Coastal Management
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713626371

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First published on: 20 April 2011

To cite this Article Pietri, Diana , McAfee, Skyli , Mace, Amber , Knight, Emily , Rogers, Liz and Chornesky, Elizabeth(2011) 'Using Science to Inform Controversial Issues: A Case Study from the California Ocean Science Trust', Coastal Management, 39: 3, 296 — 316, First published on: 20 April 2011 (iFirst)
To link to this Article DOI: 10.1080/08920753.2011.566118
URL: http://dx.doi.org/10.1080/08920753.2011.566118

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Using Science to Inform Controversial Issues: A Case Study from the California Ocean Science Trust

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Connecting science and policy to promote the effective management of marine resources is a necessity and challenge acknowledged by scientists, policymakers, and stakeholders alike. As a leader on ocean issues, California has recognized the importance of integrating science into ocean and coastal management through specific policy choices. An example is the establishment of the California Ocean Science Trust (OST), a non-profit organization mandated to support management decisions with the best available science. The OST functions as a “boundary organization” bridging the often-disparate worlds of science and policy. Recently, while coordinating a scientific study on the controversial issue of decommissioning California’s offshore oil and gas platforms, the OST encountered public misconceptions about the peer review process and how it can help ensure unbiased scientific information informs policy. The OST’s experience with this study, and generally as a scientific knowledge broker, provides a practical perspective on techniques for navigating the choppy waters between science and policy. This article presents a critical reflection on the OST’s experience coordinating the platform decommissioning study, examined through the framework of boundary organizations and salience, credibility, and legitimacy. It highlights lessons-learned from the project and shares recommendations for working toward the effective integration of science and policy.

Keywords boundary organizations, California, marine policy, oil and gas platform decommissioning, science integration

Introduction

Connecting Science and Policy in the Marine World

Connecting science and policy to promote the effective management of environmental resources is a challenge and necessity widely acknowledged by scientists, policymakers,
using science to inform controversial issues

and stakeholders alike. A plethora of scholarly articles, white papers, commission recommendations, and government documents articulate the pressing need to translate science to management in order to address the increasing pressures being placed on the world’s natural resources (e.g., Lubchenco 1998; Government of Canada 2000; Smith and Kelly 2003; National Research Council 2005; Office of Science and Technology 2005; Owens 2005; Lackey 2007; Holmes and Clark 2008; Ocean Policy Task Force 2010). Although integrating science and policy is rarely linear and often takes time to yield tangible impacts, science can demonstrably advance informed decision-making (Bradshaw and Borchers 2000; Owens 2005; Lawton 2007; McNie 2007; Holmes and Clark 2008). For instance, scientific information and expertise can help decision-makers understand and balance the various potential impacts, tradeoffs, and conflicting goals of various regulatory decisions (Lubchenco 1998; Joint Ocean Commission Initiative 2009; Doremus and Tarlock 2005; Lubchencho and Sutley 2010) and expand the alternative policy and regulatory choices available to decision-makers (McNie 2007).

Ocean resources face increasing threats, ranging from sea-level rise to ocean acidification to the depletion of valuable fishery resources. Thus, in the marine world many have called for use of the best available scientific information and expertise to inform innovative, forward-thinking, and comprehensive approaches to addressing these complex challenges, including two influential commissions—the United States Commission on Ocean Policy (USCOP) and the Pew Oceans Commission (Pew Oceans Commission 2003; USCOP 2004). According to the Pew Commission, “improving how existing [scientific] information and knowledge is used is the first and most important step to improve the scientific foundation for ocean and coastal management” (2003, 90). More recently, the final report of the presidentially mandated U.S. Interagency Ocean Policy Task Force calls for “use of the best available science and knowledge to inform decisions affecting the ocean, our coasts, and the Great Lakes” (2010, 3).

Integrating Science and Policy for Ocean and Coastal Management in California

California hosts highly diverse and vibrant marine ecosystems along its 1,100-mile coastline, which in turn support an estimated $43 billion “ocean economy” (National Ocean Economics Program 2005). As a long-time leader on ocean issues, the State of California has recognized the importance of integrating science into ocean and coastal management through specific policy actions aimed toward addressing the threats to ocean health identified by the Pew Oceans Commission, USCOP, and the Interagency Ocean Policy Task Force. A suite of legislation and statewide strategic planning documents issued by the state demonstrate its commitment to using science to inform marine resource management (Table 1). Together, these pieces of legislation provide a robust framework for facilitating the continued and increasing application of science into ocean and coastal management decisions.

The California Ocean Science Trust and California Ocean Protection Council

This article focuses on an organization created by one piece of legislation identified in Table 1—the California Ocean Science Trust (OST), established by the California Ocean Resources Stewardship Act of 2000 (CORS). The OST is a 501(c)3 non-profit organization, whose board members are appointed by the California Secretary for Natural Resources. The OST’s legislatively mandated mission is to support ocean and coastal resource management decisions with the best available science. To achieve its mission and fulfill the
Table 1
California legislation calling for science to inform decision-making in marine resource management

<table>
<thead>
<tr>
<th>Legislation/Action</th>
<th>Description of legislation and specific language (emphasis added)</th>
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| Assembly Bill (AB) 1241—Marine Life Management Act (MLMA) (1998) | The MLMA initiated a more comprehensive and science-based approach to fisheries management in California:  
- "Manage marine living resources on the basis of the best available scientific information and other relevant information that the commission or department possesses or receives." (Cal. Fish and Game Code § 7050 (b) (6))  
- "The department shall establish a program for external peer review of the scientific basis of marine living resources management documents." (Cal. Fish and Game Code § 7062 (a)) |
| AB 993—Marine Life Protection Act (MLPA) (1999) | The MLPA directs the State of California to establish a network of marine protected areas (MPAs) to be designed and managed according to the best available scientific information:  
- One of the goals of the act is to "ensure that California’s MPAs have clearly defined objectives, effective management measures, and adequate enforcement, and are based on sound scientific guidelines." (Cal. Fish and Game Code § 2853 (b) (5))  
- "The department and team shall use the best readily available scientific information in preparing the master plan [to guide decisions regarding siting new MPAs and major modifications to existing MPAs]..." (Cal. Fish and Game Code § 2856 (a)(1))  
- "The department shall establish a process for external peer review of the scientific basis for the master plan..."(Cal. Fish and Game Code § 2858) |
- "The bill authorizes the Secretary of the California Natural Resources Agency to “enter into an agreement with an existing nonprofit corporation . . . to be known as the California Ocean [Science] Trust . . . to seek and provide funding for ocean resource science projects and . . . to encourage coordinated, multiagency, multi-institution approaches to ocean resource science.” (Cal. Pub Resources Code § 36990 ((a)(b)(1)(2) (3)). |

(Continued on next page)
Table 1
California legislation calling for science to inform decision-making in marine resource management (Continued)

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<thead>
<tr>
<th>Legislation/Action</th>
<th>Description of legislation and specific language (emphasis added)</th>
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| California Ocean Action Strategy (2004)                | Governor Arnold Schwarzenegger released a State Ocean Action Strategy in 2004 that included actions to identify and support the science necessary to inform decisions regarding coastal and ocean resources and called on the state to continue its role as a leader in ocean and coastal science research and monitoring:  
  • “The fact is that protection and management measures, when based on sound science, can yield significant results.” (Ocean Action Strategy (2004; p.8) |
| Senate Bill (SB) 1319—California Ocean Protection Act (COPA) (2004) | COPA established the California Ocean Protection Council (OPC) and calls for science to inform decision-making:  
  • “The governance of ocean resources should be guided by principles of sustainability, ecosystem health, precaution, recognition of the interconnectedness between land and ocean, decisions informed by good science and improved understanding of coastal and ocean ecosystems, and public participation in decision making.” (Cal. Pub Resources Code § 35505 (c)).  
  • “A goal of all state actions shall be to improve monitoring and data gathering, and advance scientific understanding, to continually improve efforts to protect, conserve, restore, and manage coastal waters and ocean ecosystems.” (Cal. Pub Resources Code § 35510 (b) (4)). |
| AB 1056—Amendment to COPA (2007)                       | The bill to amend COPA calls for the establishment of the Ocean Protection Science Advisory Team:  
  • The bill would require the council to “establish a science advisory team of distinguished scientists to assist it in meeting the purposes of this division” (Cal. Pub Resources Code § 35615 (a)(3)(A)). |

purposes outlined in CORSA, the OST has two overarching organizational goals: facilitate collaboration among the arenas of science, policy and management, and institutionalize integration of the best science into California coastal and ocean policy and decision-making (OST 2010). In pursuit of these goals, the OST strives to provide the state with information that is objective and unbiased and maintain a neutral stance on policy issues—both ongoing challenges in the context of inherently biased policymaking processes. A key element to the OST’s ability to persevere its independence is its board. While the Secretary for Natural Resources appoints board members, they are not accountable to the state. Further, the institutional affiliation of board members varies, including private foundations, nonprofit organizations, state officials, and academic scientists. This helps the OST maintain a strong line of separation from the state and other political influences.
In providing the state with independent science to inform policy, the OST works directly alongside the California Ocean Protection Council (OPC), created pursuant to the 2004 California Ocean Protection Act (COPA). The OPC is responsible for improving coordination across state agencies with ocean-related mandates; promoting the collection and sharing of coastal and ocean scientific data between relevant agencies; and identifying and recommending changes in state and federal coastal and ocean law and policy (OPC 2010). The OPC’s five-year strategic plan highlights the need to improve scientific understanding of ocean and coastal ecosystems and fulfill the mandate of COPA (OPC 2006). The OPC’s commitment to integrating independent science into its decisions is critical in allowing the OST to maintain its neutral stance. In 2007, the OPC demonstrated this reliance on objective scientific advice by designating the OST Executive Director as its Science Advisor and co-chair of the OPC Science Advisory Team.

The OST’s applied scientific assistance to the OPC and the state has ranged from regular technical and informational support on emerging topics to coordinating complex peer reviewed projects. One such project was a major study related to options for decommissioning the 27 oil and gas platforms off California’s southern coast—a highly controversial issue. Due to the strong emotion surrounding this issue, the state engaged a “boundary organization” (Guston 1999), the OST, to produce balanced and impartial information that could inform policy. However, the OST’s experience coordinating the study demonstrates the difficulties for an organization serving in this boundary role and reveals potential mechanisms for strengthening the state’s framework for science-based decision-making. This article analyzes challenges that the OST faced throughout this study by employing the analytic framework of boundary organizations and their attributes of salience, credibility, and legitimacy (Cash et al. 2002). The lessons-learned through the OST’s efforts on this controversial issue yield valuable recommendations for other organizations working towards the effective integration of science and policy.

The Ocean Science Trust as a Boundary Organization

The Role of Boundary Organizations

Multiple analyses of the use science in policy have demonstrated that discerning the direct impacts of science on policy decisions and actions can be quite difficult (Cash et al. 2002; Owens 2005; Lawton 2007; McNie 2007; Holmes and Clark 2008). Communication between scientists and policymakers is often poor because of significant institutional and cultural differences between the worlds of science and policy (Guston 2001; Smith and Kelly 2003; Heazle 2004; McNie 2007; Holmes and Clark 2008). This results in weak uptake of scientific knowledge in the policy process (Cash et al. 2002; Jones, Jones, and Walsh 2008) and reluctance on the part of scientists to become involved in policy issues (Blockstein 2002). Conversely, and perhaps equally problematic, Lackey (2007) and Scott, Rachlow, and Lackey (2008) note the difficulties scientists face in using their research to inform policy while simultaneously maintaining their scientific integrity. Thus, despite the broad dictum for more science to be used to inform policy, in application this task can be tough to achieve and has many inherent risks for individuals or institutions working to promote these goals. One mechanism that has emerged to address this conflict is the notion of so-called boundary organizations working at the border between science and policy (e.g., Jasanoff 1990; Guston 1999; Agrawala, Broad, and Guston 2001; Guston 2001; Miller 2001; Cash et al. 2002; Hellstrom and Jacob 2003; Cash and Buizer 2005;
Using Science to Inform Controversial Issues

Waterton 2005; National Research Council 2006; Owens, Petts, and Bulkeley 2006; McNie 2007). Generally, boundary organizations are accountable to actors in both science and policy; help protect science from becoming politicized; mediate between the two realms; and maintain the flow of information from science to policy and vice versa (Guston 1999; 2001; Miller 2001; Cash et al. 2002; Cash and Buizer 2005; Jones, Jones, and Walsh 2008).

The OST embodies many key characteristics and functions of boundary organizations. First, the OST is dedicated to providing the OPC and the state with nonpartisan and policy-neutral information (Guston 2001; National Research Council 2006) on often politically contentious issues through a variety of avenues—from topical briefing papers to coordinating expert peer review. Secondly, it is the policy of the OST to require that any state entities, potential funders, or stakeholders that it provides information to are not directly involved in the scientific process or any of the research being conducted. In doing so, the OST institutes a layer of remove between the scientists and policy makers that protects the integrity of the scientific process (Jones, Jones, and Walsh 2008).

An equally important feature of the OST is its dual accountability to actors in both the scientific and policy realms and position as peripheral to each (e.g., Guston 1999; 2001; Cash et al. 2002; National Research Council 2006; Meyer 2010). An example of the OST’s dual accountability is its coordination of the OPC Science Advisory Team (OPC-SAT), a multidisciplinary team of 24 esteemed scientists established by AB 1056 (Table 1) with the mission of ensuring the scientific quality and authority of OPC products. In its role as an intermediary between the OPC-SAT and the OPC, the OST is equally accountable to both parties in that it must ensure that the needs, goals, and information produced by each are disseminated to the other group. Further, by serving as the intermediary between the scientists—and by extension, the scientific process—and the state the OST is also able to protect the integrity of the scientific advice being provided to the OPC and thus sustain its policy-neutral stance. The OST’s work with the OPC-SAT also presents an example of a final characteristic of boundary organizations: their engagement in “end-to-end” missions linking the needs and goals of producers of knowledge (e.g., scientific researchers) to users (e.g., policymakers), thus enhancing communication between the worlds of science and policy (Agrawala, Broad, and Guston 2001).

Risks at the Boundary: Balancing Salience, Credibility, and Legitimacy

Although boundary organizations fulfill an integral niche in the science/policy interface, boundary work also involves important challenges. Cash et al. (2002) propose a useful analytical framework for analyzing these risks and describe boundary work as embodying three key attributes: salience, credibility, and legitimacy. Salience refers to how relevant information is for a decision-maker or stakeholder. Is the scientific information timely, useful, and likely to have a bearing on a decision in the near-term? Credibility relates to the scientific and technical plausibility and adequacy of the information, as well as the trustworthiness of the sources of knowledge and theories used in generating the analysis. Finally, legitimacy entails how actors in the science/policy system perceive the process that produced the scientific knowledge—that is, whether the process was fair, unbiased, and considered the appropriate values and concerns of various stakeholder groups (Cash et al. 2002).

These three attributes are critical to the work of a boundary organization; as described by the participants in a 2005 National Research Council workshop on effective knowledge-action systems and boundary work: “it appears that if a system is perceived to be seriously lacking on any one of these dimensions, its likelihood of producing influential information falls significantly” (Cash and Buizer 2005, 8). However, despite the essential nature of all
In California, decommissioning the state’s offshore oil and gas platforms has proven to be particularly divisive. California is home to 27 offshore oil and gas platforms, 23 of which are in federal waters (i.e., beyond three miles from the coast) and 4 within state waters. The platforms range in depth from shallow, coastal waters to the deepest platform (Harmony), which is located ten miles offshore and at a depth of 1,198 feet (Bureau of Ocean Energy, Management, Regulation, and Enforcement 2010). The Bureau of Ocean Energy, Management, Regulation and Enforcement (formally Minerals Management Service) predicts that many of these platforms will reach the end of their useful production lifetimes in the next ten to twenty years (Proserv Offshore 2010).

The potential decommissioning of oil and gas platforms upon the end of their lifetime is a scientifically, legally complex and politically sensitive issue that often elicits heated public reactions and sparks polarized debates. Under the current regulatory framework, federal and state leases require complete removal of each platform upon decommissioning. However, due to the expense, technical challenges, and potential environmental impacts of complete removal, federal and state agencies and oil companies have investigated feasible alternatives. In the Gulf of Mexico, for example, multiple decommissioned platforms have been used to create artificial reefs, which have generated increased offshore fishing and recreational diving opportunities. Studies have shown that California’s platforms also support diverse fish and invertebrate biological communities that are similar to those found on natural rocky reefs in the region (e.g., Carr et al. 2003; Love, Schroeder, and Nishimoto 2003; Schroeder and Love 2004; Page et al. 2008; Bernstein et al. 2010). However, some debate continues regarding the net benefit that these communities have to the overall regional ecosystem.

The social context in California differs greatly from the Gulf of Mexico. Thus, stakeholders—including environmental organizations, commercial and recreational fishermen, scientists, and local residents—have been more divided over the potential benefits and risks of converting decommissioned rigs into artificial reefs (McGinnis, Fernandez,
and Pomeroy 2001). In general, there is a split between those that support leaving the platforms (or part of the platforms) in place once oil production has ceased and an opposing coalition that is strongly in favor of the full removal of the platforms. Three types of groups who have historically been involved in the issue are commercial fishing groups, such as the Pacific Coast Federation of Fishermen’s Association (PCFFA), recreational fishing interests like the Sportfishing Conservancy (SportCon), and environmental groups like the Natural Resources Defense Council (NRDC), the Environmental Defense Center (EDC), and the Orange County Coastkeeper (Coastkeeper). PCFFA oppose leaving any portion of the platforms in place, because this choice could interfere with large-scale fishing efforts, such as trawling (OPC 2008). Conversely, recreational fishing organizations like SportCon have asserted that, because the platforms support substantial fish populations, they provide increased recreational opportunities and can generate valuable recreational fishing opportunities (OPC 2008). Finally, while environmental groups such as EDC and NRDC strongly advocate for full decommissioning (EDC 2010a; 2010b; NRDC 2010), other groups, such as Coastkeeper support leaving a portion of the platforms in place (Orange County Coastkeeper 2010).

Given the social controversy surrounding decommissioning options, decision-makers are left with the difficult task of developing policies that address public concerns and differing values while taking into account the scientific and technical complexities related to disassembling or converting platforms to alternative uses. A previous effort in 2001 to establish “rigs-to-reefs” legislation was vetoed by Governor Davis, who stated that, “there is no conclusive evidence that converted platforms enhance marine species that produce net benefits to the environment” (Davis 2001). Davis’s rationale for vetoing the potential legislation points to an issue that has persisted in the platform decommissioning debate—the establishment of “net benefits to the environment” as a threshold for decision-making. This is a value-based threshold, and there are other such thresholds—such as “no net harm”—that could be applied to this decision. These standards demonstrate that while the science is an important component to consider for platform decommissioning decisions, ultimately the policy choices are likely to revolve around values.

Creating an Objective Study: The OST’s Process and Role

Despite numerous previous studies related to platform decommissioning, as of 2007 the state had yet to make definitive progress on the topic. The California Natural Resources Agency thus recognized a need to produce a new, objective synthesis that would bring together diverse information in a form accessible to policymakers. They began a three-phase process (Figure 1) to analyze decommissioning options and to provide a sound scientific basis for future policy decisions. Phase I of the process (“Issue Identification”) entailed working with representative stakeholders (e.g., environmental organizations, fishing interests, relevant agency representatives) and the Interagency Decommissioning Working Group—a group comprised of state and federal agency representatives with expertise in platform decommissioning—to develop key questions. The outcome of Phase I was a Request for Proposal (RFP) for a comprehensive, multidisciplinary, and authoritative study to address the questions and issues raised by the stakeholders and the Interagency Decommissioning Working Group. Given the social controversies surrounding platform decommissioning, the California Natural Resources Agency recognized that the study called for in Phase I needed to produce unbiased and objective information. Thus, in Phase II (“Conduct Comprehensive Investigation”), the California Natural Resources Agency partnered with the OST in October 2008 to release the RFP for a “Study to Provide Information Related to
Phase I

"Issue Identification"
- CA Natural Resources Agency convenes stakeholders and Interagency Working Group to identify and define questions for the RFP.

Phase II

"Conduct Comprehensive Investigation"
- OST coordinates all aspects of the study and convenes an Expert Advisory Committee (EAC)
- Final report released in June 2010

Phase III

"Policy Evaluation"
- The CA Natural Resources Agency uses information from the report to inform the development of policy options that may lead to new state legislation, federal regulations, or other mechanisms to address decommissioning alternatives.

Figure 1. The California Natural Resources Agency three phase process.
Oil and Gas Platform Decommissioning Alternatives in California.” The study’s purpose was “to assemble and examine scientific and legal information that will frame future state policy discussions on the alternatives for decommissioned platforms.”¹ The California Natural Resources Agency’s intent was to use the report in the third and final phase of their process (Phase III—“Policy Evaluation”) to inform the development of policy options.

The OST was tasked by the California Natural Resources Agency with creating a robust process that could be used to coordinate all aspects of the study outlined in the RFP created in Phase 1 and released during Phase II of the process. These efforts were funded by diverse sources, including Chevron Corporation, the OPC, the Ocean Conservancy, the Sportfishing Conservancy, and the United Anglers. It is important to note that these funders only supported the study financially; they were not involved in any decisions affecting study outcomes nor were they privy to any internal project products or allowed to recommend or advise upon the selection of members of the Expert Advisory Committee. This study was the first of its kind that the OST coordinated. Recognizing that controversies surrounded the decommissioning issue, the OST was very concerned with minimizing potential politicization of the study. Drawing certain aspects of the process from respected and venerable models for science and technology assessment, such as the National Academies and their extensive tiered study process (National Academies 2010), the OST therefore attempted to design a comprehensive, deliberative study process that would ensure a thorough, balanced, and unbiased final report that would be a useful reference for decision-makers.

The OST’s process began with extensive expert technical peer review of the RFP and the creation of an Expert Advisory Committee (EAC). Following significant revision of the RFP based on the detailed comments of peer reviewers, the OST then released it to a wide audience to solicit responses. The OST reviewed all submitted proposals and, with the aid of the EAC, selected a qualified project team. The OST and the EAC provided close oversight of the work of the team throughout the course of the study. Finally, the OST coordinated two public briefings—one at the midpoint of the study to update the public on the progress of the study and one upon completion and release of the report in June 2010. For the final public briefing, the OST coordinated with the OPC to organize a final public briefing and panel at the June 2010 OPC meeting in Santa Barbara. The briefing and panel provided the public with an opportunity to learn about the findings of the study, hear diverse stakeholder perspectives on decommissioning, and comment on the final report and the study process. The stakeholder opinions discussed later in this section are mainly drawn from comments presented at this final public briefing.

The OST’s decision to form an EAC early in the study was a critical component of the process. The OST assembled the EAC through a public nomination process. This multidisciplinary, 15-member body included academics, industry experts, and state and federal agency representatives. The EAC’s charge was to work with and provide guidance to the OST and the project team throughout the course of the study to guarantee that the state received authoritative and credible advice. Forming the EAC at such an early stage in the study process had many advantages. First, it allowed the EAC to work with the OST and review all project proposals and inform the selection of the project team. Additionally, it created an internal core of experts that was available to advise and guide the OST and project team on all subsequent work, including providing detailed comments to the OST on the team’s interim products and report drafts, and continually advising on the study process and approach. Overall, the EAC deepened the expertise that shaped project findings and bolstered the technical authority of the study. In addition to the EAC’s guidance, the California Attorney General’s Office advised the OST, the project team, and the EAC on issues regarding the legal components of the study.
Summary of Study Findings

The study was completed in June 2010, and yielded a report entitled, “Evaluating Alternatives for Decommissioning California’s Offshore Oil and Gas Platforms: A Technical Analysis to Inform State Policy.” Based on a detailed and carefully documented review of existing literature and consultation with experts in state and federal agencies, the project team found that the two most feasible decommissioning options were full removal of the platform or partial removal to 85 feet below the surface (leaving the bottom portion in the water). Thus, the report structured subsequent comparative analysis of the identified alternatives in relation to numerous factors (e.g., marine resources, air emissions, decommissioning costs) around these two binary options. A key finding of the report was that many categories of impacts (e.g., air emissions, short-term impacts on marine mammals and birds) are likely to be less under the partial removal scenario. Additionally, in regards to resident fish communities on platforms, the report found that rockfish (one of the key species that reside on California platforms) tend to recruit and settle below 85 feet. Thus, although the 27 platforms in California represent a small portion of the available hard substrate habitat in the regional ecosystem, partial removal would likely allow for the platforms to maintain some function as fish habitat. For partial removal, findings suggested that removal costs to the operators would be significantly lower; potentially close to $500 million in cost savings might be realized by the platform operators. A currently undetermined proportion of these funds might be available to the State of California, as has been the case in the Gulf of Mexico. Finally, in regards to the legal and regulatory framework for platform decommissioning, the report concluded that although the state would need to institute new legislation to implement the partial removal option, there are a number of existing methods—including legal and risk management mechanisms related to liability concerns stemming from partial removal—that have been used elsewhere on which the state could draw.

As a supplementary tool to the report, the project team created an interactive decision-support model that allows decision-makers and stakeholders to investigate costs and benefits of the two main decommissioning alternatives. The decision-support model provides a structured means for users to work more directly with the key data and information and allows users to explore how values can influence a choice among policy options.

Balancing Salience, Credibility, and Legitimacy

The OST encountered numerous complications in implementing its study process; these derive from the aforementioned tensions encountered by boundary organizations related to salience, credibility, and legitimacy (Cash et al. 2002; Cash and Buizer 2005; McNie 2007). The salience/credibility/legitimacy framework therefore provides a useful mechanism to explain how some of these problems might have been avoided or could be addressed in the future. The analysis in this section draws on information specifically related to the OST’s experience designing and implementing the process used during Phase II, and reactions of stakeholder groups in the form of public comment and letters submitted to the OPC and OST. Analysis of the stakeholder comments focused on identifying overarching themes that were common across multiple organizations and related to the salience/credibility/legitimacy framework.

Salience. Originally, the second phase of the California Natural Resources Agency’s three-phase process was designed to produce salient scientific and technical information for a
subsequent policy process (Phase III) that might result in legislation on platform decommissioning. Because the state wanted to make rapid progress on this issue, the OST chose to design the study as a nine-month project—an admittedly accelerated timeline that ultimately became an impediment to ensuring both the salience and credibility of the study.

The timescales of scientists and policymakers working at the science/policy boundary often are mismatched (e.g., National Research Council 1995; Smith and Kelly 2003; Lawton 2007; T.C. Hoffmann and Associates 2007; Holmes and Clark 2008; Jones, Jones, and Walsh 2008; De Santo 2010). In the world of California ocean and coastal science and management, an increasing focus on reconciling these temporal barriers has led to the development of innovative methods, such as rapid indicators of water quality assessment (e.g., Southern California Coastal Water Research Project 2010) or representative indicator species to monitor the health of marine protected areas established under the California Marine Life Protection Act (e.g., Marine Protected Area Monitoring Enterprise, 2010). However, the general trend still persists of science moving at a more protracted rate than policy—which must be able to respond to societal needs and desires (Heazle 2004; Doremus and Tarlock 2005). Thus, an initial challenge for the OST was to find, work with, and manage a project team that could produce a comprehensive report while not compromising the quality of this information due to the expedient study timeline. This issue also demonstrates the tension between salience and credibility: is it possible to produce information within the timeframe that is necessary for it to be perceived as salient while still ensuring that the information will be viewed as credible by multiple audiences?

Until the final months of the project, the OST believed that the information in the final report would be salient. This salience was undermined by two factors: delays in production of the report intended to increase its credibility (discussed in more detail below) and the introduction of legislation in February 2010 in the California State Assembly (Assembly Bill 2503, The California Marine Resources Legacy Act) related to converting decommissioned oil and gas platforms to artificial reefs. Although early versions of the bill acknowledged the study and stated that information from it would be used to inform the bill and future decisions stemming from the bill, stakeholder groups became concerned. Through written letters and more informal communications, groups such as the EDC expressed their hesitations to the OST that the bill would be premature if it were drafted in advance of the study release; it was unclear whether and how the final report would be used to inform the legislation. Additionally, while stakeholders communicated their worries to the OST, the OST was not involved in the legislative decision-making process. Thus, while these reservations were well founded, ultimately, they were not something that the OST alone could address.

Credibility. The OST continuously worked to infuse scientific and technical objectivity throughout the study process to produce a final report and that could withstand close scrutiny by partisan observers. These efforts began with the peer review by nine disciplinary experts of the initial RFP, and subsequent revision of the RFP by the OST. This preliminary review was targeted to reinforce the credibility of the study framework and to determine whether experts thought that the approach outlined in the RFP would yield relevant and useful information for decision-makers. Given that peer review is often viewed as a key tool for increasing the scientific authority of products and documents (United Kingdom 1997; Doremus and Tarlock 2005), this was a crucial first step toward furthering the credibility of the study process. Importantly, this initial peer review provided significant improvements upon the original RFP, which had centered on a series of stakeholder questions identified in Phase I. While the stakeholder questions remained important (and were included in the
revised RFP), the original RFP lacked a cohesive structure for gathering and organizing information. The comments and recommendations of the peer reviewers were instrumental in elucidating the drawbacks of this approach and helped the OST design a more coherent and robust framework for the study.

The formation of the EAC represented another critical tactic by which the OST maximized the quality of the study’s analyses and therefore the credibility of the study process and resulting products. The OST was able to mobilize and coordinate an EAC that contained individuals from both sides of the science/policy boundary—an important operating approach of boundary organizations (Miller 2001). The EAC included state and federal agency representatives well versed in the policy issues related to decommissioning, and it contained scientific researchers studying the biological communities on platforms. It also had members experienced in developing objective analyses of complex science and technology issues within contentious policy contexts. This various contrasting expertise helped provide balance and diverse perspectives throughout the course of the study.

In its efforts to promote the credibility of the study process, the OST met some hurdles. The first, mentioned above, relates to the delays in the study to: (1) allow for the incorporation of new technical information from a study commissioned by the Bureau of Ocean Energy, Management, Regulation, and Enforcement on the costs of decommissioning California’s platforms (Proserv Offshore 2010); and (2) include an additional round of peer review and subsequent edits of the draft final report. The latter came at the behest of EAC members, who believed the report would benefit from additional review to ensure the final report’s accuracy and potential value as a useful resource to decision-makers. Although these delays may have increased the credibility of the final product, the tradeoff was that they decreased its salience and ability to inform the pending legislation (AB 2503)—a perfect example of the tension between these attributes.

Credibility issues also stemmed from critiques of stakeholder groups regarding the content of the final report, particularly in relation to two issues—the legal analysis and data gaps identified by the report. Upon release of the report, environmental nongovernmental organizations such as the EDC and NRDC critiqued the report’s legal analysis through official oral and written public comment (EDC 2010b; NRDC 2010). Such content-related criticisms are inevitable when publishing research; however, the EAC peer review was a tool for the OST to ensure high quality and credible content, designed specifically to preempt these issues as much as possible. In regards to the legal analysis, the EAC had legal experts as members, including a representative from the Attorney General’s office who was added to provide advice on the legal components of the study. Even with these measures, the breadth of legal issues covered in the final report was not reflected in the range of legal expertise on the EAC. In retrospect, secondary review by targeted legal experts to bolster the technical review of the legal material could have strengthened the process and made final report less vulnerable to these types of criticisms.

Related to the concerns expressed about data gaps in the report, filling all of the extant data gaps relating to the effects of platform decommissioning was not the intention of the report; instead, the final report specifically synthesized and pointed to numerous data gaps and suggested mechanisms by which these could be filled with future research. Moreover, some gaps—such as a lack of detailed information on the biological communities existing on all 27 platforms and the contribution of these communities to the regional ecosystem—would take significant research effort, time, and monetary resources to fill while still creating a salient study. Additionally, the future process for considering platform-specific decommissioning projects is likely to include provisions for filling data gaps particular to each platform.
Legitimacy. Cash et al. (2002) note that different audiences often have varying perspectives regarding the legitimacy of information—an issue that the OST encountered in relation to the oil and gas study. A few months prior to the release of the report the EDC—who oppose all decommissioning options other than full removal—requested, through an official letter, that the OST release both drafts of the report and the EAC’s comments on these drafts for public comment and review (EDC 2010a). The EDC and other environmental groups reasserted these requests through oral public comment during the final public briefing on the report in June 2010.

At the beginning of the study process, the OST established a policy not to solicit direct stakeholder input. Part of the rationale behind this decision was that the first stage of the California Natural Resource Agency’s three-phase process was specifically designed to solicit and incorporate diverse stakeholder knowledge across a range of groups (e.g., commercial and recreational fishermen, scientists, environmental organizations, government representatives), and thus promote the legitimacy of the process. As an independent organization, the OST was free to then focus on designing a robust scientific and technical process to produce objective information, a critical component of which was insulating it from the potential biasing impact of stakeholder’s opinions and values surrounding decommissioning. This decision is in line with other practices on the peer review process, such as the National Academies (2010) and guidelines on peer review from the U.S. Office of Management and Budget (Federal Register 2005), which state that in cases where an issue is particularly controversial, deliberative documents (i.e., drafts of the report and reviewer comments) may be kept confidential in order to protect the documents from bias.

In maintaining the confidentiality of report drafts and reviewer comments, the OST’s goal was to avoid the politicization of scientific information and protect the report from biasing influence that might compromise the technical content (Jones, Jones, and Walsh 2008). These risks link to the earlier statement that various groups perceive legitimacy differently: are groups who perceive information as being legitimate more likely to politicize that information to further their own policy agendas? For the oil and gas study, the OST found that groups who were proponents of partial decommissioning expressed support for the study and did not question its legitimacy. For example, the nonprofit environmental organization Orange County Coastkeeper hosted an independent conference in July 2010 following the release of the report (Orange County Coastkeeper 2010). The OST was not affiliated with this conference; however, multiple members of the project team and representatives from the OPC and the California Natural Resources Agency spoke at and participated in the meeting. The meeting, which centered on the issue of converting decommissioned platforms to artificial reefs and focused heavily on and strongly endorsed the study process and results of the final report. As is often the case in science and technology analyses, these groups seized upon the results of the report (e.g., findings that partial removal would maintain the productive marine communities on the platforms and could yield significant revenue for the state due to the cost savings to the operators) and used them to advance their own policy agendas. While the ways in which stakeholder groups used information is not something that the OST could have controlled, the conference may have fed the perceptions of opposing stakeholders regarding the potential bias and lack of legitimacy of the study.

Discussion

The OST faced many tradeoffs in attempting to balance the salience, credibility, and legitimacy of the process and final products of the study to assess options for decommissioning
California’s oil and gas platforms. As described earlier, the study’s purpose was “to assemble and examine scientific and legal information that will frame future state policy discussion on the alternatives for decommissioned platforms.” The OST’s role was to design a robust study process that would provide the state with authoritative information on this controversial issue.

The oral public comment at the final briefing for the study and the letters submitted to both the OST and the OPC by NGOs and stakeholder groups suggest that stakeholders who support full removal of platforms did not perceive that the critical thresholds for these attributes were fulfilled. Conversely—and consistent with observations that the tension between salience, credibility, and legitimacy and that they are judged differently by different audiences (Cash et al. 2002)—other stakeholder groups (e.g., recreational fishing interests, opposing environmental organizations) expressed support for the study process and report. This support, however, tended to be from proponents of partial removal and converting decommissioned platforms to artificial reefs; their support thus fueled perceptions of study bias and politicization by opposing parties. Therefore, the question for the OST and other boundary organizations is: are there measures that the OST could have taken to ensure that all stakeholders, regardless of their political stance on oil and gas platform decommissioning, would have agreed that the report adequately met the salience/credibility/legitimacy thresholds?

The first major comments by stakeholders identified a desire for a public comment period on drafts of the report and release of EAC comments on report drafts. The OST held a position that neither request was appropriate for the development of a technical report and would have undermined the scientific integrity and credibility of the study process. The request for public review, in particular, suggests a general confusion between the roles of the OST and the OPC. As a state agency, had the OPC coordinated the study it would have been required under state law to release the report for a standard public comment period. However, as a nonprofit organization, the OST was under no such obligation. The OST assumed that its organizational mission and approach would ensure external parties perceived the study to be unbiased and objective. It also assumed that the stakeholder engagement during Phase I—where a stakeholder committee provided significant input into the drafting and final content of the RFP—had offered an appropriate opportunity for early stakeholder involvement to shape the technical study, and that public comment would also come into play in Phase III when and if the state chose to advance specific policies or legislation on decommissioning. Importantly, at the request of stakeholders and in direct response to their concerns, the OPC created an extended public comment period following the meeting and allowed for the submission of written comments on the report. While no changes were made to the report based on the comments, the record of these comments will be included as a package with the final report and together they both will be used by the state to inform policy.

Arguably, public comment on drafts of the report might have bolstered the perceived legitimacy of the study by some, particularly groups who were not satisfied with the conclusions of the report. Conversely, allowing stakeholder comments to shape the technical report could have biased the conclusions. Individuals often judge information based on their underlying values, political preferences, and perceived utility of that information in supporting their viewpoint (Heazle 2004; Morishita and Goodman 2005; Weible 2005; Lackey 2007). Thus, stakeholders historically against repurposing of decommissioned platforms as artificial reefs (e.g., EDC, NRDC) opposed the report, and those who favored reefing (e.g., Coastkeeper; California Artificial Reef Enhancement Program) supported the report. However, the stakeholder concerns regarding public comment point to a need
for clearer communication by the OST of its mission, goals, objectives, and approach to developing authoritative technical information. At a minimum, this would have helped set stakeholder expectations, and, optimistically, might have preempted some of their concerns.

Another major stakeholder reservation was related to data gaps identified in the final report and the request that the report not be considered final until these data gaps could be filled (EDC 2010b; NRDC 2010). Data gaps and incomplete information are hardly a novel problem when using science to inform policy. As observed by Doremus and Tarlock (2005) in their analysis of administration of the Endangered Species Act in the Klamath River, “the hard reality is that the scientific information available to support environmental and natural resource policy decisions is frequently incomplete, ambiguous, and contested” (8). Policy decisions must be and often are made despite uncertainty. While scientific information plays an instrumental role in elucidating these information gaps and identifying what is not yet known, ultimately, how to move forward in the face of uncertainty is a policy decision.

One potential source of stakeholder concerns about data gaps was a perception that the decommissioning report would feed directly into and heavily influence AB 2503 and any subsequent state policy. This perception was fueled by the fact that groups who supported the legislation and the partial removal option seized on the report as direct support for AB 2503. In reality, while the designated process timeline was based on producing salient information for policy, the study was only one of several factors likely to inform policy. The OST guided the project team specifically to avoid normative recommendations in the final report; instead, the report only includes information that can be used as a reference in subsequent policy processes. Scientific information, while an important and necessary component to inform policy, is generally only one factor that is considered in complex policy processes, where final decisions are often made based on values (Smith and Kelly 2003; Heazle 2004; Lackey 2007; Lawton 2007; De Santo 2010). As a boundary organization, it is not the OST’s role to be involved directly in designing the policy process. In hindsight, however, the absence of a specified policy process—that is, Phase III of the California Natural Resources Agency’s three-phase process—might have been the source of some stakeholder frustrations. In the absence of a well-articulated process, stakeholders assumed a more direct connection between the report and actual formulation of policy and legislation.

Lessons Learned and Recommendations for Future Processes

The OST’s experience coordinating the oil and gas study highlights a few of the challenges that boundary organizations may face when working to link science and policy, particularly when striving to maximize salience, credibility, and legitimacy in contentious policy contexts. The oil and gas study was the OST’s first experience coordinating a project of such size and scope. The lessons learned from this study will assist the OST in adaptively improving its methods for future projects and are also likely to be of use to other emerging boundary organizations and individuals working to link science and policy in all sectors of natural resource management:

1. **Design a Clear and Structured Framework for Producing Information:** At the beginning of its involvement in the oil and gas study, as an important first step, the OST designed a clear and detailed process to use throughout the study. Designing this process included careful consideration about the overall goals of the study process. Additionally, the creation of the process encompassed measures that were critical throughout the process, such as initial peer review of the RFP, the formation of the EAC, and the decision not to have public comment on drafts of the report.
Although these decisions were perhaps not as clearly publicized as they could have been (see Recommendation 3), when stakeholders began to voice concerns, the OST had well-conceived methods to fall back on. If it had not had a clear process in place, the OST could have had a much more difficult time addressing some of the problems that arose.

2. **Understand Important Thresholds for Adapting the Framework:** While it is imperative to have a clear framework for producing information, a boundary organization may encounter problems that necessitate adapting the framework. For the OST, the advice of the EAC to include an additional final round of review of the draft report in order to strengthen the final version’s quality and credibility represented a threshold condition that required adjustment. Even though the delay this caused may have limited the report’s salience, failing to heed the EAC’s advice could have not only compromised the report’s authoritativeness, but also might have disenfranchised members of the EAC who represented both the scientific and policy actors to whom the OST as a boundary organization is dually accountable. An important caveat to this recommendation is that while it is important to understand when the framework may need to be adapted, any changes to the process should be subjected to careful scrutiny so as to guarantee these changes are not unintentionally injecting bias.

3. **Communicate and Delineate the Role of the Boundary Organization:** Some stakeholder concerns about the final report suggest confusion about the role and requirements of the OST as a nonprofit boundary organization, as opposed to a state agency. Future efforts to coordinate similar studies would benefit from increased upfront communication regarding the specific role of the OST, the process it will be employing, and how information from this process may be used to inform policy. Although the OST did make this process available on its website, these efforts could have been expanded. For instance, the OST could have used mechanisms such as a general distribution list with regular updates on the process and report progress; it could have created a brochure that clearly outlined and delineated the study process and distributed this to stakeholders; or it could have coordinated more informational public briefings or webinars. This would have provided more information for stakeholders while protecting the integrity of the study process, thereby bolstering both the credibility and legitimacy of the study.

4. **Work with Partners to Define the Policy Process:** While designing the policy process is not typically the purview of a boundary organization, the lack of a clearly delineated policy process can confuse stakeholders and encourage them to try to influence the scientific process. Boundary organizations can advise their partners of these risks and demonstrate how a clearly delineated policy process will actually enhance the salience, credibility, and legitimacy of parallel scientific and technical processes. A minimum step is to clearly articulate the intended uses and applications of study products. Additionally, clarifying the overall policy process can help ensure scientific and technical information are integrated into policymaking and the potential formation of relevant legislation in an appropriate and timely fashion, thus increasing the salience of the information produced.

Despite the challenges that the OST faced in coordinating the oil and gas study, its position as a boundary organization allowed it to bring unique expertise to bear upon the controversial issue of oil and gas platform decommissioning. As the threats facing the world’s natural resources increase, policy makers and resource managers will need to apply emerging
scientific research, information, and expertise to form diverse and innovative policy and management approaches to address such issues. Boundary organizations like the OST can facilitate these efforts and help promote the use of the best available science to inform complex policy decisions.

Notes

1. For more information about the RFP, the study process, or to view the final report, please visit http://www.calost.org/Oil_gas.html
3. The decision model can be downloaded at http://www.calost.org/Oil_gas.html
4. All written comments on the report are available at http://www.opc.ca.gov/2010/07/public-comment-on-the-oil-platform-decommissioning-report/

References


