U.S. DEPARTMENT OF ENERGY

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Regulatory Assistance, Stakeholder Outreach, and Coastal and Marine Spatial Planning Activities in Support of Marine and Hydrokinetic Energy Deployment

Task 2.1.7: Permitting and Planning Fiscal Year 2011 Progress Report

Environmental Effects of Marine and Hydrokinetic Energy

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September 2011

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Pacific Northwest National Laboratory
Richland, Washington 99352

Abstract

This fiscal year 2011 progress report summarizes activities carried out under DOE Water Power Task 2.1.7, Permitting and Planning. Activities under Task 2.1.7 address the concerns of a wide range of stakeholders with an interest in the development of the marine and hydrokinetic (MHK) energy industry, including regulatory and resource management agencies, tribes, nongovernmental organizations, and industry. Objectives for Task 2.1.7 are the following:

- to work with stakeholders to streamline the MHK regulatory permitting process
- to work with stakeholders to gather information on needs and priorities for environmental assessment of MHK development
- to communicate research findings and directions to the MHK industry and stakeholders
- to engage in spatial planning processes in order to further the development of the MHK industry.

These objectives are met through three subtasks, each of which is described in this report:

- 2.1.7.1—Regulatory Assistance
- 2.1.7.2—Stakeholder Outreach
- 2.1.7.3—Coastal and Marine Spatial Planning.

As MHK industry partners work with the regulatory community and stakeholders to plan, site, permit, and license MHK technologies, they have an interest in a predictable, efficient, and transparent process. Stakeholders and regulators have an interest in processes that result in sustainable use of ocean space with minimal effects to existing ocean users. Both stakeholders and regulators have an interest in avoiding legal challenges by meeting the intent of federal, state, and local laws that govern siting and operation of MHK technologies. The intention of work under Task 2.1.7 is to understand and work to address these varied interests, reduce conflict, identify efficiencies, and ultimately reduce the regulatory costs, time, and potential environmental impacts associated with developing, siting, permitting, and deploying MHK systems.

Project Summary

Energy generated from the world's oceans and rivers offers the potential to make substantial contributions to the domestic and global renewable energy supply. The U.S. Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE) Wind and Water Power Program supports the emerging marine and hydrokinetic (MHK) energy industry. As major players in an emerging industry, MHK project developers face challenges with siting, permitting, construction, and operation of pilot- and commercial-scale facilities, as well as the need to develop robust technologies, secure financing, and gain public acceptance.

Although potential effects of MHK energy generation on the aquatic environment have been catalogued (e.g., EERE 2009 http://www1.eere.energy.gov/windandhydro/pdfs/doe_eisa_633b.pdf), the conditions under which those effects could occur and their relative significance have not been firmly established. This lack of certainty affects siting and operations decisions, the regulatory process, and the level and nature of stakeholder concerns, all of which limit the pace and scale of MHK deployment.

To unravel and address the complexity of environmental issues associated with MHK energy, Pacific Northwest National Laboratory (PNNL) is developing a program of research and development that draws on the knowledge of the industry, regulators, and stakeholders and builds on investments made by the EERE Wind and Water Power Program. The PNNL program of research and development—together with complementary efforts of other national laboratories, national marine renewable energy centers, universities, and industry—supports DOE's market acceleration activities through focused research and development on environmental effects and siting issues.

Research areas addressed include:

- **Categorizing and evaluating effects of stressors** – Information on the environmental risks from MHK devices, including data obtained from in situ testing and laboratory experiments (see other tasks below) will be compiled in a knowledge management system known as *Tethys* to facilitate the creation, annotation, and exchange of information on environmental effects of MHK technologies. The *Tethys* will support the Environmental Risk Evaluation System (ERES) that can be used by developers, regulators, and other stakeholders to assess relative risks associated with MHK technologies, site characteristics, waterbody characteristics, and receptors (i.e., habitat, marine mammals, and fish). Development of the *Tethys* and the ERES will require focused input from various stakeholders to ensure accuracy and alignment with other needs.
- **Effects on physical systems** – Computational numerical modeling will be used to understand the effects of energy removal on water bodies from the short- and long-term operation of MHK devices and arrays. Initially, PNNL's three-dimensional coastal circulation and transport model of Puget Sound will be adapted to test and optimize simulated tidal technologies that resemble those currently in proposal, laboratory trial, or pilot study test stages. This task includes assessing changes to the physical environment (currents, waves, sediments, and water quality) and the potential effects of these changes on the aquatic food webs) resulting from operation of MHK devices at both pilot- and commercial-scale in river and ocean settings.
- **Effects on aquatic organisms** – Testing protocols and laboratory exposure experiments will be developed and implemented to evaluate the potential for adverse effects from operation of MHK devices in the aquatic environment. Initial studies will focus on electromagnetic field effects, noise

associated with construction and operation of MHK devices, and assessment of the potential risk of physical interaction of aquatic organisms with devices. A variety of fish species and invertebrates will be used as test animals, chosen due to their proximity to and potential susceptibility to MHK devices.

- **Permitting and planning** – Structured stakeholder communication and outreach activities will provide critical information to the project team to support execution of other project tasks. Input from MHK technology and project developers, regulators and natural resource management agencies, environmental groups, and other stakeholder groups will be used to develop the user interface of the *Tethys*, populate the database, define the risk attributes of the ERES, and communicate results of numerical modeling and laboratory studies of exposure of test animals to MHK stressors. This task will also include activities to promote consideration of renewable ocean energy in national and local coastal and marine spatial planning activities.

The team for the Environmental Effects of Marine and Hydrokinetic Energy Development project is made up of staff, faculty, and students from

- Pacific Northwest National Laboratory
  - Marine Sciences Laboratory (Sequim and Seattle, Washington)
  - Risk and Decision Sciences (Richland, Washington)
  - Knowledge Systems (Richland, Washington)
- Oak Ridge National Laboratory (Oak Ridge, Tennessee)
- Sandia National Laboratories (Albuquerque, New Mexico; Carlsbad, California)
- Oregon State University, Northwest National Marine Renewable Energy Center (Newport, Oregon)
- University of Washington, Northwest National Marine Renewable Energy Center (Seattle, Washington)
- Pacific Energy Ventures (Portland, Oregon).

Acronyms and Abbreviations

AOP	Annual Operating Plan
BOEMRE	Bureau of Ocean Management, Regulation and Enforcement
CMSP	Coastal and Marine Spatial Planning
DOE	U.S. Department of Energy
EERE	DOE Office of Energy Efficiency and Renewable Energy
EPA	U.S. Environmental Protection Agency
ERES	Environmental Risk Evaluation System
FERC	Federal Energy Regulatory Commission
GIS	Geospatial Information System
MHK	marine and hydrokinetic
MSP	marine spatial planning
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Aeronautic Administration
NOC	National Ocean Council
OCS	Outer Continental Shelf
PEV	Pacific Energy Ventures
PNNL	Pacific Northwest National Laboratory
Tethys	PNNL's knowledge management system
TSP	Territorial State Plan (Oregon)
USFWS	U.S. Fish and Wildlife Service
WCGA	West Coast Governors' Agreement on Ocean Health

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Tables

1.0 Introduction

For the marine and hydrokinetic (MHK) industry to move forward, communication with affected stakeholders about concerns, uncertainties, and emerging information will be critical. The significance of potential environmental effects of MHK energy generation has not been firmly established. This uncertainty affects the actions of regulatory agencies, the opinions of stakeholder groups, and the commitment of MHK energy project developers and investors.

In addition to these concerns, success of the current Pacific Northwest National Laboratory (PNNL) MHK project depends on developing products and tools that meet the needs of strategic stakeholders. Timely outreach will ensure that laboratory findings regarding the effects of MHK devices on physical systems and aquatic organisms are disseminated to key stakeholders. Engagement with key stakeholders throughout the project will guide the development of strategies to categorize and evaluate the effects of MHK-related stressors on the marine environment. Elicitation of stakeholder views informs products related to the MHK planning and permitting processes.

In the PNNL project, Permitting and Planning (2.1.7) is a task under Environmental Impacts and Siting (2.1) for which the FY 2011 Annual Operating Plan (AOP) identifies four objectives (Table 1.1). There are three subtasks under Task 2.1.7. These include

- 2.1.7.1 – Regulatory Assistance
- 2.1.7.2 – Community and Stakeholder Outreach
- 2.1.7.3 – Spatial Planning.

Table 1.1. Permitting and Planning Task Objectives and Related Subtasks.

Permitting and Planning Task 2.1.7 Objectives	Related Subtask
A. To work with stakeholders to streamline the MHK regulatory permitting process	2.1.7.1 (Regulatory Assistance)
B. To work with stakeholders to gather information on needs and priorities for environmental assessment of MHK development	Secondarily 2.1.7.2 (Community and Stakeholder Outreach)
C. To communicate research findings and directions to the MHK industry and stakeholders	Primarily 2.1.7.2 (Community and Stakeholder Outreach)
D. To engage in spatial planning processes in order to further the development of the MHK industry	2.1.7.3 (Spatial Planning)

This year-end report summarizes activities carried out in fiscal year 2011 to meet the objectives of Task 2.1.7. Task and subtask objectives were met in full through work by PNNL staff as well as through a subcontract to Pacific Energy Ventures to assist with regulatory assessment (2.1.7.1) and outreach (2.1.7.2) subtasks. Sections 2 through 4 summarize subtask goals and objectives, activities, and results. Section 5 lists project outcomes.

2.0 Regulatory Assistance

2.1 Subtask Introduction

The U.S. Department of Energy (DOE) Water Power Team seeks to understand the magnitude to which regulatory requirements contribute to cost of energy for marine and hydrokinetic deployments. Understanding which aspects of the regulatory process contribute most to siting and permitting costs and timeframes helps prioritize research, collaborative activities, and technology development to most effectively drive down those costs and timeframes. Work carried out under this subtask provides regulatory analysis and guidance to the Water Power Team as well as regulatory assistance to developers and other stakeholders who are involved in siting, permitting, licensing, operating, and decommissioning MHK devices and arrays.

During FY 201,1 PNNL carried out two discrete actions under 2.1.7.1, described in Sections 2.2 and 2.3:

- a regulatory assessment of MHK projects in the United States to determine key regulatory cost drivers
- through a subcontract to Pacific Energy Ventures (PEV), an update of the Siting Methodologies for Hydrokinetics Handbook (www.advancedH20power.com) to incorporate changes in policy since the handbook's completion in 2010.

2.2 Regulatory Assessment

The DOE Water Power Team has established programmatic goals to pursue research and policy activities that contribute to an efficient and effective regulatory process and drive down the cost of energy associated with MHK technologies. To target these activities, DOE requires a clear picture of the various regulatory processes with which MHK developers are engaging and an understanding of the specific components of those processes that most contribute to siting and permitting costs.

In fiscal year 2011, PNNL was tasked to develop a regulatory assessment of eight ongoing tidal, wave, and riverine MHK permitting processes and provide preliminary data on the costs associated with those processes. The intent of this study was to establish an initial baseline of the key issues, concerns, best practices, and cost drivers associated with the regulatory process, as expressed through interviews and surveys of MHK industry pioneers. PNNL carried out interviews and distributed surveys in February–March 2011. An internal version of the report was submitted to DOE staff in May and refined in July. Because of the sensitive nature of some of the data and information contained within the report, the Water Power Team has requested it be revised further for public release in fiscal year 2012. This progress report provides details on the regulatory analysis approach and summarizes themes for surveys and interviews.

2.2.1 Approach

PNNL carried out interviews and distributed surveys in February–March 2011[1] to representatives of eight U.S. MHK development projects. Interviewees were selected based on their experience with the permitting process (all have entered into a regulatory process to deploy one or more MHK devices in U.S. waters) and willingness to participate in this study. Potential interviewees were contacted through email and provided a cover letter describing the project, a copy of the interview questions for consideration, and an Excel-based survey instrument to quantify costs for each stage of the regulatory process. Eight of nine contacts agreed to participate in the interview; four declined to fill out the survey due to the fact that they were relatively early in their permitting or licensing process. All information and data were aggregated to avoid any release of proprietary information or other information that could negatively affect ongoing licensing processes.

Each interviewee was asked the following 10 questions, which serve to organize the results, discussion, and summary of this report (Sections 3, 4, and 5):

1. Please describe your project—what are the key environmental/regulatory issues?
2. Did you encounter redundancies in the permitting process? If so, please describe—for example, did you submit the same data to different agencies at different times?
3. Can you identify specific statutes or regulatory requirements that were particularly costly and time consuming?
4. Were there aspects of the permitting process that worked especially well?
5. Reflecting on your own experience, what specifically could be improved about the licensing and permitting process?
6. Would you recommend any best practices/strategies to make the existing regulatory process smoother or faster?
7. In general, how have stakeholders (environmental interests, local community, local government, tribes, marine industries, etc.) responded to your project and how do you think this response has affected the cost and length of the licensing process?
8. Was the timeline for licensing your project longer or shorter than anticipated?
9. How has the regulatory process affected your financing strategy?
10. What are the most important actions that can be taken to encourage an efficient and effective permitting process?

Interviews were carried out over the telephone using a semi-structured approach (Kvale 1996) with an interview guide to ensure consistency. When possible, a second researcher participated and provided a second set of notes, to assist in compiling a detailed record of the interview. Notes were summarized immediately following each interview and analyzed for key themes. These themes were recorded on the interview guide to facilitate summary in this report.

At the time of each interview, PNNL researchers described and answered questions about the Excel based survey instrument, which had been distributed previously. Respondents were uniformly hesitant to

[1] See Appendix A for full interview guide and survey instrument.

complete the survey, as the level of detail necessary to fill in all fields was daunting. After describing the need to quantify regulatory costs and ensuring respondents that their best efforts were appreciated, four were willing to partially complete the survey. All other respondents provided an estimated cost for the aggregate of regulatory, permitting, and study activities. Part of the difficulty in filling out the survey relates to the fact that none of the interviewees had completed licensing and monitoring studies at the time of this study. Data from the survey should be viewed as a snapshot of industry pioneers; variance from project to project is to be expected at this point in time.

2.2.2 Summary of Results

The regulatory process for licensing MHK projects is still under development, and the first generation of MHK deployments is pursuing a number of different regulatory pathways depending on business and technology development goals. The Federal Energy Regulatory Commission (FERC) is the lead licensing agency for MHK in both state and federal waters. In federal waters, the Bureau of Ocean Energy Management, Research and Enforcement (BOEMRE) has established jurisdiction for leasing of submerged lands, which requires MHK developers to first secure a BOEMRE lease before pursuing a FERC license. Both FERC and BOEMRE processes require preparation of an Environmental Assessment or Environmental Impact Statement under the National Environmental Policy Act (NEPA) and consultation with agencies and tribes to complete relevant federal, state, and local permits.

In practicality, all the first-generation MHK deployments have targeted state waters; the BOEMRE process has yet to be tested and will not be discussed in this report. In both state and federal waters, a FERC license under the Federal Power Act is required to connect to or sell power to the U.S. power grid (Stoel Rives 2011). MHK developers seeking a FERC license currently are pursuing three pathways: an exemption based on the experience of Verdant Power in New York's East River, a pilot license established specifically for temporary MHK deployments of less than 5 MW, or a commercial license through FERC's existing Integrated or Traditional Licensing Process. Developers interviewed for this report represent experience with all three processes. In addition, two interviewees are pursuing processes outside FERC's jurisdiction—a non–grid-connected private technology test and a federal demonstration project.

The permitting pathway a developer selects is based on his/her own business and technology needs. Each process has its advantages, challenges, and costs, which are useful to compare. Table 2.1 summarizes the processes represented by project developers interviewed for this report.

As with other uses of the marine environment, licensing and deploying an MHK device may involve multiple regulatory agencies and jurisdictions through the Federal Power Act and NEPA process.

Federal agency involvement may include[1]

- U.S. Army Corps of Engineers—Issues permits required under Section 10 of the Rivers and Harbors Act for structures in navigable waters, as well as permits under the Clean Water Act Section 404 for dredging or filling.

[1] For more information on federal and state statutes and jurisdiction in the MHK licensing processes, see the Pacific Energy Ventures Regulatory Handbook for MHK at www.advancedh2opower.com/default.aspx.

- U.S. Coast Guard—May require markers or other aids to navigation for devices placed in navigable waters.

Table 2.1. Summary of Regulatory Processes Represented in This Report

Process	Eligibility	Process Length	Advantages	Challenges
FERC Exemption (Verdant Order)	Testing an experimental technology; project does not displace power to the grid.	1–2 years	Shorter time to deployment for early-stage demonstration.	Still requires local and other federal permits (U.S. Army Corps of Engineers, EPA) and federal concurrence. No income stream from project.
FERC Pilot[(a)]	Project generates less than 5 MW of power for a short-term duration (typically 5 to 10 years), not located in a sensitive area, for the purposes of testing new technologies.	3–5 years	A phased approach (pilot before commercial) may be politically more feasible in sensitive environments, potentially shorter licensing time-frames. Allows developers to sell power during demonstration to generate a revenue stream and test power profile.	Consulting agencies federal and state agencies are not required to treat the pilot license process any differently than a commercial license. Concurrence timelines and study requests may not be any shorter than for a commercial process. New process.
FERC Commercial (ILP)	Used to obtain a longer term license for a commercial-scale deployment	4–7 years	No need for both a pilot and commercial license. ILP process is well defined, FERC involvement and leadership an advantage. May be easier to finance the project as revenue streams should develop sooner.	May be politically difficult in sensitive environments—stakeholders and agencies may wish to discuss a phased development approach to allow adaptive management and testing. Potentially higher level of regulatory scrutiny than pilot project if environmental effects are uncertain.
Federal Lead	Project has federal lead, no power to the grid.	2–3 years	No Federal Hydropower license required, allows federal lead with a strong interest in developing renewable power to achieve federal policy goals.	Requires specific circumstances and interested federal entity. Still requires NEPA process and consultation with resource management agencies.
Non-grid Connected Technology Test	No grid connection, short-term duration.	1–1.5 years	U.S. Army Corps of Engineers Nationwide Research Permit can be obtained, programmatic agreement for agency consultation. Allows for sea-trials and technology testing in a short period of time.	Appropriate for mid Technology Readiness Level. No generation of electricity, cannot test grid connection and power profile. Short-term duration. Local permits are required.

(a) In 2008, FERC issued a white paper describing the pilot project process in detail. Refer to this for more information on the pilot project process. The white paper is accessible online at http://www.ferc.gov/industries/hydropower/indus-act/hydrokinetics/energy-pilot.asp.

- U.S. Environmental Protection Agency (EPA)—Is responsible for ensuring projects are consistent with the Clean Water Act under Section 401, although this authority is often delegated to the states.

- National Oceanic and Atmospheric Administration (NOAA) —Consults on the Endangered Species Act Section 7 for marine species, the Marine Mammal Protection Act (if marine mammals are present in project area), Essential Fish Habitat under the Magnuson Stevens Fishery and Conservation Act, and with coastal states to ensure consistency with the Coastal Zone Management Act. During FERC licensing, NOAA Fisheries may also request conditions under Section 10(j) of the Federal Power Act to ensure adequate protection of fish and wildlife resources affected by the project.

- U.S. Fish and Wildlife Service (USFWS) —Has jurisdiction over non-marine species under the Endangered Species Act (as well as some marine mammal species such as sea otters and walrus) and authority to consult under the Migratory Bird Treaty Act. In addition, during FERC licensing, USFWS (as well as state wildlife agencies) also request conditions under section 10(j) of the Federal Power Act to ensure adequate protection of fish and wildlife resources affected by the project.

- Other—During FERC licensing, land management agencies such as the U.S. Forest Service may impose conditions under the Federal Power Act Section 4(e) for projects within a federal reservation to ensure adequate protection and use of that reservation.

Additional consultation with states, tribes, and local jurisdictions for National Historic Preservation Act compliance, as well as other state and local permits to protect shoreline and aquatic habitat, may also be required. Finally, studies to address potential socioeconomic impacts, such as impacts to recreation, may also be required through the Federal Power Act. Adding to this complexity, MHK represents a new technology and use of the marine environment, which contributes to significant uncertainty, confusion, and regulatory risk.

This study used interview data, a survey, and publicly available information on the FERC database to present a snapshot of the MHK regulatory process. The eight developers interviewed for this study expressed concerns and frustrations with the process but also identified areas in which the process is working well. Key cost drivers during the permitting process are associated with environmental compliance and studies requested by agencies and stakeholders to meet regulatory needs. The Endangered Species Act was frequently cited as a key regulatory concern. Developers expressed a disconnect between perceived and actual environmental risk and an inability to balance potential effects with potential benefits of technology. They also expressed that there is a need for strong leadership by DOE (political, policy, research) and coordination between and within agencies involved in the permitting process to encourage alignment in mandates for sustainable development of this industry.

To summarize key themes from interviewees—<u>all bullets below summarize statements made by interviewees:</u>

1. Costs for the first generation of MHK permitting processes are across the board higher than MHK developers initially anticipated—in some cases, permitting costs are equal to or exceed the cost of technology development.

2. Federal/state interagency and stakeholder working groups with clear leadership from FERC can help to reduce redundancies and facilitate working toward solutions.
3. Studies associated with environmental compliance—primarily the Endangered Species Act—drive costs. It is difficult for regulators to vary their risk tolerance for small-scale or pilot projects, despite the emphasis on short-term temporary projects in the existing FERC pilot process.
4. In every case, the timeframe for permitting exceeded expectations.
5. There is a perceived disconnect between regulatory and environmental risk; there is a perception that study requests for both baseline data collection and monitoring do not always seem proportional to the actual environmental risk posed by projects.
6. There is a need for consistency in agency study requests, clear protocols for baseline and post-installation monitoring data collection, and development of acoustic, electromagnetic frequency, strike, and other models on a national level to limit the need to repeat costly studies for each project.
7. Clear policy guidance at the national level and interagency coordination are absolutely necessary to avoid wide variation and delay at the regional level. Regional agency staff operate under their existing guidance to avoid risk of legal challenge to their decisions. Transferring regulatory risk out of the regions and centralizing guidance on how to approach emerging technologies like MHK could encourage a more rapid, and proportional regulatory response.

2.2.3 Next Steps

PNNL and the Water Power Team will revise the internal regulatory assessment for public release in fall and winter 2011. A draft report will be released to industry members who participated in the study, and following review, results will be presented to the Federal Renewable Energy Working Group in early 2012.

In future years, as the industry and regulatory processes mature, this study can be revisited to measure progress by DOE, the regulatory community, and MHK industry to reduce uncertainties, ensure sustainability, and drive down costs associated with siting and deploying MHK technologies. This study is very much from the perspective of industry; it would be useful to also interview regulatory agencies to determine key cost drivers and time-consuming processes from their perspective.

2.3 Advanced H20 Power Website Updates

In FY 2009, the Wind and Water Power Program funded PEV to create a Siting Methodologies for Hydrokinetics Handbook (Handbook) to be used as a tool for developers in navigating the siting and permitting process for MHK technology deployment. The Handbook was completed in August 2010 and hosted on PEV's Knowledge Base at www.advancedH2Opower.com. To maintain the relevance and usefulness of the Handbook, it will need to be updated periodically to ensure that the policies and regulations it describes are up to date. Such updates will need to be reviewed for accuracy and completion.

Beginning in FY 2011, PEV initiated an annual revision and maintenance process for the Handbook, researching changes in policy, and updating the advancedH20power.com Knowledge Base to reflect these changes. PNNL worked with PEV and the Water Power Team to review the revisions and provided

comments and recommended changes. Following revision and DOE approval of changes, PEV uploaded revised Handbook sections to www.advancedH20power.com and disseminated updated material to relevant stakeholders, regulators, and industry members through their monthly newsletter. Table 2.2 summarizes Handbook updates in 2011.

Table 2.2. 2011 Pacific Energy Ventures Regulatory Handbook Updates

Task	Description
Track Process Changes	Research state and federal process changes relevant to siting MHK (e.g., new/revised state permitting processes, state and regional CMSP rules, etc.); compile info for updates
MHK and Recreation	Add section to Federal Authorizations chapter w/ brief overview of and reference to Guide; add recreation resource information requirements for FERC license
Authorizations for Federally Managed Lands	Move National Park Service (NPS) info to new section and revise content accordingly
National Park Service	Add section on NPS authorities to Federal chapter
National Marine Sanctuaries Act	Add section on NMSA to Federal chapter
Outer Continental Shelf Lease	Update lease process description and OCS roadmaps per new BOEMRE rule for noncompetitive lease process
MMS-BOEMRE	Replace all references to MMS with BOEMRE
Oregon Territorial Sea Plan	Update Oregon chapter per new TSP rules
Hawaii	Update state permitting authorities per Hawaii Clean Energy Initiative
Massachusetts Ocean Management Plan and Updated Coastal Cone Management Policy	Draft new sections for Ocean Management Plan and new CZM Policy per NOAA approval; update existing sections per the new plans: MEPA, CZMA
Maine Test Project Lease	Add new leasing process for tidal test projects to Maine chapter
Roadmap Updates	Revise regulatory roadmaps per new/revised processes; upload revised roadmaps and the roadmap links in each chapter
Contacts & Acronyms	Update contacts chart and acronym lists per additions/updates
Navigation	Add/update entry points to new content
Revise/Finalize	Revise per DOE review; finalize content in KB
Disseminate New/Updated Content	Distribute new/updated content to stakeholders via announcements on Advanced Water Power website and newsletter articles (aequoreus navitas)

3.0 Stakeholder Outreach

3.1 Subtask Introduction

Recognizing the importance of strategic and timely stakeholder engagement, subtask 2.1.7.2 addresses the concerns of a wide range of stakeholders with an interest in the development of the MHK industry, including regulatory and resource management agencies, tribes, nongovernmental organizations, and industry. Potential environmental effects of MHK devices and operations lead the list of issues of concern for many stakeholders; conflicts with existing and planned beneficial uses are also of importance. This subtask assists with information collection for development of the *Tethys* and ERES tools (subtasks 2.1.1.1 and 2.1.1.2, respectively) and provides outreach and dissemination of materials developed under Tasks 2.1.2 (Effects on the Physical System) and 2.1.3 (Effects on Aquatic Organisms) in a manner accessible to stakeholders. Both internal (PNNL) and Water Power programmatic outreach needs are targeted through subtask 2.1.7.2 activities. Objectives of subtask 2.1.7.2 are

- to develop a process for gathering input from stakeholders that will assist in defining the needs and parameters of *Tethys* and the ERES
- to develop project outreach materials and convene opportunities for dissemination of project information and outcomes to interested stakeholder groups
- to work with industry stakeholders to determine the environmental study needs for specific MHK technology types and to compare those needs to the research directions of the national laboratories and the DOE MHK program.

The overall approach of Community Stakeholder Outreach (2.1.7.2) activities is to bring together regulators, MHK device and project developers, and engaged stakeholders to ensure that all parties have the same information about proposed projects and regulatory pathways. Although the stakeholder group is broad and varied and, in some areas, not well defined, two separate overall groups are identified: 1) the MHK industry, which includes technology developers, project developers, and some instrumentation manufacturers; and 2) regulatory and resource management agencies at the federal, state, and local level; tribes; nongovernmental organizations; university researchers; and interested members of the public. Where appropriate, the two overall stakeholder groups are brought together, usually focused on a site-specific project or region; however, in general, information has been and will continue to be sought from the two groups separately to ensure that there is an open and free exchange of information. Further divisions within the second group can be useful to better deliver information to target audiences. For example, based on the level of engagement in the topic and likely interests, we have found it useful to meet separately with regulatory and resource management agencies and the environmental non-governmental organizations community.

3.2 FY 2011 Stakeholder Outreach Activities

DOE identified three objectives for the Community and Stakeholder Outreach task in the FY 2011 Annual Operating Plan (objectives 1–3 in Table 3.1). In addition to objectives in the AOP, DOE has expressed a need to better coordinate, collaborate, and disseminate the products of our environmental research to other national laboratories, federal agencies, industry, and interested stakeholders (Objective 4 in Table 3.1).

Table 3.1. FY 2011 Objectives and Planned PNNL Activities

Subtask 2.1.7.3 Objectives		PNNL Activities
Objective 1	To develop a process for gathering input from stakeholders that will assist in defining the needs and parameters of the *Tethys* and ERES	Develop communications plan Develop outreach materials describing project outcomes Convene stakeholder input meetings with agencies, industry, and environmental non-governmental organizations Host online meeting for stakeholder input
Objective 2	Develop project outreach materials and convene opportunities for dissemination of project information and outcomes to interested stakeholder groups	Develop specific outreach products Participate in scientific and technical conferences
Objective 3	Work with industry stakeholders to determine the environmental study needs for specific MHK technology types and to compare those needs to the research directions of the national labs and DOE MHK program	Work with industry leaders including Snohomish County Public Utility District, Ocean Power Technologies, Ocean Renewable Power Company, Free Flow Power, and others
Objective 4 (not in FY 2011 AOP)	Better coordinate, collaborate, and disseminate the products of ongoing environmental research (DOE-funded as well as funded by other entities) to other laboratories, federal agencies, industry, and interested stakeholders	Host environmental webinars

3.2.1 Objective 1—Inform Development and Use of *Tethys* and ERES

Activities to address objective 1 carried out in fiscal year 2011 include the following:

- Developed a FY 2011 Stakeholder Communication and Outreach Plan to focus and guide activities throughout FY 2011. The completed plan was submitted to the DOE Water Power Team in March.
- Developed ERES- and *Tethys*-related communication materials (PowerPoint presentations, one-pagers, and webinars), and carried out a series of meetings (in-person, via teleconference, and webinar) with key stakeholders to familiarize them with ERES and *Tethys* and solicit input. Communication and outreach materials were designed to facilitate explanation of ERES and *Tethys* and engage target stakeholder groups in discussions about the outputs and interface of the tools. Materials were tailored to specific audiences and updated as needed.
- In partnership with Pacific Energy Ventures, PNNL planned and executed three in-person *Tethys* and ERES demonstrations in Washington, D.C., on April 25, 2011, with agencies and environmental nongovernmental organizations. The first meeting targeted the BOEMRE in Herndon, Virginia; the second meeting was hosted at the FERC with NOAA and DOE staff in attendance; The Ocean Conservancy hosted the third meeting at their Dupont Circle headquarters with the Natural Resources Defense Council, The Nature Conservancy, and Environmental Defense Fund also in attendance. Andrea Copping and Scott Butner demonstrated ERES and *Tethys* at all three meetings, solicited

guidance from meeting attendees, and encouraged use of these DOE-funded information management tools. See Appendix B for meeting summaries and attendance sheets.

- Participated on a panel on April 27 during the Industry Development Day preceding the Global Marine Renewable Energy Conference. The panel was another chance to demonstrate *Tethys* and ERES and was specifically intended to target industry feedback.
- Hosted a 1-hour live meeting (webinar) open to all interested parties. This event provided an opportunity for interested stakeholders to be introduced to ERES/*Tethys* and updated on progress.
- Through a subcontract with Pacific Energy Ventures, completed an MHK Strategic Outreach Needs Assessment that surveyed industry, agencies, and other stakeholders on their knowledge and use of *Tethys* and PEV's advancedh20power.com knowledge portal. The assessment also solicited input on how stakeholders currently access information on MHK technologies and environmental effects to better align *Tethys* and advancedH2Opower to meet stakeholder information needs.

3.2.2 Objective 2—Develop Project Outreach Materials and Disseminate Results Through Scientific and Engineering Conferences

Activities to address objective 2 include development of communication and outreach materials designed to promote understanding and knowledge of other project subtasks (other than ERES and *Tethys*). The most pressing need for these materials will be to communicate results of subtasks 2.1.2 (Effects on the Physical System) and 2.1.3 (Effects on Aquatic Organisms). Participation in scientific and technical conferences are the primary tools used to deliver project information to technology developers, researchers, and scientists at resource management agencies. PNNL staff are involved in chairing and organizing sessions on MHK energy and/or delivering papers developed as part of this project at each of the conferences listed in Table 3.2. The mix of conferences in which PNNL project staff participate in reflects the mix of audiences with a stake in MHK energy development. Scientific societies such as the American Fisheries Society and the Society for Environmental Toxicology and Chemistry engage scientists whose skills are needed to understand interactions between MHK devices and aquatic animals or ecosystem components. Oceanographic and engineering conferences such as the European Wave and Tidal Energy Conference engage the oceanographers and engineers who measure phenomena in the oceans, developing monitoring instrumentation that will be vital to measuring interactions between MHK devices and receptors.

3.2.3 Objective 3—Understand Industry Needs for Environmental Research

Activities to address objective 3 carried out in fiscal year 2011 include the following:

- Through regular calls and attendance at project planning meetings, coordinated with MHK project developers and technology providers, including Snohomish County Public Utility District, Ocean Power Technologies, Ocean Renewable Power Company, and Free Flow Power. These coordination activities serve to inform the project about the needs and challenges of an MHK project developer and to provide technical assistance to project developers such as Snohomish County Public Utility District and others.
- Through a subcontract with PEV, completed the Puget Sound Tidal Energy Framework and lessons learned document.

Table 3.2. Scientific and Technical Conferences for FY 2011

Event	Event Type	Location	Date
International Conference on Ocean Energy (ICOE 2010)	International scientific conference	Bilbao, Spain	October 6–8, 2010
Renewable Ocean Energy and the Marine Environment	National scientific conference	Palm Beach, FL	November 3–5, 2010
Society for Environmental Technology and Chemistry	National scientific conference	Portland, OR	November 7–11, 2010
American Geophysical Union (AGU) National Meeting	International Scientific Conference	San Francisco, CA	December 13–17, 2010
American Society of Limnology and Oceanography (ASLO)	National scientific conference	San Juan, Puerto Rico	February 13–18, 2011
Global Marine Renewable Energy Conference	Industry conference	Washington, DC	April 2011
Energy Ocean International	Industry Conference	Portland, ME	June 14-16, 2011
American Fisheries Society	National scientific conference	Seattle, WA	September 4–8, 2011
European Wave and Tidal Energy Conference Series (submitted paper)	International technical conference	Southampton, UK	September 5–9, 2011

3.2.4 Objective 4—Raise Awareness of Results from Ongoing MHK Environmental Research

Activities to address objective 4 are intended to encourage strategic and efficient application of DOE-funded environmental research to address the major problems facing the MHK industry. DOE Headquarters has identified three major problems it would like to see addressed:

1. Other agencies, industry, and researchers may not be aware of DOE-funded work; without awareness, work will not be applied.
2. Other agencies may be funding similar work, and there is increased attention to avoiding duplication of effort.
3. Interactions between researchers working in the ocean renewable energy/environment space need to be more strategic and less opportunistic, and provide the basis for a healthy research community.

By addressing these challenges, DOE will be better able to determine gaps in the nation's ocean renewable energy/environment research portfolio, recognize opportunities to apply research findings, and target funding to address key needs. Avoiding duplication of effort and building a strong research community will reduce risk in the research portfolio and make efficient use of federal funds. DOE, together with partners from EPA, NOAA, and BOEMRE, developed an approach to address these needs that utilizes a series of webinars on environmental topics. PNNL staff supported Anna Coffey and Jocelyn Brown-Saracino in planning and executing three webinars in 2011 (see Appendix B for flyers and

rosters for all three webinars; webinars are archived and accessible on *Tethys* at http://mhk.pnl.gov/wiki/index.php/DOE_MHK_Webinar_Series):

1. Data Management, Risk Assessment, and Cumulative Effects Analysis (July 27)
2. Research on Aquatic Animal Interaction with MHK Devices (August 29)
3. Monitoring Technologies and Strategies (September 14).

Webinars were attended by an average of 160 participants. Results of an evaluation survey prepared by DOE and submitted to webinar participants shows that webinars provided excellent value in communicating the results of MHK environmental research.

4.0 Coastal and Marine Spatial Planning

4.1 Subtask Introduction

In July 2010, President Obama issued an Executive Order[1] adopting the recommendations of the Interagency Ocean Policy Task Force, establishing the Nation Policy for the Stewardship of the Ocean, Coasts, and Great Lakes, creating the National Ocean Council (NOC), and providing for the development of coastal and marine spatial plans. Activities under subtask 2.1.7.3 focus on the directive for development of coastal and marine spatial plans and the implications of those activities on ocean renewable energy, with a particular focus on regional planning activities on the U.S. West Coast.

Coastal and Marine Spatial Planning (CMSP) is a relatively recent coastal and ocean management concept with roots in Integrated Coastal Resource Management, Ecosystem-Based Management, and Comprehensive Shoreline Planning. The development of geospatial information system (GIS) spatial analysis tools have emphasized the incorporation and visualization of scientific data to drive planning processes. However, planning remains a collaborative stakeholder-driven process, as emphasized by the United Nations Educational Scientific and Cultural Organization description of CMSP as "...a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process..." (Ehler and Douvere 2009). Activities in this subtask aim to engage with and understand both sides of CMSP: spatial data-driven decision support and collaborative policy processes.

Two objectives for this subtask are

- to provide input and assess the findings of ongoing coastal and marine spatial planning programs, and to apply those findings to help guide future research directions
- to incorporate MHK-specific environmental, resource, and competing use data into comprehensive ocean and resource planning tools and engage with industry, government, and other stakeholders to develop coastal and marine spatial planning activities in order to fully incorporate MHK equities and values.

Specifically, PNNL was tasked to participate on the West Coast Governor's Agreement on Ocean Health Renewable Energy Action Team and other regional planning bodies as directed by Water Power headquarters. The goal of this participation was to connect ongoing West Coast regional planning activities to DOE-supported research products and information about renewable energy siting needs. Participation activities are described in Section 4.2.

In addition to direct support for DOE engagement in CMSP activities, PNNL carried out a literature review and research on previous and ongoing CMSP processes, both in the United States and abroad, as well as reviewing information on available tools, data sets, and portals being utilized for renewable energy planning activities. Section 4.3 summarizes the current status of CMSP activities on the U.S. West Coast and provides context for the NOC regional planning processes that are just getting underway. As national guidelines for CMSP are developed by the NOC and implemented at the regional level, it will be critical that renewable energy equities and values are considered in the process. Understanding the

[1] Executive Order No. 13547, 75 *Federal Register* 43023 (July 22, 2010).

tools, data, and policies on the West Coast that are related to renewable energy and CMSP provides the water power team information to inform DOE participation in planning activities.

4.2 Summary of 2011 PNNL CMSP Participation

In fiscal year 2011, PNNL worked on behalf of the Water Power Team to engage with agencies, industry, non-governmental organizations, and other stakeholders in CMSP activities from the perspective of ocean renewable energy. CMSP is underway in many states and regions with implications for how and where MHK technologies will be deployed. PNNL has supported DOE engagement in West Coast CMSP activities, through the West Coast Governor's Agreement on Ocean Health, the BOEMRE/Oregon Renewable Energy Task Force, and attendance at other national and West Coast CMSP forums. PNNL has provided briefings to DOE staff, meeting summaries, presentations, and other support resulting from these activities.

Table 4.1 summarizes PNNL participation in CMSP activities in fiscal year 2011. All meetings listed were attended at the request of DOE, with briefings provided to Water Power Team staff either in memo form, via email, over the phone, or in person.

4.3 Summary of West Coast CMSP Progress in 2011

This section summarizes the current status of CMSP activities on the U.S. West Coast as of summer 2011. At the national level, the NOC is taking preliminary steps to refine national objectives for CMSP and conducting outreach in each of the nine regions where CMSP plans will be prepared in future years. A lack of federal funding for regional planning activities has slowed the process somewhat, although on the West Coast, Washington, Oregon, and California continue with state planning initiatives of their own, as well as coordinated activities through the West Coast Governor's Agreement on Ocean Health.

Renewable energy is a CMSP driver on the West Coast. However, as an emerging use of ocean space characterized by diverse technologies and business models, it is not always easy for the renewable energy industry to participate fully in planning processes in a coordinated way. State planning activities have sought to first identify and protect areas that are important to existing users and then consider areas left over as suitable for energy use. If the best areas for energy production are excluded through this approach, renewable energy may be relegated to places that are not economically advantageous or feasible for energy production due to lack of resource availability, transmission difficulties, distance from port facilities, and other factors. Part of the problem stems from uncertainty over technology needs (e.g., depth, transmission distance); as mentioned before, planners may not have a consensus from industry about which areas are most desirable for energy use. Concern and uncertainty over potential for effects on other uses is another important factor to consider. As consolidation of technology takes place and as research on the environmental/social effects of MHK devices is completed over the next several years, planners and industry members will be better informed for productive planning and siting conversations. Until that time, it will be essential for planning activities to consider multiple-use areas where renewable energy siting would be allowed under existing regulations, avoid strictly prohibiting energy uses, and designate appropriate areas for technology testing, pilot projects, and demonstration.

Table 4.1. FY 2011 PNNL Participation in West Coast CMSP Activities and Processes

Activity/*Attendees*	Dates	PNNL Staff	Product or Presentation
West Coast Governor's Agreement on Ocean Health—Renewable Energy Action Coordination Team *Representatives from WA, OR, CA, BOEMRE, NOAA, USFWS, DOE, FERC, Tribes, Interested Citizens, and Industry*	Monthly Teleconference	Simon Geerlofs and Brie Van Cleve	• Presentation on DOE environmental research portfolio to alert members to useful information for planning activities. • Provided information on TRL FOA winners located on the West Coast. • Monthly briefings to Coordination Team on MHK, DOE, and PNNL progress on research activities. • Quarterly briefing memos to DOE as well as updates on CMSP activities over the phone.
BOEMRE/Oregon OCS Renewable Energy Task Force *Formal State Federal Working Group, representatives from OR planning and resource management agencies, and federal partners in planning for renewable energy*	Portland, OR. March 31, 2011 and August 1, 2011	Simon Geerlofs	• Presentation at March 31 meeting to Task Force on DOE funded research products that can be used to inform siting of MHK technologies. • Coordinated with Parametrix on a presentation to the Task Force on DOE/BOEMRE/NOAA funded Bayesian Analysis Decision Support Tool. • Coordinated on presentations with DOE and provided briefings over the phone.
Department of Interior West Coast CMSP Workshop *Attended by all agencies within the Department of Interior, NOAA, Council on Environmental Quality, DOE, Universities and Environmental Non-Governmental Organizations*	San Francisco, CA. December 1–2, 2011	Simon Geerlofs	• Participated in CMSP discussions from the perspective of siting renewable energy on the OCS—submitted workshop report to DOE on January 4, 2011.
Hydropower Reform Coalition MHK Recreational Effects, West Coast Workshop *MHK industry, NOAA, BOEMRE, FERC, State Agencies, Environmental Non-Governmental Organizations*	Portland, OR. June 28-29, 2011.	Simon Geerlofs	• Attended on behalf of DOE to provide input on the DOE funded Recreational Impacts Assessment Guide. • Phone briefing to DOE following the workshop.

Table 4.1. (contd)

Activity/*Attendees*	Dates	PNNL Staff	Product or Presentation
OR and West Coast CMSP Data Needs Workshop *West Coast data management and GIS professionals engaged in information management in support of West Coast CMSP*	Salem, OR	Scott Butner	• Attended to determine how *Tethys* could be better utilized for data aggregation to inform MHK planning activities. • Email report to DOE from Scott Butner following the workshop on June 8, 2011.
Regional National Ocean Council Listening Sessions *Multiple stakeholders with an interest in marine planning and management at the federal, state, and local level.*	Portland, OR and Ocean Shores, WA. June 27 and July 1, 2011.	Luke Hanna and Kara Blake	• PNNL staff volunteered as session note takers and facilitators. • Written workshop summaries emailed to DOE July 12, 2011.

Existing BOEMRE and FERC processes for leasing and licensing technologies allow for projectbyproject consideration of effects on other uses and the environment. The promise of CMSP is that it can provide clear guidance and information tools to coordinate and support these processes, but it is not intended to be a replacement or additional complicating factor. For future DOE participation in CMSP nationwide and on the West Coast, in order to be effective, DOE needs to emphasize and support activities that encourage the promise of CMSP and work to avoid its potential pitfalls. This report offers a snapshot of West Coast activities, policies, and information management tools in order to help DOE accomplish this goal.

4.3.1 National Overview, Priority Objectives for CMSP—National Ocean Council

In July 2010, President Obama issued an Executive Order adopting the recommendations of the Interagency Ocean Policy Task Force, establishing the Nation Policy for the Stewardship of the Ocean, Coasts, and Great Lakes, creating the NOC, and providing for the development of coastal and marine spatial plans.[1] The Executive Order specifically does not impair or otherwise affect the authority of existing agencies and does not change any existing laws.

The NOC is currently drafting a strategic action plan and has established nine priority objectives:

1. Ecosystem-Based Management
2. Coastal and Marine Spatial Planning
3. Inform Decisions and Improve Understanding
4. Coordinate and Support

[1] Executive Order No. 13547, 75 *Federal Register* 43023 (July 22, 2010).

5. Resiliency and Adaptation to Climate Change and Ocean Acidification
6. Regional Ecosystem Protection and Restoration
7. Water Quality and Sustainable Practices on Land
8. Changing Conditions in the Arctic
9. Ocean, Coastal, and Great Lakes Observations, Mapping and Infrastructure.

The CMSP objective is to implement comprehensive, integrated, ecosystem based coastal and marine spatial planning and management in the United States.

In summer 2011, NOC hosted 12 Regional Listening Sessions, soliciting public comment on the strategic action plan outlines. West Coast Listening Sessions included Ocean Shores, Washington, on June 27; San Francisco Bay, California, on June 30; and Portland, Oregon, on July 1. PNNL attended the listening sessions in both Ocean Shores, Washington, and Portland, Oregon. Offshore renewable energy was mentioned at both listening sessions; however, it was more prominent throughout the Portland listening session than at Ocean Shores due to the current interests in wave power off the coast of Oregon.

4.3.2 Regional Cooperation—West Coast Governor's Agreement on Ocean Health

In September 2006, the governors of California, Oregon, and Washington created a proactive regional collaboration called the West Coast Governors' Agreement on Ocean Health (WCGA). The purpose of this collaboration is to address critical ocean and coastal management and protection issues present along the West Coast. The agreement addresses the following areas of focus:

- Ensuring clean coastal waters and beaches.
- Protecting and restoring healthy oceans and coastal habitats.
- Promoting the effective implementation of ecosystem-based management of our ocean and coastal resources.
- Reducing adverse impacts of offshore development.
- Increasing ocean awareness and literacy among out citizens.
- Expanding ocean and coastal scientific information, research, and monitoring.
- Fostering sustainable economic development throughout our diverse coastal communities.

Although the WCGA initially did not have any specific objectives addressing CMSP, WCGA received funding in 2010 to further CMSP efforts on the West Coast. Along with this funding, WCGA

also applied to NOAA for funding and technical support to develop a comprehensive marine spatial plan for the West Coast. In creating this regional plan, several high-priority actions of regional importance have been identified. These are:

- Develop a West Coast data network to address regional ocean and coastal issues.
- Gather information needed to identify ecologically important habitats and areas and map areas of human use.
- Identify and test the best tools to assist states and federal agencies and the WCGA in working with tribes, stakeholders, coastal communities, and partners to plan and make decisions about ocean uses and resources.
- Working with federal and tribal governments, create a West Coast regional planning body to engage partners, coastal communities, stakeholders, technical and scientific experts, local governments, and the general public in achieving ocean and coastal priorities.
- Realize the goals of the WCGA Action Plan by defining the highest-priority action items, providing WCGA action coordination teams with the resources to succeed, and providing funding for the WCGA to operate.

One of the eight teams, the Renewable Ocean Energy Action Coordination Team, explores the feasibility for responsible offshore renewable ocean energy development as part of the West Coast energy mix. In doing so, the team will strive to

- Have an informed energy industry, ocean users, public, government, and tribal partners.
- Have a clear, efficient, and effective regulatory process.
- Encourage siting that maximizes energy benefits and avoids or minimizes environmental impacts.
- Improve understanding of environmental, social, and cultural impacts and ramifications of technologies.

4.3.3 Washington State

4.3.3.1 Policy and Legal Framework for CMSP

In March 2010, the Washington State Legislature enacted a new state law on marine spatial planning (MSP) (Substitute Senate Bill 6350). Within this law, the Legislature tasked the governor's office with chairing an interagency team, the State Ocean Council, to assess existing state efforts and recommend steps to begin undertaking MSP. Representatives from coastal Marine Resources committees and two federal agencies were also included in this process. In January 2011, the State Ocean Council delivered a final report to the Washington legislature consisting of 21 final recommendations for advancing marine spatial planning in Washington State. These recommendations fall under six main categories:

- Focus of Marine Spatial Planning in Washington State
- Goals and Objectives
- Ecosystem Indicators
- Spatial Data Needs

- Data Management and Delivery
- MSP Framework: How do we get there?

Proceeding with additional planning activities is contingent upon securing federal or other non-state funds. Although funding is currently unavailable, the State Ocean Council has recommended state actions in order to continue to prepare for marine spatial planning in Washington State.

- Identify and see non-state funding for initiating MSP activities and/or planning processes, including workshops or meetings to establish organizational structures and coordinate next steps.
- Pursue government-to-government consultation with tribes regarding MSP activities and structures.
- Finalize spatial data inventory and seek non-state funding to fill priority spatial needs and gaps as well as improve access to information that is already available.
- Further evaluate options for improving data sharing and data management and seek non-state funding for projects to advance these activities.
- Evaluate establishing partnerships with a wide range of public and private groups with expertise for advancing particular aspects of MSP.
- Continue efforts to advance MSP for the state by coordinating with the West Coast Governors' Agreement and related efforts in British Columbia, Canada, on regional MSP and, where possible, utilize opportunities to advance priority MSP needs for the state that would also benefit regional planning.

(Note: These actions are not in priority order and are dependent on available resources.)

4.3.3.2 State Data and Information Management Resources for Renewable Energy-Focused CMSP

- Washington Department of Ecology Coastal Atlas – The purpose of the Washington Coastal Atlas is to make relevant information easily available for use in coastal and shoreline resource planning and management. Although it does not provide any offshore renewable energy data for users to view and analyze, it does possess many ecological and social data layers which can assist the CMSP process is Washington State. https://fortress.wa.gov/ecy/coastalatlas/
- Washington State Governor's Office of Regulatory Assistance – This website serves as an information portal which provides the user with all the information needed to understand and begin the environmental permitting processes required for offshore renewable energy as well as other regulatory issues in the state of Washington. http://www.ora.wa.gov/resources/permitting.asp

4.3.4 Oregon

4.3.4.1 Policy and Legal Framework for CMSP

Initially adopted in August 1994, Oregon's Territorial Sea Plan (TSP) was created by the Ocean Policy Advisory Council to provide a means of coordinating and creating ocean policy for the state and to prepare a plan for managing the resources and uses of Oregon's territorial sea. In March 2008,

Governor Kulongoski directed that the TSP be amended to guide the siting of ocean renewable energy facilities, led by the Department of Land Conservation and Development. This process was carried out in two phases:

- Phase I, completed in November 2009, incorporated stakeholder and affected agency engagement to create a new chapter to the TSP. This new chapter describes policies, standards, and procedures that state agencies will use to approve new alternative energy developments.
- Phase II of the amendment process, which is currently under way, is to spatially analyze the various ocean uses and ecological resources. This will be carried out through a public process to identify and allocate areas that are appropriate for renewable energy development. http://www.oregon.gov/LCD/OCMP/Ocean_TSP.shtml

The State of Oregon and BOEMRE are coordinating activities through an intergovernmental task force consisting of federal officials, elected state and tribal officials, and designated member representatives. The task force is chartered by the BOEMRE Office of Offshore Energy and Minerals Management to provide for coordination and consultation with respect to its consideration of potential renewable energy activities on the Outer Continental Shelf (OCS) offshore Oregon. The task force met twice in FY 2011 to develop a charter, hear presentations on the current status of renewable energy research on the OCS, and discuss tools and data sets that could guide planning activities. Meetings will continue into FY 2012.

4.3.4.2 State Data and Information Management Resources for Renewable Energy Focused CMSP

- Oregon Marine Map – Oregon Marine Map is a web-based decision support tool for open and participatory spatial planning in the marine environment. As a product of the MarineMap Consortium developed by the University of California Santa Barbara, Ecotrust, and The Nature Conservancy, the development of Oregon Marine Map will assist the continuous public process of updating the Oregon TSP. Through data visualization, real-time analysis, and reporting, the primary goal of Oregon MarineMap is to provide resource managers, scientists, stakeholders, and the public a means to conduct transparent coastal and marine spatial planning. Available data layers consist of: fishing ground maps, shoreline boundaries and seafloor mapping surveys, critical habitat for endangered fish, as well as TSP working group data layers consisting of fisheries, ecological, and existing use analyses. Oregon Marine Map will also assist to facilitate the positioning of nearshore marine habitats and renewable energy sites through visualization, analysis, and collaboration. http://www.oregonocean.info/index.php?option=com_content&view=article&id=335:oregon-marinemap-an-introduction&catid=208:marinemap-general-info&Itemid=132.
- Oregon Coastal Atlas – The Oregon Coastal Atlas is a multi-group project that provides traditional and digital information to users in order to inform and improve decision-making within the Oregon Coastal Zone. Pertinent to CMSP, the Oregon Coastal Atlas provides interactive maps which allow users to view and access social and ecological data layers. Layers such as wave energy preliminary permit sites, ground fish Essential Fish Habitat restricted areas, state marine managed areas, kelp surveys, etc. may all be useful to many different stakeholders involved with the Oregon CMSP process including wave energy developers. http://www.coastalatlas.net/
- Parametrix Bayesian Decision Framework – Parametrix has partnered with Aquaterra and Oregon State University to develop a robust statistical system that integrates oceanographic, ecological, and

human use data; stakeholder input; and cumulative impacts to assist decision makers in accurately siting future ocean renewable energy projects. This system will focus on the West Coast of the United States and is a key component for energy evaluation and marine spatial planning efforts. Although this system was originally developed for wave energy, the methodology will also be utilized for offshore wind and other renewable.

- Parametrix/Aquaterra Cumulative Effects Analysis – Parametrix and Aquaterra have partnered with Oregon Wave Energy Trust, European Marine Energy Center, and BC Hydro Power Tech Labs to develop a multi-criteria decision making tool for evaluating the environmental and socioeconomic impacts of various ocean renewable energy technologies. The final product is a GIS tool that can be used for assessing various development scenarios and the potential impacts and benefits.

4.3.5 California

4.3.5.1 Policy and Legal Framework for CMSP

In 1999, the California state legislature adopted the Marine Life Protection Act, which requires the state to re-evaluate and redesign California's system of marine protected areas (MPAs). The goal of redesigning these MPA networks is to increase coherence and effectiveness in protecting the state's marine life and habitats, marine ecosystems, and marine natural heritage, as well as to improve recreational, educational, and study opportunities provided by marine ecosystems subject to minimal human disturbances.

The Marine Life Protection Act initiative, a public-private partnership of the California Natural Resources Agency, Department of Fish and Game, and the Resources Legacy Fund Foundation, uses the best readily available science, as well as the advice and assistance of scientists, resource managers, experts, and stakeholders to develop recommendations for the State of California. Of the 1,100 miles of coastline, California has decided to take a regional approach to reorganizing their MPA network and has divided the state into five separate study regions: San Francisco Bay, North Coast, South Coast, North Central Coast, and the Central Coast region. http://www.dfg.ca.gov/mlpa/.

4.3.5.2 Data and Information Management Resources for Renewable Energy Focused CMSP

- MarineMap Consortium – MarineMap is a web-based decisions support tool for open and participatory spatial planning in the marine environment. Developed by the University of California Santa Barbara, Ecotrust, and The Nature Conservancy, MarineMap offers users web-based access to a great deal of marine and coastal data for the state of California. Although this tool is primarily focused on MPAs, it allows for users to view and overlay many social and ecological data layers enabling many different stakeholders to utilize this tool to build planning scenarios and generate reports to improve our understanding on the existing uses and their proximity to offshore renewable energy sites within California waters. http://marinemap.org/.

4.3.6 Additional Data and Information Resources

PNNL has compiled a more comprehensive list of data portals, tools, and datasets available to guide siting and planning for MHK technologies. This list was developed at the request of and submitted to the Wind and Water Power Technologies Program in December 2010. As new tools become available, they will be added.

In addition, data and information contained within national databases, such as the Multipurpose Marine Cadaster, developed and maintained by NOAA, BOEMRE, and PNNL's *Tethys* knowledge management system, have excellent application to West Coast regional and state planning activities. PNNL, NOAA, and BOEMRE have coordinated to integrate Multipurpose Marine Cadaster data sets with *Tethys* through work under Task 2.1.1; as described in Section 3 of this report, ensuring knowledge and use of the *Tethys* system was a primary outreach task this year.

5.0 Summary and Outcomes from 2011 Activities

As articulated in the FY 2011 AOP, task 2.1.7 has the following four objectives:

- to work with stakeholders to streamline the MHK regulatory permitting process
- to work with stakeholders to gather information on needs and priorities for environmental assessment of MHK development
- to communicate research findings and directions to the MHK industry and stakeholders
- to engage in spatial planning processes in order to further the development of the MHK industry.

Through the activities described in this progress report, PNNL addressed all four objectives through outreach, regulatory assessment, and spatial planning activities. Outcomes for each subtask are summarized below:

Subtask 2.1.7.1

- Through meetings, webinars, and conference sessions, *Tethys* and ERES were demonstrated to agency staff, industry members, members of environmental non-governmental organizations, and other stakeholders. Web statistics indicate an increase in usership of *Tethys* as a result. Agency and stakeholder interactions have improved *Tethys* functionality—in particular collaboration with BOEMRE and NOAA has resulted in a *Tethys*/Multipurpose Marine Cadaster linkage to better support geospatial applications.
- Pacific Energy Ventures Strategic Outreach Assessment resulted in a better understanding of how and what stakeholders search for regarding information on MHK. This information is being used to adapt *Tethys* and advancedH2Opower.com to accommodate stakeholder needs.
- Three environmental webinars were attended by more than 150 stakeholders each. Webinars encouraged interaction between researchers working on similar topics, captured the current status of environmental research on MHK in the United States and abroad, and linked regulators and industry members to the researchers best able to answer pressing environmental questions. Webinars will continue in fiscal year 2012 based on the overwhelmingly positive feedback by participants.

Subtask 2.1.7.2

- Interviewed eight project developers engaged in the permitting process for MHK devices in U.S. waters to determine regulatory challenges to meeting their deployment goals.
- Reviewed the literature of published study plans and regulatory materials to understand which regulations and processes most contribute to environmental study costs.
- Using these two sets of data, carried out a regulatory assessment for DOE and submitted the assessment as an internal document. Working with DOE to refine the internal document for public release in FY 2012.

Subtask 2.1.7.3

- Identified ongoing CMSP activities on the U.S. West Coast where renewable energy siting and permitting is a primary driver. At the request of the Water Power Team, engaged with these initiatives and provided input on ongoing DOE activities and research that could facilitate siting and permitting.
- Created a comprehensive list of existing data portals, tools, and datasets that could be used for siting and permitting ocean renewable technologies. Submitted this list to DOE in December 2010.
- Identified opportunities for *Tethys* to add geospatial capabilities or other data that could be useful for encouraging efficient and effective siting and planning for ocean renewable technologies.

The overarching strategic goal for Task 2.1.7 is to "reduce the regulatory costs, time, and potential environmental impacts associated with developing, siting, permitting, and deploying MHK systems." Task 2.1.7 is just one task of many intended to achieve this goal, but its contribution is an important one. Work under subtask 2.1.7.1 helps DOE identify key environmental and regulatory uncertainties where additional research resources would have the greatest impact on driving down costs and reducing timeframes. Through subtask 2.1.7.2 activities, we strive to encourage use of DOE-funded research tools by industry, regulators, and other stakeholders. Connecting stakeholders to research and information that can address uncertainty and present a path forward toward deployment of first-generation technologies enhances the value of DOE work. And finally, through active engagement in policy and planning forums, work under subtask 2.1.7.3 helps DOE stay involved in West Coast forums where decisions about the availability of ocean space for renewable technologies will be made over the next several years.

6.0 References

Clean Water Act. 1977. Public Law 95-217, as amended, 33 USC 1251 et seq.

Coastal Zone Management Act. 1972. Public Law 92-583, 16 USC. 1451-1456.

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Appendix A

Regulatory Assessment Cover Letter, Interview Guide, and Survey

INTERVIEW AND SURVEY

The survey is presented in two parts. The first part includes a set of interview questions regarding your project that we will use to guide the phone interview (don't worry about filling these questions out ahead of the interview, but please be prepared to discuss). The second part consists of a spreadsheet listing each requirement you may have had to fulfill, or anticipate fulfilling (see the attached Excel file). During the phone interview, we can discuss the survey questionnaire—you may choose to walk through your answers during the interview or provide them at a later date.

Interview Questions—*These questions will be used as a starting point for discussion during the phone interview (ALL information collected will be kept confidential).*

Company Name: _____
Project Name and FERC Number: _____
State: _____
Waterbody (Federal or State waters?): _____
Size of project (number of devices and generation capacity): _____

1. Please describe your project—what are the key environmental/regulatory issues?

2. Did you encounter redundancies in the permitting process? If so, please describe—for example, did you submit the same data to different agencies at different times?

3. Can you identify specific statutes or regulatory requirements that were particularly costly and time consuming?

4. Were there aspects of the permitting process that worked especially well?

5. Reflecting on your own experience, what specifically could be improved about the licensing and permitting process?

6. Would you recommend any best practices/strategies to make the existing regulatory process smoother or faster?

7. In general, how have stakeholders (environmental interests, local community, local government, tribes, marine industries, etc.) responded to your project and how do you think this response has affected the cost and length of the licensing process?

8. Was the timeline for licensing your project longer or shorter than anticipated?

9. How has the regulatory process affected your financing strategy?

10. What are the most important actions that can be taken to encourage an efficient and effective permitting process?

Instructions for Survey Spreadsheet and Column Descriptions

The following describes the attached survey spreadsheet. We understand that the MHK industry still has limited deployment experience to inform this survey and that it may be difficult to fill out the survey completely. For columns where you do not have hard data, an estimate is still helpful (please note where you are estimating).

Column	Description

b. Total Time to Complete Action: This is the entire amount of time (in hours, days or months) that you or your team spent to complete each regulatory action.

c. Cost: The total amount of cost incurred by you in relation to staff and resources spent for each regulatory action.

d. Person-hours: The total amount of person-hours you spent for each action. For example, 2 people each spending 3 days (24 hours) a week for 2 weeks = 96 hours.

e. Number of people: The number of staff you had working to complete each regulatory action and their skills.

f. Outside contractors: Did you hire the help of contractors/consultants to assist you in completing this action? What were their skill sets?

g. Necessary for next step: Did you need to complete this regulatory action before beginning next step of regulatory/permitting action?

h. Special cases/circumstances: If you would like to further explain your experience with a particular regulatory action, please indicate in this column.

i. Other comments: If you have additional comments on the regulatory action, please add them here or include an additional page.

If there were actions (Federal and State) that we may have missed in this survey, please list them in the "other" row in the spreadsheet.

Appendix B

Tethys and ERES Meeting Summaries

Pacific Northwest National Laboratory
ERES/*TETHYS* Version 1 Demonstration
Meeting Summary

Demonstration Objectives:

- Demonstrate Version 1 functionality of ERES and *TETHYS*.
- Illustrate the benefits and uses of ERES and *TETHYS*.
- Encourage participant use of and population to the *TETHYS* tool.
- Gather input on functionality and applicability to current issues.

Meeting Questions and Comments

4/26 BOEMRE Meeting

- You mentioned that the current output from ERES does not include the risk of exposure. Will you be adding that and, if so, when?
- ERES appears to be based on existing regulations. How do risks and impacts not known and, therefore, not currently part of regulations factor into ERES?
- Is ERES intended to be a decision model?
- ***Response***: It is intended to support decision making but not a decision making tool itself.
- BOEMRE indicated that is consistent with what is needed. Currently, don't need a number or a decision making tool. Just looking for a tool that gives knowledge and is a link to the real world.
- How are you dealing with variability of data? Rather than just using the most conservative estimates can you show a range?
- Lots of interest in access to documents – both publicly available and copyrighted. Is there a way of listing those copyrighted documents so that they can be secured outside of *Tethys*? The shopping cart is a good idea.
- There is some concern about intersection of social media and *Tethys*. The concern is around the need for controls as to who access and provides information into *Tethys*.
- There is interest in the work that PNNL is doing on offshore wind projects. Bob would like to coordinate with DOE to work on this together (Chris Hart, Patrick Gillman, and Bob to connect). Specific interest in geospatial maps of information related to wind.

4/26 Federal Agency Meeting

- Does ERES consider just environmental issues or does it consider other elements (i.e., physical risks, economic benefit, etc)?
- ***Response***: It considers just environmental issues.
- What level of detail are you developing with the ERES model (ex: more water in bypass reach versus the Instream Flow Incremental Methodology (IFIM))?

- Who determines the value associated with an article listed in *Tethys*?
- Who can edit the history in *Tethys*?

4/27 Environmental Organizations

- Does ERES consider cumulative effects
- How will the *Tethys* date be managed and maintained?
- How does this related to the Marine Cadaster work? It was discussed that the Marine Cadaster was a comprehensive geospatial database from which CMSP analyses could be conducted. It was noted that the work that this work is a critical input to CMSP, as it helps prioritize.

5/10 Webinar

- How often will the information in *Tethys* be updated?
- Who will update *Tethys*?

Meeting Participants

4/26 BOEMRE Meeting

Lori Medley
Mike Rasser
James Price
Christine Taylor
Jennifer Ewald
Fonald Lai
Barbara Wallace
Bob LaBelle
Angel McCoy
Erin Trager
Brian Krevor
Marjorie Weisskohl
Greg Boland

4/26 Federal Agency Meeting

Benjamin Baron-Taltre, NOS
Jennifer Hill, FERC
Jocelyn Brown-Saracino, DOE
Whitney Blanchard, NOAA
Kate Haber, NOAA
Patrick Gilman, DOE
Anna Coffey, DOE
Caitlin Frame, DOE
Carrie Gill, DOE
Stephen Bowler, FERC
Merrill Hathaway, FERC
Tim Konnert, FERC
Woohee Choi, FERC

4/27 Environmental Organizations

Jennifer Dean, PEW Environmental Group
Jeff Waters, Ocean Conservancy
Roxanne Thomas, Ocean Conservancy
Regan Nelson, Natural Resource Defense Council
KC Cervney, Marine Conservation Institute
Sandara Whitehouse, Ocean Conservancy
Sean Cosgrove, Conservation Law Foundation
Steve Eick, Ocean Conservancy

5/10 Webinar

David Perekstra, BOEMRE
Ann Bull, BOEMRE
Holly Freifield
James Bond, USFWS
Kara Blake
Kate Sherman
Keith Hastie
Luke Hanna
Lyon Lamerole
Mary Grainey, OWRD
Rupak Thapalya, Hydropower Reform Coalition
Susan Henkel, OSU
Steve Patch
Steve Sinkevich, USFWS
Emily Lindow, NOAA
Alison Goss Eng

Appendix C

Environmental Webinar Flyers

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