AN ABSTRACT OF THE THESIS OF

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Title: Evaluating Community Engagement in Wave Energy Siting off the Oregon Coast

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Flaxen Conway

The ocean off Oregon's coast is a busy place with many activities occurring that can sometimes be in competition or cooperation. Deciding how new uses fit with existing ocean uses is complex, but there are some tools available to help decision-makers. Generating energy from waves is an emerging ocean use and the human dimension effects require further study.

In 2011, the Northwest National Marine Renewable Energy Center (NNMREC), in conjunction with Oregon Sea Grant (OSG), began efforts to identify a site for a grid-connected, open-ocean test facility for full-scale wave energy devices. The NNMREC and OSG led a siting process that included meetings with community leaders, public workshops, and the creation of teams of community members to develop siting proposals.

This thesis research emerged from a solicitation for an independent evaluation of the siting process. The overall goal of this research was to determine if the siting process was effective. Specifically, using a mixed methods research approach consisting of semi-structured interviews and an online

questionnaire, this research answered if participants: (a) where participants involved in the process at the level they wanted to be, (b) did participants understand the process, (c) did participants feel as though they were heard, and (d) did participants feel they had an influence on the outcome of the process? The goal of evaluating this siting process was to provide lessons that can inform future marine renewable energy siting efforts.

Logistically, there were several successful aspects of the siting process. Most participants reported they had at least a fair understanding of the process and felt they had enough information. The most frequently used sources of information about the process came from public meetings and personal communications with process leaders. On average, participants reported they wished they had been more involved in the process, but most participants reported that this less-than-desired involvement was due to personal or professional constraints, not the process itself. On average, respondents understood the process and felt heard, but they neither agreed nor disagreed they had an influence on the process.

As existing and new uses compete for space in the ocean, more social science research is needed to understand how best to choose sites for new uses. Research about stakeholder engagement in the process of siting marine renewable energy facilities is an emerging field of study, and gaining a better understanding of how to design and implement processes that effectively engage

communities in wave energy siting could lead to more successful siting efforts in the future.

Evaluating Community Engagement in Wave Energy Siting off the Oregon Coast

by
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Major Professor, representing Marine Resource Management

Dean of the College of Earth, Ocean and Atmospheric Sciences

Dean of the Graduate School

I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

Briana Goodwin, Author

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CONTRIBUTION OF AUTHORS

Flaxen Conway, Teresa Johnson, and Mark Needham advised on all aspects of this research. Mark assisted heavily in the questionnaire design and quantitative data analysis and interpretation. Belinda Batten and Kaety Jacobson assisted in writing the PMEC-SETS process description and edited the Final Report (Appendix C).

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CHAPTER ONE: INTRODUCTION

The ocean off the coast of Oregon is a busy place with many activities occurring that can sometimes be in competition or cooperation. For example, many marine species call Oregon's ocean home, commercial fishers make a living by harvesting some of these species, and recreational divers enjoy viewing and sometimes collecting those same species. There are many more uses of the ocean (e.g., whale watching, research, transportation, mining, beachcombing, dredge disposal) that occur in the same proximity. Decision makers face the challenging goal of deciding when and where existing and new uses can occur. This can be a complex process but there are some tools available to help decision-makers (Coleman, Foley, Prahler, Armsby, & Shillinger, 2011; Stelzenmüller, Lee, South, Foden, & Rogers, 2013).

Ecosystem-based Management and National Ocean Policy

Ecosystem-based management (EBM) calls for managing human behavior to ensure healthy, fully functioning ecosystems (McLeod & Leslie, 2009). This holistic framework allows resources to be managed in a way that incorporates many different perspectives and has a long-term outlook. EBM takes into account the full range of social, economic, and natural systems, and the connections among these systems.

EBM calls for decision-makers to involve community members in the management of resources (McLeod & Leslie, 2009). Considering that management

decisions impact different community members in unique ways, it is important to consider the individual outcomes of each decision. Using boundaries defined by nature challenges traditional management that uses politically defined boundaries such as state or county lines. However, to minimize impacts to other places, EBM calls for decisions to be made across human-created boundaries and outside of specific agency focus areas. The creation of groups such as the National Ocean Council, which was formed to coordinate ocean uses in a manner that includes all involved agencies and locations, is expected to help bring together the appropriate parties to ensure decisions are well thought out.

The National Policy for the Stewardship of the Ocean, Our Coasts, and the Great Lakes (commonly referred to as the National Ocean Policy or NOP), signed into effect in July 2010 by President Obama through Executive Order 13547, aims to create a more integrated and representative approach by the federal government and its management of U.S. oceans and coasts (*Exec. Order No. 13547*, 2010). To facilitate turning the NOP into tangible actions, the National Ocean Policy Implementation Plan (herein referred to as 'the Implementation Plan') was created. The Implementation Plan, finalized in April 2013, took two years of work with a multitude of stakeholders including scientists, coastal community members, and marine-based businesses. Both the NOP and Implementation Plan emphasize the importance of stakeholder engagement and public participation "to ensure that actions are based on a full understanding of the range of interests and interactions that occur in each region" (National Ocean Council, 2013, p. 23).

The NOP (2010) calls for the use of coastal and marine spatial planning (CMSP), "a comprehensive, adaptive, integrated, ecosystem-based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean, coastal, and Great Lakes areas" (FR 43024, p. 75). CMSP is proposed as a voluntary tool to be applied with the engagement and support of the federal government throughout designated regions in U.S. coastal areas, including the Great Lakes. The Implementation Plan (2013) calls for the use of CMSP as a method for diverse stakeholders to come together and evaluate "emerging ocean uses, such as renewable energy, and to consider how those uses might be most appropriately pursued" (p. 85).

Wave Energy in Oregon

Oregon's Renewable Portfolio Standard, enacted in 2007 by Senate Bill 838, calls for 25% of Oregon's energy production to come from renewable resources by 2025. One potential way to increase the state's renewable energy production is through marine renewable energy such as wave energy. The West Coast has the greatest potential for wave energy generation on the continental U.S. (Electric Power Research Institute, 2011). The ocean off the coast of Oregon has enough potential wave energy to power 28 million homes annually (Oregon Department of Energy, n.d.).

Realizing the need to prepare for marine renewable energy as a new additional ocean use, the state amended Oregon's Territorial Sea Plan (TSP) in 2009 to include renewable energy development. TSP Part 5 requires "the proper siting

and development of these [marine renewable energy] facilities in order to minimize damage to or conflict with other existing ocean uses and to reduce or avoid adverse effects on marine ecosystems and coastal communities" (Oregon Department of Land Conservation and Development, n.d.-a). To that end, Part 5 calls for all state agencies with regulatory oversight to develop and implement policies specific to wave energy.

In addition to agencies preparing to handle possible wave energy developments, Oregon citizens are interested in learning about the potential effects of wave energy (Conway et al., 2009). Oregon's Statewide Planning Goal 1 calls for citizens to be involved in all phases of public planning (Oregon Department of Land Conservation and Development, n.d.-b). Studies on the socioeconomics of wave energy development have shown that Oregonians are generally accepting of testing wave energy technologies and want more information on the impacts of wave energy developments (Conway et al., 2009, 2010; Stefanovich Petrova, 2010).

Wave Energy Test Site in Oregon

In 2011, the Northwest National Marine Renewable Energy Center (NNMREC) began a focused effort to develop an open-ocean facility to test full-scale devices, called the Pacific Marine Energy Center South Energy Test Site (PMEC-SETS). NNMREC partnered with Oregon Sea Grant Extension (OSG) to implement a community process to find the site for the test facility. The process leaders began by meeting with community leaders in coastal communities then held community forums. Finally, two communities – Reedsport and Newport – were invited to

submit proposals to host PMEC-SETS. Newport was ultimately selected as the site for PMEC-SETS based on several parameters including community support, technical aspects, and available services in the community. A detailed description of the PMEC-SETS process can be found in Chapter 2 of this thesis.

Stakeholder Engagement

A central component of this thesis involves public participation and stakeholder engagement, which have many accepted definitions. Reed (2008, p. 2418) defines stakeholder participation as "a process where individuals, groups and organisations choose to take an active role in making decisions that affect them." Another definition in a report by Tamarack (2003, p. 32) takes into account the need to be flexible and defines engagement as "an ongoing interactive process characterized by commitment to ever-changing community needs and interests." Community engagement can "go beyond merely making information available or gathering opinions and attitudes. It entails a more active exchange of information and viewpoints" (New South Wales, Department of Local Government, PlanningNSW, & Elton Consulting, 2003, p.6).

Defining stakeholders in a process is usually challenging. A stakeholder can be defined as anyone who can affect or is affected by an action (Mitchell, Agle, & Wood, 1997). Coastal and ocean resources fall under the Public Trust Doctrine, "the legal concept that the government holds the common water resource in trust for the public and regulates the commons in the public interest" (Scanlan, 2006, p. 2). Considering the Public Trust Doctrine, when managing those resources the list of

potential stakeholders is immense – including coastal residents, tourists, surfers, commercial fishers, and coastal business owners. To further complicate the definition of stakeholders specific to ocean planning in Oregon, each geographic or occupational community may have unique priorities and concerns. For example, some stakeholder groups in Oregon, such as whiting fishers, may operate outside of political boundaries such as state lines.

Involving stakeholders at the beginning and throughout a siting process can create a stronger sense of ownership over the project and can help build trust (Ehler & Douvere, 2009), especially when a process is transparent and takes into consideration all viewpoints (Richards, Carter, Sherlock, & Macaulay Institute for Soil Research, 2004). Having broader viewpoints represented can also lead to the anticipation and mitigation of potential negative impacts (Beierle, 2002; Koontz & Thomas, 2006). When managers and scientists work together with stakeholders and respect their contributions to the understanding of the local resource, it empowers resource users and can help overcome distrust of government and outsiders (Mallory, Fontaine, Akearok, & Johnston, 2006). The development of strong relationships through frequent interaction promotes personalized communication strategies that are necessary for communication (Cone, Borberg, & Russo, 2011).

Study Rationale and Research Questions

NNMREC and OSG solicited an independent evaluation of the PMEC-SETS siting process. The overarching goal of this thesis research was to determine if the siting process was effective. Specifically, this research answered the following

questions: (a) where participants involved in the process at the level they wanted to be, (b) did participants understand the process, (c) did participants feel as though they were heard, and (d) did participants feel they had an influence on the outcome of the process?

NNMREC has been approached for information about the siting process and guidance on how to conduct siting processes, providing further motivation for conducting a formal evaluation. A final report (Appendix C) on this evaluation was provided to NNMREC and OSG. This report will be made available on both the NNMREC and OSG websites, and it will be provided in response to requests for information about the process. The evaluation of this siting process has provided lessons that can inform future marine renewable energy siting efforts.

Thesis Organization

Chapter 1 provides an overall introduction to this thesis. Chapter 2 is a journal article that will be submitted to the journal *Marine Policy.* The article is written with resource managers as the audience and focuses on information that could be used for helping to inform future siting processes. Chapters 3 and 4 summarize the results and discussion of the evaluation that were not presented in the journal article. Finally, Chapter 5 provides a broad conclusion to this thesis.

CHAPTER TWO: AN EVALUATION OF WAVE ENERGY SITING IN OREGON

To be submitted to Marine Policy

Abstract

Research about stakeholder engagement in the process of siting marine renewable energy facilities is an emerging field of study, and gaining a better understanding of how to design and implement processes that effectively engage communities in siting decisions could lead to more successful siting efforts in the future. This study evaluated the process used to choose the site for a grid-connected, open-ocean test facility for full-scale wave energy devices in Oregon. A mixed methods approach was used to collect data from stakeholders involved in this process, including semi-structured interviews and an online questionnaire. On average, respondents understood the process and felt heard, but they neither agreed nor disagreed they had an influence on the process. Results are discussed through the lens of the theory of Trinity of Voice. Finally, the evaluation of this siting process along with a review of literature provides lessons that can inform future marine renewable energy siting efforts.

Introduction

Generating energy from waves is an emerging ocean use. Wave energy converters (WECs) are devices that use either the direct motion of waves or the pressure changes caused by waves to generate electricity. To date, there are nine categories of WECs with their own unique method for converting wave energy to

electricity (Goodwin & Jacobson, 2013). The environmental and human dimension effects of wave energy devices are being studied, but are still not fully understood (Boehlert, McMurray, & Tortorici, 2008; Cada et al., 2007; Haller & Ozkan-Haller, 2013; Haxel, Dziak, & Matsumoto, 2013; Sherman, Henkel, & Webster, 2013; Suryan et al., 2012). In part, this lack of full understanding is because effects are unique to the type of device and size and placement of the installation.

Marine renewable energy, such as wave energy, is a relatively new industrial use of coastal and ocean space in the U.S. Its siting, placement, and maintenance require consideration of a complicated web of potential effects on social, economic, and ecological systems. Research about stakeholder engagement specifically in marine renewable energy siting is a newly emerging field, and past studies have identified the need for more research on the human dimensions of this type of energy (Conway et al., 2010; Kerr et al., 2014; Stefanovich Petrova, 2010). Specifically, Kerr et al. (2014, p. 700) called for comparative studies in the human dimensions of marine renewable energy to identify examples of what works and what does not, which may "reduce the risk of failure of individual projects [and] support successful implementation of marine renewable energy projects."

Considering that marine renewable energy projects have failed due to a lack of attention paid to human dimensions (Chozas, Stefanovich, & Sørensen, 2010; Conway et al., 2010), it is important for those conducting siting processes to plan for stakeholder involvement. Stakeholder engagement has several benefits and overall, it can lead to higher quality and strength of decisions (Beierle, 2002; Dalton, 2006;

Reed, 2008; Reed, Dougill, & Baker, 2008). The legally required approaches of public participation, such as public meetings and comment periods, may not be effective at truly achieving public involvement (Innes & Booher, 2004; Persons, 1990; Senecah, 2004).

There are several opinions on what criteria should be used to evaluate stakeholder participation processes (Beierle, 2002; Blackstock, Kelly, & Horsey, 2007; Chase, Decker, & Lauber, 2004; Rowe & Frewer, 2000). Chase et al. (2004) developed evaluation criteria based on theory and literature, and then worked with stakeholders involved in public participation processes to determine which criteria resonated most. They found that a successful process "uses scientific information, has a genuine influence on the decision, treats all citizens equally, and promotes communication and learning" (Chase et al., 2004, p. 638). Blahna and Yonts-Shepard (1989) identified five conditions essential for effective stakeholder engagement processes: (a) begin engagement early, (b) maintain involvement for the duration of the process, (c) ensure diverse perspectives are represented, (d) use in-person and engaging methods, and (e) incorporate stakeholder input in decisions. In spite of the lack of consensus on evaluation criteria, the need for process evaluation is clear (Blackstock et al., 2007; Chess & Purcell, 1999; Reed, 2008), especially considering "the quality of a decision is strongly dependent on the quality of the process that leads to it" (Reed, 2008, p. 2421).

Theoretical Context

Trinity of Voice (TOV) theory (Senecah, 2004) is a "rubric or a schematic...to design, assess, or remediate effectiveness in public processes" (p. 22). TOV is built on the belief that "the key to effective process is an ongoing relationship of trust building" (p. 23) and identifies access, standing, and influence as necessary elements in gaining and sustaining trust. Access is defined as having the opportunity to be heard within a process. Standing is taking a stakeholder's view as legitimate. Influence refers to a stakeholder's view being considered within the decision making process and that stakeholder being part of the process. These three key elements of TOV – access, standing, and influence – are interdependent and build on each other. For example, a stakeholder with standing, but no access would have no way of providing input.

Study Context

The Northwest National Marine Renewable Energy Center (NNMREC) was established in 2008 by the U.S. Department of Energy to support marine renewable energy development through research, education, and outreach. As a partnership among Oregon State University, University of Washington, and, most recently, the University of Alaska Fairbanks, the NNMREC investigates technological needs, human impacts, and environmental impacts of marine renewable energy. Included in the NNMREC's suite of tools is a group of several test facilities, including the planned Pacific Marine Energy Center South Energy Test Site (PMEC-SETS). The

PMEC-SETS, planned to be operational in 2017, will be the first grid-connected open-ocean test facility for full-scale wave energy devices in North America.

Conversations about this type of test facility began in 2005. In 2011, the NNMREC, in conjunction with Oregon Sea Grant (OSG), began focusing efforts on identifying a site for the PMEC-SETS (called only Pacific Marine Energy Center, or PMEC, at the time of siting). Leaders from both organizations began by meeting with state and local government officials, the commercial fishing community, and leaders of stakeholder groups, ports, and officials in Coos Bay, Reedsport, Newport, and Camp Rilea, Oregon. Goals of the meetings were to create awareness about the PMEC-SETS, answer questions, gauge interest levels of each community to host the PMEC-SETS site, and seek feedback on what stakeholder groups and individuals needed to be involved. Input was also gathered on where to hold public meetings, timing of engagement (to avoid overlapping concurrent events), and other existing community issues of which the process leaders needed to be aware.

In August 2012, community forums were held in Coos Bay, Reedsport, and Newport, Oregon. Goals of these forums were to provide information to the community and begin a dialogue. After completing these forums, the potential host communities were narrowed to Reedsport and Newport; this decision was based on several factors, including possibilities for ocean sites near the community, community support for hosting the PMEC-SETS, and access to existing services and infrastructure.

A community forum was not held for Camp Rilea because siting the PMEC-SETS there would require coordination with another wave energy project led by the Oregon Military Department. Although this department viewed the opportunity to host the PMEC-SETS as positive and exciting, the site at Camp Rilea was not pursued after technical analysis showed that the site was not ideal. Coos Bay was also not selected for further consideration due an unfavorable technical analysis. In addition, there were two other offshore renewable energy projects proposed for the Coos Bay area.

In September 2012, community members in Reedsport and Newport were invited by process leaders to apply to serve on "Site Selection Teams" that would eventually be tasked with preparing a proposal for hosting the PMEC-SETS. These teams were designed to broadly reflect the demographics of each community, so process leaders sought representatives from commercial and recreational fishing, local governments, economic development and marine infrastructure groups, local utilities, tribes, educational organizations, environmental groups, non-consumptive recreation users, and the public at large (Table 1). Process leaders reviewed the applications and ultimately accepted everyone who applied to serve on a Site Selection Team. The Reedsport Site Selection Team contained 18 members and the Newport Site Selection Team contained 14 members.

In November 2012, a request for proposals (RFP) was released to each Site Selection Team outlining the desired site characteristics, criteria needed for a fully functioning deep-water test site, and the proposal requirements. Both communities

put forth proposals in December 2012 that were evaluated by a team of external reviewers. Selection was based on ocean site characteristics, marine and on-shore cable routes, port and industry capabilities, impacts to existing ocean users, challenges in securing permits, stakeholder participation in the proposal process, and support of the local fishing community. In the end, Newport was chosen as the site for the PMEC-SETS.

NNMREC and OSG solicited an independent evaluation of the PMEC-SETS siting process. The overarching goal of this research was to conduct this evaluation and determine if the siting process was effective. Specifically, this research answered the following questions: (a) where participants involved in the process at the level they wanted to be, (b) did participants understand the process, (c) did participants feel as though they were heard, and (d) did participants feel they had an influence on the outcome of the process? These research questions reflect the three key elements of TOV – access, standing, and influence.

Methods

Data Collection

Data were gathered from various participants in the PMEC-SETS process who fit into one of five broad categories. The *community leader* category included leaders from coastal communities. Participants in this category included people such as mayors, city councilors, port commissioners, and respected commercial fishers. Members of the *Site Selection Team* category were split into two groups based on

the geographic community they were representing — Reedsport or Newport. Therefore, there was a *Reedsport Site Selection Team* category and a *Newport Site Selection Team* category. The *NNMREC* category included NNMREC employees and those who served as advisors to process leaders. Finally, the *public* category included those who participated by attending a public meeting or through personal communication with process leaders, and did not fit the other categories.

A sequential, mixed methods approach was used for collecting data. Initially, semi-structured interviews (n=4) were conducted with a subset of participants selected through purposive sampling (Berg & Lune, 2012; Miles, Huberman, & Saldaña, 2014). These semi-structured interviews informed the design of questions asked and ensured the use of appropriate terminology in a confidential online questionnaire.

The electronic questionnaire was administered online using Qualtrics software. The initial invitation to participate was sent in November 2014 via email with reminders sent three and six weeks after the initial email invitation. In December 2014, reminder telephone calls were made to each Site Selection Team participant who had not completed the online questionnaire. Out of 130 questionnaire invitations sent, 61 questionnaires were completed, resulting in an overall response rate of 47%. Table 2 lists each respondent category, total respondents, total questionnaires sent, and the response rate for each category. It is estimated there were approximately 180 total participants in the PMEC-SETS

process. Therefore, the margin of error in this study is +/- 10.2% at a 95% confidence interval.

Following Dillman (2007), several steps were taken to maximize effectiveness of the online questionnaire. For example, a welcome screen provided information about the questionnaire and directions for how to proceed. Instructions on how to respond were also included for each question. Drop-down menus were not used and responses were on a voluntary basis and not required to advance through the questionnaire. In addition, the questionnaire was pre-tested with process leaders and several members of the study population. Feedback from this pilot test was incorporated to make the instrument as understandable and user-friendly as possible.

Analysis Variables for Questionnaire

Respondents' participant category (independent variable) was tested against three dependent variables (Table 3). All responses were on a five-point recoded scale between -2 "strongly disagree" and 2 "strongly agree." The first dependent variable, respondent understanding of the process, was computed from four variables addressing the concept. The second dependent variable, respondents' feeling of being heard during the process, was computed from five variables addressing the concept. The third dependent variable, respondents' feeling of having an influence on the outcome of the process, was computed from six variables addressing the concept. The individual variables addressing each of these three

concepts are shown in Tables 3-5. Responses about actual and desired level of involvement in the process were on a four-point scale from 0 “not involved” to 3 “extremely involved.”

Data Analysis

Questionnaire data were analyzed using SPSS software. Cronbach alpha coefficients were used for testing reliability of multi-variable scales. An alpha coefficient of ≥ .65 implies that the variables are measuring the same concept and may be combined into an index (Vaske, 2008). The reliability analysis for understanding of the process revealed that one variable (“I did not have a good understanding about the selection process at the time”) needed to be reverse coded before analysis.

Kruskal-Wallis *H* tests (i.e., non-parametric alternative to one-way analysis of variance) were used for determining whether responses to these composite indices varied among categories of participants (Schafer & Ramsey, 2013). When a difference among groups was identified, Mann-Whitney *U* tests (i.e., non-parametric alternative to independent samples *t*-test) were used for determining which specific participant categories significantly differed among each other in their responses (Schafer & Ramsey, 2013). A Wilcoxon matched-pairs signed-ranks test (i.e., non-parametric alternative to paired samples *t*-test) was used for determining if there were significant differences in the way respondents answered questions about their actual level of involvement compared to their desired level of involvement (Schafer

& Ramsey, 2013). Effect sizes were used to show the strength of significance for each statistical test (Vaske, 2008). Specifically, eta was used for Kruskal Wallis, point-biseral correlation for Mann-Whitney *U*, and Cohen's *d* for Wilcoxon matched-pairs signed-rank test.

Results

This research sought answers to questions regarding involvement, understanding, feeling heard, and influence: all reflective of the three key elements of TOV – access, standing, and influence.

Involvement

Respondents were asked what their *actual* level of involvement was during the process and what their *desired* level of involvement would have been. When asked about their *actual* level of involvement in the siting process, on average, participants reported being between somewhat and moderately involved (M = 1.49). When asked about their *desired* level of involvement, on average, participants wished they had been moderately involved (M = 1.82). A Wilcoxon matched-pairs signed-rank test showed the desire to be more involved was statistically significant (Z= 3.35, p = .001) with Cohen's d = .34 indicating a strength of significance between "small" and "medium" (Cohen, 1988). The public and Reedsport Site Selection Team categories desire to be more involved in the process was statistically significant (Z= 2.59, p = .010; Z= 2.00, p = .046) with Cohen's d = .75 and .60 indicating a strength of significance between "medium" and "large" (Cohen, 1988).

Respondents were asked to explain why there was a difference between their *actual* and *desired* participation levels. Of the participants who answered, most (78%) cited personal or professional reasons for not being more involved. For example, one respondent said, "I am a Federal Government employee and had to be careful to act only as a private citizen, which limited my involvement." The remaining respondents (22%) said they were not more involved because they were not invited to participate more in the process.

Understanding, Feeling Heard, and Influence on Outcome

Four survey questions were utilized to generate an index assessing respondents' understanding of the process. A reliability test suggested the items could be combined to create an index of understanding (Cronbach's alpha = .75). All variables were included because dropping any variable would not cause a significant increase in Cronbach's alpha (Table 3). On average, participants across all categories slightly agreed (M = .78) that they understood the process. Participants in the Public category had the lowest understanding of the process (M = .10), whereas participants in the Newport Site Selection Team category had the highest understanding (M = 1.61, Table 6).

A Kruskal Wallis H test revealed that understanding varied significantly across participant categories, $H(4) = 17.86$, $p = .001$, $\eta = .58$, with an effect size of "large" (Cohen, 1988). Mann-Whitney U tests showed several significant differences among the categories. The Public category of participants reported a significantly

lower understanding than the Community Leader category (U = 2.54, p = .011, r_{pb} = .49, Table 8), Newport Site Selection Team (U = 3.62, p < .001, r_{pb} = .74), and Reedsport Site Selection Team (U = 2.46, p = .15, r_{pb} = .49) categories. Each of the previous differences had an effect size of "large" (Cohen, 1988). However, there were no statistically significant differences among the other categories of participants (U = -1.69 to 1.94, p = .054 to 1.0).

Five survey questions were utilized to generate an index that assessed feeling of being heard during the process. A reliability test suggested the items could be combined to create an index of feeling heard (Cronbach's alpha = .94). All variables were included because dropping any variable would not cause a significant increase in Cronbach's alpha (Table 4). On average, respondents across all categories slightly agreed (M = .84) that they felt heard during the process. Participants in the Public category had the lowest feeling of being heard during the process (M = .27), whereas participants in the Newport Site Selection Team category had the highest feeling of being heard (M = 1.8, Table 6).

A Kruskal Wallis H test revealed that feeling heard varied significantly across participant categories, $H(4)$ = 17.24, p = .002, η = .53, with an effect size of "large" (Cohen, 1988). Mann-Whitney U tests showed several significant differences among the categories. The Public category of participants reported feeling significantly less heard than the Community Leader category (U = 2.33, p = .018, r_{pb} = .39, Table 6) and the Newport Site Selection Team category (U = 3.95, p < .001, r_{pb} = .80). Additionally, participants in the Reedsport Site Selection Team category felt

significantly less heard during the process than participants in the Newport Site Selection Team category (U = 2.22, p = .031, r_{pb} = .54). Each of the previous differences had an effect size of "large" (Cohen, 1988). However, there were no statistically significant differences among the other categories of participants (U = .98 to 1.87, p = .066 to 1.0).

Six survey questions were utilized to generate an index that assessed influence on the outcome of the process. A reliability test suggested the items could be combined to create an index of influence on the outcome of the process (Cronbach's alpha = .95). All variables were included because dropping any variable would not cause a significant increase in Cronbach's alpha (Table 5). On average, participants across all categories slightly disagreed (M = -.27) that they had an influence on the outcome of the process. Participants in the Reedsport Site Selection Team category had the lowest perceived influence on the outcome (M = -.91), whereas participants in the Newport Site Selection Team category had the highest perceived influence on the outcome (M = .91, Table 6).

A Kruskal Wallis H test revealed that perceived influence on the outcome varied significantly across participant categories, $H(4) = 24.13$, $p < .001$, $\eta = .65$, with an effect size of "large" (Cohen, 1988) (Table 7). Mann-Whitney U tests showed several significant differences among the categories. The Public category of participants reported a significantly lower perceived influence on the outcome than the Community Leader category (U = 2.14, p = .034, r_{pb} = .43, Table 6), the Newport Site Selection Team category (U = 4.03, $p < .001$, r_{pb} = .74), and the NNMREC

category (U = 2.63, p = .007, r_{pb} = .48). Additionally, participants in the Community Leader category reported a significantly lower perceived influence on the outcome than the Newport Site Selection Team category (U = 2.09, p = .04, r_{pb} = .50). Participants in the Reedsport Site Selection Team category reported a significantly lower perceived influence on the outcome than participants in the Newport Site Selection Team category (U = -3.30, p < .001, r_{pb} = .78). Each of the previous differences had an effect size of "large" (Cohen, 1988). However, there were no statistically significant differences among the other categories of participants (U = -1.88 to 1.57, p = .063 to 1.0).

Discussion

In this evaluation, "understanding" was used as a proxy for access while "being heard" was used as a proxy for standing. Considering the public category of participants had the least opportunities to be involved, it is not surprising they had the lowest level of understanding and felt the least heard. Some participants within this category might have only attended one public meeting in the beginning of the process, which might not have given them quite enough information to understand the process or enough opportunity to feel heard. In contrast, the Newport Site Selection Team category had the highest level of understanding and the highest feeling of being heard. This category of participants had many more opportunities to be involved in the process.

Participants in the public category had access, but no perceived standing or influence. This is consistent with Senecah's (2004) evaluation of public hearings

where participants rarely feel heard although they have access to the decision making process (Senecah, 2004). Comparatively, respondents in the Newport Site Selection Team category were the most involved in the PMEC-SETS process and had access, standing, and influence. Likewise, the Reedsport Site Selection Team category held all three TOV elements, but they did not feel as though they had an influence on the outcome of the process. However, within the TOV framework, the Reedsport Site Selection team had influence because they were involved in the process and their input was considered equally with that of the Newport Site Selection Team (i.e., their proposals were evaluated using the same criteria).

Although the Reedsport Site Selection Team's proposal was not selected, participants in that category still slightly agreed they were heard in the process. Not surprisingly, the Reedsport Site Selection Team category felt less heard than the Newport Site Selection Team category. This is likely because despite having access and standing, the perceived level of influence was lower. Surprisingly, participants in the NNMREC category, which included people who ultimately chose which proposal would be selected, neither agreed nor disagreed they had an influence on the outcome of the process. The reason why those with arguably the most power did not feel heard was not apparent from the data collected in this evaluation and requires further investigation.

Several strategies can be used to plan for or improve access to a decision making process, and the recommendations embedded below have been drawn from the evaluation of the PMEC-SETS process, considerations of the TOV framework, and

a review of literature on community engagement, marine renewable energy siting and spatial planning, and other relevant topics.

Stakeholders need understandable information about the decision being made to allow for them to form opinions and provide input (Bryson, Quick, Slotterback, & Crosby, 2013; Dalton, 2006). Use a variety of methods for information sharing (Chess & Purcell, 1999; Gopnik et al., 2012) and find out the communication methods best suited for the communities where the process will take place. Consistent with TOV, several studies have suggested that **early stakeholder engagement is key** to a successful process (Blahna & Yonts-Shepard, 1989; Chess & Purcell, 1999; Chozas et al., 2010; Ehler & Douvere, 2009; Johnson, Jansujwicz, & Zydlewski, 2013).

To improve understanding, **the process should be designed** so there are clear expectations and opportunities for two-way information exchange. Richards et al. (2004) suggests being clear on, and designing an active plan for, stakeholder engagement can help establish realistic expectations and lay the groundwork for a smoother process. Consistent with Blahna and Yonts-Shepards' (1989) five conditions essential for effective stakeholder engagement processes, diverse perspectives should be considered within a process. In fact, including diverse stakeholder input in decision-making can lead to more well-rounded decisions (Dalton, 2006).

Influence can be improved through transparency and by **providing meaningful responses to stakeholder input** (Senecah, 2004). This is consistent

with Chase et al. (2004) and Blahna and Yonts-Shepards' (1989) findings that stakeholders having an authentic influence on a decision and having their opinions incorporated into the decision is key to successful processes. In addition, Richards et al. (2004) suggests transparency and considering all viewpoints can help build trust. Communicating the rationale of a decision and clearly identifying how stakeholder input was incorporated can help stakeholders realize their actual influence on the process.

TOV presents access, standing and influence as essential to **build trust**, and, ultimately, trust is the key to a successful process. Trust has been defined as "the willingness to rely on those who have the responsibility for making decisions and taking actions" (Siegrist & Cvetkovich, 2000, p. 354). Several studies have also shown trust to be an important component to success and can reduce the amount of active opposition to a project (Olsen & Shindler, 2010; Richards et al., 2004; Stern, 2008). **Partnering with a local organization** to learn about the community and be familiar with priority issues facing the community might also be helpful to build trust (Johnson et al., 2013). By focusing on the recommendations related to access, standing and influence, process leaders can build trust within the communities of interest.

Management Implications

The results of this study are not only relevant to wave energy developers in the siting phase, but also to coastal and ocean managers in the permitting phase of

marine renewable energy development. Concurrent with past research, these results suggest that effective stakeholder engagement requires more than public comment periods (Innes & Booher, 2004). To maximize the utility of public input periods, managers should follow the above recommendations, including making staff available to answer questions, ensuring multiple methods of communicating about the proposed permit are used, and making sure there is an adequate amount of time for citizens to provide feedback.

In addition, a community support section could be added to the permitting process for marine renewable energy permits. The recommendations in this study could be used to create such guidelines for building support. Requiring effective community engagement to obtain a permit is likely the most effectual way to ensure there is a community involvement portion in the siting of facilities. Reed (2008) stated, "although participation is increasingly becoming embedded in policy, the requirements of participatory processes are at variance with many of the institutional structures of the organizations charged with implementing these policies" (p. 2426). Richards et al. (2004, p. 18) concluded, "if participation is a democratic right, not just a normative goal, then participation must be institutionalized."

Limitations and Future Research

It is always important to recognize potential recall bias in this type of evaluation (Eisenhower, Mathiowetz, & Morganstein, 2004). For this study, there

were two years between the conclusion of the siting process and the beginning of this evaluation. Although the recall bias does not invalidate the results of this evaluation, it is important to keep in mind that some of the finer details of a participant's involvement might have been lost from his or her memory. Additionally, participants in the process might have changed how they feel about the process during the period of time between the process finishing and the evaluation beginning.

Krejcie and Morgan (1970) suggest a 5% margin of error for social research. Considering the large margin of error in this study (10.2%), the results may not be generalizable for all participants in the PMEC-SETS process. This evaluation only included people who participated in the PMEC-SETS siting process in some way. It is possible that people were not involved in the process that wanted to be involved. However, because this evaluation only used contact information for those involved, the opinions of those not involved were not collected. Given more time and resources, a study could have surveyed all residents in the communities being considered for the PMEC-SETS regardless of their participation in the process.

Future research could compare this process, which was specifically for a research facility, to a process used for siting commercial wave energy or other marine renewable energy development. Future studies could also compare siting for this research facility with siting for other offshore research facilities. Finally, an investigation into the benefits and constraints of using of a competitive process to site wave energy would be helpful if a similar process were to be used in the future.

Conclusion

Our analysis suggests that in order to ensure the success of marine renewable energy siting processes, more effort should be put into effective stakeholder engagement as a central component of the process. The lessons learned from this research, along with the growing body of literature, theory and practice, can inform the design and implementation of successful marine renewable energy siting and other stakeholder engagement processes.

Tables

Table 1. Groups represented on the Reedsport and Newport Site Selection Teams

	Site Selection Team	
Group Represented	**Reedsport**	**Newport**
Commercial fishing	x	x
Recreational fishing		x
Local governments	x	x
Economic development	x	x
Marine infrastructure	x	x
Local utilities	x	x
Tribes		x
Education	x	x
Environmental groups	x	
Non-consumptive recreation users		x
Public at large	x	x
Business	x	

Table 2. Total respondents, total surveys sent and response rate for each respondent category

Respondent Category	Total Respondents	Total Surveys Sent	Response Rate
Site Selection Team — Reedsport	9	17	53%
Site Selection Team — Newport	9	13	69%
Community Leaders	10	26	50%
Public	23	59	39%
NNMREC	10	15	67%
Overall	61	130	47%

Table 3. Reliability results for understanding

	Mean[1]	Percent Agree	Corrected item total	Alpha if deleted
I understood who contributed to making the decision about the final site.	.85	73	.70	.59
I did not have a good understanding about the selection process at the time.[2]	.85	67	.36	.78
I understood how to provide feedback during the siting process.	.94	69	.58	.67
I understood how decision makers chose the final site.	.50	63	.55	.68

[1] Means on a 5-point recoded scale of -2 strongly disagree to 2 strongly agree.

[2] "I did not have a good understanding about the selection process at the time" reverse coded on a 5-point scale with -2 meaning strongly agree and 2 meaning strongly disagree.

[3] Cronbach Alpha = .75

Table 4. Reliability results for feeling of being heard

	Mean[1]	Percent Agree	Corrected item total	Alpha if deleted
I believe that my opinions were heard during the siting process.	.87	62	.81	.88
My input on choosing the site was captured by decision-makers.	.73	56	.91	.85
I feel as though I had a voice in the siting process.	.69	60	.75	.91
I was given sufficient opportunity to provide input in the siting process.	1.02	71	.74	.90
Project leaders listened to the input they received on where the site should go.	.90	62	.91	.86

[1] Means on a 5-point recoded scale of -2 strongly disagree to 2 strongly agree.

[2] Cronbach Alpha = .91

Table 5. Reliability results for having an influence on the outcome of the process

	Mean[1]	Percent Agree	Corrected item total	Alpha if deleted
My input was incorporated into the final decision about where the site would be.	.02	37	.87	.93
My participation made a difference in the siting process.	-.08	33	.93	.92
Decision-makers made their final decision based on my feedback.	-.38	19	.83	.94
The final decision about the siting process would have been different if I had not participated.	-.65	6	.75	.95
I am able to clearly identify areas of the final decision where my input was recognized.	-.21	29	.78	.94
I believe that I was able to influence the siting process.	-.33	23	.87	.93

[1] Means on a 5-point recoded scale of -2 strongly disagree to 2 strongly agree.

[2] Cronbach Alpha = .94

Table 6. Understanding, feeling heard, and influence on the outcome of the process by participant category

	Participant Category[4,5]								
	Public	Community Leaders	Site Selection Team - Newport	Site Selection Team - Reedsport	NNMREC	Total	*H*	*p*-value	eta
Understanding[1]	.10 [a]	1 [bcde]	1.61 [bcde]	.97 [bcde]	.97 [abcde]	.78	17.86	.001	.580
	(.71)	(.94)	(.60)	(.86)	(1.02)				
Feeling heard[1]	.27 [ab]	1.07 [bc]	1.80 [bc]	.93 [ab]	.63 [abc]	.84	17.24	.002	.531
	(.63)	(1.35)	(.46)	(.91)	(1.10)				
Influence on outcome[1]	-.87 [abcd]	.04 [bcd]	.91 [c]	-.91 [abd]	.04 [bcd]	-.27	24.13	< .001	.647
	(.91)	(1.02)	(.49)	(.98)	(.53)				

[1] Means on a 5-point scale with -2 meaning "strongly disagree" and 2 meaning "strongly agree"

[4]Results are presented as Mean (Standard Deviation)

[5]Means with different letter superscripts in each row are significant at $p<.05$ based on a Mann-Whitney U test

CHAPTER THREE: RESULTS AND DISCUSSION

This chapter presents the results and discussion of the PMEC-SETS evaluation that were not presented in the previous chapter.

Logistics

In general, participants were content with the logistical aspects of the process, such as the amount of notice provided, amount of information provided, and number of opportunities to engage. Most of participants (80%) felt they had adequate notice about the siting process before the site was selected in January 2013. When asked how far in advance a community should be consulted before a final marine renewable energy site is chosen, the average response was 22 months with 53% of respondents suggesting 12-24 months.

Overall, participants had enough information about the process, and their most-frequently used sources of information were in-person communication methods. A majority of participants (76%) felt they had adequate information about the siting process, while the remaining participants (24%) felt they had received too little information. The most-frequently used source of information was personal communication with the process leaders (M = 3.00), followed closely by public meetings or presentations (M = 2.74, Table 7).

The more passive forms of digital communication, such as websites, were the least-used sources of information. A majority of participants never used social media venues such as Facebook (M = .29). In the “other” category for this question,

participants listed receiving information from additional groups, notably the Oregon Wave Energy Trust (OWET) and Fishermen Interested in Natural Energy (FINE).

Although public meetings or presentations were listed as the second most frequently used sources of information, some participants felt there could have been better advertising of these events to the general public. For example, one member of the Public category of participants knew about a public meeting only because he or she was connected to OSU. This person added, "Many of the people I spoke to did not know [public meetings] even occurred."

The two most frequently used forms of receiving information (public meetings or presentations and personal communication) allow for two-way communication between process leaders and community members. In addition, those more interactive forms of informational exchange require more resources from process leaders – namely time. The PMEC-SETS process leader from OSG was surprised by how much time the communities wanted during the process. Looking back, she would have liked to have two staff leads with an additional notetaker to allow the leads to focus on facilitation.

The PMEC-SETS siting process was generally viewed as successful from the perspective of respondents and through the lens of the theory of Trinity of Voice. The logistical aspects of a marine renewable energy siting project can have significant implications on participants' access and standing (Bryson et al., 2013; Senecah, 2004; Tuler & Webler, 1999) . For example, having enough information

about the process and the information needed to make a decision are required for access (Bryson et al., 2013; Dalton, 2006; Senecah, 2004).

When considering how to share information, it is important to understand which methods will be most effective for the specific population receiving the communication. For example, if working with a community where personal computers are rare, information sharing should not be solely through digital means. For example, on aspect to consider is that digital sources of information can particularly limit access by ethnic and racial minorities and those with a lower socio-economic standing (Mossberger, Tolbert, & Gilbert, 2006), and communication should be at an appropriate level and relevant to the target population (Cone et al., 2011) in order to be effective.

Greatest Strengths of the Process

When asked what the greatest strength of the process was, participants listed several. Participants identified the communication and outreach portion of the process as a strength. Particularly, participants were happy with the physical presence and availability of the process leaders. The process leaders themselves were named several times as the greatest strength in the process. Their names were associated with trust, openness, strong facilitation, and being good listeners. One participant appreciated that the process leaders listened to what people wanted and, of equal importance, to what they did not want — referencing specifically communities that were not interested in hosting the site and were therefore excluded from the late stages of the process.

Some participants in the Site Selection Team categories (in both locations) thought using a competitive process for selecting the site was a "great way to get communities to want to welcome marine renewable energy," and that competition led to stronger proposals and, ultimately, stronger support. Interestingly, the process leaders did not intend for the process to be "competitive." The leaders expected more informal proposals that included only the requirements outlined in the RFP, but the Site Selection Teams went above and beyond and put together really impressive proposals (personal communication).

The idea of hosting a competitive process to site wave energy is interesting and deserves further attention. It may not be feasible (or desirable) for commercial developers to solicit competitive proposals. On the other hand, it could be an innovative way to collect site-specific information that includes local knowledge. Inclusion of local knowledge shares many of the same benefits of stakeholder engagement (Corburn, 2003; da Silva & Kitts, 2006; Granek & Brown, 2005; Mallory et al., 2006; Weber & Christophersen, 2002). Furthermore, having communities put forward proposals could reduce the amount of resources expended by the commercial developer in scoping potential locations, although communities would need technical support in building their proposals (Bryson et al., 2013; Cone et al., 2011; M Gopnik, Fieseler, & Crowder, 2011; Senecah, 2004).

Greatest Weaknesses of the Process

There were few weaknesses of the process listed. The main two weaknesses were perceived biases toward Newport and the commercial fishing industry. The

most frequent complaint about the process was the perceived bias toward Newport, and people within every category except for the NNMREC category held this view. A participant in the Public category cited the greatest weakness of the process as "it's obvious preference for the Newport site prior to the formal decision," whereas a participant in the Community Leader category said, "it was going to be Newport from day one." Another member of the Public category said, "I am somewhat disappointed, as a resident of [the southern Oregon coast], that Newport tends to get the lion's share of interest, attention, and money from Oregon's universities…" Anecdotally, many communities on the Oregon coast tend to feel that Newport receives more attention and investment than other communities.

Although working with the fishing community was perceived as a strength of the process, the amount of power given to the fishing community in choosing the site in each proposal was perceived as a weakness of the process. Although one participant felt that the fishing industry should be given more power because "it was generally felt they could suffer a loss economically," most participants felt the power afforded the fishing industry was too great. Another Site Selection Team member recognized the ocean belongs to the public and said:

> Commercial fishing is important and we need to keep that industry vital and sustainable. That said, however, the process should proceed with everyone aware that the fishermen (*sic*.) do not own any ocean areas or bottom…these places are instead owned by the public and should be treated as such.

A Site Selection Team member felt the greatest weakness in the Site Selection Team portion of the process was allowing fishermen to "put some pretty serious constraints on the locations that they'd 'allow'." This person added that Site Selection Team members were not comfortable enough to make alternative recommendations, and that when fishermen chose the site for the test facility, "it was like a secret meeting that did not include the [Site Selection] team."

Respondents complained that the selection criteria for PMEC-SETS changed throughout the process. Several reasons could have contributed to the confusion over selection criteria, although no explanation is explicit in the data. Although the print criteria were the same, verbal explanations of the criteria may not have been consistent. Considering the complaint of shifting criteria was shared among multiple categories of participation, it is likely not being used as a rationalization for Reedsport not being awarded the site.

Perceptions about the Site Selection Teams

Site Selection Team members from both locations (Reedsport and Newport) were asked a series of additional questions specific to the Site Selection Team portion of the process. Overall, a majority of Site Selection Team members felt the representation on their respective Site Selection Team was appropriate, and most members indicated they would participate in future processes to site marine renewable energy. Two criticisms of the Site Selection Team process were that the site-selection criteria shifted and that commercial fishers had too much influence over which sites were proposed.

The majority of Site Selection Team members (78%) felt there were no individuals or categories of stakeholder groups missing from the Site Selection Team that should have been represented. Two Site Selection Team members felt that three groups — local natural-resource conservation groups, shipping industry, and tug operators — should have been on the Site Selection Teams, but were not. During the formation of Site Selection Teams, process leaders suggested stakeholder groups to be represented so the teams would be broadly representative of the communities the team served. However, community members outside of those groups were welcome to apply.

When asked whether they would participate in future siting processes, over half of the respondents in the Site Selection Team category (54%) said yes, an additional 21% would maybe participate again, and 8% would not participate in future processes. There were only a few specific critiques of the Site Selection Team process. One complaint shared by both teams was that the time allowed for creating site proposals (two months) was too short.

The biggest complaint from Site Selection Team members on both teams was that the site selection criteria were not always clear or that they shifted throughout the process. A participant in the NNMREC category also noted that the selection criteria "seemed to be in flux during the process." A couple of the Site Selection Team members felt they understood the original selection criteria, but they were not the same criteria used to evaluate the sites. However, as was previously noted, the Site Selection Teams were provided with a Request for Proposals (RFP) to guide

the development of their proposals. A comparative content analysis of the RFP and the score sheet used to rate the proposals shows the same selection criteria were used in both documents.

Respondents complained that the selection criteria for PMEC-SETS changed throughout the process. Several reasons could have contributed to the confusion over selection criteria, although no explanation is explicit in the data. Although the print criteria were the same, verbal explanations of the criteria may not have been consistent. Considering the complaint of shifting criteria was shared among multiple categories of participation, it is likely not being used as a rationalization for Reedsport not being awarded the site.

General Marine Renewable Energy Siting

In addition to the questions related to evaluating the process for siting PMEC-SETS, the survey also asked a few questions about wave energy siting in general. Many process participants noted that this siting process was unique in that it was for a "research facility" of limited size and was not lead by a public agency or a private developer. One participant said, "it [this process] might not work for other types of projects. Each project needs to develop its own approach that recognizes the characteristics of the project and the full-spectrum of stakeholders involved." Additionally, the process may be different depending on the types of devices and the size of the development. One participant stated, "the process would need to be modified considerably due to the nature of what will end up offshore." A Site Selection Team member added, "this bottom-up approach is how these types of sites

should be developed. A top-down approach would have been much more difficult and painful."

Stakeholders in Wave Energy Development

Respondents were asked how they thought different stakeholder groups would be impacted by marine renewable energy development. Several respondents noted that impacts would be different based on project specifics such as the size, how many devices, and the types of devices. Participants felt that commercial fishing would be the most negatively impacted (*M* = -1.17), whereas scientists would be the most positively impacted (*M* = 1.18, Table 6). Participants felt, on average, that tribes (*M* = -.07), coastal residents (*M* = -.09), tourists (*M* = .05), and non-profit organizations (*M* = -.05) would not be impacted at all by marine renewable energy development (Table 8).

In addition, respondents were asked how important it is to engage with certain stakeholder groups about putting a marine renewable energy development in their community. Respondents felt that it was moderately to extremely important (*M* = 1.98 to 2.94) to engage with every group listed except tourists, who were listed as slightly important to engage with (*M* = 1.15, Table 9). When asked which group is the most important to work with when choosing a site for a marine renewable energy development, the most frequent response was commercial fishing (46%), followed by local government (12%). Respondents recognized that different

developments would have varying impacts and potentially different stakeholders who would need to be engaged.

Respondents felt that tourists would, on average, not be impacted by wave energy development and only slightly agreed it was important to engage with tourists when making a decision about where to site a wave energy development. It is important to note that since this was a confidential evaluation, the background of each respondent is not known. If there were any tourists included in the evaluation, it was likely a very small number. It is also unknown how many respondents are associated with tourism-related industries.

Participants in this evaluation felt that scientists would be the most positively impacted by a wave energy development. Sherman (2013), however, discussed that scientists can be negatively impacted by offshore energy development especially when they are barred from accessing a long-term research site. The resulting cyclical effect can lead to scientific research being interrupted, causing less scientific information to be available for making informed management decisions.

Role of Community Members in Wave Energy Siting

Respondents were asked for their opinion on the role of community members when choosing a site for a marine renewable energy development. On average, respondents strongly agreed that community members should learn about the project (M = 1.70) and be consulted with, so they can outline concerns about the

project (*M* =1.72, Figure 1). Participants slightly agreed that the role of community members is to listen to the perspectives of the developer (*M* = 1.38), negotiate alternative options for the project (*M* = .96), and engage in trade-offs to see changes in the project/design (*M* = .98). Participants strongly disagreed that the community should not have a role in choosing a site (*M* = -1.66), and they slightly disagreed that the community should have full control over the project (*M* = -1.09).

Figures

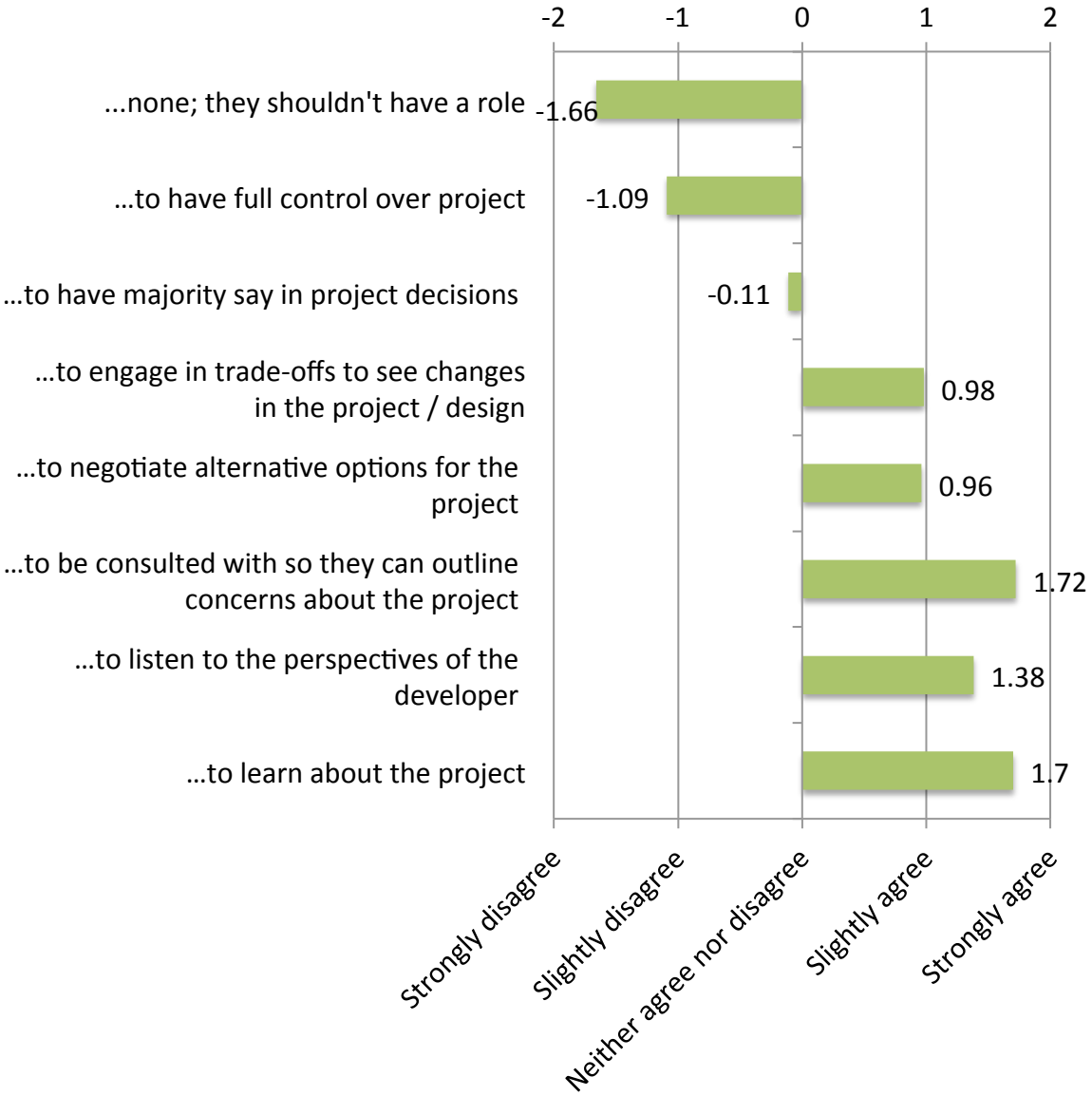

Figure 1. Community role in marine renewable energy siting (b)

Figure 1 shows the response to the question, "To what extend do you disagree or agree with each of the following statements about the role of the community members when choosing a site for a marine renewable energy development?"

The role of community members when choosing a site for a marine renewable energy development should be...

Tables

Table 7. Frequency of use for individual information sources

Information source	Mean[1]
Personal communication with OSU, OSG, or NNMREC	3.00
Public meetings or presentations	2.74
Other	1.73
OSG email list	1.58
NNMREC website	1.37
Family or friends	.82
OSU website	.63
OSG website	.51
Social media (such as Facebook or Twitter)	.29
Newspaper	1.19
Radio	0.53

[1] Means on a 5-point scale with 0 meaning never used and 4 meaning often used

Table 8. Impact of marine renewable energy on individual stakeholder groups

Group	Mean[1]
Scientists	1.18
Local businesses	.69
Local utilities	.69
Local governments	.59
Tourists	.05
Non-profit organizations	-.05
Tribes	-.07
Coastal residents	-.09
Other	-.29
Non-consumptive recreation ocean users	-.37
Recreational fishing	-0.70
Commercial fishing	-1.17

[1] Means on a 5-point scale from -2 "strongly negatively impacted" to 2 "strongly positively impacted"

Table 9. Importance of engaging specific stakeholder groups

Group	Mean[1]
Commercial fishing	2.94
Local utilities	2.72
Local businesses	2.68
Scientists	2.64
Recreational fishing	2.57
Other	2.44
Coastal residents	2.43
Non-consumptive recreation ocean users	2.11
Tribes	2.09
Non-profit organizations	2.04
Local governments	1.98
Tourists	1.15

[1] Means on a 4-point scale from 0 "not important" to 2 "extremely important"

CHAPTER FOUR: CONCLUSION

Using a mixed methods approach, this study evaluated the effectiveness of the PMEC-SETS process. Specifically, this study explored if participants understood the process, felt heard, and felt as though they had an influence on the outcome. The secondary goal of this research was to provide advice for future marine renewable energy siting processes.

Logistically, there were several successful aspects of the PMEC-SETS process. Most participants had at least a fair understanding of the process used for selecting the site, and about three-quarters of participants felt they had enough information about the process compared to about a quarter of participants who wanted more information. The most frequently used sources of information about the process came from public meetings and personal communication with process leaders. Respondents used web-based sources of information such as websites or social media the least frequently.

When comparing participants' desired level of involvement in the process to their actual level of involvement, participants wanted to be more involved. Qualitative data revealed that most participants were not more involved due to personal or professional constraints and not due to the process itself. Respondents understood the process and felt slightly heard during the process. On average, respondents were unsure if they were able to influence the outcome.

As competition for ocean and coastal resources increases, effective siting processes need to be developed and studied. Reviewing literature of relevant fields,

such as stakeholder engagement and marine spatial planning along with case studies of marine renewable energy siting processes, can help inform design of marine renewable energy siting processes. By implementing inclusive and effective community engagement, siting processes are more likely to include social, economic, and natural systems, and the connections among these systems. In addition, siting processes are more likely to be successful if the human dimensions of marine renewable energy siting are given adequate consideration.

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APPENDIX

Appendix A: Questionnaire

[Text export from Qualtrics]

Q1 In late 2011 and throughout 2012, a process was conducted to select a site for a grid-connected wave energy test facility for Oregon State University (often referred to as PMEC) to be located off the Oregon Coast. As an Oregon State University (OSU) Marine Resource Management graduate student, I am conducting an evaluation of this process. Thank you for your help by completing this survey. When answering questions, please think back to 2011 and 2012 when the site selection process was being conducted and try to answer based on that specific time.

Please note, this is an evaluation of the process for OSU's proposed grid-connected wave energy test facility; it is not an evaluation of other similar processes such as the State of Oregon's Territorial Sea Plan Revision process for identifying potential wave energy sites. Thank you for focusing your attention on the OSU process only.

Q2 Were you aware of the process to choose a site for Oregon State University's (OSU) proposed grid-connected wave energy test facility off the coast of Oregon? Please select one.

- ❍ No
- ❍ Yes
- ❍ Unsure

Q7 Do you think you received enough notice about the siting process for OSU's proposed grid-connected wave energy test facility before the site was selected in January 2013? Please select one.

- ❍ I did not receive enough notice
- ❍ I received the correct amount of notice
- ❍ I received more than enough notice
- ❍ I do not remember when I received notice

Q39 Who do you think led the process to decide where OSU's grid-connected wave energy test facility would be located. Please select all that apply.

- ❑ Northwest National Marine Renewable Energy Center (NNMREC)
- ❑ Oregon Sea Grant Extension
- ❑ Oregon State University (OSU)
- ❑ Bureau of Ocean Energy Management (BOEM)
- ❑ Oregon Department of Fish & Wildlife (ODFW)
- ❑ Oregon Wave Energy Trust
- ❑ Federal Energy Regulatory Commission (FERC)
- ❑ Unsure

Q5 How would you rate your understanding of the site selection process for OSU's proposed grid-connected wave energy test facility? Please select one.

- ❍ Very poor
- ❍ Poor
- ❍ Fair
- ❍ Good
- ❍ Very good

Q3 How much information did you have about the siting process for OSU's proposed grid-connected wave energy test facility? Please select one.

- ❍ Far too Little
- ❍ Too Little
- ❍ About Right
- ❍ Too Much
- ❍ Far too Much

Q4 How often did you receive information about the siting process for OSU's proposed grid-connected wave energy test facility from each of the following? Please select one option for each source.

	Never	Rarely	Occasionally	Sometimes	Often
Newspaper	❍	❍	❍	❍	❍
Radio	❍	❍	❍	❍	❍
Public meetings or presentations	❍	❍	❍	❍	❍
Family or friends	❍	❍	❍	❍	❍
Personal communication with Oregon State University (OSU), Sea Grant, or Northwest National Marine Renewable Energy Center (NNMREC)	❍	❍	❍	❍	❍
NNMREC website	❍	❍	❍	❍	❍
Oregon State University website	❍	❍	❍	❍	❍
Oregon Sea Grant Extension website	❍	❍	❍	❍	❍
Social media (such as Facebook or Twitter)	❍	❍	❍	❍	❍

Oregon Sea Grant Extension email list	❍	❍	❍	❍	❍
Other	❍	❍	❍	❍	❍

Q10 How do you feel about the number of opportunities available to engage in the siting process for OSU's proposed grid-connected wave energy test facility? Please select one.

❍ Far too Little
❍ Too Little
❍ About Right
❍ Too Much
❍ Far too Much

Q13 What was your level of involvement in the siting process for OSU's proposed grid-connected wave energy test facility? Please select one.

❍ Not involved
❍ Somewhat involved
❍ Moderately involved
❍ Extremely involved

Q14 If you could have participated at a different level, what would have been your desired level of involvement in the process? Please select one.

❍ Not involved
❍ Somewhat involved
❍ Moderately involved
❍ Extremely involved

Q15 If your actual and desired participation levels are different, please explain why. Type your answer below.

Q28 To what extent do you disagree or agree with each of the following statements about your understanding of the process for siting OSU's proposed grid-connected wave energy test facility? Please select one for each statement.

	Strongly Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Strongly Agree
I understood who contributed to making the decision about the final site.	❍	❍	❍	❍	❍
I did not have a good understanding about the selection process at the time.	❍	❍	❍	❍	❍
I understood how to provide feedback during the siting process.	❍	❍	❍	❍	❍
I understood how decision makers chose the final site.	❍	❍	❍	❍	❍

Q49 To what extent do you disagree or agree with each of the following statements about if you were heard during the process for siting OSU's proposed grid-connected wave energy test facility? Please select one for each statement.

	Strongly Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Strongly Agree
My input on choosing the site was captured by decision-makers.	❍	❍	❍	❍	❍
I believe that my opinions were heard during the siting process.	❍	❍	❍	❍	❍
I was given sufficient opportunity to provide input in the siting process.	❍	❍	❍	❍	❍
Project leaders listened to the input they received on where the site should go.	❍	❍	❍	❍	❍
I feel as though I had a voice in the siting process.	❍	❍	❍	❍	❍

Q50 To what extent do you disagree or agree with each of the following statements about your influence on the outcome of the process for siting OSU's proposed grid-connected wave energy test facility? Please select one for each statement.

	Strongly Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Strongly Agree
My input was incorporated into the final decision about where the site would be.	❍	❍	❍	❍	❍
My participation made a difference in the siting process.	❍	❍	❍	❍	❍
Decision-makers made their final decision based on my feedback.	❍	❍	❍	❍	❍
The final decision about the siting process would have been different if I had not participated.	❍	❍	❍	❍	❍
I am able to	❍	❍	❍	❍	❍

clearly identify areas of the final decision where my input was recognized.					
I believe that I was able to influence the siting process.	❍	❍	❍	❍	❍

Q29 In your opinion, what was the greatest strength of the process to site OSU's proposed grid-connected wave energy test facility? Please type your answer below.

Q30 In your opinion, what was the greatest weakness of the process to site OSU's proposed grid-connected wave energy test facility? Please type your answer below.

Q16 What community was chosen to host OSU's proposed grid-connected wave energy test facility? Please select one.

- ❍ Reedsport
- ❍ Coos Bay
- ❍ Newport
- ❍ Unsure

Q31 Should future marine renewable energy siting efforts in Oregon use the same process used for siting OSU's proposed grid-connected wave energy test facility? Please select one.

- ❍ No
- ❍ Yes
- ❍ Unsure

Q45 Please explain your response about if the process used for OSU's proposed grid-connected wave energy test facility should be used in future siting efforts. Please type your answer below.

Answer If ST-N Is Equal to 1 Or ST-R Is Equal to 1

Q40 In fall 2012, Site Selection Teams were formed in Reedsport and Newport to create competitive proposals to host OSU's proposed grid-connected wave energy test facility. The following questions are specific to the Site Selection Teams that composed the community proposals to host the test site. Please answer these questions for the specific Site Selection Team you were on.

Answer If ST-N Is Equal to 1 Or ST-R Is Equal to 1

Q43 Were there any individuals or groups not represented on the site selection team that you felt should have been on the team? Please select one.

- ❍ No
- ❍ Yes
- ❍ Unsure

Answer If Where there any stakeholder groups not represented on the site selection team that you felt should have been on the team? Yes Is Selected

Q44 In your opinion, which individuals or groups were missing from the site selection team? Please type your answer below.

Answer If ST-N Is Equal to 1 Or ST-R Is Equal to 1

Q19 Do you have any comments about the site selection team composition? Please type your answer below.

Answer If ST-R Is Equal to 1 Or ST-N Is Equal to 1

Q21 Do you believe that the perspectives of all site selection team members were adequately represented by the final site proposal generated by your team? Please select one.

- ❍ No
- ❍ Yes

Answer If Do you believe that the perspectives of all selection team members were adequately represented by the final site proposals? [ST] No Is Selected

Q22 Which stakeholder groups on the site selection team were left out? Please type your answer below.

Answer If Do you believe that the perspectives of all selection team members were adequately represented by the final site proposals? [ST] No Is Selected

Q23 In your opinion, why were those stakeholder groups left out? Please type your answer below.

Answer If CL-F Is Equal to 1 Or ST-N Is Equal to 1 Or ST-R Is Equal to 1

Q32 Would you be willing to participate in future processes for selecting a marine renewable energy site in your community? Please select one.

- ❍ No
- ❍ Maybe
- ❍ Yes
- ❍ Unsure

Answer If ST-N Is Equal to 1 Or ST-R Is Equal to 1

Q41 Is there anything else you would like to share about participating in a site selection team? Please type your answer below.

Q33 The following questions are about marine renewable energy siting in general (not specific to OSU's process).

Q8 Ideally, how far in advance do you think a community should be consulted before a final marine renewable energy site is chosen? Please enter a number of months.

Q34 How do you think each of the following groups would be impacted by marine renewable energy development? Please select one option for each.

	Strongly negatively impacted	Slightly negatively impacted	Not impacted at all	Slightly positively impacted	Strongly positively impacted
Commercial fishing	❍	❍	❍	❍	❍
Recreational fishing	❍	❍	❍	❍	❍
Local government	❍	❍	❍	❍	❍
Local businesses (such as restaurants and hotels)	❍	❍	❍	❍	❍
Local utilities (such as Central Lincoln Public Utility District)	❍	❍	❍	❍	❍
Tribes	❍	❍	❍	❍	❍
Non-consumptive recreation ocean users (such as surfers and kayakers)	❍	❍	❍	❍	❍
Coastal residents	❍	❍	❍	❍	❍
Tourists	❍	❍	❍	❍	❍
Scientists (such as university or agency researchers)	❍	❍	❍	❍	❍

Non-profit organizations (such as Surfrider Foundation or CoastWatch)	❍	❍	❍	❍	❍
Other	❍	❍	❍	❍	❍

Q35 How important is it to engage with each of the following groups about putting a marine renewable energy development in their community? Please select one option for each.

	Not important	Slightly important	Moderately important	Extremely important
A. Commercial fishing	❍	❍	❍	❍
B. Recreational fishing	❍	❍	❍	❍
D. Local government	❍	❍	❍	❍
C. Local businesses (such as restaurants and hotels)	❍	❍	❍	❍
E. Local utilities (such as Central Lincoln Public Utility District)	❍	❍	❍	❍
F. Tribes	❍	❍	❍	❍
G. Non-consumptive recreation ocean users (such as surfers and kayakers)	❍	❍	❍	❍
H. Coastal residents	❍	❍	❍	❍
I. Tourists	❍	❍	❍	❍
J. Scientists (such as university or agency researchers)	❍	❍	❍	❍
K. Non-profit	❍	❍	❍	❍

organizations (such as Surfrider Foundation or CoastWatch)				
L. Other	❍	❍	❍	❍

Q36 From the list in the question above, which group do you think is the most important to work with when choosing a site for a marine renewable energy development? Please type the corresponding letter below.

Q42 To what extent do you disagree or agree with each of the following statements about the role of community members when choosing a site for a marine renewable energy development? Please select one option for each.

The role of community members when choosing a site for a marine renewable energy development should be…

	Strongly Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Strongly Agree
...to learn about the project	❍	❍	❍	❍	❍
...to listen to the perspectives of the developer	❍	❍	❍	❍	❍
..to be consulted with so they can outline concerns about the project	❍	❍	❍	❍	❍
...to negotiate alternative options for the project	❍	❍	❍	❍	❍
...to engage in trade-offs to see changes in the project / design	❍	❍	❍	❍	❍
...to have majority say in project decisions	❍	❍	❍	❍	❍

...to have full control over project	❍	❍	❍	❍	❍
...none; they shouldn't have a role	❍	❍	❍	❍	❍

Q52 Thank you for participating in this survey. The final two questions will help us gather additional information.

Q6 To the best of your ability, please describe the process used to select OSU's proposed grid-connected wave energy test facility. The format of your response can be typed in as a narrative description of the process or a list of the steps in the process.

Step one

Step two

Step three

Step four

Step five

Additional steps

Q37 Are there any other thoughts that you would like to share about the process of marine renewable energy site selection in Oregon or the process used for OSU's proposed grid-connected wave energy test facility? Please type your answer below.

Appendix B: Interview Questions

I would like to record this interview solely for the purpose of having notes. The interview will not be made available to anyone outside of the research team and your identity will not be associated in any way with your responses. Do I have your permission to record this interview?

Thank you for taking the time to discuss the PMEC siting process. As I stated in my email, I have been hired to evaluate the process itself. Your responses today will help form a survey that will ultimately allow all participants the opportunity to evaluate the process. When answering questions today, please try to think back to 2012 when the process was occuring.

1. To get started, can you please describe how you participated in the siting process and any ways that role changed over time.
2. I'm trying to wrap my head around the terminology or jargon that was used during the siting process. For example,
    a. how did people refer to the "proposed site" ? What did they call it?
    b. how did people refer to the individuals perceived as running the siting process?
3. Please share with me your understanding of the process itself.
4. Was the general public involved? In what way?
5. How was information exchanged and / or what was your main source of information during the process?

6. Please share your thoughts about how input you provided during the process was used DURING the process. In other words, do you feel like you were or were not “heard” in the process? What made you feel like this? For example,
7. What did project organizers / leaders / coordinators do that made you feel that they were listening (or not) to you?
8. If you were asking all the participants in the process a question to get to this, what do you think is the best way to ask this question?
9. Please share with me all the ways you felt like you had (or did not have) a real influence on the outcome of the process…and what made you feel this way?

Thank you, again, for your time. This fall I will send an electronic survey. Though you’ve shared some of your thoughts on the process today, it would be very helpful to have you complete the survey as well because it will address topics we did not discuss today.

Appendix C: Final Report

EVALUATION OF THE PROCESS TO SITE A PROPOSED GRID-CONNECTED WAVE ENERGY TEST FACILITY IN OREGON (FINAL REPORT TO FUNDER)

Report Availability

This report is available for download from the Northwest National Renewable Energy Center and Oregon Sea Grant.

http://seagrant.oregonstate.edu/publications

http://nnmrec.oregonstate.edu/biblio

The report can also be requested from:

Belinda Batten
Director
Northwest National Marine Renewable Energy Center
belinda.batten@oregonstate.edu

Kaety Jacobson
Marine Fisheries Extension Educator
Oregon Sea Grant
Kaety.Jacobson@oregonstate.edu

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Although several people assisted with this project, any errors, omissions, or typographical inconsistencies in this final report are the sole responsibility of the authors. All content in this final report was written by the authors and represents views of the authors based on the data and does not necessarily represent views of the funding agency or others who assisted in this project.

Executive Summary

The Northwest National Marine Renewable Energy Center (NNMREC) was established in 2008 to support marine renewable energy development through research, education, and outreach. NNMREC supports marine renewable energy development in many ways; one is by providing scaled testing opportunities for marine renewable energy devices in various stages of development.

In 2011, NNMREC began a focused effort to develop an open-ocean facility to test full-scale devices, called the Pacific Marine Energy Center South Energy Test Site (PMEC-SETS). NNMREC partnered with Oregon Sea Grant Extension (OSG) to implement a community process to find the site for PMEC-SETS. Leaders from both organizations began the process by meeting with community leaders in four coastal communities to create awareness about PMEC-SETS, to answer questions, and to gauge the interest level of each community in hosting the PMEC-SETS site. The process continued with community forums regarding the process to find a site for PMEC-SETS. Over time, the potential site for PMEC-SETS was narrowed to Reedsport and Newport, Oregon, and a request for proposals (RFP) was presented to both communities.

This report details an evaluation of this process to determine a final site for PMEC-SETS, and it provides recommendations for future wave energy siting efforts based on the evaluation and relevant literature. The evaluation was conducted using a mixed methods approach of interviews and an online survey. Specifically, it explored whether participants in the process understood the process (the siting of

PMEC-SETS), whether they felt heard in the process, and whether they felt they had a real influence on the outcome of the process.

Logistically, there were several successful aspects of the siting process. Most participants in the evaluation reported that they had at least a fair understanding of the process and felt that they had enough information. The most used sources of information about the process came from public meetings and personal communications with process leaders. On average, participants reported that they wished they had been more involved in the process; most participants reported that this less-than-desired involvement was due to personal or professional constraints (not the process itself).

As existing and new uses compete for space in the ocean, more social science research is needed to understand how best to choose sites for new uses. Research about stakeholder engagement in the process of siting marine renewable energy facilities is an emerging field of study, and gaining a better understanding of how to design and implement processes that effectively engage communities in wave energy siting could lead to more-successful siting efforts in the future.

Introduction

The Northwest National Marine Renewable Energy Center (NNMREC) was established in 2008 by the US Department of Energy to support marine renewable energy development through research, education, and outreach. As a partnership among Oregon State University, University of Washington, and, most recently, the University of Alaska Fairbanks, NNMREC investigates the technological needs,

human impacts, and environmental impacts of marine renewable energy. Included in NNMREC's suite of tools is a group of several test facilities, including the planned Pacific Marine Energy Center South Energy Test Site (PMEC-SETS). PMEC-SETS, planned to be operational in 2017, will be the first grid-connected, open-ocean test facility for full-scale wave energy devices in North America.

Conversations about a full-scale open-ocean test facility began in 2005. In 2011, NNMREC, in conjunction with Oregon Sea Grant Extension (OSG), began focused efforts to identify a site for PMEC-SETS (called only Pacific Marine Energy Center, or PMEC, at the time of siting). Leaders from both organizations began by meeting with state and local government officials, the commercial fishing community, and leaders of stakeholder groups, ports, cities, and counties in Coos Bay, Reedsport, Newport, and Camp Rilea, Oregon, to create awareness about PMEC-SETS, to answer questions, to gauge the interest levels of each community to host the PMEC-SETS site, and to seek feedback on what stakeholder groups and individuals needed to be involved. Input was also taken on where to hold public meetings, timing of engagement (to avoid overlapping concurrent events), and other existing community issues the process leaders needed to be aware of.

In August 2012, community forums were held in Coos Bay, Reedsport, and Newport, Oregon. The goal of each community forum was to provide information to the community at large and to begin a dialogue. After completing the community forums, the potential host communities were narrowed to Reedsport and Newport; this decision was based on several factors, including possibilities for ocean sites

near the community, community support for hosting PMEC-SETS, and access to existing services and infrastructure.

A community forum was not held for Camp Rilea because siting PMEC-SETS there would require coordination with another wave energy project led by the Oregon Military Department. Although the Oregon Military Department viewed the opportunity to host PMEC-SETS as positive and exciting, the site at Camp Rilea was not pursued after technical analysis showed that in order to provide the depth required for deep-water device testing, the site would have to be located at least 10 nautical miles from shore (further than at any other location). Additionally, due to the onshore site being owned by the Military Department, there was concern about potentially limited access during times of heightened national security.

Coos Bay was not selected for further consideration due to the long distance between potential offshore sites to necessary onshore infrastructure. Additionally, Ocean Power Technologies already had a preliminary permit for a large wave energy development in the Coos Bay area, and there was lack of interest and support for additional development. Also, preliminary conversations were under way with Principle Power about a possible offshore wind project located off Coos Bay but further from shore.

In September 2012, community members in Reedsport and Newport were invited by process leaders to apply to serve on “Site Selection Teams” that would eventually be tasked with preparing a proposal for hosting PMEC-SETS. The Site Selection Teams were meant to broadly reflect the demographics of each

community; thus, process leaders sought representatives from commercial and recreational fishing, local governments, economic development, marine infrastructure, local utilities, tribes, education, environmental groups, non-consumptive ocean recreation users, and the public at large (see Table 1 for the actual representation). Process leaders reviewed the applications and ultimately accepted everyone who applied to serve on a Site Selection Team. The Reedsport Site Selection Team ended up having 18 members; the Newport Site Selection Team had 14.

In November 2012, a request for proposals (RFP) was released to each Site Selection Team outlining the desired site characteristics, criteria needed for a fully functioning deep-water test site, and the proposal requirements. Both communities put forth proposals in December 2012 that were evaluated by a team of external reviewers. Selection was based on ocean site characteristics, marine and on-shore cable routes, port and industry capabilities, impacts to existing ocean users, challenges in securing permits, stakeholder participation in the proposal process, and support of the local fishing community. Newport was awarded the bid.

Overview of Process Evaluation

A graduate student in the Marine Resource Management program was tasked with evaluating the process of siting PMEC-SETS. This graduate student was independent and had not been involved in the process.

Evaluation Questions

The evaluation was built around four main questions:

1. Did participants like the logistics of the process?
2. Did participants understand the process?
3. Did participants feel heard during the process?
4. Did participants feel that they had an influence on the outcome of the process?

Participants

The evaluation gathered data from a variety of participants in the process. Participants in the process fit into five broad categories:

1. The "community leader" category includes leaders from coastal communities. Participants in this category include people such as mayors, city councilors, port commissioners and well-respected fishermen.

2. and 3. Members of the "Site Selection Team" category were split into two categories, based on the geographic community they were representing — Reedsport or Newport. Therefore, there was a Reedsport Site Selection Team category and a Newport Site Selection Team category.

4. The "NNMREC" category includes NNMREC employees and those who served as advisors to process leaders.

5. The "public" category includes those who participated only by attending a public meeting or through personal communication with process leaders and did not fit in the other categories.

Data Collection

A mixed methods approach was used to collect data. Initial, semi-structured interviews were conducted with a subset of process participants who were selected through purposive sampling (Berg & Lune, 2012; Miles et al., 2014). These semi-structured interviews were used to inform the design of the questions asked on a confidential, online survey, ensuring the use of appropriate terminology.

The confidential survey was administered online using Qualtrics software. Email addresses were obtained from a list of participants kept by the process leaders; the initial invitation to participate was sent in November 2014 via email. Reminder emails were sent three weeks and six weeks after the initial email. In December 2014, reminder phone calls were made to Site Selection Team participants, who were given extra questions relating specifically to the Site Selection Team portion of the process.

The total number of surveys sent was 130 and the total received was 61, resulting in an overall response rate of 47%. Table 2 lists each respondent category, total respondents, total surveys sent, and the response rate for each category.

Data Analysis

Data from the surveys and interviews were analyzed using both qualitative and quantitative techniques. Qualitative data from interviews and surveys were analyzed by cataloging recurring themes (Auerbach & Silverstein, 2003). Quantitative data from the surveys were analyzed using traditional methods of

quantitative data analysis.[a] In particular, a reliability test was used to determine whether a set of questions could be combined into one index to measure a specific concept. After running a reliability test, a Cronbach's alpha coefficient is calculated. An alpha of greater than or equal to 0.65 allows the individual responses to be combined into one index (Vaske, 2008).

Key Findings

Logistics

In general, participants were content with the logistical aspects of the process, such as the amount of notice provided, the amount of information provided, and the number of opportunities to engage.

Notice and Timing

Nearly 80% of participants felt they had adequate notice about the siting process before the site was selected in January 2013. When asked how far in advance a community should be consulted before a final marine renewable energy site is chosen, the average response was 22 months.

Information

Overall, participants in the process had enough information about the process, and their most-frequently used sources of information were in-person

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[a]Descriptive statistics, Wilcoxon matched-pairs signed-ranks test, Kruskal–Wallis, Mann–Whitney U test, and reliability test

communication methods. A majority of participants (76%) felt they had adequate information about the siting process, while the remaining participants felt they had received too little information. Participants were asked, "How often did you receive information about the siting process for OSU's proposed grid-connected wave energy test facility from each of the following?" The responses were based on a five-point scale: Never, Rarely, Occasionally, Sometimes, or Often. The most-frequently used source of information was personal communication with the process leaders, followed closely by public meetings or presentations (Table 7). The more passive forms of digital communication, such as websites, were the least-used sources of information. A majority of participants never used social media venues such as Facebook. In the "other" category for this question, participants listed receiving information from additional groups, notably the Oregon Wave Energy Trust (OWET) and Fishermen Interested in Natural Energy (FINE).

Though public meetings or presentations were listed as the second-most-frequently used sources of information, some participants felt there could have been better adversitising of these events to the general public. For example, one member of the Public category of participants knew about a public meeting only because he or she was connected to OSU. This person added, "Many of the people I spoke to did not know [public meetings] even occurred."

Opportunities to Engage

There were several opportunities to engage in the PMEC-SETS siting process. These opportunities were mainly through personal communication with the process leaders, attending a public meeting or presentation, and serving on a Site Selection Team. Overall, participants wanted to be more involved in the process. Most participants who provided a reason for not being involved cited personal reasons and did not blame the process itself.

The survey asked participants in the process what their *actual* level of involvement was during the process and what their *desired* level of involvement would have been. Responses were on a four-point scale: "not involved," "somewhat involved," "moderately involved," and "extremely involved." When asked about their *actual* involvement, on average, participants reported being somewhat involved. When asked about their *desired* involvement, on average, participants wished they'd been more involved (between somewhat and moderately involved). The desire to be more involved was statistically significant.[b]

Additionally, participants were asked to explain why there was a difference between their *actual* and *desired* participation levels. Of the participants who answered, seven cited personal or professional reasons for not being more involved. For example, one participant said, "I am a Federal Government employee and had to

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[b] A Wilcoxon matched-pairs signed-rank test showed the desire to be more involved was statistically significant ($z = 3.35$, $p = .001$) with Cohen's d of .34 indicating a strength of significance between "small" and "medium" (Cohen, 1988).

be careful to act only as a private citizen which limited my involvement." The remaining two respondents said they were not more involved because they were not invited to participate more in the process.

Understanding of the Process

On average, participants across categories slightly agreed they understood the process. Participants in the Public category had the lowest understanding of the process, while participants in the Newport Site Selection Team category had the highest understanding (Figure 5).

Participants responded to four questions that assessed their understanding of the process. The four questions were combined into a single index[c] to address understanding of the process. On average, participants across all categories slightly agreed that they understood the process on a five-point scale, ranging from strongly disagree to strongly agree (Figure 5). The Public category of participants reported a statistically significant lower understanding than the Community Leaders,[d] Newport Site Selection Team,[e] and Reedsport Site Selection Team[f] categories. However, there were no statistically significant differences among the other categories of participants.

Feeling Heard During the Process

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[c] Cronbach's alpha (α) = 0.75
[d] U = 2.54, p = .011, r_{pb} = .49; effect size of "large" (Cohen, 1988)
[e] U = 3.62, p < .001, r_{pb} = .74; effect size of "large" (Cohen, 1988)
[f] U = 2.46, p = .15, r_{pb} = .49; effect size of "large" (Cohen, 1988)

On average, participants across categories slightly agreed they felt heard during the process. Participants in the public category felt the least heard; participants in the Newport Site Selection Team category felt the most heard (Figure 6).

Participants responded to five questions on a five-point scale, which contained responses ranging from strongly disagree to strongly agree, to assess whether they felt heard during the process. The five questions were combined into a single index[g] to address the feelings of being heard in the process. On average, participants slightly agreed they felt heard during the process. The Public category of participants felt significantly less heard than the Community Leaders[h] and the Newport Site Selection Team[i] categories of participants. Additionally, the Reedsport Site Selection Team felt significantly less heard than the Newport Site Selection Team.[j] There were no statistically significant differences among the other categories of participants.

Influence on the Outcome

On average, participants across categories neither agreed nor disagreed that they had an influence on the outcome of the process. Participants in the Reedsport Site Selection Team category felt they had the least influence on the outcome of the

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[g] Cronbach's alpha (α) = 0.94
[h] U = 2.33, p = .018, r_{pb} = .39; effect size of "large" (Cohen, 1988)
[i] U = 3.95, p < .001, r_{pb} = .80; effect size of "large" (Cohen, 1988)
[j] U = -2.22, p = .031, r_{pb} = .54; effect size of "large" (Cohen, 1988)

process; those in the Newport Site Selection Team category felt they had the most influence (Figure 7).

Participants responded to six questions on a five-point scale, from strongly disagree to strongly agree, to assess their understanding of the process. The six questions were combined into a single index[k] addressing influence on the outcome of the process. On average, across all categories of participation, participants neither agreed nor disagreed that they had an influence on the outcome of the process. The Public felt they had significantly less influence on the outcome of the process compared to Community Leaders,[l] the Newport Site Selection Team,[m] and NNMREC.[n] Community Leaders also felt they had significantly less influence on the outcome of the process compared to the Newport Site Selection Team.[o] The Reedsport Site Selection Team also felt they had less influence than the Newport Site Selection Team.[p] There were no statistically significant differences among the other categories of participants.

The perception of having less influence on the outcome of the process could be attributed to several factors, although only a few were revealed in this study. Reedsport Site Selection Team members, in the community that was not selected,

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[k] Cronbach's alpha (α) = 0.95
[l] U = 2.14, p = .034, r_{pb} = .43; effect size of "large" (Cohen, 1988)
[m] U = 4.03, p < .001, r_{pb} = .74; effect size of "large" (Cohen, 1988)
[n] U = 2.63, p = .007, r_{pb} = .48; effect size of "large" (Cohen, 1988)
[o] U = 2.09, p = .04, r_{pb} = .50; effect size of "large" (Cohen, 1988)
[p] U = -3.30, p < .001, r_{pb} = .78; effect size of "large" (Cohen, 1988)

were less likely to feel they had an influence on the outcome. This is clearly evident when comparing the responses of the Reedsport Site Selection Team with those of the Newport Site Selection Team. Additional comments by people in the Public category of participants showed disappointment in the perceived "lack of weight and consideration given to the information and comments that came from the outreach effort."

Greatest Strength of the Process

When asked what the greatest strength of the process was, participants listed several. Participants identified the communication and outreach portion of the process as a strength. Particularly, participants were happy with the physical presence and availability of the process leaders. The process leaders themselves were named several times as the greatest strength in the process. They were associated with trust, openness, strong facilitation, and being good listeners. One participant appreciated that the process leaders listened to what people wanted, and, of equal importance, to what they did not want — referencing specifically communities that were not interested in hosting the site and were therefore excluded from the late stages of the process. Some participants in the Site Selection Team (in both locations) thought using a competitive process for selecting the site was a "great way to get communities to want to welcome marine renewable energy," and that competition led to stronger proposals and, ultimately, stronger support.

Greatest Weakness of the Process

There were few weaknesses listed. The main two were a perceived bias toward Newport and a perceived bias toward the commercial fishing industry. The top complaint about the process was the perceived bias toward Newport. People within every category except for the NNMREC category held this view. A participant in the Public category cited the greatest weakness of the process as "it's obvious preference for the Newport site prior to the formal decision," while a participant in the Community Leader category said, "It was going to be Newport from day one." Another member of the Public category said, "I am somewhat disappointed, as a resident of [the southern Oregon coast], that Newport tends to get the lion's share of interest, attention, and money from Oregon's universities…"

Though working with the fishing community was perceived as a strength of the process, the amount of power given to the fishing community in choosing the site was perceived as a weakness of the process. While one participant felt the fishing industry should be given more power because "it was generally felt they could suffer a loss economically," most participants felt the power afforded the fishing industry was too great.

Site Selection Team Process

Site Selection Team members from both locations (Reedsport and Newport) were asked a series of additional questions specific to the Site Selection Team portion of the process. Overall, a majority of Site Selection Team members felt the representation on their respective Site Selection Team was appropriate, and most members indicated they would participate in future processes to site marine

renewable energy. Two criticisms of the Site Selection Team process were that the site-selection criteria shifted and that fishermen had too much influence over which sites were proposed.

The majority of Site Selection Team members (78%) felt there were no individuals nor categories of stakeholder groups missing from the Site Selection Team that should have been represented. Two Site Selection Team members felt that three groups — local natural-resource conservation groups, shipping industry, and tug operators — should have been on the Site Selection Teams but were not.

When asked whether they would participate in future siting processes, over half the Site Selection Team members (54%) said yes. An additional 21% would maybe participate again, while only 8% would not participate in future processes. There were only a few specific critiques of the Site Selection Team process. One complaint shared by both teams was that the time allowed for creating site proposals (two months) was too short.

The biggest complaint from Site Selection Team members on both teams was that the site selection criteria were not always clear or that they shifted throughout the process. A participant in the NNMREC category also noted that the selection criteria "seemed to be in flux during the process." A couple of the Site Selection Team members felt they understood the original selection criteria but that they were not the same criteria used to evaluate the sites. However, as was previously noted, the Site Selection Teams were provided with a Request for Proposals (RFP) to guide the development of their proposals, and an independent comparison of the

RFP and the score sheet used to rate the proposals shows the same selection criteria were used in both documents.

One Site Selection Team member felt the greatest weakness in the Site Selection Team portion of the process was allowing fishermen to "put some pretty serious constraints on the locations that they'd 'allow'." This person added that Site Selection Team members were not comfortable enough to make alternative recommendations, and that when fishermen chose the site for the test facility, "it was like a secret meeting that did not include the [Site Selection] team." Additional participants outside of the Site Selection Teams agreed with this sentiment, as described previously in this report.

General Marine Renewable Energy Siting

In addition to the questions related to evaluating the process for siting PMEC-SETS, the survey also asked a few questions about wave energy siting in general. Data from this section could provide helpful information in future siting efforts.

Groups Impacted by Wave Energy Development

Survey participants were asked how they thought different stakeholder groups would be impacted by marine renewable energy development on a scale from strongly negatively impacted to strongly positively impacted, with an option for not impacted at all. Several respondents noted that impacts would be different based on project specifics such as the size, how many devices, and the types of

devices. Participants felt that commercial fishing would be the most negatively impacted, while scientists would be the most positively impacted (Figure 8). Participants, on average, did not think Tribes, non-consumptive recreation ocean users, coastal residents, tourists, or non-profit organizations would be impacted by marine renewable energy development.

Most-Important Groups to Engage

When asked how important it is to engage with certain groups about putting a marine renewable energy development in their community, survey respondents felt it was moderately to extremely important to engage with every group listed except tourists, who were listed as slightly important to engage with. When asked which group is the most important to work with when choosing a site for a marine renewable energy development, the most frequent response was commercial fishing (46%), followed by local government (12%). Process participants recognized that different developments would have varying impacts and potentially different stakeholders who would need to be engaged.

Role of Community Members in Wave Energy Siting

Participants were asked for their opinion on the role of community members when choosing a site for a marine energy development. Responses were recorded on a five-point scale, from strongly agree to strongly disagree. On average, process participants strongly agreed that community members should learn about the project and be consulted with, so they can outline concerns about the project

(Figure 9). Participants slightly agreed that the role of community members is to listen to the perspectives of the developer, negotiate alternative options for the project, and engage in trade-offs to see changes in the project/design. Participants strongly disagreed that the community should not have a role in choosing a site, and they slightly disagreed that the community should have full control over the project.

Discussion and Conclusion

Considerations

It is always important to recognize potential recall bias (Eisenhower et al., 2004) in this type of evaluation. For this study, there were two years between the conclusion of the siting process and the beginning of this evaluation. While the recall bias does not in any way invalidate the results of this evaluation, it is important to keep in mind that some of the finer details of a participant's involvement might have been lost from his or her memory. Additionally, participants' feelings might have changed between the end of the process and the beginning of the evaluation.

The process reviewed in this evaluation was for a small-scale research facility for wave energy devices and the siting process was led by people in the academic realm from Oregon State University and Oregon Sea Grant Extension. It is important to note that commercial wave energy developers would have varying sizes, specifications, and effects. Additionally, the responsibility for any siting process would fall on the private company pursuing the development.

Many process participants noted that this siting process was unique in that it was for a "research facility" of limited size and was not led by a public agency or a

private developer. One participant said, “It [this process] might not work for other types of projects. Each project needs to develop its own approach that recognizes the characteristics of the project and the full-spectrum of stakeholders involved.” Additionally, the process may be different depending on the types of devices and the size of the development. One participant stated, “The process would need to be modified considerably due to the nature of what will end up offshore.” A Site Selection Team member added, “This bottom-up approach is how these types of sites should be developed. A top-down approach would have been much more difficult and painful.”

Impact to Stakeholders

Participants in this evaluation felt that tourists would not, on average, be impacted by wave energy development, and they only slightly agreed that it is important to engage with tourists when making a decision about where to site a wave energy development. It is important to note that since this was a confidential evaluation, the background of each respondent is not known. If there were any tourists included in the evaluation, it was likely a very small number. Additionally, it is not known how many respondents are associated with tourism-related industries. Other studies with more of a focus on residents outside of siting areas, or with a larger representation of respondents working in tourism-related businesses, might obtain different results.

Participants in this evaluation felt that scientists would be the most-positively impacted by a wave energy development. Literature has shown, however, that scientists can be negatively impacted by offshore energy development, especially when they are barred from accessing a long-term research site. One study showed that there can by a cyclical effect when scientists are excluded as stakeholders and their research is therefore impacted by development (Sherman, 2012). This cycle, shown in Figure 4, can lead to scientific research being interrupted, ultimately resulting in the availability of less scientific information for making informed management decisions.

Reflection of a Process Leader

The previously reported results were solely from the evaluation participants. The following is from the process leader from Oregon Sea Grant Extension, who was interviewed two years after the completion of the process (and before this evaluation was completed). The interview focused on her advice for future efforts and her reflection on the process used for PMEC-SETS.

Adequate capacity and staff time are required for community engagement efforts. For example, it would have been great to have a dedicated note taker so lead staff could focus on facilitation. Additionally, it would have been helpful to have two lead staff members focusing on facilitation and communication with community members.

Find out the nuances of each community. For example, learn whether there are existing barriers to communication among stakeholder groups

within a community. Additionally, find out whether there were past projects that left the community disheartened.

Put in more time up front to build rapport with the community. A commercial developer may not have existing name recognition or the existing trust that the process leaders for the PMEC-SETS process had. Therefore, they will need to spend more time in the beginning talking about who they are as a company, before jumping into what their project will be.

Hire someone local to facilitate the outreach-and-engagement process. This will help in building trust and learning the nuances of each community.

Recommendations

Stakeholder involvement is an important component in marine renewable energy siting. Studies have shown that renewable energy projects often fail due to lack of consideration for the interests of stakeholders (Chozas et al., 2010). In recognition of this, Ocean Renewable Power Company, a tidal energy company based in Maine, operates under the belief that "agencies give permits, communities give permission" (Johnson et al., 2013).

The recommendations listed below have been drawn from the evaluation of the PMEC-SETS process and a review of literature on community engagement, marine renewable energy siting, marine spatial planning, and other relevant topics.

Create a plan for stakeholder engagement. Stakeholder engagement is sometimes viewed as burdensome. Being clear on, and designing an active

plan for, stakeholder engagement can help establish realistic expectations and lay the groundwork for a smoother process (Richards et al., 2004).

Begin stakeholder engagement early. Several studies have shown that early stakeholder engagement is key to a successful process (Chozas et al., 2010; Ehler & Douvere, 2009; Johnson et al., 2013). Stakeholder engagement should begin as early as possible. Participants in this evaluation suggest beginning 22 months before a site is to be chosen.

Use a variety of methods for information sharing (Gopnik et al., 2012)**.** Participants in this process preferred in-person communication through public meetings or directly with process leadership. Find out the communication methods best suited for the communities where the process will take place. Relying solely on digital communication likely will not work.

Partner with a local organization or resident to learn about the community and help build trust. One study found that community members praised an offshore marine renewable energy developer for hiring local people to aid in its outreach process (Johnson et al., 2013).

Familiarize yourself with priority issues facing the community. Find out whether there is anything else happening in the community that could impact the siting process. For example, are there other marine renewable energy developers working with the community? Have there been recent land use decisions that were controversial?

Build trust within the community. Trust has been defined as "the willingness to rely on those who have the responsibility for making decisions and taking actions" (Siegrist & Cvetkovich, 2000). This evaluation showed that, from the perspective of the participants, trusting the process leaders was one of the biggest strengths. Several studies have also shown trust to be an important component to success and that trust can reduce the amount of active opposition to a project (Olsen & Shindler, 2010; Richards et al., 2004; Stern, 2008).

Future Work

Future research could compare this process, which was specifically for a research facility, to a process used for siting a commercial wave energy or other marine renewable energy development. Furthermore, this evaluation was of one process; future studies could compare siting for this research facility with siting for other offshore research facilities. Finally, an investigation into the pros and cons of using of a competitive process to site wave energy would be helpful if a similar process were to be used in the future.

Figures

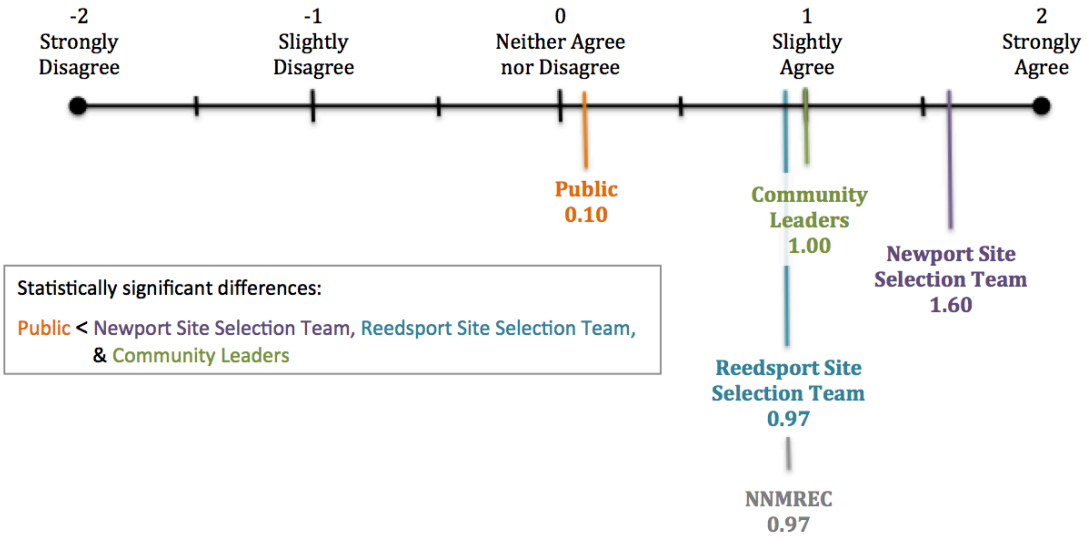

Figure 1. The extent to which each category of participants agreed or disagreed that they understood the process

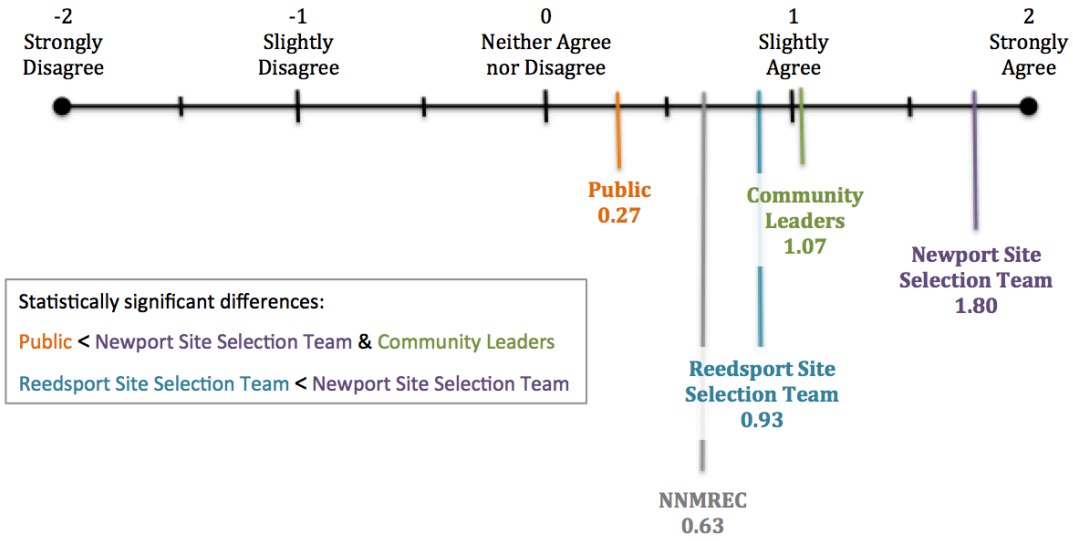

Figure 2. The extent to which each category of participants agreed or disagreed that they felt heard during the process

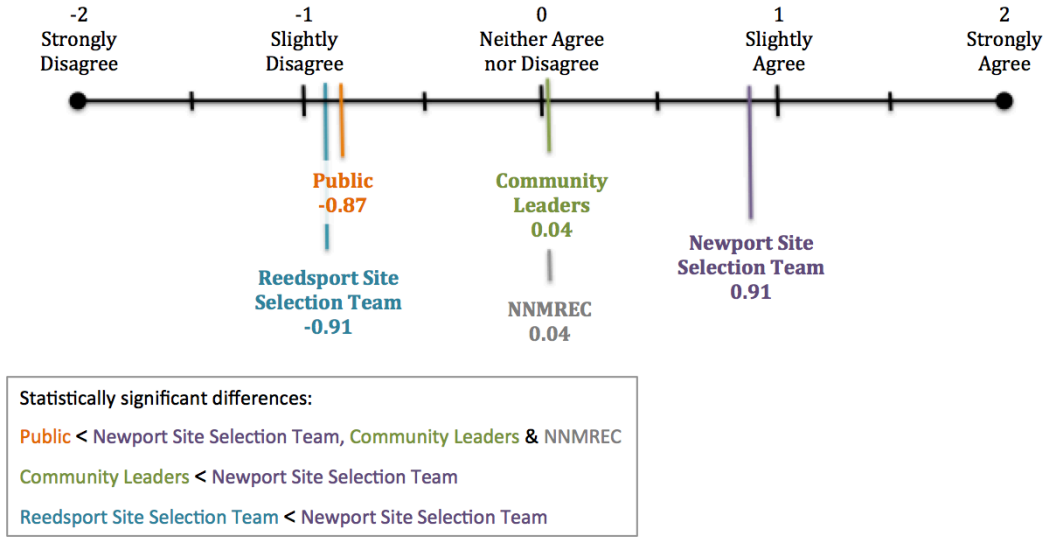

Figure 3. The extent to which each category of participants agreed or disagreed that they influenced the outcome of the process

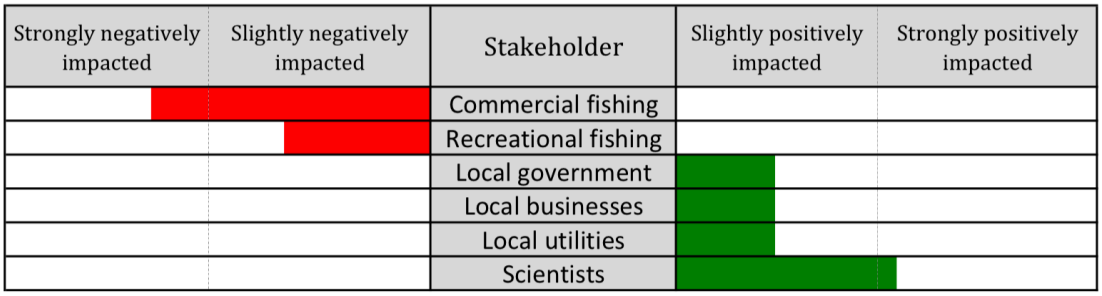

Figure 4. Impact to stakeholders

Figure 4 shows how respondents thought certain stakeholder groups would be impacted. (Note: This figure does not show groups identified as having no impact.)

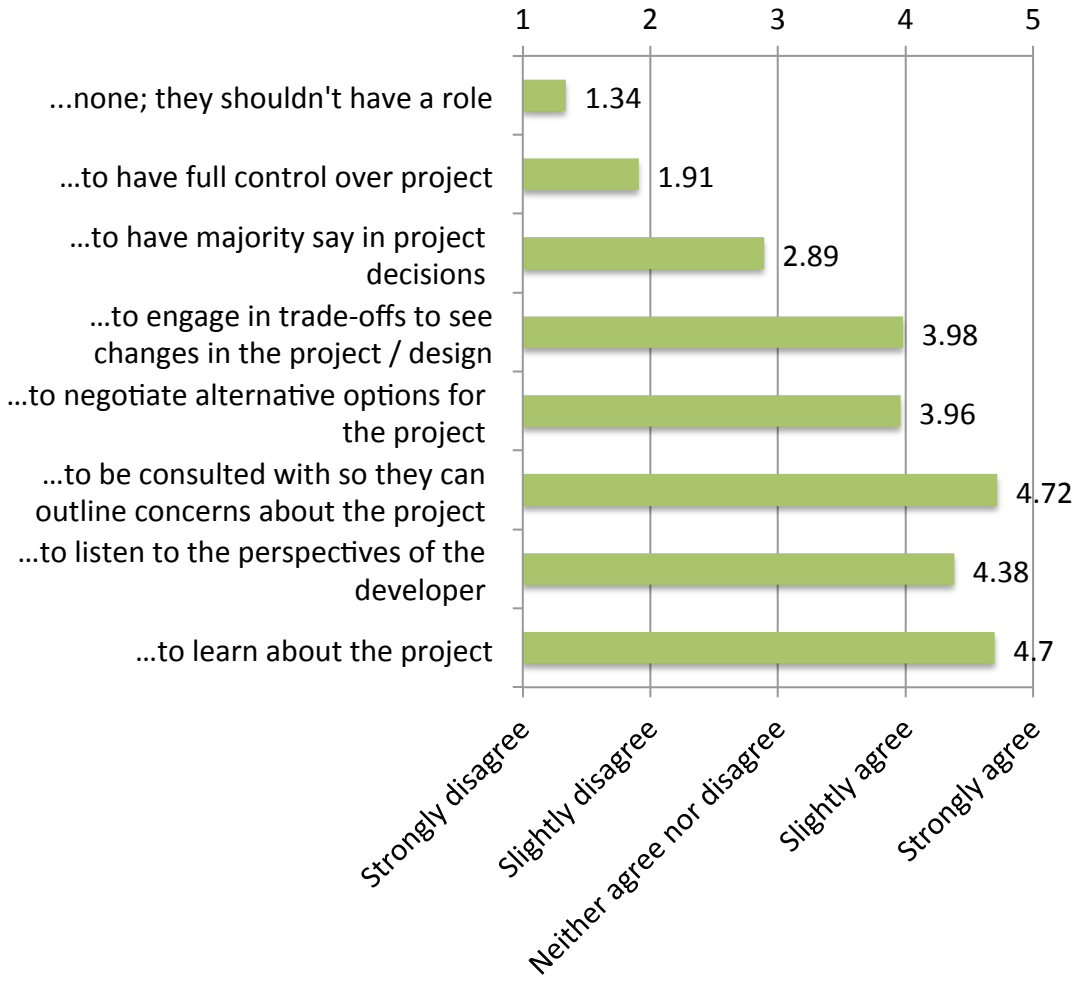

Figure 5. Community role in marine renewable energy siting

Figure 5 shows the response to the question, "To what extend do you disagree or agree with each of the following statements about the role of the community members when choosing a site for a marine renewable energy development?"

The role of community members when choosing a site for a marine renewable energy development should be...

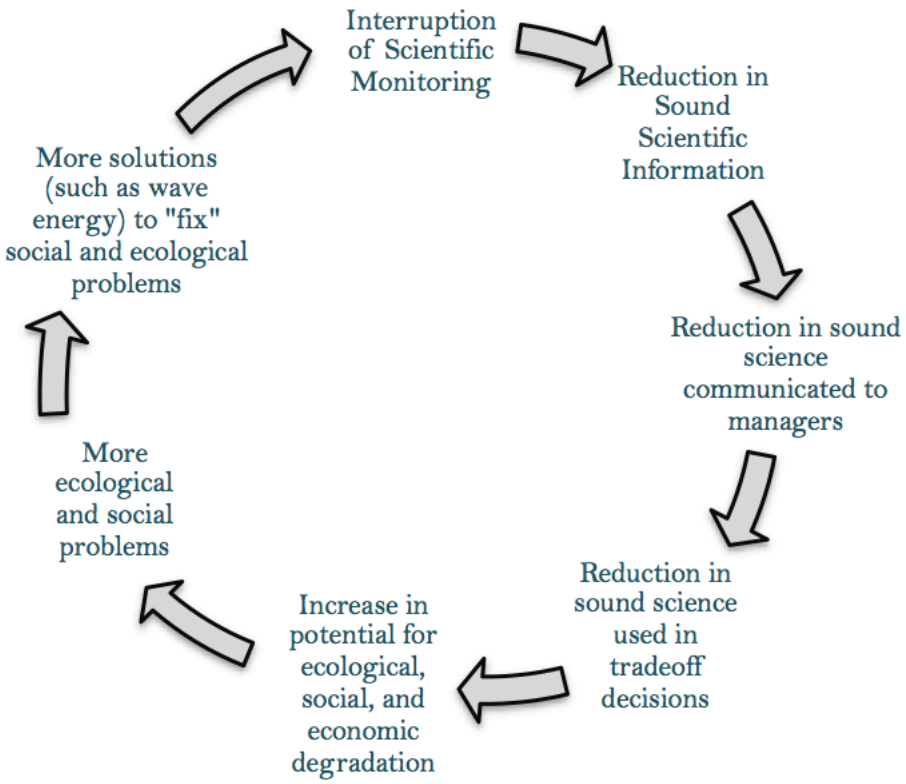

Figure 6. Feedback loop if scientists are not included as stakeholders

The "feedback loop potential if the scientific community is not included as a stakeholder in the marine spatial planning process" (Sherman, 2012)

Tables

Table 1. Information sources

Table 1 shows the source of information and average frequency of use. Information sources are listed from most frequently used (top) to least frequently used (bottom).

Information Source	Average Frequency of Use
Personal communication with Oregon State University, Oregon Sea Grant, or NNMREC	Sometimes
Public meetings or presentations	Sometimes
Oregon Sea Grant email list	Occasionally
NNMREC website	Rarely
Newspaper	Rarely
Family or friends	Rarely
Oregon State University website	Rarely
Radio	Rarely
Oregon Sea Grant Extension website	Rarely
Social media (such as Facebook or Twitter)	Never