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MPAs Matching the Tools to the Objectives

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Marine Protected Areas are one tool for marine ecosystem management. As a tool for fisheries management evidence suggests that MPAs are often an important tool in overexploited fisheries or fisheries where direct output controls such as catch limits, or input controls such as effort limits cannot be implemented and enforced. In many places MPAs may be the only enforceable method of regulating catch. In regulated fisheries that typify developed countries it is well demonstrated that overfishing can be controlled and good biological outcomes and achieved without areas permanently closed to fishing, although closed areas for specific gears and or for specific times are a common tool. MPAs can also serve as reference sites for maintenance of more intact ecosystems and habitats. It is unclear what the appropriate size and or scale of MPAS should be to achieve these objectives. In the implantation of the California Marine Life Protection Act both fisheries impacts and ecosystem protection were considered. I will provide a personal perspective on how I believe the objectives of the act and the science were integrated.

A National Perspective on the Role of Marine Protected Areas in Sustaining Fisheries

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The U.S. has over 1600 MPAs, most of which focus primarily on the natural heritage conservation (70%), with 24% focusing on sustainable fisheries. This presentation will: (1) present data from the MPA Inventory to provide a national perspective on the use of MPAs as a tool for fisheries management, protecting habitat, and conserving ecosystem function; (2) highlight geospatial tools that have been created to view MPAs and patterns of human uses of the ocean, including commercial and recreational fishing; and (3) discuss the role of the National System of MPAs in sustaining fisheries.

The National Marine Protected Areas Center's MPA Inventory includes MPAs managed by federal, state and territorial agencies, and includes information on MPA conservation focus, managing agencies, authority, scope, level of protection, ecoregion, and GIS shapefiles. The Center is currently expanding the Inventory to add information on natural and cultural resources located within MPAs, such as habitat types. These data will contribute to regional and national analyses of MPA objectives, functions and gaps. The Center has also developed mapping tools to make spatial information from the Inventory readily available to non-GIS users.

In addition to MPA information, the Center is gathering and analyzing information related to human uses of the ocean. The distribution of human uses is essential information for ecosystem approach to management, but comprehensive, consistent information on a wide range of human uses is often unavailable. The Center is working with partners using a participatory GIS process to gather human uses data from the shoreline to the EEZ, including recreational and commercial fishing, as well as non-consumptive, military and industrial uses. Ocean use mapping projects have been completed for the California coast, Southern Maine and New England, and parts of Hawaii, and the process is being expanded to other regions. This information has many applications, including MPA planning and Coastal and Marine Spatial Planning.

The National System of MPAs is a partnership to enhance conservation of the nation's natural and cultural marine heritage and represent its diverse ecosystems and resources. Although MPAs in the system are managed by their individual federal, state and territorial programs, they work together at the regional and national levels to achieve common conservation goals. Focal areas include fostering connectivity and MPA networks; capacity building; and information sharing. Currently, there are 258 MPAs in the national system, including four federal fisheries sites managed by NMFS and the Mid Atlantic Fishery Management Council.

MPAs as Management Tools in Northern Boreal Ecosystems: What are Our Goals and How Do We Get There?

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Marine protected areas (MPAs) have become increasingly popular as management tools in recent years. While many MPAs have been successfully established in tropical reef systems, fewer MPA examples exist in temperate or subarctic systems (e.g. North Pacific, Bering Sea) where species diversity is lower, abundance of single species is higher, and many fish species exhibit large amounts of movement in one or more of their life history stages thus covering large geographic areas. In addition, in the subarctic systems, MPAs are often located in remote locations that are expensive to study and therefore data on local habitat and fauna are difficult to obtain. These conditions may present a different set of challenges for designing successful MPAs than the ones for tropical systems.

This presentation will review the most common goals and mechanisms for MPAs as successful management tools in subarctic ecosystems and discuss possible scenarios for implementation. Many times successful MPA design is hampered by difficulties in communication between scientists, decision makers, and user groups. The author will examine the different expectations of each group and provide possible suggestions on how to improve the MPA design implementation process. The goal is to stimulate discussion and communication between the different groups involved in the MPA design and implementation process.

Ideas for this presentation were developed during several joint workshops on MPAs between the NMFS Alaska Fisheries Science Center (Seattle), Northeast Fisheries Science Center (Woods Hole), and the Institute of Marine Research (Bergen).

What are We Protecting? The Challenges of Marine Protected Areas for Multispecies Fisheries

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In the quest to limit the bycatch of non-target species, fisheries managers have wielded a range of policy tools. One instrument that has achieved substantial use is marine protected areas (MPAs) to protect vulnerable aggregations of bycatch species. MPAs are often popular with ecologists and fishery managers because of their relative ease of administration, the potential for multiple benefits due to protection of habitat from damage, and the widespread acceptance of MPAs as an instrument of choice for "ecosystem-based management" of fisheries. Despite these merits, we argue that MPAs may have significant limitations that should figure in their adoption. First, closures can displace fishermen from favored fishing grounds, potentially reducing the productivity of fishing effort and increasing the variable costs of fishing. Second, by reducing fishermen's spatial choice set, closures can create significant spillovers for the management of other species. For instance, a closure intended to protect one vulnerable species may increase fishing pressure on another.

To provide empirical context for our criticisms, we examine the closure of grounds in the Bering Sea flatfish trawl fishery for the protection of red king crab. We utilize the availability of detailed spatial data on fishing effort and catch before and after the closure to estimate zero-inflated negative binomial models of king crab and halibut bycatch. We demonstrate that, while the MPAs were effective in reducing crab bycatch, they also displaced fishermen to grounds with increased density of an alternative bycatch species – halibut. By utilizing novel simulation techniques from the pre and post-closure data, we demonstrate how the spatial "corner solution" presented by the MPAs is not cost effective and how a policy that allows fishing over the entire grounds while providing a disincentive for both crab and halibut bycatch (as in a multispecies individual quota system) can achieve the multispecies bycatch conservation targets adopted by managers while increasing fishery profits.

The Use of Monitoring Data from In and Around No-take Marine Reserves for Fishery Management

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Monitoring data from inside and outside marine reserves can provide useful information on the size and abundance of harvested fishes under fished and relatively unfished conditions. A proposed control rules that reduces allowable relative fishing effort as a function of the ratio of fish density outside versus inside no-take marine reserves (as a measure of depletion) was found to be effective at maintaining spawning stock biomass and yield in a management strategy evaluations based on five nearshore California fish species. Scenarios with fish movement, illegal fishing in the reserve, or post-dispersal density dependence in recruitment required higher density ratio targets, such as 60% of mature fish or 80% of all fish, to avoid stock depletion. In addition to density data, monitoring data can provide information on fish lengths, which may be informative about fishing mortality rates. A Bayesian length-based cohort analysis of length frequency in each year inside and outside the Channel Islands marine reserves, both before and after the reserve were established, was able to estimate both natural mortality (M) and fishing mortality (F) rates, which were comparable to rates found in the stock assessment for California sheephead. There is a need for greater research investment in methods to use marine reserves to inform fishery management.

Legitimacy and Collaborative Process: Factors Influencing Public Support of Puget Sound Marine Protected Areas

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Success of Marine Protected Areas (MPAs) is often equated with biological improvement or prevention of further degradation. Local communities' perceptions of MPA legitimacy and level of public support are additional indicators of management success. Collaborative processes are increasingly viewed as a mechanism to increase public support and legitimacy of environmental regulations. This paper examines public involvement in the establishment of 7 Puget Sound MPAs. Using social survey data, relationships between measures of collaboration and measures of legitimacy and public support are explored.