



CALIFORNIA OCEAN PROTECTION COUNCIL

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MEMORANDUM

TO: Ocean Protection Council

FROM: Christina Cairns, Project Manager

DATE: September 17, 2009

RE: Coordinating Geospatial Data to Map Human Uses and Conditions in the Ocean Environment

ATTACHMENT: 1) [Map from Massachusetts Ocean Management Plan](#) showing offshore areas set aside for human use and ecological protection

REQUESTED ACTION:

Staff recommends the council adopt the following resolution:

“The Ocean Protection Council (OPC) resolves to support interagency collaboration and management of geospatial information that will help to identify priority uses and address current and future user conflicts in the ocean environment. The OPC further directs staff to analyze and develop recommendations on marine spatial planning, including planning principles and objectives, for future approval by the council.”

SUMMARY:

With the increasing human activity in our ocean environment, there is a growing need for long-term, comprehensive planning that prioritizes areas for human use and conservation, mitigates existing and future user conflicts, and considers the cumulative impacts of human uses in the ocean. State agencies are currently unable to access all pertinent information when making permitting decisions and conducting long-term planning. Even if information is available, few agencies have been able to take advantage of a new generation of mapping programs and techniques that allow them to visualize and analyze data in a geospatial format. To address these issues, the OPC staff is pursuing ideas that will:

- Increase the amount of physical, biological, and economic data that is available to agencies in an electronic, geospatial format;
- Reduce barriers to data-sharing among agencies;
- Create new tools or adapt existing tools to better analyze and present data visually so that managers can readily assess conflicting uses and potential cumulative impacts.

Although the need for this type of effort has existed for some time, there is now opportunity for real advancement with heightened interest in marine spatial planning (MSP) at the national level. MSP is a public process of analyzing and allocating space for human activities in the ocean to achieve politically determined ecological, economic, and social objectives. It is in the state's interest to improve data management and sharing among agencies in an effort to leverage support from the federal government and coordinate with the federal MSP process to ensure that uses in federal waters match priorities for California.

BACKGROUND:

The ocean environment is facing increasing demands on its resources, with increasing pressure to accommodate offshore energy facilities, shipping lanes, commercial fishing, and recreational activities, among other uses. Each of these activities results in environmental impacts that must be weighed against the benefit of the use itself, and considered in context of other activities. When undertaken together, these uses may lead to cumulative impacts that threaten the long-term health of the ocean. In addition, these uses can conflict with one another, a problem that is likely to become more frequent as new uses of the ocean emerge. To maximize both the environmental and economic benefits our oceans provide and to avoid future user conflicts, it is important to have the necessary information to make informed decisions that consider a variety of factors.

There is momentum at the national level to develop a planning process designed to balance human uses of the ocean with environmental protection objectives (see "Marine Spatial Planning" below). Given the President Obama's June 2009 Memorandum calling for a national framework for effective coastal and marine spatial planning, the time is right for California to continue its leadership in ocean and coastal planning by committing to improved marine spatial management off its coast. This will require the development of partnerships to leverage funds in support of these efforts, particularly the need for better methods of data management and sharing.

The development, management, and sharing of geospatial information (such as mapped jurisdictional boundaries, habitats, and human activities) are important components of ocean use planning and conservation. However, inadequate budgets and resources have constrained the full development and use of the tools necessary to provide these services. Despite the proliferation of geospatial data display and analysis tools (such as ArcGIS) in recent years, local, state, and regional agencies still face obstacles to finding and obtaining up-to-date information on natural resources, human uses of the environment, and even regulatory boundaries. Clearly there is a need to make improvements in our ability to use and access spatial information.

Use permits in the ocean are currently issued on a case-by-case basis, often with inadequate consideration for future long-term uses. Essentially, those who arrive first have a greater likelihood of obtaining access to the area or resource, which may not be considered in a long-term plan for ocean uses context. There is currently no "comprehensive plan" for offshore areas as there are for many regions onshore. Moreover, there is little to no coordination or geospatial data sharing between planners in different sectors to evaluate the cumulative impacts or tradeoffs between uses and to prioritize suitable uses of the ocean. Thus, there is a pressing need in California to share relevant data and present a comprehensive picture of marine geospatial information. Access to such tools will help develop more comprehensive long-term plans, resulting in better informed project selection, fewer user conflicts, and reduced impacts to the environment.

Earlier this year, California appointed a chief Geographic Information Officer (GIO) to coordinate data access and sharing among different agencies and to integrate digital mapping services for state agencies.¹ The GIO has begun a collaborative initiative with various state agencies to organize datasets for land-based needs, mainly emergency response. Yet marine and coastal data, and those agencies responsible for such information, are largely absent from this coordinated effort. The OPC is in a unique position to address this omission and bring the relevant players together (agencies as well as academics, non-governmental organizations (NGOs), etc.) to provide important coastal and marine geospatial information that will allow for more comprehensive ocean planning and inform effective decision-making on the part of all state agencies.

DATA AVAILABILITY AND SHARING ANALYSIS:

OPC staff, in coordination with the NOAA Coastal Services Center (CSC), conducted an investigation into the potential need for, and barriers to, interagency data sharing and collaboration for effective ocean management. This investigation occurred through interviews with a number of key state agencies possessing coastal and marine jurisdiction, including the State Lands Commission, California Coastal Commission, San Francisco Bay Conservation and Development Commission, Department of Fish and Game, Department of Parks and Recreation, and State Water Resources Control Board. The objective of the interviews was to identify current capacities and needs for geospatial data management, including data creation, maintenance, and sharing among agencies. As a result of these interviews, staff discovered several key barriers to data sharing and ideas for improved collaboration. The main barriers to data sharing included:

- 1) a lack of staff time and resources to devote to geospatial data creation, maintenance, and sharing
- 2) limited technological capabilities, such as bandwidth and data storage capacities
- 3) data that was not readily accessible (i.e., it had not been published or was not known to exist)
- 4) data containing confidential information
- 5) inaccurate data
- 6) lack of metadata standards (information on the origin and composition of data)

Common ideas for improved collaboration and performance included:

- 1) support for more GIS staff
- 2) increased data storage capacity and bandwidth
- 3) better identification of datasets that are available
- 4) improved access to data
- 5) improved interagency coordination through the creation of a task force or other organized means

¹ In 2007, recognizing the need for better coordination of geospatial information within the state, Governor Schwarzenegger established a GIS (Geographic Information Systems) Task Force to develop a statewide strategy to enhance the technology for environmental protection, natural resource management, traffic flow, emergency preparedness and response, land use planning and health and human services. The GIS Task Force subsequently recommended establishing a Geographic Information Officer (GIO) position to spearhead this effort. In March 2009, California Chief Information Officer Teri Takai appointed Michael Byrne as GIO within the Office of the State CIO, also established by the Governor in 2007 to oversee information technology in state government.

In addition, several regulatory agencies have expressed desires to link their permit databases to mapping or geospatial data software for improved project analysis and comprehensive planning but don't have the means to do so.

Based upon the results of these interviews, OPC staff believes that it is important to approach a broader range of stakeholders, such as federal agencies and NGOs, to discuss ways to improve geospatial data management and to work collaboratively to craft an approach for comprehensive ocean planning. OPC staff recently joined the CSC, the Ocean Science Trust (OST), the Center for Ocean Solutions (COS), and The Nature Conservancy (TNC) in hosting a workshop at Stanford University for state and federal technical staff and project managers to evaluate their current capacities and needs as they relate to geospatial data management and tools. The workshop engaged participants in thinking about existing barriers and methods for collaborative data sharing, identifying data gaps, and crafting useful data analysis and display tools. The participants applied these ideas to planning for current and emerging ocean uses, such as marine protection areas, aquaculture and renewable energy development, in the context of their own agencies' mandates.

The workshop resulted in several recommendations to the OPC and the state GIO. Specifically, workshop participants suggested the OPC meet with the GIO to support the creation of a state geospatial information policy that would define the California's commitment to geospatial data management and establish a leadership role within each agency to further that policy. The policy would seek to improve communication and coordination for data sharing efforts between agencies with marine and terrestrial jurisdiction and interests, as well as within agencies, such as the marine and terrestrial divisions of the Department of Fish and Game. Participants also stressed the need to improve data accessibility for all agencies and suggested an assessment to determine information needs and preferences about how to retrieve and share data as part of a data-sharing framework.

Ideas for tools to support this framework included a Web portal, data clearinghouse, and a search tool able to access various agency databases. Agency representatives at the workshop stressed the importance of building internal capacity, such as improving technical support for staff through training and hiring more GIS analysts and dedicated funding for data management, to support any data-sharing framework. Participants also noted that the state can and should build upon existing relationships between academics, NGOs and private partners to create, manage and maintain geospatial data. The state should work with these partners to develop data and metadata (information about the source and content of the data) standards for useful research products and to identify priority research needs to fill in data gaps. Finally, the state must leverage new ideas and sources of funding to achieve its commitment to improving geospatial data management for lasting benefits over the years to come. A final workshop report with details about these recommendations will be published by staff in October.

MAPPING TOOLS:

Many tools have been developed in recent years that have improved geospatial data sharing, analysis, and presentation capabilities through mapping. In addition, advances in open-source Web interfaces, such as Google Earth and Google Ocean, are making mapping tools more universal and user-friendly.

Within California, one particularly successful tool called MarineMap was created to inform the marine protected area (MPA) selection process under the California Marine Life Protection Act (MLPA) Initiative. Created by a team of academics working with the Department of Fish and Game (with input from various other agencies and non-governmental organizations), MarineMap contains dozens of data layers composed of human use and ecological data, such as the location of kelp forests, commercial fishing areas, and kayak access and recreation points, within the Southern California Bight. MarineMap users can view this information on a relatively detailed scale and select certain areas as potential MPAs; within the selected area, viewers can see what existing activities, species, and habitats will be affected by the MPA designation. Although it required a significant investment in time and money to create (and additional funds to maintain) MarineMap, the tool has proven very successful in informing the MPA selection process. This tool holds great potential if it can be applied on a broader scale for comprehensive ocean use planning and decision-making purposes.

Other geospatial data tools that include information useful for large-scale ocean planning include NOAA's Multipurpose Marine Cadastre, originally developed in partnership with the Minerals Management Service to support alternative energy siting decisions in the ocean, and TNC's Coastal Resilience tool to help local communities and states prepare for sea level rise due to climate change. Another tool developed by academics at the National Center for Ecological Analysis and Synthesis (NCEAS) allows for resource managers to evaluate the tradeoffs between different ocean uses and conservation objectives and assess cumulative impacts under different scenarios.

Recognizing the need for comprehensive ocean management in the face of emerging ocean uses (primarily wind energy development), Massachusetts and Rhode Island have each initiated statewide efforts to coordinate geospatial data and map existing ocean uses and conditions to assist in resolving user conflicts between sectors such as renewable energy, shipping, and fishing, and to prepare for long-term ocean use planning. Massachusetts recently released a draft of its "Ocean Management Plan," which is intended to provide "comprehensive science-based planning... to assure long-term protection and sustainable use of ocean resources," with an eye toward protecting existing habitats and uses while accommodating emerging industrial uses. Both states collected relevant geospatial datasets and used mapping tools to identify priority use and conservation areas, with input from public workshops. California can learn from these states and help lead the way toward more comprehensive ocean management by advancing geospatial data management techniques and tool development, in coordination with federal and state partners.

FUTURE ACTION:

Given the OPC's longstanding support of research yielding marine geospatial data (i.e., seafloor mapping, MPA baseline monitoring, etc.) and its responsibility to coordinate agency efforts for marine conservation, the OPC can play a unique role in coordinating data sharing and collaboration among state and federal agencies. Staff recommends the Council work with the state GIO to craft a leadership policy that supports an interagency collaborative framework and commit future financial support for geospatial data management capabilities and tools to allow improved data accessibility and sharing. This could include support for:

- Development of an interagency interface, mapping or search tool for accessing and sharing coastal and marine geospatial information between state and federal agencies.

- Building a public Web portal to display relevant coastal and marine geospatial data based upon identified priority needs.
- Creation of common data and metadata standards and establishment of original authorship guidelines for easier searching, access, and source identification of data within the various state agency databases.
- Support for additional technical staff time for those agencies with severely limited budgets and/or large legacy (paper) datasets.
- Identification of best practices for data management, metadata standards, and geospatial tool development that can be adopted or leveraged by the state.

MARINE SPATIAL PLANNING:

These recent efforts and the OPC's future support for interagency collaboration and improved geospatial data management will allow California to engage with the federal process of marine spatial planning (MSP). In June 2009, President Obama issued a Memorandum calling for "a recommended framework for effective coastal and marine spatial planning" within 180 days of issuance of the proclamation (i.e., by December 2009). He defined this framework as incorporating "a comprehensive, integrated, ecosystem-based approach that addresses conservation, economic activity, user conflict, and sustainable use of ocean, coastal, and Great Lakes resources consistent with international law..." This proclamation has a clear and direct nexus with the OPC's efforts to further interagency geospatial data sharing and illuminate data gaps and existing user conflicts to ultimately improve the management of ocean resources. Clearly any spatial planning that is happening in federal waters off California must be coordinated with state priorities and existing uses – compiling and distributing existing spatial data will be a necessary step to actively work with our federal partners now and in the future.

Marine spatial planning is defined by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as "a public process of analyzing and allocating, within space and time, human activities in the ocean to achieve politically determined ecological, economic and social objectives." UNESCO further explains MSP as "not an end in itself, but a practical way to create and establish a more rational use of marine space and the interactions between its uses, to balance demands for development with the need to protect the environment, and to achieve social and economic objectives in an open and planned way."²

The sharing of geospatial information among agencies, researchers, and the public is not only a sound method for improving the management of coastal and ocean resources and resolving user conflicts, but may be an essential first step toward setting the stage for MSP in California. Other states, such as Massachusetts, Rhode Island, and Florida, have included the concept and development of MSP as an identified goal in their ocean-related policies. In a 2009 report³, UNESCO outlines a multi-step approach to implementing MSP. The first step is to define and establish authority over the planning and implementation of MSP in a given area. The next steps include defining and analyzing existing and future conditions, as well as organizing stakeholder participation and obtaining financial support. While California may not undertake some of the

²UNESCO, <http://www.unesco-ioc-marinesp.be/>

³ EHLER C., DOUVRE F. 2009. Marine spatial planning: A step-by-step approach toward ecosystem-based management. Intergovernmental Oceanographic Commission and Man and the Biosphere Programme. IOC Manual and Guides, No. 53, IOCAM Dossier No. 6, Paris, UNESCO.

steps in this particular approach (i.e., establishing a single management authority to manage a planning process in concert with several regulatory bodies with independent authority), it is important to tackle those steps that can be accomplished and are necessary to improving comprehensive planning in the ocean environment. Namely, we should complete the task of compiling and assessing existing and future ocean uses and conditions. Through supporting and promoting interagency data sharing and collaboration, the OPC can assist in gathering and presenting data that is necessary to define and analyze existing conditions and to plan for future conditions, as well as consider planning alternatives. This in turn will help agencies to evaluate tradeoffs and measure cumulative impacts of human uses and ecosystem protection, to resolve user conflicts, and to ultimately undertake comprehensive, long-term planning that will help maintain the health of ocean and coastal ecosystems for the benefit of current and future generations.

California is at a critical point in the effort to protect its ocean resources. Fortunately, this is also a time when effective, comprehensive management of our oceans is a national priority. By working toward an integrated system of geospatial data sharing and adopting tools for improved display and analysis, agencies can make better informed decisions about ocean planning and set the course for successful management of California's ocean resources in the near and long term. Understanding current ocean uses and identifying future needs for California will allow the state to fully engage with federal agencies as they implement their framework for marine spatial planning in the coming years.

In addition to following and engaging in the national effort, staff intends to begin examining what MSP would mean for California. As an initial endeavor staff is proposing to:

- (1) research current legal and regulatory constraints to comprehensive marine spatial planning in California
- (2) develop recommendations on marine spatial planning, including planning principles and objectives, for the state.

Staff will bring these recommendations to the Council at a future meeting for review and approval

CONSISTENCY WITH THE CALIFORNIA OCEAN PROTECTION ACT:

The proposed action is consistent with the California Ocean Protection Act (Division 26.5 of the Public Resources Code). Section 35615(a)(1) specifically directs the council to coordinate activities of state agencies to improve the effectiveness of state efforts to protect ocean resources and establish policies to coordinate the collection of scientific data related to the ocean. It is also consistent with Section 35615(a)(5), which directs the council to transmit the results of research and investigations to state agencies to provide information for policy decisions.

CONSISTENCY WITH THE OPC'S STRATEGIC PLAN GOAL(S) & OBJECTIVE(S):

The project is consistent with the OPC's Five-Year Strategic Plan in the following respects:

Goal A (Governance), Objective 2b: Interagency Collaboration: "Work with all relevant state agencies to develop necessary legislation, regulations, or other tools to improve ocean governance." The proposed action is designed to encourage collaboration among state and federal agencies with regard to ocean planning and promote the sharing of geospatial data and

creation of data analysis and visualization tools that would result in more effective ocean management.

Goal A (Governance), Objective 4a: Ecosystem-based Management: “Work with all relevant state agencies to develop proposed legislation, regulations, or other tools to integrate EBM principles into agency operations.” EBM (ecosystem-based management), as defined in the OPC Strategic Plan, is “an integrated approach that considers the entire ecosystem, including humans.” The gathering and sharing of geospatial information on human uses, as well as species and habitat data, will lay the groundwork for a thorough and effective approach toward EBM.

Goal B (Research and Monitoring), Objective 2: Monitoring: (f) “Develop and implement a system for data management and a standardized approach to the format and distribution of mapping products.” (i) “Establish a mechanism or organization to provide data synthesis services with the goal of assembling scientific results from state and national efforts and producing products for diverse scientific, public, and policy audiences.” The OPC is considering ways to support agency management and sharing of geospatial data, in part through the creation of data standards and data analysis and visualization tools. Future efforts may include establishing a centralized portal for the sharing and synthesis of priority state and national agency data for use by agencies, researchers, and eventually the public, and/or a task force to provide support and direction for future data sharing and collaboration.