA’s Office of Ocean and Coastal Resource Management, the Marine and Coastal Keystone Grant offered through the National Fish and Wildlife Foundation (an MPA-specific grant was cut in FY2012), and the US Navy.

- Potential state sources for funding include the Aquatic Lands Enhancement Account, revenue generated from the sale of boating licenses, revenue generated from the sale of fishing and shellfishing licenses.
- Potential private sources of funding include foundations with an interest in marine planning and protection, such as the George and Betty Moore Foundation, the David and Lucile Packard Foundation, the Campbell Foundation, and the Bullitt Foundation, as well as private corporations like Boeing and REI.
- Consider funding approaches that build local awareness and support for MPAs, including “Friends of...” organizations.
- Investigate whether funds from pollution and damages settlements or mitigation and in-lieu fee programs may be appropriate to apply to MPA planning or management.
- Consider revenue-generating options, such as recreational use fees or merchandise sales.

C. Scientific and Technical Challenges and Opportunities

C.1 Scaled, Regional Scientific Guidance

Challenge:

Access to relevant, best available science should be a key concern in developing a network of marine protected areas. A network whose design and management practices are grounded in an understanding of local marine ecology has a better chance at long-term ecological success than MPAs established opportunistically. Such a network also is more likely to be supported by tribal representatives and other stakeholders, particularly if these groups are involved in collecting relevant information used throughout the process.

Although there has been extensive research to develop the general principles for designing networks of MPAs, research specific to Puget Sound is limited. Few of the established MPAs have been consistently monitored, and fewer were monitored prior to establishment. This lack of information means it is difficult to demonstrate conclusively what ecological attributes contribute to a successful MPA in Puget Sound.

“We found that the use of guiding principles, science and socioeconomic considerations, and local experiential knowledge was key to having the best available information integrated into policy. The guiding principles helped to keep the process on track and provided a basis for which decisions could be made about how to manage the process.” (Gleason 2010)

In California’s MLPA process, scientific guidance was developed for each region along the coast prior to the establishment of any new MPAs, by bringing together a

Science Advisory Team (SAT) comprised of scientists from public and private institutions with expertise in local marine ecology, oceanography, fisheries, socioeconomics, and other topic areas. Profiles developed for each region by the MLPA Initiative team served as a starting point for discussions, and these reports included local knowledge gathered from fishing communities and other resource users, as well as physical and biological information. One recurring difficulty encountered in that process was managing timely interaction between the SAT and the regional stakeholder groups involved in the implementation – there could be considerable lag times to get approved, science-based answers to questions arising in other stages of the planning process. Overall, however, this process design allowed for the effective and transparent exchange of information.

Science-based guidelines for an MPA network in Puget Sound could differ significantly from those used in other regions that focus on coastal and offshore areas. For example, size and spacing guidelines developed for the MLPA process in California assume a regular distribution of habitat types along the coast, according to depth, and a linear relationship between distance and larval connectivity. The need to develop guidelines specific to an estuary system is one reason planning in the San Francisco Bay region has stalled (B. Ota, pers. comm). In a large estuarine system like Puget Sound, where habitat and species distributions are determined by complex relationships among currents, shoreline and benthic geomorphology, and salinity gradients, dynamic models may provide more relevant information on effective size and spacing than simple, strict standards.

Opportunities:

In developing a network of MPAs, one important early step should be compiling the relevant information that does exist into a regional profile that can help support the design of the network. Such a profile may need to be divided into regions within the Sound to account for differences among areas, but should be directed to the initial goals set up for the network as a whole. In addition to ecological information drawn from monitoring or research studies, local knowledge should be incorporated into the profile by consulting with resource users, potentially through a joint fact-finding process.

There is extensive research available on the Puget Sound region that could be incorporated into a profile to guide the network planning process, and many scientists and technical experts could be tapped to serve on an advisory group that could develop guidelines and provide comment on certain steps of the network planning process. Where appropriate, it may be efficient to use existing groups to help coordinate information gathering and monitoring across the MPA network, including the Puget Sound Partnership's Science Panel, Social Science Work Group, the Puget Sound Ecosystem Monitoring Program (PSEMP), Puget Sound Nearshore Ecosystem Restoration Project (PSNERP), and the Rockfish Work Group facilitated by NOAA.

C.2 Important Data Needs

Challenge:

While much of the information necessary for planning an MPA network in Puget Sound already exists, it will be important to identify any critical information gaps that might delay or compromise the planning process.

Table 4 outlines priority spatial information categories that have been identified as important in other MPA network planning efforts (Botsford et al. 2003, Laffoley et al. 2008, Gleason et al. 2010) and that will likely be needed for a planning process in Puget Sound. The third column indicates whether the information is available for Puget Sound, either entirely or partially. Information on data availability was drawn from a 2011 data inventory compiled by the Washington State Ocean Caucus (SOC) and Department of Ecology to support coastal and marine spatial planning (SOC 2011).

Table 4. Information Needs for MPA Network

| Key decision support data | | Available in WA? |
|---------------------------|--|----------------------|
| Base maps | Regional boundary | Y |
| | Coastline | Y |
| | Terrestrial region & features | Y |
| | Nautical charts | Y |
| | Latitude & longitude | Y |
| Physical & bathymetric | Bathymetric imagery/habitat | Some |
| | Depth contours | Y |
| | Submarine features | Unknown |
| | Coastal watersheds | Y |
| | Rivers and streams | Y |
| | Land cover, land use patterns | Y |
| Biological/habitats | Shoreline habitats (rocky intertidal, sandy beach, marsh, etc.) | Y, ShoreZone, PSNERP |
| | Kelp forests | Some |
| | Estuaries and associated habitats (eelgrass, shellfish beds, etc.) | Some |
| | Hard bottom habitats (by depth zone) | Some |
| | Soft-bottom habitats (by depth zone) | Some |
| | Seabird nesting, feeding areas | Some |
| | Marine mammal haulouts | Some |
| | Rockfish habitat | Some |
| | Forage fish spawning areas | Some |
| | | |
| Cultural | Towns, cities | Y |
| | Roads and infrastructure | Y |

| | | |
|-------------------------------|--|---|
| | Harbors, ports | Y |
| | Boat ramps | Y |
| | Coastal access points | Y, Coastal Atlas |
| | Geographic names | Y |
| | Impaired water bodies | Y |
| | | |
| Consumptive uses | Commercial fishing data (logbook and landing receipt data) | Some, but would need to be converted to spatial layer |
| | Areas of importance to commercial fisheries | N |
| | Recreational fishing data (commercial-passenger fishing vessel data, report cards, etc.) | Some, but would need to be converted to spatial layer |
| | Areas of importance to recreational fisheries | N |
| | | |
| Non-consumptive uses | Dive sites | N |
| | Kayaking areas | N |
| | Wildlife viewing areas | Some |
| | | |
| Existing Marine Managed Areas | Existing MPAs | Y, but needs to be updated |
| | Fishery closures | Some, not one coordinated spatial layer |

In addition to spatial information, certain non-spatial data could be crucial to the MPA network planning process. These include socioeconomic assessments for communities that would be impacted by an MPA network, as well as biological information on the population distributions and life history stages of species the network would protect. In developing guidelines for the effective size and spacing of MPAs, it will be important to consider what circulation or other relevant models exist and what additional modeling work may be needed, as well as what other datasets may be useful.

Opportunities:

One of the key gaps identified in a 2011 data inventory and workshop was a lack of human use data that delineates the patterns of resource use in marine areas or identifies areas of economic importance to commercial and recreational users. Currently, there is an opportunity to work with NOAA's MPA Center to collect some of this data in the short-term at a coarse scale through participatory mapping workshops.

A second known gap is the lack of benthic habitat data for many parts of Puget Sound. While parts of the Sound, including the San Juan Islands, have been extensively mapped, a comprehensive map that identifies locations of a limited number of important habitat categories could be used to evaluate the representativeness of the current set of MPAs, and to help identify gaps in coverage.

A current effort led by the Nature Conservancy to coordinate the work of different groups involved in benthic habitat mapping (USGS, NOAA, Tombolo Institute, and others) could lead to such a data layer.

For additional data needs, it may make sense to partner with university research programs or other institutions to help fill priority data needs. Local Sea Grant extensions have played a supporting role in other regions, and in Washington the Geoduck Aquaculture Research Program (<http://www.wsg.washington.edu/research/geoduck/index.html>) provides a potential model for how such a targeted research program could be designed to inform policy.

C.3 Areas of Scientific Uncertainty

Challenge:

MPAs often are recommended as a precautionary management tool, of use in situations where uncertainty about population rates, mortality, ecological interactions, and the impact of catastrophic events mean traditional management approaches can lead to overexploitation. Yet many aspects of our complicated marine ecosystems are not well understood enough to allow scientists to make accurate predictions about the exact extent to which designating marine protected areas or creating a network will result in the benefits promised. Meta-analyses have revealed many of the general characteristics of successful MPAs, but these recommendations are not site-specific (Roberts et al. 2003, Halpern 2003, Lester et al. 2009). This lack of certainty about the effectiveness of MPAs can lead some participants to criticize any proposals to create new or modified spatial protections.

While extensive available scientific information exists or can be collected to help inform the design and management of an MPA network, there remain many areas of uncertainty, including the following (Botsford et al. 2003, Sale et al. 2005, McLeod et al. 2009, Mora and Sale 2011):

- Larval dispersal patterns for many marine species
- Patterns of juvenile and adult movement for some species targeted for protection
- Effectiveness of MPAs in combination with other established fishery management and restoration regulatory tools
- Thresholds that determine the resilience of marine populations
- Cumulative impacts of ecosystem threats that are not reduced by the existence of an MPA (pollution, shoreline modification, invasive species, etc.)
- Trade-offs and potential conflicts among user communities

- Potential impacts of climate change on the effectiveness of MPAs

In developing a network of MPAs for Puget Sound, managers must be candid about the uncertainties involved in this management decision. There must be a dedicated and transparent effort to regularly evaluate whether both individual MPAs and the MPA network as a whole are meeting their goals. Managers should also establish a process for adapting management – including by discontinuing regulations in areas where the protection is shown to be ineffective. A network can be implemented as a way to test and get answers to these remaining questions.

“Denying uncertainty is a huge risk we cannot afford to take. When MPA advocates make sweeping statements about the benefits of MPAs, expectations are raised in user groups and put MPA cynics on their guard... While it is imperative that performance be strictly monitored in all MPAs, we should be wary of traps that unrealistic targets pose for conservation interests.” (Agardy 2003)

In Oregon, this question of uncertainty is addressed clearly in the goal for the marine reserve system; one of the five objectives for the network is to:

Use marine reserves as reference areas for conducting ongoing research and monitoring of reserve condition, effectiveness, and the effects of natural and human-induced stressors. Use the research and monitoring information in support of nearshore resource management and adaptive management of marine reserves.

This objective is being pursued through extensive baseline monitoring before the closure of any areas, as well as ongoing analysis and evaluation.

C.4 Data Management

Challenge:

Marine spatial planning efforts, such as designing a network of MPAs, can involve compiling a considerable amount of existing and new data. This data includes the physical, biological, and social information that is vital to make informed decisions, but that may have been collected at different scales and resolutions. This information must be made accessible at various stages of the process to participants with varying technological skill levels. Some groups and institutions with proprietary or sensitive data may be reluctant to share that information for use in a public planning effort. Information on the location of important fishing grounds, military exercise locations, or tribal cultural areas can be extremely sensitive. Certain groups may be more comfortable sharing their data if it is stored at an

independent or educational institution, rather than at a state agency, or if aspects of the data are kept confidential or recorded at a coarse resolution.

As part of the MPA network planning process, it will be important to take a coordinated approach to data management and information sharing. One management challenge will be determining where the data for the process will be stored and supported – as well as for how long and in what capacity. A second will be determining common standards for the quality and scale of data used during the process. A third challenge will be fostering connections among institutions, agencies, and data-generating groups to ensure all information that could help support the process is shared openly and made available for public use.

Spatial data compiled to support California's MLPA process is hosted in a geodatabase at the University of California Santa Barbara. This partnership has allowed the process to benefit from that institution's powerful hosting capacity and technological expertise.

In British Columbia, geographic information for MPA planning is managed by a government initiative called GeoBC (<http://geobc.gov.bc.ca/>). In addition to hosting data and supporting GIS infrastructure for many projects across the province, a division within this agency was tasked with developing a number of spatial planning products to inform management of MPAs. These products have included creating a marine classification system for British Columbia and conducting a GAP analysis.

Opportunities:

One of the early steps in developing a network must involve decisions on how the data needed throughout the planning process and implementation will be stored and accessed. While state agencies like Ecology, DNR, RCO, and WDFW have considerable data capabilities, it will be helpful to consider the benefits and tradeoffs of hosting data at a single state agency, or with a private, nonprofit or educational institution. The state Office of the Chief Information Officer and the Washington State Geospatial Portal could be useful in developing a data strategy (<http://geography.wa.gov/GeospatialPortal/index.shtml>).

To the extent possible, data that is gathered for an MPA network planning process in Puget Sound should adhere to the same data standards and requirements developed for the ongoing marine spatial planning process underway on the Washington outer coast.

C.5 Decision Support Tools

Challenge:

Designing a network of marine protected areas in Puget Sound will require pulling together and analyzing information from many diverse sources, in ways that consider complex social and ecological interactions. Increasingly, decision makers

working in such data-intense situations are using decision support tools – software or web-based technology that is able to take in this disparate information, analyze it, and display it in a way that helps those involved to gain a more holistic understanding of the considerations and tradeoffs involved in their decision.

Numerous decision support tools have been developed to inform previous or ongoing marine spatial planning efforts, including planning MPA networks, and they can be applied at many steps in the planning process (Center for Ocean Solutions 2011), including:

- data management
- mapping and visualization of data
- alternative scenario development
- stakeholder participation
- tradeoff assessment
- community outreach

With so many decision support tools available, and more being developed all the time, one of the challenges for those involved in the network planning process will be deciding which tools will be the most useful and cost effective for the level of information and analysis needed.

Opportunities:

A wide array of decision support tools have been developed that could assist the planning of a network of marine protected areas in Puget Sound, and several existing projects may already be in place that could serve this need.

The Nature Conservancy is adapting the online Marine Planner tool used in California and Oregon to inform the pilot marine spatial planning project in Pacific County (<http://washington.marineplanning.org/>), and this platform could be extended for Puget Sound.

The Puget Sound Partnership and Puget Sound Institute are considering conducting a threat assessment for Puget Sound that would include spatially explicit information on the location and intensity of various priority threats to Puget Sound, including its marine environments. This assessment could be used to inform the design of a network of MPAs in several ways: by tracing the extent to which outside impacts may reduce the effectiveness of MPAs; by identifying where currently protected areas are at greatest risk; and by identifying ecologically important areas that are less impacted by outside pressures, and thus may be more likely to benefit by spatial protection.

The type of decision support tool selected, and the decision to use any tool at all, will depend heavily on the goals and management framework of the MPA network under development. Thus, no single tool should be selected before these are in place.

D. Social and Cultural Challenges and Opportunities

D.1 Balancing Top-down and Bottom-up Governance

Challenge:

Successfully implementing a network of marine protected areas in Puget Sound will require a combination of top-down and bottom-up governance strategies. Top-down processes include the legal and regulatory authorities that underlie the state's ability to control and enforce certain activities in the interest of protecting certain species or preserving biodiversity. Bottom-up processes include participatory approaches in which stakeholders instigate and are heavily involved in management decisions.

As identified above in section B.1, having a strong, legal mandate that clearly defines

"MPA governance can become more effective, equitable, and resilient to external driving forces if different [legal, participative, economic, knowledge, and interpretive] incentives are combined to address conflicts and challenges." (Jones et al. 2011)

the objectives of the network as well as the roles and responsibilities of the parties involved can be essential to generate the capacity, resources, and attention necessary to carry through an extensive, and potentially contentious, planning process. At the same time, without the support and involvement of key stakeholders, an MPA network designated by legal mandate alone may ignore important local ecological and social context. When the surrounding community does not view an MPA boundary as legitimate, the results may include low compliance, higher

enforcement costs, and, ultimately, failure of the network to protect the resources it was established to defend.

A recent UNEP report on governing practices in marine protected areas worldwide concludes that legal incentives, such as those utilized in a top-down management approach, are the tools most frequently cited as necessary to improve governance; however, the most effective MPAs employ a combination of legal, participatory, interpretive, and economic tools (Jones et al. 2011). The report identifies five approaches to governance:

1. MPAs managed primarily by the government under clear legal framework
2. MPAs managed by the government with significant decentralization and/or influences from private organizations
3. MPAs managed primarily by local communities under collective management arrangements
4. MPAs managed primarily by the private sector and/or NGOs granted with property/management rights
5. No clearly recognizable effective governance framework in place

Approach 1, which combines an emphasis on top-down, government-led management with other participative and economic tools, was ruled particularly effective for the few network approaches considered in the report, including the California MLPA process and Great Barrier Reef Marine Park. In these cases, the legal mandate and centralized guidance of a government-led process provided the platform for local participation, and enabled the use of broad economic programs and public education campaigns. MPAs that operate under Approach 3, and are primarily community-led were also shown to be effective, but were strongest when their management was reinforced through legal recognition.

Washington State currently hosts an array of top-down MPA tools (such as the EPA's National Estuarine Research Reserve program, WDFW's Marine Preserves, and state or city parks), as well as bottom-up, stakeholder-driven MPA-tools (such as voluntary Marine Stewardship Areas). There also are MPA tools that combine top-down elements with bottom-up stakeholder involvement, such as DNR's Aquatic Reserve system, which invites site proposals from outside sources that are evaluated by a Technical Advisory Committee against criteria set for the program; and Saltwater State Park, where the recreational diving community is involved in management and maintenance of the site.

While engaging local communities and user groups will be crucial to the long-term success of both individual MPAs and an MPA network, it also is important to acknowledge the conditions and limitations that accompany a bottom-up approach. Evans and Klinger (2008) describe some of the obstacles encountered in a stakeholder-driven process to designate a Marine Stewardship Area in San Juan County.

One of the greatest challenges these researchers noted is that broadening the project scope to include multiple species and habitats, which is key for an ecosystem-based approach, also broadens the number of stakeholder groups with an interest in the planning process. This added complexity can significantly increase transaction costs, both for the planning agency and the participants. The amount of technical information that the organizer must gather and prepare can be significant and may exceed what participants are willing to absorb. The authors also noted that although the effort was community-based, it failed to include some significant user groups, including recreational and commercial fishing interests. It is clear that while bottom-up community participation will be crucial to the development of a network of MPAs, such involvement must be inclusive, representative, and well coordinated within a larger planning framework.

Opportunities:

Developing a network of MPAs in Puget Sound will require strong leadership from both government agencies and local community representatives, clear delineation of the roles of each, and cross-jurisdictional coordination that allows for the sharing of information, resources, and authority across sectors.

MPA managers can draw lessons from the many examples of collaborative management in Washington State, including those in the Puget Sound region. The Puget Sound Partnership was established to set priorities to guide regional recovery efforts and to coordinate the work of federal, state, and local entities involved in that work. The Northwest Straits Commission is a federally authorized body that guides and mobilizes science and work related to marine resources in that region; the Commission also provides direction and resources to local Marine Resource Committees, which implement projects on the ground and bring that local understanding to the larger discussion. The Puget Sound ECO Net is social network of environmental education and outreach professionals that links regional priorities with the individuals and groups best placed to disseminate those ideas at the local level. This program could be used to engage local communities and disseminate information on the goals and status of the MPA network through outreach.

The MPA Work Group recommended that the state “consider using Marine Stewardship Areas to engage local governments and NGOs in developing MPA proposals” (Van Cleve et al. 2009). The San Juan County MSA and proposed Port Susan Bay MSA are the only two existing examples of this kind of organization. In order for this strategy to be effective, the management decisions developed by these local groups must be backed by some mechanism of regulatory authority, rather than the purely voluntary restrictions to which they are limited.

D.2 Diverse Constituencies

Challenge:

One of the attractions of Puget Sound is the incredible diversity of life that it supports across its varied geography – such that a visitor to the South Sound will encounter very different species and habitats from those that occur in the Strait of Juan de Fuca. Although some species are present throughout the Sound, determining how a network of MPAs can be effective across ecosystems with different spatial distributions will be a challenge.

Similarly, different places around the Sound have different authorities, economies, user groups, and concerns. Some rural communities depend heavily on the use of their beaches and subtidal areas by the commercial shellfish industry, while other marine areas see more activity from recreational boaters and beach visitors traveling from nearby urban areas. As noted in section C.2 on data needs, it is important to understand the spatial distribution of these different human uses and evaluate their economic ties to local communities in order to make a reliable assessment of the costs and tradeoffs of any MPA network design.

Incorporating this local context effectively within a regional process that sets overarching goals and objectives will be one of the challenges faced in developing a network of MPAs. One decision will be whether to approach development of the

network as a whole, or to break it into smaller parts. The two approaches present different benefits and complexities

One of the successful practices identified in California's MLPA process was the decision to break their planning approach into five regional stages, and proceed one region at a time. This has allowed later processes to learn and apply lessons from earlier ones, and enabled each stage to be customized to local needs. One downside to this approach, is that it can significantly extend the timeline to establish protection in all areas. The longer timeline also enabled opposition to the process to coalesce, making some later regional processes more contentious. Should the planning process be less well-funded than California's, an additional risk is that later stages may never be completed if funds are not sustained. In fact, one reason the MLPA planning process has yet to move forward in the fifth and final region, San Francisco Bay, is that the major funder of the MLPA Initiative has stated it will offer less support for this region.

By contrast, Oregon received proposals for marine reserves located anywhere along the coast that met the established criteria, then settled on designating marine reserves in those areas judged of highest priority. The benefit of this approach is that the areas with the highest ecological value and the most stakeholder support can be identified and protected sooner, rather than later. A caveat to this approach is that while Oregon may eventually develop a network of reserves that are biologically and oceanographically connected, its current reserves are too dispersed to lay claim to this benefit.

If the decision is to break the process into smaller areas, the next step will be to decide what boundaries will be most appropriate. The MPA Work Group in its 2009 inventory subdivided the MPAs into the seven Action Areas developed by the Puget Sound Partnership, plus two additional action areas for the outer coast. Other agencies divide Puget Sound into four or five basins, while some work in Puget Sound has proceeded at a watershed scale.

One additional challenge is that certain groups will be more informed about MPAs and willing to engage in a potentially long process than others. Recreational fishing groups have been closely following and involved in the MPA processes in Oregon and California, and local members of this constituency may come to the process with well-formed views drawn from those observations. Other marine resource users may be less aware of how a network of MPAs in Puget Sound could affect them – positively or negatively. Groups who feel they have much to lose by the designation of additional MPAs may have a greater initial presence than those who may benefit indirectly by the long-term preservation and recovery of species and habitats. Considerable outreach and education may be required, not only to bring all relevant parties into the discussion, but to ensure that no single group, or small subset of groups, comes to dominate that discussion.

Opportunities:

As an early stage in the process, it will be important to identify all relevant stakeholders, and understand what existing knowledge and concerns they may have about MPAs and MPA networks, and what could lead them to support such a process. One way to do this using an existing local group will be to engage Marine Resource Committees (MRC), in areas where they are active, to understand the context of local communities. In areas without MRCs, there may be other existing groups with a central interest in marine issues, and these groups may be in a position to lead or help support local efforts in their areas.

D.3 Public Participation & Process Fatigue

Challenge:

As noted above, participation by the diverse members of the public with interest in conserving and using marine resources and marine areas will be key to the success of implementing a network of MPAs in Puget Sound. Some of the best practices for involving the public in an MPA network planning process were identified by Dalton (2005), and include:

- Active participant involvement
- Complete information exchange
- Fair and transparent decision making
- Efficient administration
- Positive interactions

To ensure that public input is thoughtfully integrated into the planning process, it will be important to develop a comprehensive public participation plan. This plan should outline how to reach out to different groups, and how to engage participants and members of the public who may have different levels of interest in the process, time available, and technological skill.

Even with a well-designed plan for public participation, however, developers of an MPA network in Puget Sound will have to contend with the fact that a tremendous amount of time, resources, and effort have been applied to other processes and planning efforts in Puget Sound, including those instigated by the Puget Sound Partnership. It is reasonable to expect that many of the stakeholders important to developing the network will have a history of involvement in other process, and may be skeptical about its prospects or may have limited time and energy to devote to an additional process. It will be important to show how the planning process for an MPA network will complement these other processes, and how the network itself, once implemented, will support the goals and objectives of these wider initiatives and achieve something that these other processes do not.

Opportunities:

One aim of a process for developing a network of MPAs in Puget Sound should be ensuring meaningful participation by a broad range of stakeholders. There must be

different levels and pathways of participation available, to enable that participation. It will be worth evaluating whether a new group should be formed to take on this role, or whether an existing group or a subcommittee of an existing group, such as the Ecosystem Coordination Board, may serve this purpose.

It will also be important to build connections with user groups, and engage them in the long-term management of the network. One successful practice employed in other MPA networks has been engaging local communities and resource users in both monitoring and enforcement activities, especially the recreational boating and fishing community. The nonprofit group People for Puget Sound has initiated a pilot project that uses volunteer kayakers to monitor shoreline development in Aquatic Reserves. This model could be extended to helping gather baseline and regular monitoring data for MPAs in Puget Sound.

D.4 Tribal Rights

Challenge:

Tribal communities hold a central role in caring for the marine areas of Puget Sound, and must be closely involved in the development of a network of MPAs. There are 15 tribes with legally recognized usual and accustomed (U&A) grounds in Puget Sound – areas of historic use by the tribes and where tribal members have secured by treaty the right to fish or gather other resources. Each tribe has its own, geographically distinct U&A, but all tidelands in Puget Sound are within the harvest areas of one or more tribes. The exact boundaries of these areas are in some cases a matter of dispute between individual tribes. For many tribes fishing and other marine resource harvest is an important economic as well as a cultural activity. The restrictions on fishing or other resource use in MPAs designated in Puget Sound by state or local authorities do not extend to tribal use, but tribal management may decide to honor the same boundaries if the benefits provided by the MPA are well demonstrated.

In 2003, the Northwest Indian Fisheries Commission released a Tribal Policy statement on MPAs, stating that:

“Any relevant government agency or regulatory body may propose MPAs in the tribes’ Usual and Accustomed fishing areas, but they cannot and must not be implemented without first, initiating and second, continuing consultation with the affected tribes.”

The policy statement outlines a framework for assessing individual MPAs or new proposals for MPAs that includes defining the situation or threat that prompts the proposal, understanding the current status of the resources to be protected, identifying the goals and objectives of the MPA, and considering whether alternative management or regulatory tools can achieve these goals without restricting harvest or access. In practice, tribes may honor MPA regulations and some individual tribes have been involved in recent MPA designations, most actively in the creation of

marine stewardship areas (MSAs). Tribes often oppose permanent closures, preferring regulations that are periodically reviewed, because they do not wish to place restrictions on future generations' abilities to access those areas (Whitesell et al. 2007).

There are several challenges associated with tribal rights that will be encountered in developing a network of MPAs in Puget Sound. One will be ensuring that tribes are involved in the process at a level that is appropriate to their government-to-government negotiating status. Ideally, tribes should be co-leaders of the process, so that the network that is developed represents a joint vision for marine protection in the Sound. It also will be important that all Puget Sound tribes – including those without legal representation – are included in the process at appropriate stages. Although there is a general tribal policy statement on MPAs, individual tribes have different views on the role of MPAs and this variety of perspectives should also be reflected in the decisions made. This may involve outreach and education above and beyond the opportunities extended to the public or other user groups.

A second challenge involves the spatial design of the network. Because U&As are geographically distinct and limited, tribal fishing effort in an area where an MPA is designated cannot be easily displaced to other areas with no restrictions. This can lead to an unequal distribution of economic hardship caused by the restrictions, if the MPA network impacts more area reserved for some tribes than for others. It will be important to consider the distribution of tribal use in the design stages, as well as ecological and other human use patterns to ensure no single tribe is disproportionately impacted without their expressed involvement or consent.

The legal status of tribes as co-managers of marine resources in Puget Sound differs markedly from the status of tribes in other areas that have created MPA networks. One of the faults noted in many of these previous efforts is the lack of inclusion or respect of tribal interests. In Canada, First Nations tribes were excluded from the initial development and implementation of the national network of MPAs, however, in British Columbia, some tribes are now involved in regional marine planning efforts. The Haida Nation has been involved in a marine planning project in northern British Columbia called the Pacific North Coast Integrated Management Area (PNCIMA) that may result in the development of a network of MPAs. The process has incorporated traditional indigenous knowledge of marine resources and resulted in increased Haida involvement in management decisions (Jones et al. 2010).

In California, the original MLPA legislation did not explicitly address the sovereignty of California's tribes. During the subsequent regional planning processes, native peoples have been considered at a level with other stakeholder groups, without specific outreach or government-to-government negotiation, and tribal participation has been uneven among different tribes and different regions. An analysis of the MLPA Initiative on the North Coast found there was a disconnect

between the procedure for stakeholder involvement set out by the MLPA Initiative and the ways tribal groups prefer to be involved (Effron et al. 2011). Some tribes were willing to participate in the ways made available, but other tribes were absent from the process. The analysis also found that the structure of the MLPA, scientific guidelines, and state law associated with the designation of MPAs made it difficult to accommodate traditional tribal uses, while restricting those uses for other groups.

Interviews with western Washington tribal leaders on their perspectives about MPAs reflect a long-term commitment to the recovery of marine environments that will be essential to the success of a network approach (Whitesell et al. 2007). This research suggested some predictors for positive outcomes in working with tribes on marine conservation, including:

- Tribes must be given the opportunity to be meaningfully involved in all phases of MPA discussions, planning, and implementation, through government-to-government relations.
- MPAs must have clear, site-specific, scientific justifications for resource protections.
- Bureaucracy and regulation must be made less burdensome in MPA design and management.
- Tribes should be supported financially for carrying out co-management responsibilities.
- Organizations and agencies should prove themselves to be well-informed about tribes and trustworthy.
- High-level, comprehensive and coordinated data gathering and sharing should be built into the process.

Opportunities:

Although Washington's tribes have noted reservations about the use of MPAs, they have shown support for initiatives that take an ecosystem-based approach to restoration and conservation, and for measures that protect the best remaining habitat for endangered species (NWIFC 2011).

Individual Puget Sound tribes have been involved in several efforts to designate individual MPAs, and these cases could be further investigated to identify best practices for involving tribes in the development of a network. The Nisqually Indian Tribe helped lead the coalition that developed the Nisqually Aquatic Reserve, which was officially designated in 2011. The Tulalip Tribes have helped lead the creation of voluntary Marine Stewardship Areas in both the San Juans and Port Susan Bay, and the Lummi Nation, Samish Indian Nation, and Stillaguamish Tribe also have been instrumental in creating MSAs. Individual tribes historically have also implemented area-based restrictions on their own use of marine areas, although the spatial extent of these protections are not well known outside these groups.

D.5 Public Awareness

Challenge:

The success of any single MPA or MPA network depends heavily on the response of local communities and user groups to the protected area. The difficulties of monitoring use and enforcing regulations across a large marine area are compounded if local users do not support or understand the restriction, or are unaware that the MPA exists. When the surrounding community is supportive of and engaged in the management of the area, compliance can increase dramatically, which both increases the opportunity for success and decreases operating costs.

In Puget Sound, public awareness of the existing MPAs varies among sites, but is almost universally low. A recent survey of waterfront users near seven Puget Sound MPAs found that on average less than half (44%) were aware of the nearby protected area. Awareness ran as high as 82% among users near the popular SCUBA diving site, Brackett's Landing, while at the more remote Smith and Minor Islands Aquatic Reserve just 9% of people contacted knew of its existence (TCW Economics 2008). Awareness may be greater among user groups whose activities are restricted in an area, including recreational fishers.

In California, public awareness about the MPA network has been encouraged through the Monterey Bay Sanctuary Foundation, which has awarded competitive grants for speaker series, interpretive displays, educational programming, and more using funding from the National Geographic Society's Ocean Education Program and Resources Legacy Fund Foundation. Interactive exhibits at the Hatfield Marine Science Center in Oregon have helped educate visitors about the role of marine reserves in that state. Additionally, as part of the guidelines developed by OPAC, each individual marine reserve must develop a site management plan that includes strategies for increasing public outreach and awareness, including through signage and displays.

For a network of MPAs in Puget Sound to be implemented, it is essential that stakeholders and local community members understand the need for such a system, how it would operate, and what the benefits of such a network would be, both locally and to the region. However, public awareness also can have drawbacks: Without sufficient resources devoted to monitoring and enforcement, MPAs can become a target for poachers drawn to higher populations within the boundaries of reserve areas, and such activity can ultimately undermine the success of the MPA. In California, poaching of abalone, lobsters, and other species within the newly established MPAs is an ongoing problem substantial enough that some argue it has inhibited the recovery of these overexploited species (Byers and Noonburg 2007, Karnow 2010).

Opportunities:

Increasing public awareness about the science of MPAs and the goals of the MPA network will be one of the most crucial steps in developing a network of MPAs in Puget Sound. Outreach and education efforts must begin early in the planning process and continue throughout, to ensure enough time to develop public support for the project. There are currently many organizations and outlets throughout the region that could help spread awareness about the role of MPAs in recovering Puget Sound. Public education and outreach efforts should be coordinated through a comprehensive plan to ensure a consistent message is communicated throughout the region. Opportunities within that plan could include the following:

- Develop an online presence for the Puget Sound MPA network that provides information on the goals and objectives of the network, as well as information about the resources within each MPA and opportunities for public access.
- Work with Marine Resource Committees, recreational groups, and other local organizations to organize lectures or lecture series on the ecology of MPAs.
- Collaborate with regional groups that have an educational focus like Washington Sea Grant, the Northwest Straits Commission, or the SeaDoc Society to develop a public education and outreach effort.
- Work with educational or recreational centers near existing MPAs or with a marine ecology focus to provide visitor information on the ecology and function of MPAs, including the Seattle and Point Defiance Aquariums, Padilla Bay National Estuarine Research Reserve, Nisqually Reach Nature Center, Port Townsend Marine Science Center, and other marine centers.
- Develop underwater video series to showcase the species and habitats protected within MPAs.
- Create a searchable web application, linked to the Washington State Coastal Atlas, that would display access and resource information for each MPA.

E. PUGET SOUND MPA NETWORK PLANNING OPTIONS

E.1 Development of Options

Having considered the challenges and opportunities described in earlier sections, this report presents five process options for developing a network of MPAs in Puget Sound. The options described here respond to a range of potential or suggested goals and motivations for a network, and consider what outcomes might be possible depending on available resources, including political will and funding. Considered as a series, the likely resources and funding required increase with each successive option. The options developed are:

- Option Zero: No Process and No Change to Current MPA Status
- Option One: Administrative MPA Network
- Option Two: Single-Species Network
- Option Three: Comprehensive MPA Network A – Sound-wide Focus
- Option Four: Comprehensive MPA Network B – Regional Focus

Not all of the options presented assume that a network of MPAs will be created in Puget Sound, nor that a network that is created would achieve all the results called for either in the 2008 Action Agenda or by the 2009 MPA Work Group. Table 5 summarizes the different desired outcomes to be attained by the different process options. The first scenario (Option Zero) presents the option to take no further steps to develop a network. All other options would be expected to at least increase coordination among marine managers, as requested in Substitute Senate Bill 6231 (2008).

Three scenarios, (Options Two, Three, and Four) if pursued, would address the 2009 MPA Work Group's recommendation for "the establishment of an ecologically meaningful network of MPAs." For the purposes of this analysis, an "ecologically meaningful network" is one in which individual protected areas complement one another – by linking different larval recruitment areas, connecting across different life stages, or representing a full range of important habitat types – and collectively provide more support to the marine ecosystem than individual sites otherwise could do.

Three scenarios (Options One, Three, and Four) would entail a comprehensive process that includes or considers all existing Puget Sound MPAs and managing agencies. This is the scope outlined by the 2009 MPA Work Group in its inventory and report, which recommended "a comprehensive process to evaluate the effectiveness of existing MPAs" (Van Cleve et al. 2009).

Two scenarios (Options Three and Four) would address the 2008 Action Agenda's call for a network that "contributes to conserving the biological diversity and

ecosystem health in marine areas of Puget Sound” by considering multiple species and habitats, or overall ecosystem goals, rather than focusing on the recovery of a single target species or small subset of species, such as rockfish.

One scenario (Option 4) would allow for the network to be scaled to local context, by proceeding in regional stages. While local context and information will be an essential component of other process options, this outcome implies a focus on how an MPA network can be best developed to suit the conservation concerns and geography of specific sub-regions, such as the San Juan Islands or Hood Canal, as well as to aid in the recovery of Puget Sound as a whole.

Table 5. Outcome Achieved by Different Process Options

| Desired Outcome | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Improves coordination among marine managers | | ✓ | ✓ | ✓ | ✓ |
| Creates ecologically meaningful network | | | ✓ | ✓ | ✓ |
| Comprehensive inclusion of existing MPAs | | ✓ | | ✓ | ✓ |
| Conserves biological diversity and ecosystem health | | | | ✓ | ✓ |
| Scaled to local context | | | | | ✓ |

Each option presented below includes a description, a potential rationale for why this option might be selected, the process components likely to be included in the option, the partners likely to be involved in the development, and the outcomes that should be expected. A list of potential process components, and a comparison of which options would likely require them, is outlined in Table 6. This list is not intended to provide a comprehensive picture of all elements and steps that will be required in any planning process. Instead it identifies certain important administrative, technical, implementation, and public outreach-related activities that have been highlighted elsewhere, either in the Tribal Policy Statement or MPA Work Group’s suggested evaluation methodology, or as components of other regional MPA network processes.

This report does not recommend any particular option. These five options are not the only paths by which a network of MPAs could be developed, and additional analyses could to determine the exact need for the individual elements associated with each option and their related costs. Managers may decide to combine elements of different options to achieve their ultimate marine protection goals, or may opt to pursue multiple tracks.

Table 6. Comparison of components included in MPA network planning options 0-4

| Components | Process Options | | | | |
|--|-----------------|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 |
| Administrative | | | | | |
| Develop goals of network | | ✓ | ✓ | ✓ | ✓ |
| Develop measurable objectives of network | | * | ✓ | ✓ | ✓ |
| Develop sub-regional goals and objectives | | | | | ✓ |
| Develop criteria for inclusion in network | | ✓ | ✓ | ✓ | ✓ |
| Develop new or amended MPA proposals | | | ✓ | ✓ | ✓ |
| Create or amend mandates/current regulations | | | * | * | * |
| Process groups | | | | | |
| MPA Managers/ Central Work Group | | ✓ | ✓ | ✓ | ✓ |
| Science Advisory Team (SAT) | | | ✓ | ✓ | ✓ |
| Stakeholder Advisory Group (SAG) | | * | * | ✓ | ✓ |
| Community Teams | | * | | | ✓ |
| Tribal Outreach/Council | | ✓ | ✓ | ✓ | ✓ |
| Technical/Data | | | | | |
| Compile existing information | | * | ✓ | ✓ | ✓ |
| Develop regional profile/scientific white paper | | | ✓ | ✓ | ✓ |
| Develop sub-regional profiles | | | | | ✓ |
| Develop/gather new data | | | * | ✓ | ✓ |
| Analyze data | | | ✓ | ✓ | ✓ |
| Identify protection gaps | | | ✓ | ✓ | ✓ |
| Assess alternative management measures | | | ✓ | ✓ | ✓ |
| Develop guidance/criteria for size and spacing | | | ✓ | ✓ | ✓ |
| Data management | | | * | ✓ | ✓ |
| Decision support tool | | | * | * | * |
| Develop MPA proposal alternatives | | | ✓ | ✓ | ✓ |
| Implementation | | | | | |
| Develop ongoing funding plan | | ✓ | ✓ | ✓ | ✓ |
| Coordinate monitoring programs | | * | ✓ | ✓ | ✓ |
| Coordinate enforcement of sites | | * | * | ✓ | ✓ |
| Public Outreach/Communication | | | | | |
| Communicate decision | ✓ | ✓ | ✓ | ✓ | ✓ |
| Create MPA network-specific website | | ✓ | * | ✓ | ✓ |
| Develop print materials (logo, marketing, factsheets, etc) | | ✓ | * | ✓ | ✓ |
| Coordinate signage, outreach | | | ✓ | ✓ | ✓ |
| Host public workshops/information sessions | | | ✓ | ✓ | ✓ |

- ✓ - component is included in planning process
- * - component is optional or limited in planning process

E.2 Option Zero: No Process and No Change to Current MPA Status

This option lays out the choice to not move forward with any further planning or implementation of an MPA network in Puget Sound.

- *Rationale*

Decision makers may forgo any further development of an MPA network if it is determined that it is not feasible to conduct any planning process or that current efforts offer sufficient protection to marine resources of interest at this time. Additional rationale for Option Zero may include that there is insufficient interest or funding to pursue further network development, or that those resources are better devoted to other, existing priorities. Puget Sound area agencies, communities, and organizations are currently involved in other efforts related to regional protection and restoration, and may not have the desire or energy to engage in another large-scale, process-heavy initiative.

- *Process Components and Partners*

Option Zero requires little to no additional funding or resources. No additional data gathering, analysis, coordination, or outreach would take place, beyond any communication of the decision to not develop a network of MPAs.

- *Result*

This option does not create an MPA network and would not lead to any of the desired outcomes.

E.3 Option One: Administrative MPA Network

This option envisions the creation of a social or administrative network, in which MPA managers are brought together to facilitate improved information sharing and collaboration. Option One would most closely resemble the process used to develop the Gulf Coast MPA Network.

- *Rationale*

Option One may be preferred if there is agreement that that the region and marine ecosystems can benefit from greater connectedness among managers and more frequent opportunities to share experiences, but insufficient interest or resources to pursue a comprehensive MPA network. This choice also may be seen as a foundational or interim step toward comprehensive development of an MPA network; by building support and common understanding among managing agencies, these entities might later bring together their collective resources to support the design of an ecologically meaningful network.

- *Process Components and Partners*

This option could be implemented with limited additional funding or resources, and could be initiated within a short time period. Some funding and staff time would be

required to convene, coordinate, and facilitate regular meetings for a work group of marine managers. This group's role would include setting overarching goals to frame their collaboration, and the group could pursue projects to achieve those goals and increase overall coordination among different MPA entities. Option One would not involve additional information gathering or analysis, unless these were pursued as an interest of the group, however, it could include some investment in increased public education and outreach. The group might develop a website with profiles of the individual sites included in the network and information on its overall purpose. Depending on the goals identified for the network, the group could pursue collaborative projects, such as designing a regional public education program, developing common indicators and coordinating monitoring across sites, or sharing enforcement responsibilities.

The development of an administrative network could be led by one coordinating entity, such as the Puget Sound Partnership, which could provide or contract staff to coordinate meetings, develop and host a website for the network, and manage communications for the network. Members of the group could include all managing agencies and organizations that participated in the original MPA Work Group. Other partners could include local and regional resource user groups, educational groups, and environmental groups.

- *Result*

This option would not create a comprehensive network of ecologically significant MPAs, but would improve coordination over the current status using limited resources. Over time it may prove difficult to sustain interest and funding in a network that does not lead to measurable ecological improvement.

E.4 Option Two: Single-Species MPA Network

This option envisions the creation of a network designed to protect a single species or small, related set of species, such as Puget Sound's threatened rockfish. Such a path would most closely resemble the process employed in British Columbia to designate of Rockfish Conservation Areas.

- *Rationale*

The rationale for Option Two may be that with several ESA listings, rockfish are the species that can benefit most from an MPA network that restricts fishing activity in important habitat areas. A more comprehensive MPA network that considers the ranges and life cycles of multiple species and habitats, as well as the interests of numerous stakeholder groups will take a protracted period of time, while providing compromised protection to this target species. Decision makers may desire that designation of MPAs or marine reserves be completed quickly to limit ongoing risk to threatened populations, while still including relevant scientific and social input.

- *Process Components and Partners*

Option Two would require a far greater funding base and more resources than Option One. Creating a species-specific network would require considerable information gathering and analysis, including habitat mapping and modeling, as well as some stakeholder involvement and group facilitation. The process might involve convening a central work group to determine the goals and objectives of the network and to shepherd the process through all subsequent stages, though membership of this group would not necessarily consist of all marine managing agencies, as outlined in the previous option. There will also be a need for a scientific or technical advisory group to develop guidance and criteria to be used in identifying important habitat to consider for protection and in analyzing the effectiveness of current MPAs. Compared with options Three and Four, fewer overall stakeholders and agencies would be involved in the design process, which will limit the costs and time required to complete this work. Government-to-government consultation with tribal representatives will be an important part of the process, as will outreach to user groups, including recreational and commercial fishers, but this may take the form of outreach and public meetings, rather than the establishment of a stakeholder advisory group. This choice might result in the creation of new MPAs, including no-take marine reserves, or expanding the boundaries of a few existing areas in important habitat areas, rather than integrating all current MPA programs.

The process could be led by a single entity or a partnership among entities with responsibility for species management, such as NOAA or WDFW. Other agencies with marine management authority – such as US Fish and Wildlife, DNR, Parks, and the Puget Sound Partnership – could be included or consulted in such a process, but would be less likely to take a lead role. Additional partners, including universities and recreation groups, could aid in contributing scientific or socioeconomic data, or developing education and outreach about the network.

- *Result*

This option would create an ecologically meaningful network of MPAs, but not a comprehensive network that considers regional biodiversity or links existing MPA programs. Such a network could be included within an administrative or comprehensive network.

E.5 Option Three: Comprehensive MPA Network A – Sound-wide Focus

This option envisions the development of a comprehensive network of MPAs in Puget Sound through a single process that identifies goals and protection gaps for the entire Sound. This path would follow most directly on the recommendations of the 2009 MPA Work Group, and would somewhat resemble the process developed to create Oregon's marine reserve system.

- *Rationale*

Option Three should be pursued if there is sufficient resources and interest to create a comprehensive network, using a single, Sound-wide process.

- *Process Components and Partners*

Option Three would entail a single, but comprehensive process during which the entire Sound is profiled and evaluated for protection of multiple species and habitats. It would require the creation of an MPA Work Group and Science Advisory Group that would set overarching goals and objectives for the network and science-based design guidelines and criteria, as well as a Stakeholder Advisory Group that would provide input on the views of different resource users. Proposals for new or modified MPAs within the network could be created by the MPA Work Group itself or by self-organized sub-regional groups, and these would be evaluated against the established criteria. This approach would require extensive data gathering and analysis, data management, as well as outreach and stakeholder engagement. Discussions and decisions for every stage of the process would need to be effectively and transparently communicated, at the least through the creation of a dedicated website. Public participation would also likely include hosting multiple public workshops and information sessions. Support for all these steps would require extensive funding and resources dedicated for planning, as well as for implementation and ongoing management of the network.

This option could be led by one coordinating entity, such as the Puget Sound Partnership, which could provide or contract staff to coordinate multiple process groups and public meetings, develop and host a website for the network, and manage communications over the course of the project. Members of the group could include all managing agencies and organizations that participated in the original MPA Work Group. Other partners would include local and regional resource user groups, educational groups, and environmental groups.

- *Result*

This option would create a coordinated, comprehensive, and ecologically meaningful network of MPAs.

E.6 Option Four: Comprehensive MPA Network B – Regional Focus

This option considers the development of a comprehensive network of MPAs in Puget Sound, using a process that divides the Sound into smaller sections, or subregions, and tackles each in succession – developing local profiles and identifying gaps and preferred MPA network designs in each area. This option most closely resembles the regional process pursued in California.

- *Rationale*

Option Four should be pursued if there are sufficient resources and interest to create a comprehensive network, and a desire to fully scale that process to local

context and incorporate local information. The rationale for this approach may include the desire to adequately incorporate local information and local stakeholders into the process.

- *Process Components and Partners*

The process for Option Four would include all the components identified for Option Three, including the creation of a central MPA Work Group, Science Advisory Team and Stakeholder Advisory Group. In addition, it envisions the convening of local Community Teams that would develop goals and objectives, collect information, and develop proposals related to each sub-region. Sufficient time would need to be devoted early in the process to determining the appropriate boundaries of those subregions and on how the subregional goals can complement the goals of the network as a whole. Rather than creating entirely new groups, these Community Teams potentially could be coordinated through Marine Resource Committees or through Local Integrating Organizations. This approach also will include extensive data gathering and analysis, data management, as well as outreach and stakeholder participation. It would likely require the most funding, resources, and time of all options presented.

- *Result*

This option would create a coordinated, comprehensive, and ecologically meaningful network of MPAs.

CONCLUSIONS and NEXT STEPS

This report provides an initial consideration of many of the challenges that managers might face in attempting to develop a network of MPAs in Puget Sound. It also identifies opportunities and resources available in the region to support such an effort and outlines five planning options for moving forward.

The idea of developing such a regional network in Puget Sound has been put forth for many years, in different forums. Meanwhile, various types of MPA networks have been successfully implemented in many places around the world, including in the regions just to our north and south. However, as this research shows, the seeming agreement around the need for an MPA network masks an underlying uncertainty about what exactly the purpose of such a network should be. The 2009 MPA Work Group recommended that MPAs address a “documented conservation concern through clear goals and objectives” and added that “for future Puget Sound MPAs, managing agencies should work with the Puget Sound Partnership to agree on goals and objectives that align with the goal to recover the health of the Puget Sound by 2020” (Van Cleve et al. 2009). The information included here is intended to help decision makers determine what path forward, if any, makes the most sense when considered in light of regional priorities for the recovery of Puget Sound and specific threatened and endangered species, as well as the current status of funding and resources available to support any process.

The five options presented suggest different potential outcomes for a network of MPAs, and the planning processes that would be necessary to achieve those outcomes. Although this report does not recommend a particular option as the preferred path forward, there are some next steps that could help further inform this decision.

- *Scope potential funding and support.* The funding available to pursue further planning and the level of support and interest among potential partners will be critical factors in deciding which option is most feasible. Therefore, a key next step will be scoping these components, an effort that might further refine the challenges and options discussed in this report. This step could include identifying and communicating with likely stakeholders about their interest and preferred level of involvement with different types of MPA network planning processes. It could also include analyzing the cost and benefit tradeoffs of different planning approaches.
- *Conduct initial protection assessment.* The gap analysis recently completed by The Nature Conservancy (Smith et al. 2012) is a good first step toward gaining a better understanding of the level of protection offered by existing Puget Sound MPAs. This information could be made more useful by pairing that analysis with information about key species and habitats likely to be considered in any MPA process, including rockfish, forage fish, and eelgrass.

- *Fill priority data gaps and further identify data needs.* So that relevant information is available if and when a planning process is selected, emphasis should be placed on filling the following priority data needs: benthic habitat map for Puget Sound, essential habitat sites for key species and life stages, human use patterns (recreational and commercial fishing, dive sites, kayaking areas, wildlife viewing areas, etc), socioeconomic assessment.
- *Develop an improved approach to outreach and education.* Public support for an eventual network of MPAs in Puget Sound will depend on greater understanding about the marine ecosystem in general, and about the science of MPAs, than exists currently.
- *Establish a decision-making process.* Communicate with decision makers and potential partners to determine what additional information, if any, is needed to select an appropriate approach, and what the timeline for such a decision will be.

Developing a regional network of marine protected areas in Puget Sound is a significant undertaking that will require substantial resources and the collaboration of many agencies, organizations, and individuals with competing needs and interests. Whatever the path forward, it will be important to communicate with the public and include local communities, managing agencies, and tribes in discussions and decisions about how to improve protection in the marine areas of Puget Sound.

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G. APPENDICES

Appendix 1. Puget Sound MPA Tools, Protection Levels, and Authority

| Protection Type | Level | Agency | How Many in PS? | Authority | Restrictions | Activities Restricted | Activities Allowed | TNC Protection Score |
|-------------------------------------|---------|----------|-----------------|---|--|--|--|----------------------|
| Formal MPAs | | | | | | | | |
| National Estuarine Research Reserve | Federal | NOAA/DOE | 1 | Coastal Zone Management Act (Section 15); 15 CFR 921 | <input type="checkbox"/> Access Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Commercial Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Recreational Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Seabed Alteration Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed | Seabed alteration: dredging, filling, dumping | Commercial and recreational harvest, non-extractive recreational activities, education/research activities | 1 |
| National Wildlife Refuge | Federal | USFWS | 3 | National Wildlife Refuge System Administration Act (16 USC 668dd et seq.); 50 CFR 25 - 38 | <input checked="" type="checkbox"/> Access Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input checked="" type="checkbox"/> Commercial Harvest Prohibited <input checked="" type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input checked="" type="checkbox"/> Recreational Harvest Prohibited <input checked="" type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Seabed Alteration Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed | Varies: Some NWR's prohibit access (Protection Island), some completely prohibit all harvest (Dungeness NWR) while others restrict harvest, but are multiple-use (Nisqually NWR) | Varies | 2 - 4 |

| | | | | | | | | |
|----------------------------|-------------|------------------------------|---|----------------|---|---|--|-------|
| Marine Biological Preserve | State | UW, FHL | 1 | RCW 28B.20.32 | <input type="checkbox"/> Access Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Commercial Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Recreational Harvest Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed <input type="checkbox"/> Seabed Alteration Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed | Harvest of non-food organisms without an FHL permit | Commercial and recreational fishing | 1 |
| Conservation Area | State/Local | WDFW /City of Des Moines (1) | 9 | WAC 220-20-100 | <input type="checkbox"/> Access Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input checked="" type="checkbox"/> Commercial Harvest Prohibited <input type="checkbox"/> Restricted <input type="checkbox"/> Allowed <input checked="" type="checkbox"/> Recreational Harvest Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed <input type="checkbox"/> Seabed Alteration Prohibited <input checked="" type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed | Commercial and recreational fishing prohibited. Shellfishing prohibited where tidelands are owned by local government (City of Des Moines Park, South 239th Street Park, Saltar's Point Beach CA). Seabed alteration restricted where bedlands have been withdrawn by DNR (Orchard Rocks) | Where tidelands are privately owned (Octopus Hole, Sund Rock CA), private harvest of clams and oysters are allowed | 3 - 5 |

| | | | | | | | | |
|-----------------------|-------------|--------------------------------|----|---|---|---|---|------|
| Marine Preserve | State/Local | WDFW /City of Seattle | 15 | WAC 220-20-100; Fish and Wildlife Commission Policy C3013 | <input type="checkbox"/> Access Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input checked="" type="checkbox"/> Commercial Harvest Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed <input type="checkbox"/> Recreational Harvest Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed <input checked="" type="checkbox"/> Seabed Alteration Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed | Fishing restrictions vary by site. Mostly closed to bottomfish and shellfishing. Where tidelands are owned by local government (Golden Gardens, Lincoln Park, Richey Viewpoint - all Seattle parks), dredging, drilling, scouring, digging is prohibited. | Mostly open to salmon fishing; in some cases open to certain gear types, like fly fishing (Zee's Reef) or hook-and-line gear (Golden Gardens, Lincoln Park, Richey Viewpoint) or from non-motorized boat (Titlow Beach) | 2 -4 |
| State Wildlife Refuge | State | WDFW | 1 | RCW 77.12.047 | <input checked="" type="checkbox"/> Access Prohibited <input type="checkbox"/> Restricted <input type="checkbox"/> Allowed <input checked="" type="checkbox"/> Commercial Harvest Prohibited <input type="checkbox"/> Restricted <input type="checkbox"/> Allowed <input checked="" type="checkbox"/> Recreational Harvest Prohibited <input type="checkbox"/> Restricted <input type="checkbox"/> Allowed <input type="checkbox"/> Seabed Alteration Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed | Access has been prohibited in one area (McNeil Island Wildlife Area) through an agreement with the Department of Corrections because of prison facility on McNeil Island, now closed. Restriction here may change. | Seabed alteration - bedlands not withdrawn by DNR | 6 |
| Aquatic Reserve | State | DNR (Aquatic Reserves Program) | 7 | WAC 332-30-151 | <input type="checkbox"/> Access Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Commercial Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Recreational Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Seabed Alteration Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed | New uses of bedlands are evaluated | Access, all fishing, all existing uses of bedlands, all new uses of bedlands judged by DNR to be consistent with goals of the aquatic reserve | 1 |

| | | | | | | | | |
|-------------------------------------|-------|-----------------------------|---|---------------------------------------|---|--|---|---|
| Lease Withdrawal/ Resource Area | State | DNR | 4 | RCW 79.105.210; Commissioner's orders | <input type="checkbox"/> Access Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Commercial Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Recreational Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Seabed Alteration Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed | New uses of bedlands are prohibited | Access and fishing allowed. Use of private tidelands are allowed | 1 |
| Natural Area Preserve | State | DNR (Natural Areas Program) | 3 | RCW 79.70 | <input type="checkbox"/> Access Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed <input type="checkbox"/> Commercial Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Recreational Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Seabed Alteration Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed | Access with permission only, for education and research purposes | Fishing and harvest permitted, although because most of these are land-based, with only minor aquatic portions, and access to tidelands is restricted, shellfishing may be restricted | 2 |
| Natural Resources Conservation Area | State | DNR (Natural Areas Program) | 1 | RCW 79.71 | <input type="checkbox"/> Access Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Commercial Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Recreational Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Seabed Alteration Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed | | | 1 |

| | | | | | | | | |
|----------------------------------|-------|-------|--------|---|---|---|-----------------------------|---|
| State Park | State | WPRC | 61 | RCW 79A.05; WAC 352-32-350; WAC 352-32-150 | <input type="checkbox"/> Access Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Commercial Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Recreational Harvest Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed <input type="checkbox"/> Seabed Alteration Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed | | | |
| Marine Stewardship Area | Local | Local | 2 | - | <input type="checkbox"/> Access Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Commercial Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Recreational Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Seabed Alteration Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed | Voluntary restrictions only | Voluntary restrictions only | 0 |
| Other Formal Restrictions | | | | | | | | |
| Commercial Fishing Closure | State | WDFW | varies | RCW 77.12.047; WAC 220 | <input type="checkbox"/> Access Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Commercial Harvest Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed <input type="checkbox"/> Recreational Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Seabed Alteration Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed | Specific fishing activities may be restricted by species (smelt, salmon, herring, crab) or by gear type (bottomfish troll, set line, jig, pots) | | 1 |

| | | | | | | | | |
|---------------------------------------|---------|---------|---------|---|---|--|--|--|
| Private Preserve | Private | Private | unknown | - | <input type="checkbox"/> Access Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed <input type="checkbox"/> Commercial Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Recreational Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input checked="" type="checkbox"/> Seabed Alteration Prohibited <input type="checkbox"/> Restricted <input type="checkbox"/> Allowed | | | |
| Shoreline Master Programs | Local | Local | 0 | | <input type="checkbox"/> Access Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Commercial Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Recreational Harvest Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed <input type="checkbox"/> Seabed Alteration Prohibited <input type="checkbox"/> Restricted <input checked="" type="checkbox"/> Allowed | | | |
| Informal/De facto Restrictions | | | | | | | | |
| Tribal Closures | Tribal | Tribal | unknown | - | <input type="checkbox"/> Access Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed <input type="checkbox"/> Commercial Harvest Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed <input type="checkbox"/> Recreational Harvest Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed <input type="checkbox"/> Seabed Alteration Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed | | | |

| | | | | | | | | |
|-------------------|---------|------|---------|---|--|--|--|--|
| Military Closures | Federal | Navy | unknown | - | <div style="border: 1px solid black; padding: 2px;"> <p>- Access</p> <p><input type="checkbox"/> Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed</p> </div> <div style="border: 1px solid black; padding: 2px;"> <p>- Commercial Harvest</p> <p><input type="checkbox"/> Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed</p> </div> <div style="border: 1px solid black; padding: 2px;"> <p>- Recreational Harvest</p> <p><input type="checkbox"/> Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed</p> </div> <div style="border: 1px solid black; padding: 2px;"> <p>- Seabed Alteration</p> <p><input type="checkbox"/> Prohibited <input checked="" type="checkbox"/> Restricted <input type="checkbox"/> Allowed</p> </div> | | | |
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Appendix 2. Puget Sound MPA Conservation Goals

Defining regional goals and objectives is an important step in developing a network of marine protected areas in Puget Sound, as the stated goals of a network help to establish the role of the network, as well as its scope. In a report to the Washington State Legislature (Van Cleve et al. 2009), the MPA Work Group identified the need for a “coordinated strategy to guide the establishment of an ecologically meaningful network of MPAs.” That group recommended that the Puget Sound Partnership sponsor a process to evaluate the effectiveness of MPAs in Puget Sound, and identified this first step in that evaluation:

“Review the goals and objectives of existing Puget Sound MPAs with a conservation focus as described in the inventory developed by the MPA Work Group.”

A review of the 2009 MPA Inventory created as part of that report and more recent information on MPAs, including from the database managed by the National MPA Center, identified 110 existing marine protected areas in Puget Sound. A search of the management plans, agency websites, or other guidance materials on individual sites and MPA programs found information on specific management goals and objectives for 56 of the 110 areas. Broadly, the goals stated in these documents are related to ecological conservation (of species and habitats), resource preservation and enhancement, education, recreation, and scientific research. The areas address a combination of intertidal and subtidal ecosystems. Many plans identify specific species or habitats to be preserved.

The list below is a compilation of species and habitats noted across all the MPAs surveyed. The information included in this inventory was gathered from site-specific management plans, where available, or from websites of managing agencies.

Species:

Fish

| | |
|------------------------------|---|
| Anchovy | Pacific cod |
| Cabazon | Pacific herring (juveniles and Cherry Point) |
| Eulachon | Pacific sandlance |
| Flatfish | Ratfish (spotted) |
| Gadids | Red Irish lord |
| Goby (blackeye) | Rockfish (black, brown, copper, demersal, quillback, Puget Sound, vermillion, tiger, yelloweye, yellowtail, juveniles) |
| Greenling (kelp and painted) | |
| Halibut | |
| Kelp perch | |
| Lingcod | |
| Olympic mudminnow | |

Salmonids (juvenile and Chinook,
Coho, Cutthroat trout)
Sculpin
Seaperch (striped)
Skates
Sole (Dover, English, Rock)

Spiny dogfish
Starry flounder
Surfperch
Surf smelt
Wolfeel

Birds

Alcids
Bald Eagle
Black oystercatcher
Common murre
Cormorant (Double-crested,
Brandt's)
Diving ducks (buffleheads, grebes,
mergansers, scoters)
Glaucous-winged gull
Great blue heron

Harlequin duck
Loons
Marbled murrelet
Migratory shorebirds (plovers,
sandpipers)
Migratory waterfowl
Pigeon guillemot
Purple martin
Rhinoceros auklet
Tufted puffin

Plants/Algae

Bladed kelp
Bull kelp
Coralline algae
Eelgrass

Red algae
Seaweeds (mixed)
Sugar kelp

Marine Invertebrates

Cloud sponges
Dungeness crab
Encrusting organisms
Giant anemones
Intertidal bivalves
Northern abalone
Nudibranchs

Olympia oyster
Pacific octopus
Red sea cucumbers
Scallops
Sea pens
Sea urchin (red and green)
Shrimp

Marine Mammals

Harbor seals
Minke whale
Orca
Sea lions

Habitats:

Artificial rocky reef habitat
Artificially high-relief
Bedrock
Bluffs

Boulders & boulder fields
Clay benches
Cobble and pebble
Dredge spoils

| | |
|-------------------------------|--------------------------|
| Eelgrass/seagrass bed | Pocket beach |
| Estuarine intertidal | Rocky beach |
| Fine to mixed cobble | Rocky ridges |
| Forage fish spawning habitat | Salmon habitat |
| Glacial till islands | Sand & fine sand |
| Gravel flats | Sand and mud flat |
| Grottos | Sand/cobble beach |
| Hardpan | Sand spit |
| Jetty | Sandbars |
| Kelp bed & kelp canopy forest | Shoreline (rocky, sandy) |
| Marsh, Brackish marsh | Unconsolidated substrate |
| Mudflat | |

Sites Included in Survey:

| Site Name | Managing Agency | Owner/Sponsor |
|---|------------------------|----------------------|
| Tongue Point Marine Life Sanctuary | Clallam County | Clallam County |
| San Juan Island National Historical Park | NPS | WDNR |
| Carkeek Park | Seattle, City of | WDFW |
| Discovery Park | Seattle, City of | WDFW |
| Emma Schmitz Memorial Marine Preserve | Seattle, City of | WDFW |
| Golden Gardens Marine Preserve Park | Seattle, City of | WDFW |
| Lincoln Park Marine Preserve | Seattle, City of | WDFW |
| Richey Viewpoint Marine Preserve | Seattle, City of | WDFW |
| Middle Waterway | Tacoma, City of | WDNR |
| Olympic View Resource Area | Tacoma, City of | WDNR |
| Dungeness National Wildlife Refuge | USFWS | USFWS |
| Nisqually National Wildlife Refuge | USFWS | USFWS |
| Protection Island National Wildlife Refuge | USFWS | USFWS |
| San Juan Islands National Wildlife Refuge | USFWS | USFWS |
| San Juan County/Cypress Island Marine Biological Preserve | UW | FHL |
| City of Des Moines Park Conservation Area | WDFW | Des Moines, City of |
| Brackett's Landing Shoreline Sanctuary Conservation Area/ Edmonds Underwater Park | WDFW | Edmonds, City of |
| Yellow and Low Islands San Juan Islands Marine Preserve | WDFW | TNC/UW |
| Argyle Lagoon San Juan Islands Marine Preserve | WDFW | UW |
| Shaw Island San Juan Islands Marine Preserve | WDFW | UW |
| False Bay San Juan Islands Marine Preserve | WDFW | UW/FHL |
| Friday Harbor San Juan Islands Marine Preserve | WDFW | UW/FHL |
| Admiralty Head Marine Preserve | WDFW | WDFW |
| Colvos Passage Marine Preserve | WDFW | WDFW |
| Haro Strait Special Management Fishery Area | WDFW | WDFW |
| Keystone Harbor Conservation Area | WDFW | WDFW |
| McNeil Island/South Puget Sound Wildlife Area | WDFW | WDFW |
| Octopus Hole Conservation Area | WDFW | WDFW |
| Orchard Rocks Conservation Area | WDFW | WDFW |

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Prepared for the Puget Sound Partnership: September 2012

| | | |
|--|------|------|
| Saltar's Point Beach Conservation Area | WDFW | WDFW |
| San Juan Channel and Upright Channel Special Management Fishery Area | WDFW | WDFW |
| South 239th Street Park Conservation Area | WDFW | WDFW |
| Sund Rock Conservation Area | WDFW | WDFW |
| Titlow Beach Marine Preserve | WDFW | WDFW |
| Toliva Shoal Closed Area | WDFW | WDFW |
| Waketick Creek Conservation Area | WDFW | WDFW |
| Zee's Reef Marine Preserve | WDFW | WDFW |
| Zella M. Schultz/Protection Island Seabird Sanctuary | WDFW | WDFW |
| Saltwater State/Underwater Park/ Saltwater Marine Preserve | WDFW | WPRC |
| Cherry Point Aquatic Reserve | WDNR | WDNR |
| Cypress Island Aquatic Reserve | WDNR | WDNR |
| Dabob Bay Natural Area Preserve | WDNR | WDNR |
| Fidalgo Bay Aquatic Reserve | WDNR | WDNR |
| Maury Island Aquatic Reserve | WDNR | WDNR |
| Nisqually Reach Aquatic Reserve | WDNR | WDNR |
| Protection Island Aquatic Reserve | WDNR | WDNR |
| Smith & Minor Islands Aquatic Reserve | WDNR | WDNR |
| Woodard Bay Natural Resources Conservation Area | WDNR | WDNR |
| Padilla Bay National Estuarine Research Reserve | WDOE | WDOE |
| Belfair State Park | WPRC | WPRC |
| Dash Point State Park | WPRC | WPRC |
| Fort Ebey State Park | WPRC | WPRC |
| Lilliwaup State Park | WPRC | WPRC |
| Potlatch State Park | WPRC | WPRC |
| Twanoh State Park | WPRC | WPRC |

Appendix 3. MPA Network Case Studies

G.3.1 British Columbia, Canada: Rockfish Conservation Areas

In 2007, Fisheries and Oceans Canada (DFO) established 164 Rockfish Conservation Areas (RCAs) along British Columbia's outer coast and inside the Strait of Georgia. The areas cover 20% of rockfish habitat in outside areas and 30% of inside rockfish habitat. RCAs do not prohibit all types of recreational or commercial fishing – instead fishing is limited to a short list of activities that are considered to have limited impact on rockfish populations. The types of recreational fishing allowed in RCAs include: invertebrates by hand picking or dive, crab by trap, shrimp/prawn by trap, smelt by gillnet. Commercial fishing methods allowed in RCAs include: invertebrates by hand picking or dive; crab or prawn; scallops by trawl; salmon by seine or gillnet; herring by gillnet, seine and spawn-on-kelp; sardine by gillnet, seine, and trap; smelt by gillnet; euphausiid (krill) by mid-water trawl; opal squid by seine; and groundfish by mid-water trawl.

What are the goals and/or objectives of the network?

Establishing additional Rockfish Conservation Areas was one of four strategies identified in DFO's 2002 Inshore Rockfish Conservation Strategy, along with accounting for all rockfish catch, decreasing fishing mortality, and improving stock assessment.

According to an early planning document, which uses the term Rockfish Protection Areas (RPAs), the management objectives of these areas include:

1. *To protect vulnerable rockfish species, to prevent their decline and to foster the sustainability of populations*, harvest impacts must be minimized. Inshore rockfish are generally sedentary in nature and do not migrate over large distances. RPAs are considered an essential management tool for the conservation of inshore rockfish.
2. *Over the long-term, enhance the production of larvae*. An increase in the size of individual inshore rockfish as well as in population densities should result in enhanced larval production.
3. *Over time, RPAs may provide a spillover of larvae into adjacent areas and a spillover of fish along the margins of the RPAs*. As fish and populations grow, it is expected that not only larvae would be dispersed over larger areas (with the prevailing currents), but that individual fish of various sizes would also move beyond the margins of the RPAs.
4. *To establish control and reference sites for scientific research and fishery assessment*. RPAs as well as areas where fishing activity occurs must be monitored and assessed to provide baseline data for stock assessment and advance the scientific knowledge of the effects of exploitation. Science is needed to provide advice to managers on the utility of RPAs as a management tool.

Why/how was the network initiated?

Prior to 1986, the hook-and-line-fishery for rockfish in this region was unrestricted, and landings increased from 248 metric tons in 1951 to a high of 1,823 metric tons in 1991. By the mid-1990s, declining catch shares, particularly in inshore areas, led to licensing restrictions, quotas, and the development of 18 protected areas that restricted only commercial harvest and covered less than 1% of the coast. Surveys in 2000 indicated the rockfish population was continuing its sharp decline, and scientists with DFO recommended a precautionary approach to management. This led the department to advocate the establishment of RCAs that protect extensive habitat as one of four strategies in its 2002 conservation plan. The initial targets were to close fishing in 50% of inshore habitat and 20% of outside habitat, though the inshore target was later lowered to 30% of habitat.

What was the structure of the planning process?

A technical team of representatives from several DFO departments, including staff working on enforcement and communications, generated an initial framework for developing areas. The agency began consultation with stakeholder groups, and local information elicited from these groups was used to identify initial areas for closure. The boundaries of these sites were modified after an internal review. Additional sites were identified using a predictive rockfish habitat model, and with consideration of other practical and socioeconomic factors.

How was science collected/addressed during the planning process? How did scientific information inform the network planning process?

An extensive literature review helped shape the development of guidelines for RCAs. Managers also relied on the use of a predictive habitat model that considered bathymetry and benthic complexity to identify large areas of potential rockfish habitat. Local traditional knowledge on the current and historic locations of rockfish populations gathered from fishermen and other resource users during stakeholder discussions was also important throughout the planning process.

How is the network funded? Both the planning process and the ongoing management of the network?

Funding for all planning stages and ongoing management comes from the federal budget. Some monitoring work is funded through the University of British Columbia, and DFO has also collaborated with the Vancouver Aquarium, which has partially funded some projects.

What were some of the most important information to the planning process? (examples: bathymetric data, habitat maps, socioeconomic analyses, etc)

- 2000 survey data showing the extent and trend of the population decline
- local information from stakeholder groups
- habitat modeling outputs

How were stakeholders/public groups engaged in the planning process?

DFO held 10 public meetings and arranged over 50 consultations with different groups, including commercial and recreational interests, local governments, and First Nations. During these meetings, groups were asked to identify rockfish habitat on maps, by circling current or historic fishing areas where rockfish were located, as well as spawning, nursery, and feeding areas. Groups also identified fishing grounds for other species that were important to them. These groups also provided comment and feedback on all proposed areas. This back and forth continued over several years.

How were tribes and tribal rights addressed during the planning process?

First Nations were engaged individually during the consultation stage of the planning process. Recognized tribal members can fish within RCAs for sustenance, but not for commercial purposes.

How were sites selected?

Sites were selected through consultation with stakeholders, employing their local knowledge, and through use of a rockfish habitat model. Additional considerations included the size and spatial distribution of areas, level of agreement among stakeholders, socioeconomic concerns, and proximity to existing land-based parks.

What monitoring occurs across the network?

Funding has not been allocated for monitoring by DFO. The University of British Columbia is conducting some long-term monitoring of RCAs, and Simon Fraser University and the Vancouver Aquarium also have studies looking at the impacts of the RCAs.

Lessons learned and best practices

Strong internal leadership, consensus-based decision making, and an open consultation process that engaged a variety of stakeholders all were noted as crucial elements that ensured the successful planning and implementation of the network. The strong scientific basis developed early in the process was another asset, as was the ability of DFO representatives to be consistent in their message and objectives throughout the process, and follow through on those objectives.

The process could have benefited if better data on the spatial patterns of benthic habitat had been available early in the process – this information became available later and a retrospective analysis found less rockfish habitat within the sites than the predictive model had estimated.

Sources:

Gary Logan, Department of Fisheries and Oceans (ret.), interviewed 8/27/2012
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Marliave, J., and W. Challenger. 2009. Monitoring and evaluating rockfish

- conservation areas in British Columbia. *Canadian Journal of Fisheries and Aquatic Sciences* 66:995–1006.
- Robb, C. K., K. M. Bodtker, K. Wright, and J. Lash. 2011. Commercial fisheries closures in marine protected areas on Canada's Pacific coast: The exception, not the rule. *Marine Policy* 35:309–316.
- Yamanaka, K. L., and G. Logan. 2010. Developing British Columbia's inshore rockfish conservation strategy. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science*:28–46.

G.3.2 Oregon Marine Reserve System

Oregon is in the process of implementing a system of marine reserves along its coast. As of September 2012, five sites have been designated that prohibit “all extractive activities, including the removal or disturbance of living and non-living marine resources, except as necessary for monitoring or research to evaluate reserve condition, effectiveness, or impact of stressors.” Harvest restrictions went into effect at two pilot sites in January 2012, and baseline monitoring is occurring at the remaining three sites, where restrictions are slated to go into effect in 2014 and 2016. Oregon’s marine reserves do not comprise an ecologically connected network; instead they are a “limited system” of sites that share a common monitoring framework and that meet common guidelines. Oregon defines that system as: “a collection of individual sites that are representative of marine habitats and that are ecologically significant when taken as a whole” and describes “ecologically significant” as a system that would contribute to biodiversity or resilience. Planning of the reserves program began in 2000, and has been handled by the Oregon Policy Advisory Council (OPAC), an advisory body that provides marine policy support to the Governor. The Oregon Department of Fish and Wildlife (ODFW) is the lead agency tasked with managing the reserve sites.

What are the goals of the network?

Marine Reserve Goals: Protect and sustain a system of fewer than ten marine reserves in Oregon’s Territorial Sea to conserve marine habitats and biodiversity; provide a framework for scientific research and effectiveness monitoring; and avoid significant adverse social and economic impacts on ocean users and coastal communities. (Executive Order 08-07)

Objectives:

1. Protect areas within Oregon’s Territorial Sea that are important to the natural diversity and abundance of marine organisms, including areas of high biodiversity and special natural features.
2. Protect key types of marine habitat in multiple locations along the coast to enhance resilience of nearshore ecosystems to natural and human-caused effects.
3. Site fewer than 10 marine reserves and design the system in ways that are compatible with the needs of ocean users and coastal communities. These marine reserves, individually or collectively, are to be large enough to allow scientific evaluation of ecological effects, but small enough to avoid significant adverse social and economic impacts on ocean users and coastal communities.
4. Use marine reserves as reference areas for conducting ongoing research and monitoring of reserve condition, effectiveness, and the effects of natural and human-induced stressors. Use the research and monitoring information in support of nearshore resource management and adaptive management of marine reserves.

Although marine reserves are intended to provide lasting protection, individual sites may, through adaptive management and public process, later be altered, moved, or removed from the system, based on monitoring and reevaluation at least every five years.

Why/how was the network initiated?

In March 2008, Governor Ted Kulongoski issued an Executive Order directing OPAC to develop a list of nine or fewer recommended marine reserve sites by January 2009, through a public nomination process, using the goals, objectives, and the spacing and planning guidelines developed by OPAC between 2000 and 2007. The order identified ODFW as the lead agency.

Oregon's marine reserve process was accelerated in part because of an expectation that environmental NGOs were prepared to push for the creation of very large marine reserves through a statewide ballot measure, if the state and local communities did not initiate a process of their own.

What was the structure of the planning process?

OPAC relied on subcommittees to develop the initial policy recommendations, including a Marine Reserve Planning Committee (MRPC), a Marine Reserve Science Advisory Team (SAT), and technical staff from several state agencies. These recommendations included definitions, goals, objectives, planning principles, and implementation guidelines.

Between June and September 2008, community groups, organizations, and other members of the public developed and submitted 20 proposals for marine reserve sites. Each proposal form had to include information on size and location of the site, habitat and species present, ease of enforcement, research opportunities, community support, and information on how the site proposed would avoid "significant adverse economic and social impacts." OPAC reviewed all proposals, using ecological and socioeconomic criteria, and recommended the state move forward with six areas, identifying two sites as pilot projects. The recommendations put forth by OPAC were later ratified by the legislature in House Bill 3013 (2009).

In 2009, ODFW began adopting rules to establish and conduct baseline monitoring in the two pilot sites. ODFW also convened multi-stakeholder community teams to evaluate and modify three of the remaining reserve proposals. The fifth recommended site, which had the least community support, was held until a new compromise proposal could be developed in a collaborative process overseen by the Port of Coos Bay. The three community teams met over 11 months to develop consensus recommendations, .

How was science collected/addressed during the planning process? Was new data collected? How did scientific information inform the network planning process?

Oregon mostly relied on existing information to inform the marine reserve process, although work by Oregon Sea Grant and Oregon State University, particularly a high-resolution habitat mapping project, aided the effort. A subgroup of OPAC's Scientific and Technical Advisory Committee (STAC) focused on developing ecological guidelines and provided advice to community teams on marine reserve science, and how different reserve designs might affect different species, habitats, or human uses.

How is the network funded – both the planning process and the ongoing management of the network?

No funding was dedicated to the marine reserve process until 2009, when the legislature allocated \$1,000,000 left over from the *New Carissa* settlement to ODFW for the 2009-2011 biennium. This funding, along with grants from the Meyer Memorial Trust and the federal state wildlife program, enabled ODFW to hire a dedicated marine reserve staff and implement the pilot sites and community team process. Ongoing management of the marine reserve system is currently funded through the Oregon State Lottery.

What was the most important information to the planning process? For ongoing management? (examples: bathymetric data, habitat maps, socioeconomic analyses, etc)

- High-resolution habitat maps
- Local knowledge

How were stakeholders/public groups engaged in the planning process?

Members of the public were invited to submit proposals for reserve sites during the first round, and eight interest groups were identified in HB 3013 to be included in community teams, which met extensively over 11 months. Public comment was taken at meetings throughout the process.

How were tribes and tribal rights addressed during the planning process?

Tribes in Oregon have rights to use of rocky intertidal areas, but not subtidal areas. There is a tribal representative on OPAC, but tribes were not very engaged in the planning process. ODFW made efforts to reach out to individual tribes, but on the whole, tribes stated a preference to be considered in a government-to-government process that ties in with other ongoing issues. The marine reserve regulations may in the future allow for limited intertidal harvest for cultural reasons.

How were sites selected?

Community groups made proposals for marine reserve and multi-use protected areas that had to meet guidelines set by OPAC. These proposals were then evaluated in the process described above.

What monitoring occurs across the network?

Baseline monitoring on ecological and human dimensions is collected for two years before the establishment of a marine reserve. Ongoing monitoring is less extensive. Methodologies used include [ecological] oceanographic assessment, seafloor mapping, ROV and SCUBA surveys, benthic surveys, hook and line fishing survey; and [human] interviews and surveys, observational studies, economic modeling, and more.

What worked and what didn't in your process?

Although the timeline of the process was aggressive, it helped to have a specific deadline to motivate groups to make a decision. The extensive, 11-month community team process allowed extensive opportunity for public comment and allowed time to develop buy-in for the result.

The science advisory team and community teams were both staffed by volunteers, and the time commitment was considerable. It could be difficult for the SAT to turn around answers to questions from the stakeholder group quickly, because they all had other full-time jobs.

In developing the monitoring plans, it has been important to be clear about the specific research questions, and how they are anchored in the goals and objectives set for the reserves. Staff must reiterate that with limited staff and resources, these are the only things that are being monitored.

The process has generated incredible information on the nearshore coastal environment, an area that had relatively little information available previously, and this will be useful in many non-reserve management discussions, now and in the future.

The community team process could have been better structured; they spent the first three months brainstorming, and could have started with more clarity about the steps they would need to get through to do their evaluation.

The legislative mandate provided important cover throughout the process, and more support than the executive order, which initiated the marine reserve process.

Sources:

Cristen Don, Oregon Department of Fish and Wildlife, interviewed 8/29/2012
Alix Laferriere, Oregon Department of Fish and Wildlife, presentation, 2/8/2012
www.oregonocean.info/marinereserves
<http://www.oregon.gov/LCD/OPAC/Pages/workinggroups.aspx>

G.3.3 California: Marine Protected Area Network, MLPA

In 1999, California voters approved the Marine Life Protection Act (MLPA), which directed the state to reevaluate and redesign the state's many ad hoc MPA designations into a statewide network, and improve the protection afforded to the state's marine ecosystems, as well as educational and recreational opportunities, using best available science. After two initial attempts to implement MLPA, the process took shape after the creation of the MLPA Initiative, a public-private partnership that includes two state agencies - the California Natural Resources Agency and Department of Fish and Game (DFG) – and the private Resources Legacy Fund Foundation. California's 1,100-mile coastline was divided into five regions, and planning of the network took place sequentially. To date, planning in four regions is complete, and planning in the final region, San Francisco Bay, is on hold indefinitely. The regional networks include five different classifications, each with specific harvest and use regulations: marine reserves, marine parks, marine conservation areas, marine recreational management areas, and special closures for breeding seabirds or marine mammals. As of April 2012, the statewide network includes 124 MPAS, covering 16 percent of all coastal state waters – 9 percent of coastal state waters is in a no-take marine reserve.

Questions:

What were/are the goals of the network?

The Marine Life Protection Act established the following goals for the Marine Life Protection Program:

1. To protect the natural diversity and abundance of marine life, and the structure, function, and integrity of marine ecosystems.
2. To help sustain, conserve, and protect marine life populations, including those of economic value, and rebuild those that are depleted.
3. To improve recreational, educational, and study opportunities provided by marine ecosystems that are subject to minimal human disturbance, and to manage these uses in a manner consistent with protecting biodiversity.
4. To protect marine natural heritage, including protection of representative and unique marine life habitats in California waters for their intrinsic value.
5. To ensure that the state's MPAs have clearly defined objectives, effective management measures, and adequate enforcement, and are based on sound scientific guidelines.
6. To ensure that the state's MPAs are designed and managed, to the extent possible, as a network.

Why/how was the network initiated?

The Marine Life Protection Act provided the mandate for the creation of the network. It was passed by a majority in the state legislature, and ratified by voters. In addition, the California Marine Managed Areas Improvement Act (2000), which overhauled and streamlined MPA management and authority by reducing the

number of MPA classifications from 18 to just six, clearly identifying the level of restriction associated with each MPA, and identified the agencies with designation or management authority.

What was/is the structure of the planning process?

In each study region, an appointed regional stakeholder group (RSG) develops MPA proposals that are reviewed and evaluated by a science advisory team (SAT), the California Department of Fish and Game, MLPA Initiative staff, the public and a policy-level blue ribbon task force (BRTF). The MPA proposals are then refined by the RSG and presented to the BRTF, who makes a recommendation to the California Fish and Game Commission.

How was science collected/addressed during the planning process? How did scientific information inform the network planning process?

There was no time or funding allocated for collecting new data or information; instead the process relied on best available science. High-resolution benthic mapping was conducted during the MLPA process, and came to be an important information source. Each regional process began with the compilation of an exhaustive regional profile that gathered existing data. Each region also had a science advisory team (SAT) made up of scientists with expertise in the study area, and this group was used to answer questions from the stakeholder groups and members of the public.

How is the network funded? Both the planning process and the ongoing management of the network?

The planning process has been funded through a mix of public and private funds. One of the largest supporters is the private Resources Legacy Fund Foundation. Ongoing implementation and management has depended on state funds for DFG.

What information or data was the most important information to the planning process? (examples: bathymetric data, habitat maps, socioeconomic analyses, etc)

The spatial data that was most useful in the planning process, included seafloor habitat data and socioeconomic information. Other important spatial data included bathymetric imagery, landcover, submarine features, shoreline habitats, upwelling zones, estuary and eelgrass locations, kelp beds, seabird colonies, marine mammal haul outs, harbor and port locations, public access points, commercial and recreational fishing data, dive and kayaking sites, and existing marine managed areas.

How were stakeholders/public groups engaged in the planning process?

Stakeholders had the option to going regional stakeholder groups for each study area, and to provide local input and knowledge to the process. These groups ranged in size from 25 to 60. There were also many opportunities for public comment throughout the process.

How were tribes and tribal rights addressed during the planning process?

California tribes and tribal rights have not been effectively considered throughout the MLPA process. Many tribes in the state are not recognized, and were not consulted in some regional processes. In some of the regional study areas, tribes were invited to join regional stakeholder groups (RSG), but only a few tribes responded or took part. Currently, there is ongoing litigation concerning tribal rights and the MLPA in the North Coast area.

What monitoring occurs across the network?

Early in the MLPA process, California Sea Grant and DFG staff worked to do some initial baseline monitoring. In 2007, the nonprofit California Ocean Science Trust created the MPA Monitoring Enterprise, which designed a monitoring framework for the MLPA program as a whole, to look at how to structure monitoring to address the MLPA goals, and regional monitoring programs for each region. The monitoring framework is scaled to be adjustable based on available funding and resources. Baseline monitoring is conducted for 2-3 years in each region, and this is followed by long-term monitoring. The monitoring results are intended to be used to assess the network every five years.

What worked and what didn't in your process?

There was considerable support through the process from successive governors and the legislature, and this support was crucial. The timeline set by policy makers was ambitious, but there was merit to setting goals and not stretching out the process indefinitely. The downside of the timeline is that it was not possible to answer every question or gather new information, and sometimes the lag in making information available was frustrating for stakeholders. The process and regional profiles made effective use of existing science. The communication between the RSG and SAT was not always seamless, but allowed for a good learning process. Tribes could have been much more effectively engaged throughout the process, and this fault has had lasting repercussions.

Sources:

- Becky Ota, California Department of Fish & Game, interviewed 8/27/2012
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G.3.4 Gulf Coast MPA Network

The Gulf of Mexico is managed by a variety of state, federal, and local agencies, and contains many individual marine protected areas, including sites managed by NOAA, the National Park Service, US Fish and Wildlife, and the Nature Conservancy. In April 2011, managers from many of these programs gathered to form the Gulf Coast MPA Network with the intention of raising awareness about the different sites and leveraging resources across agencies and programs. The Gulf Coast Network is an administrative or collaborative MPA network, rather than an ecological network – although the sites are connected ecologically. Currently, twelve sites are included in the network, including the Everglades and Dry Tortugas National Parks in Florida, the Flower Garden Banks National Marine Sanctuary in Texas and Louisiana, and the Grand Bay NERR in Mississippi.

What are the goals of the network?

Development of a regional plan and functional network within coastal states of the Gulf of Mexico, highlighting priority actions and common interests.

- Objective: Identify parameters and develop a draft framework needed to establish a functional MPA network to increase communication, collaboration, coordination and effective sharing of resources in the Gulf of Mexico.

The network's mission is: "To improve coordination, cooperation, communication, and collaboration among Gulf coastal and marine protected areas by creating opportunities for collective environmental planning and response; information sharing; leveraging resources; and conveying a common message."

Why/how was the network initiated?

The Gulf Coast network was initiated because of interest among the different marine managers in finding a way to improve collaboration and coordination among their different MPA program. It was officially created during a two-day meeting in April 2011, when 22 participants developed a regional plan.

What was the structure of the planning process?

An advisory committee helped develop the workshop and identify the participants.

How is the network funded? Both the planning process and the ongoing management of the network?

A grant from the National Fish and Wildlife Foundation was awarded to the Friends of Rookery Bay, which enabled the group to hire a graduate student coordinator and host the workshop in the first year, and begin implementation of the regional plan in the second year. The Rookery Bay NERR hosted the initial workshop, and the network coordinator is currently hosted by the Florida Department of Environmental Protection (DEP).

What was the most important information to the planning process? (*examples: bathymetric data, habitat maps, socioeconomic analyses, etc*)

The network has developed four Focus Areas:

- communications strategy
- climate resiliency
- education and outreach
- disaster response

One first step has been to develop an online communication portal for all network members to share ideas and announcements. The network also has developed site profiles for the initial 12 sites – over 150 MPAs might be eligible to join the network, but the way to do this is still being considered. The group is currently considering ways to conduct collaborative regional projects.

What are the next steps for the network?

Next steps include completing construction of the website and enhancing the online communication portal, building an active MPA member base, and conducting collaborative projects, including a needs assessment. Some challenges include figuring out how to gather the large number of people, who are dispersed geographically, together, and maintaining enthusiasm for the network.

Sources:

Ryan Young, Florida Department of Environmental Protection, presentation
8/20/2012

<http://www.rookerybay.org/professional-development/gulf-mpa-network>