AN ABSTRACT OF THE THESIS OF

Zachary G. Covell for the degree of Master of Science in Marine Resource Management presented on December 19, 2014.

Title: Preferences and Strategies of Interest Groups and their Constituents in the Responsible Development of Wave Energy Technology in Oregon

Abstract approved:

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During 2007 proposals for wave energy technology projects in Oregon's nearshore stirred up attention as interest groups experienced rapid changes both socially and economically. The purpose of this research was to analyze factors influencing interest groups and their membership so as to examine their preferences and strategies pertaining to emerging wave energy technology.

Using qualitative research methods, this study includes: 1) an in-depth content analysis of semi-structured interviews specifically seeking to learn where people, namely interest groups, acquire their information about wave energy and if they currently have strategies to promote their preferences; 2) stakeholder input from surveys sent throughout the state to interest group representatives spanning five different sectors; and 3) an evaluation of interview and survey data using a backdrop of five research questions to tell the story wave energy development has had on interest groups in five sectors. Five interest group sectors were: 1) workforce, 2) commercial fishing, 3) recreational, 4) environmental, and 5) energy developers.

Key findings suggest interest groups formulate their strategies based on how informative their sources of information were and where their membership lives in proximity to the coast. A significant trait evidenced by the formation of interest groups with a smaller membership was their use of lobbying. Some groups, regardless of their size, took a much more cautious stance to wave energy as there was a continued need to collect information from their membership. Interest groups were not always subscribing to the notion of a consensus approach as some groups were informed but hesitant in how to participate in wave energy as their leadership was also focused on other projects.

# Preferences and Strategies of Interest Groups and their Constituents in the Responsible Development of Wave Energy Technology in Oregon

by
Zachary G. Covell

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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.

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Zachary G. Covell, Author

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Thank you so much to my father and mother who both worked on the Columbia River for being an inspiration to pursue a degree in the Marine Sciences. From my early childhood the ocean has been a calling for me. I have experienced many aspects of an early version of a career working in the field of marine science from working alongside my parents, fishermen, the Coast Guard, and scientists on the Oregon coast.

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## CHAPTER I

## INTRODUCTION

> Evidence that has been accumulating in diverse regions all over the world suggests that natural and social systems behave in nonlinear ways, exhibit marked thresholds in their dynamics, and that social-ecological systems act as strongly coupled, complex and evolving integrated systems. (Folke et al., 2002, p. 437)

### Problem Statement

This study is a human perspective analysis about whether interest groups had strategies to promote their preferences for alternative energy sources with the specific focus on wave energy development in Oregon. This study was the first to assess interest group perceptions regarding wave energy and other hydrokinetic technologies in Oregon. Wave energy development is the emergence of a possible sustainable energy technology that generates electrical power through the extraction of the energy inside the oscillatory motion of waves and/or tides. Interest groups in this study include communities and organized groups with common interests who were advocating for a position regarding wave energy development, or who were beginning to formulate their strategies. Following an energy policy model from Mundo (2008), interest groups can be distinguished by their policy positions and preferences in five categories. To pursue interest group preferences and perceptions with wave energy five interest group categories were also established in this study: 1) workforce, 2) commercial fishing, 3) recreational, 4) environmental, and 5) energy developers. Workforce groups represented primarily service-oriented businesses and labor unions with workers skilled in the engineering, design, deployment, and maintenance of wave technologies being proposed for wave installations.

Commercial fishing groups were commercial Dungeness crab fishermen and members of organized groups advocating for fishers on the Oregon coast. Recreation groups were associations and coalitions formed to address the wave energy topic and also members of sport fishermen (non-commercial) and some advocacy groups not related strictly to environmental or conservation goals. Environmental groups were generally larger groups of concerned citizens and associations involved and concerned with the conservation of nature and the marine environment. Energy developers were groups with members as well as energy companies proposing wave energy development projects and university / regulatory agencies.

Given the timing of the study in 2007, proposals for wave energy technology projects in Oregon's nearshore stirred up attention as interest groups experienced rapid changes in the political, economic, scientific and social landscape. The same year the Oregon state Legislature passed Senate Bill 838 establishing Renewable Portfolio Standards calling for 25% of the state's electricity to be generated from renewable sources by 2025 (Kulongoski, 2006). The Federal government introduced in Congress the Marine Renewable Energy Research and Development Act of 2007 (H.R. 2313) but it was not enacted. The Federal act proposed research and demonstrations on marine renewable energy production in the United States (U.S. Congress, 2007). This prompted movement when the Federal Energy Regulatory Commission (FERC) approved four preliminary permits for wave energy after issuance of a notice of intent, preliminary application document, and requests to use alternative licensing processes and newspaper notices were sent out (Hampton, 2009). In addition to Oregon State University and University of Washington receiving funding to explore the feasibility of new wave technologies, the Oregon Wave Energy Trust was formed as a nonprofit, public-private partnership to assist in connecting interest groups, R&D, public outreach, and policy. Interest groups represented

business interests or professional interests, while other interest groups were building public support in urban core areas, such as Portland, Oregon, to build the capacity to pressure governmental decision-makers.

Jasper's (1985) review of Chubb (1983) study on the politics of energy points out that interest groups' perception of promising strategies will be influenced by the political structures they face. Interest groups had to balance their own agendas for their members and simultaneously be aware of the potential effects wave energy development could have on their organization, clients, and community, including any political structures created to promote early-stage development of wave energy facilities. Research by Steel, Pierce and Lovrich (1996, p. 401) suggest "interest group influence derives primarily from the ability to mobilize human resources." Head (2007) states there are potential limits on the influence the citizenry and community groups can have as a result of international trends in governance and political economy. Moreover, the limits on the influence the stakeholders, coalitions, and interest groups may have in the process of wave energy proposals became a central focus for many social scientists because this information was unknown.

Interest groups were experiencing an unprepared set of circumstances from the state of Oregon because the 2007 Legislative session had not taken place to announce a format for public outreach and appropriate social engagement. The challenge in Oregon was few assessments of socio-economic impacts were available about wave energy to identify unresolved issues being experienced by interest groups. The broader socio-economic perceptions that interest groups held about wave energy projects were only beginning to gain attention. Consequently, this study intended to find out where involved interest groups focused their efforts and why. In spite of improved stakeholder engagement throughout the state of Oregon as a result of concurrently

developing environmental and ecological protection programs in the nearshore, some interest groups were coping with wave energy by placing it alongside these other developments as an analogous topic.

There was a great need to share responsibility for resolving issues arising between groups and mitigate responses to the pressures of developing alternative energy sources, but the perceptions about wave energy were unaccounted for. For example, in relation to the state governments' established Renewable Portfolio Standards and a wide array of proposals for wave projects, commercial fishing interest groups prompted a larger statewide discussion to address the need for having the voices of their membership be heard. This caused an increasing concern for interest groups to reorient their knowledge to better inform one another of the changes they were experiencing with wave energy developments.

The commercial crab fishing industry had more or less fished state waters unimpeded for over 100 years and the proposed wave energy projects had raised concerns about how to delegate this ocean space appropriately and fairly. Wave technology companies were proposing their implementation and early designs to take place in state waters within the 3-mile limit of the shore where overlap with Dungeness crab grounds occurred. Wave action over the sandy-bottom was advantageous for wave devices to extract power as well as prime fishing grounds for crab. The scope and extent to which wave energy projects would have impacts was still unclear. Oregon's nearshore contains strong ocean wave conditions for wave energy development. These conditions spurred advocacy on the part of environmental groups, research from scientists and industry interest in wave energy extraction. Wave technology companies would be learning the process of permitting and siting devices and performing environmental impact assessments with the Federal and state government, engaging with the commercial fishing representatives, and

testing prototype technologies. Universities were building model laboratories to offer wave developers a testing facility for their devices as well as research on scalability for more than one wave buoy.

Schutz (1976) points out the structure of social action, or "rational-action," requires us to go further into the structure of the social world and make more extensive inquiries into the different attitudes toward the social world adopted, on the one hand, by the actor within this world, and, on the other hand, by the scientific observer of it. Ideally, a straight-forward distinction could be drawn from simply asking interest group representative leadership to share their strategies and perceptions of wave energy in anonymity, but as stated by Schutz above, scientific observation must also be rational.

## Project Description

The study analyzed the sources of information interest groups used to learn about wave energy and the strategies they used to promote their preferences. This study served as a piece of a larger effort in Oregon (Conway et al., 2009) to compare the undeveloped wave energy technology in terms of sustainability with other alternative energy sources from both a social and economic lens. To examine the attitudes, beliefs, values, and well-being of many stakeholders who reside throughout Oregon the policy-actors, interest groups, and the public participated. Fifteen semi-structured interviews (Robson 1993) were conducted with representatives in five sectors: 1) workforce, 2) commercial fishing, 3) environmental, 4) recreation, and 5) energy developers.

*The research questions under investigation were as follows:*

1. How is wave energy perceived by organized interest groups and lobbyists?
2. What types of strategies are being used to promote interest group preferences?
3. What role is science playing in their decision making to participate in the process?
4. How does the current science connect Industry pursuits to wave energy?
5. What stance do environmental advocates take on wave energy and why?

To explore and analyze the inter-group relationships between interest groups this study did not look at political structures. Instead, to identify representative interest groups perceptions of wave energy and the strategies they used, including their sources of information, one must integrate the subjective world of people's experience with the abstract world of theory (Auerbach and Silverstein, 2003). Grounded Theory, as outlined in Auerbach & Silverstein (2003), can provide a theoretical framework to the benefit of using both qualitative (semi-structured interviews) and quantitative (open-ended surveys) methods in tandem to begin to understand situations just like this.

# CHAPTER II

## RATIONALE

Literature from the 1950's on the study of language and mind was part of what was considered the behavioral sciences, including aspects of sociology and psychology. As the name implies the object of inquiry in the behavioral sciences was taken to mean "behavior," and for linguistic studies the mind was also a product of behavior. Behavioral sciences in the early 20th century was a human dimensions research using texts or a corpus elicited from a native informant, essentially many interviews would help construct what science called behavior. Linguistic and behavioral science theory consisted of procedures of analysis, primarily segmentation and classification guided by some limited assumptions about structural properties and their arrangements. David Silverman in (Czarniawska, 2004) notes of *Naturalism* the qualitative researcher of the 1930's documented the "raw" world as it was lived and experienced by its subjects. The problem with this approach was *Naturalism* failed to recognize sufficiently the gendered and socially and ethically stratified character of the world. This branched out into *Structuralism* and eventually *Post-Structuralism* in the 1970's which presented even more alternative analytic frameworks (Wetherell, 1998). Chomsky, (2006, p xvii) writes, "modern linguistics shares the delusion – the accurate term, I believe – that the modern “behavioral sciences” have in some essential respect achieved a transition from “speculation” to “science” and that earlier work can be safely consigned to the antiquarians." This leads us to a point in the development of improved experimental design principles where the reductionist methods science has employed to date become impaired or obsolete.

Social research can now constitute a practice of developing theory, as a self-reflective process for improving the subjectivity and sensitivity to deriving hypotheses and research

questions more suited for the specific constituents or phenomenon being studied. Univariate analysis and unconsolidated coded segments may be used in the overall process to create a framework to deepen the findings, but factors in the social realm are far more complex than running word tests only.

## Grounded Theory

The researcher using grounded theory has to immerse in the information while not falling away from the applicable, caring, and most relevant factual data to present it as a story instead of as a heavy dose of statistics and theory. The three basic elements of grounded theory are concepts, categories and propositions, and the terms vary depending on where one comes across them in the literature. For example, a 'proposition' was originally termed 'hypotheses' by Glaser and Strauss (1967). In some ways today when using grounded theory a proposition is still unofficially a hypothesis except the assumptions made are not merely binary oppositions that constitute structural tests (Craig, 1998).

A systematic grounded theory lens was applied in this study in order to allow the perceptions, action strategies, and stance expressed by interest groups to emerge "from the ground up" in an inductive manner. For example, using grounded theory helped make interview text manageable after coding to understand how interest group thoughts could be used to create a coding tree that corresponds to specific levels of data analysis (Auerbach and Silverstein, 2003). "Paradoxically, emphasizing an organized approach and consistent method when finding themes can cause the researcher to lose touch with the participants' subjective experience" (Auerbach and Silverstein, 2003, p. 74). We must expect the nuances from the social research to become increasingly clearer as the researcher applies their framework or grounded theory to piece

together the data into a story. Hearing what was said in this study was a tabulation, a sequentially more detailed qualitative process followed by a quantitative process. Hearing what participants said implies that the concerns qualitative researchers face is turning to language as an important dataset and literally hearing what was said through a systematic and qualitative method.

Weingand (1993) points out the use of qualitative methods is the nature of discovery itself [and] provides a conceptual base for the development of grounded theory as a research strategy. Rennie and Fergus (2006) say that while conceptualizing the meanings of other individuals, as given in transcribed interviews, the experience itself prompts the emergence of such categories and seemingly helps to provide a sense of their adequacy.

According to Creswell (2014) using mixed method research combines statistical trends (quantitative data) with stories and personal experiences (qualitative data) for a better understanding of the research problem than either form of data alone. "Sequential mixed methods data collection strategies involve collecting data in an iterative process whereby the data collected in one phase contribute to the data collected in the next" (Driscoll et al, 2007, p. 21).

Selin et al. (2000) states collaborative natural resource initiatives have not emerged in response to social science models and predictions. To have a better understanding of how what we do affects people, communities, and society we cannot have synthetic views of the complete energy system in its relation to the whole society (Zaller and Feldman, 1992). A number of alternative management models have been advanced by academics, resource managers, and advocacy groups trying to break the gridlock and protracted conflict over natural resource issues. In response to self-reproducing structures in economics, technology, and culture new approaches to traditional methods for assessing phased development and socio-economic perspectives are being developed (Wallace and Wallace, 1999).

The researcher is part of this process because personal notes become more relevant later on, and can be used to interpret textual data long after the content analysis has completed. The bridge between personal notes and interview text modify the linkage between concepts or themes whereby the subjective experience of the participants of the study can be more accurately interpreted. Probing into the mind of the interest groups at-large the study gained a relative sense how to speculate on interest group arrangements based on the preferences and strategies they expressed. One cannot launch into a philosophical discussion to understand the constructs that align socio-economic and cultural factors. The goal was to make an insightful inquiry into the minds of the individual organizations involved and as consistently as possible follow a methodology through to a relationship, strategy, preference, etc.

The timing of this research also meant that it was too early to know what Oregon interest groups and other stakeholders were doing to address the topic of wave energy technology. Assessing human impacts before data is available requires much stakeholder involvement (GMCME, 2005). The main obstacle was a lack of information. An authentic portrayal of the objective perceptions from interest groups' strategies responding to the changes could be examined. There were no published positions easily available on websites, and there were few community projects and mitigated impact approaches to use as a framework for assessment.

Using an exploratory sequential design quantitative and qualitative data was collected and analyzed in response to five research questions. The five research questions that guided this study (listed on page 5), and the results of this research, are not intended as a comprehensive catalogue of the preferences, perceptions and strategies used by interest groups. Nor does this study assess socio-economic data directly or the topic of policy positions of interest groups with

regard to understanding their interrelationships in forming or not forming coalitions with respect to wave energy (Stevenson, 2009).

# CHAPTER III

# METHODS

This study characterized interest group preferences and strategies with respect to wave energy development within five interest group categories in the state of Oregon:

1) workforce, 2) environmental, 3) recreational, 4) commercial fishing, and 5) energy developers.

## Identification of Interest Groups

An incremental approach was taken to identify the five most suitable interest group categories for wave energy development. Through having attended conferences and meetings alongside stakeholders and wave energy developers both on the Oregon coast and inland it was recognized that across agencies and timescales of up to 3 years stakeholders felt guarded about making any decisions about wave projects. There were an abundant number of interest groups to choose from and identifying which groups may have something to say about wave energy was a challenge. Primarily, the interest groups were identified through referrals and online research until some 400 group representatives were accumulated.

## Semi-Structured Interviews

Qualitative data was collected between January 11, 2009 and March 2, 2009. The first two interest group representatives gave referrals to others who may be good candidates to interview. Using a snowball referral process (Berg 2004), 15 semi-structured interviews were conducted with representatives who could speak on behalf of the interest group. Each interview followed standard, semi-structured format (Robson 1993) and a five-question interview guideline

was provided to the interest group informants before the interview. The questions asked of interest group representatives during interviews were related to the five research questions. The questions asked interest groups their wave energy perceptions, strategies used to get involved, how science played into their decision-making, how science connected to industry, and what stance environmental groups took on wave energy and why. Table 1 shows the interview questions.

Table 1. Interview Protocol - Guideline Questions

| |
|---|
| 1) Please tell me about your organizations/clubs – what kinds of issues, topics, or concerns do you work on and what are the characteristics/demographics of your members? |
| 2) How is wave energy development off the Oregon coast perceived by your organization? |
| 3) Please tell me about the sources of information you use to inform your group members on the topic of wave energy development (industry, media, university, consultant, scientific, etc.)? |
| 4) What strategies are used to inform your group members on the topic of wave energy development and/or renewable energy alternatives? |
| 5) What changes in attitudes or behaviors of your group members have these strategies brought about? |

The purpose of the interviews was to discern the vast number of issues, reasons, and perspectives that may be relevant to the research questions. Of the 15 interviews, 14 were conducted in-person at a location chosen by informants and one was conducted over the phone for reasons of convenience for the representative. All interviews were digitally recorded and then transcribed. Interview lengths ranged from 30 minutes to just under two hours, with most lasting approximately one hour.

After transcription, interviews were numbered and then reclassified so that all interview responses were referenced by interview questions, e.g., all responses to question #1 were referenced in one document, with responses to question #2 in another document, and so forth. The documents were called perception, strategies, sources, organizational structure, and change in attitudes, with respect to the five research questions. Responses were then open-coded to

create a list of repeated ideas. Repeating ideas from the in-person interviews were condensed into shorter sentences and keywords, using open-coding, while quotes were used to provide another layer to a specific theme. Textual data from interviews with interest group representatives were analyzed via content analysis (Auerbach & Silverstein, 2003).

## Grounded Theory and Content Analysis

Both conceptual and textual aspects of each interview were considered while taking notes. Grounded theory was used as a complimentary coding process with content analysis as they share common steps. Schreier (2012) states data reduction is achieved by limiting the analysis to those aspects that are relevant with a view to your research questions. This study used five research questions to create a theoretical narrative and craft a story so as to acquire the most central or crucial themes regarding experiences interest groups have had with wave energy. Many steps were taken in the coding approach creating content categories from repeating ideas. Each interview was coded uniquely, but following the same systematic method. This was helpful to spend more time with each interview and do more open-coding, effectively self-organizing the repeating ideas into themes and later into broader abstract concepts.

Content analysis was used earlier in the research to generate the coding categories. Grounded theory was used afterwards to extract quotes from the interview process to discover patterns within responses and see if these patterns were similar to that found in the survey data. By organizing the repeating ideas and codes into a personal story shared by interest groups from their own descriptions the subjective experiences of the organizations emerged.

This study completed one step in the content analysis before proceeding to the next step. This was done until each interview had been dealt with in the same systematic fashion. It is

recommended to record notes during all steps of any content analysis because contrasting opinions will be lost and simply accounted for via text alone. Figure 1 is an illustration of the process following content analysis, which allowed for interpretation of the data of interest groups activities, preferences and strategies.


Figure 1. Qualitative Data Content Analysis

Open-Coding Content Analysis

Words, sentences, and phrases were recorded as voice notes and were later written on printed pages of the transcribed interviews next to the words where the notes referred to some concept. Step-by-step using this method to highlight specific sections of words and text a subjectively chosen set of repeated ideas was achieved. The phrases within sentences with strings longer than 4 words and which answered one of the five research questions or seemed important were also saved in another document with a notation of which interest group participant the statement came from.

Once all the text for each interview had been read and highlighted with individual repeated ideas another important avenue of content analysis followed. The first step used cut-and-paste with statements from individuals answering one research question only to compile all interview comments into one document. Each interview was read thoroughly again to pull out just the sentences that answered a research question. Then all cut-and-pasted sentences were transferred into a document for one research question.

As the relevance of statements made during the interviews is subjective to the author, care was taken to make indentations in the cut-and-paste stage so as to not only keep the interest groups in the same order, but to also emphasize the relationship one statement had with multiple themes being expressed. For example, the indentation created on a page was later used as a reference point to identify the theme it could be attached to. Twelve overall themes were found as longer sentences and phrases were organized. Themes can be seen in the Codebook of Content Analysis in APPENDIX A (listed on page 54). The bulk of the interview was selected in some cases, depending on how informative the representative of the interest group was in expressing their perceptions and any strategies. Words that did not specifically answer one of the research questions either explicitly or implicitly were not included in this step.

Qualitative Data Analysis Software

Interview data was analyzed with a software program called Qualitative Data Analysis Miner (QDA). QDA was used to report frequencies of the language used during the interviews and helped merge the qualitative data with that of the quantitative mail survey results.

Placing nearly all of the interview text into the software and "removing all the authors comments" while only including the recorded data from transcribed interviews which was

highlighted with text sections and indentations it was now possible to associate themes in the sidebar with statements coinciding with those themes. The repetition in statements from the interviews that fell into a theme were chosen inside the software and was used to generate frequencies. The QDA Miner 'Codebook of Content Analysis' phase consisted of 12 defined themes that were parsed out into many sets of individual keywords and phrases. Using the software to dredge the textual themes the frequencies were examined for each interest group. Each one of the 12 themes was carefully considered for each interview, however; the specific interviewee was now disregarded so as to only search for words and phrases that were similar and / or different within each theme category.

A total of 238 different keywords were examined to see which had the highest prevalence in the 5 interest group categories highlighting sentences, phrases, paragraphs, and concepts to build the 'Codebook of Content Analysis' the 12 themes were used as a bridge to keywords connecting the larger framework within one of the 12 themes. There were 9 sub-categories with statements underneath the theme of 'wave energy,' and some 72 keywords. Perception, connectedness, not come up, come up, ecological, heritage, jobs, siting, and anchoring system were the resulting keywords conveying interest group information about wave energy.

Figure 2 shows the 12 qualitative data analysis keyword themes linked to interview text with a few other sub-categories. The right-hand column in Figure 2 shows the themes linked to highlighted text from qualitative analysis. Interview text and participants are blurred for confidentiality.

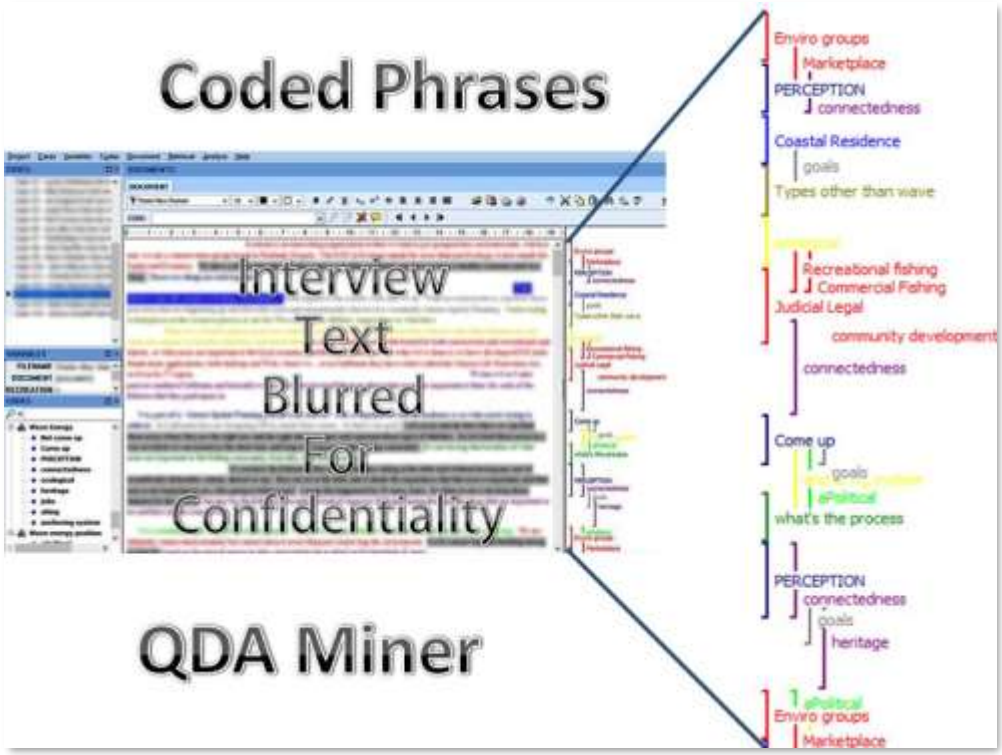



Figure 2**.** Keyword themes linked to interview text

QDA Miner allowed for testing the frequency of statements in terms of the keywords and phrases expressed by interest groups. In Figure 2 we see the word PERCEPTION specifically contained by statements referring to the interest groups' perception. For example, using QDA Miner 13 of a total of 15 interviewees who mentioned their stance on having a long-term or short-term outlook about the wave energy topic was tested. Statements shared which highlighted the focus of the group were able to be cross-referenced to related ideas to see if their thinking was long or short-term in scope based on both frequencies as well as in relation to other interest group categories.

Boolean keyword searching was used in running all syntax within the software so multiple word wildcard operators could be found as well. This yielded across each interest group category the frequency of statements during an interview, either expressly or implicitly. Phrases

of up to five word-strings long were used to specify these preferences in the text across all interviews.

Closed-ended Mail Surveys

Closed-ended mail surveys were developed following Dillman's (2000) method. Then mail surveys were sent to these interest groups and their constituents across the state of Oregon. Survey questions focused on the relationships between preferences and strategies organized groups may or may not employ to promote, leverage, and/or advocate for a position regarding wave energy.

The first mailing of the survey was on March 1, 2009, followed by a second mailing with a cover letter four weeks later; as per Salant and Dillman's (1994) surveying protocol. The survey instrument was sent from Oregon State University with a note attached instructing the interest group contact to take the survey. The survey contained six sections. Section I collected interest group characteristics including the year the organization started, the role of the respondent in the organization, and questions about their membership. Section II asked how frequently their organization communicated specific information concerning natural resource and environmental policy. Section III asked how well informed the interest group was concerning renewable energy policy issues in Oregon, how familiar they were with different technologies, and the strength of their agreement to statements concerning energy policy. Section IV asked specifically the organizations knowledge about wave energy issues and their understanding of different potential impacts as well as the sources of their information they use to learn about wave energy. Section V acquired the organizational understanding between humans and the environment and a couple questions about climate change. Section VI asked about general

demographics including age, gender, liberal or conservative, and a question about their perception of the country's goals long-term.

The survey questionnaires were analyzed using SPSS software. On some survey questions comparisons across the interest group categories were analyzed using a one-way analysis of variance (ANOVA). Differences among groups were determined if the F-ratio was significant at a 95% confidence interval ($p<.05$), while the effect size (Eta) was used to indicate the strength of the differences among groups. If the F-ratio was not significant, no further analysis was conducted. If the F-ratio was significant, a post-hoc test was conducted to determine specific differences between groups using LSD or Tahame's T2 tests for equal or unequal variances, respectively, which was determined by a Levene's test. These post-hoc tests are generally more liberal than others such as Sheffe's and allow for greater variances in samples, but was necessary to account for the small sample sizes used in this analysis. Statistical significance between groups is denoted in the tables by subscripts so that two groups with the same letter are statistically different at a 95% confidence interval ($p\leq.05$). Lower case subscripts (abcde) given in tables denote significant differences assuming equal variances (LSD), while capitalized subscripts (ABC) denote significant differences assuming unequal variances (Tahame's T2).

# CHAPTER IV

## RESULTS & DISCUSSION

Results reported about wave energy development reflect all data collected and analyzed via interviews and mail surveys. The research questions were:

1. How is wave energy perceived by organized interest groups and lobbyists?
2. What types of strategies are being used to promote interest group preferences?
3. What role is science playing in their decision making to participate in the process?
4. How does the current science connect Industry pursuits to wave energy?
5. What stance do environmental advocates take on wave energy and why?

Reading through each interview in its entirety there was a pronounced gradient of expertise and thoughts shared regarding wave energy. Comments as detailed as exclusive economic zones and its relationship to various Federal level memorandums, laws, and coastal zone management were mentioned as well as things as simple as having a sustainable economy for our children's future.

Twelve themes emerged from interview data, and were used as building blocks for keywords and phrases found during content analysis. The 12 themes were: Academic, Economic, Industry Category, Membership, Outlook, Process, Renewables, Sources of Information, Story, Strategies, Wave Energy, and Wave Energy Position. The 12 themes extracted from interview statements helped to answer the research questions because themes and their sub-themes of repeating ideas contained text that when analyzed yielded frequencies and means of statements across all groups. Finally, the 12 themes were organized with similar questions from data collected with the mail surveys to compare and contrast between interviews and mail survey results.

The overall response rate for this survey was 39% (n=112) of 290 mailed; this accounts for undelivered surveys (n=28). The mean age of interest group respondents to surveys was 52 years old and the gender of the respondents was 32% female and 61% male, with 7% no response. The distribution of completed surveys were workforce (n=9), recreation groups (n=23), commercial fishing (n=26), environmental (n=42), energy developers / buyers (n=4), and a public control group (n=4).

Interest Group Familiarity with Wave Energy

Interest group familiarity with wave energy was explored using surveys. The majority of respondents had at least some familiarity with wave energy as a renewable energy technology topic. The interest groups were asked on a survey question "how familiar are you with specific renewable energy technologies, including…wave energy?" In Table 2 respondents chose four possible answers: "not familiar," "somewhat familiar," "familiar," and "very familiar." The majority of interest group representatives indicated that they were either “familiar” (28.6%) or “somewhat familiar” (39.3%) with wave energy. Figure 3 depicts a bar chart for familiarity with only "somewhat familiar" and "familiar" being shown. The height of the bar chart indicates the level of familiarity with wave energy. Sample size is also notable in this inquiry into interest group level of familiarity. Workforce (n=9), recreation (n=23), commercial fishing (n=26), environmental (n=42), energy developers (n=4), and public control group (n=4). As there were fewer energy developers (n=4) who returned a survey, for example, their level of familiarity is not very well represented in this particular survey question although energy developers are generally more familiar than this survey question indicates.

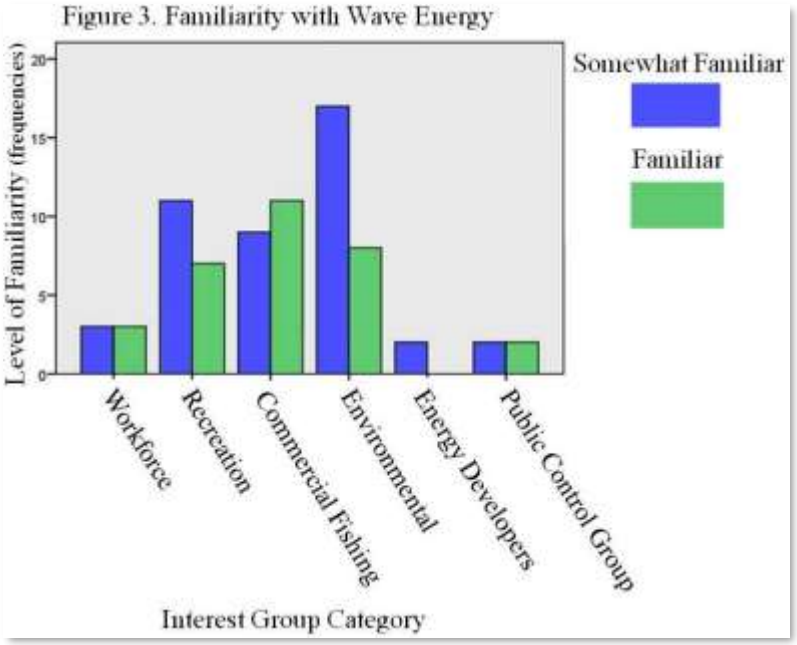



Figure 3. Familiarity with Wave Energy

Table 2. Interest Group Familiarity with Wave Energy

| | |
|---|---|
| Not familiar | 8.9% |
| Somewhat familiar | 39.3% |
| Familiar | 28.6% |
| Very Familiar | 17% |

Commercial fishing was the only interest group that answered "familiar" more often than "somewhat familiar." This may have been the case because wave energy development was proposed oftentimes in the same ocean zones as favorable fishing grounds for Dungeness crab. The likelihood wave energy projects would affect specific commercial fishing groups was high, so more commercial fishing group respondents were familiar with wave energy.

Connection to Place

What was compelling was the degree to which coastal heritage / family and socio-economic points of view emerged. Already feeling constrained, commercial fishing groups were

functioning with the precautionary principle as they were operating on the low side of targets. Hilborn (2002) wrote emphasizing the precautionary principle has caused neglect of the true purpose of a fishery, which is to produce social and economic benefits to society. Regulations within the fishery such as lower harvesting rates and scientific monitoring commitments left commercial fishing groups concerned which citizens had more value than others if things ever came to a vote. They were partial about a consensus approach because the majority of stakeholders lived inland off the Oregon coast on the Interstate-5 corridor and had the larger population to vote on wave energy. It is also because they had not seen a buoy that was successful by that time. Commercial fishing groups placed high importance on a fair consensus process as their families relied upon the income generated from fishing in areas wave energy parks were proposed. The following quote from a workforce member speaks to the livelihood of a fisherman.

> *"A farmer, a rancher, and a fisherman. I deal with them both pretty close. They're the same "cut!" They're the same individual. Hard working, straight-forward, difficult to organize. All thinking they'll find their gold mine. They're a different breed and usually in issues like these rural Oregon will kind of unite. They understand a commercial fisherman getting hurt as well as a rancher getting his allotment taken away by different issues. So they're kind of the same type of animal."*
>
> *- Workforce Interest Group*

Workforce and commercial fishing shared a similar opinion on topics such as seeing the "ocean as an equalizer," a harsh environment, they needed to wait and see if the technology was feasible in the ocean conditions and waves, and they had the need to wait for research regarding environmental impacts in areas they use or their clients use to recreate for business or play in the nearshore ocean. Workforce and commercial fishing in a similar fashion exemplified in statements a shared connection toward their place and way of life.

> *"It doesn't feel good not to work for your money and to be compensated because you lost that. I think that's demoralizing…it's a way of life."*
>
> *- Commercial Fishing Interest Group*

> *"They loved the idea of working on something that was beneficial for the state, for the country, adding a new renewable energy resource, plus it's their jobs and their stability, and they are getting paid to do it."*
>
> *- Workforce Interest Group*

The interview process provided a baseline of data from representatives all over the state and not just on the coast. A recreational group representative said;

> *"My husband is involved in industrial Wind Energy, so he helps by working with a company in Santa Barbara building industrial scale Wind Turbines, and he's talked to some of the people doing the Wave Energy stuff and he's convinced that it's 20 years out until they get something that is comparable to what you could put into a Wind farm."*
>
> *- Recreation Interest Group*

The above statement is indicating the perception this recreation group representative holds regarding wave energy is based on the opinion of her husband who works with wind energy, and is a very long-term outlook. An implicit comparison is being drawn between wind and wave energy, so it is also important to be cognizant of this factor and the fact this family is supported financially from this other sector.

After reading a few quotes we gain a relative sense of how contrasting the viewpoints can be. Interest groups that have smaller membership size do not necessarily have similar perceptions to larger groups in the same category. There were other factors from interviews that also influenced the language the interest group used to address wave energy. The main influential factors were the organization's geographical location, the knowledge of the leadership, the importance or lack thereof with consensus, heritage and family, and whether or not studies from colleges and universities were readily available in their locale. This was determined through the application of content analysis with interview data as well as cross-referencing with similar questions regarding group sources of information from surveys.

Interest Group Perception of Wave Energy

Interest groups were asked what issues, topics, and concerns they worked on and their perception of wave energy. A survey question asked “how much do you agree or disagree with the following statements concerning wave energy development along the Oregon coast,” and then asked to respond to a series of statements on a Likert scale from 1 = Strongly Disagree to 5 = Strongly Agree. In Table 3 the means from this question measuring general support for wave energy development are depicted. The first question in Table 3 asked interest group representatives to respond to the statement “wave energy should be developed in Oregon’s ocean.” Overall, most respondents indicate some degree of support for developing wave energy in Oregon’s ocean (total mean=3.7). Those who agree most with the statement are energy developers (mean = 4.4) and the control group of public respondents (4.4), followed by environmental (3.8) and recreation groups (3.8). Workforce and commercial fishermen indicate less overall support (means $\leq 3.5$). Wave energy support across all interest groups also indicate the commercial fishing groups having chose a neutral stance to the question 'wave energy should be developed.'

The second question inquired, "we would be supportive of wave energy if there was a stronger focus on doing it correctly." Strongest agreement among energy developers (mean = 4.3), and recreation groups (4.2) and commercial fishermen (3.7). Overall, most groups generally agreed with this statement as well (total mean = 3.9) and did not significantly differ from each other. ($p = .436$).

Table 3. Comparison of Wave Energy Support by Interest Group Category

| Phased-Development: | Workforce (labor union) | Recreation Groups | Commercial Fishing | Environmental (conservation) | Energy (developers / buyers) | Control (general public) | Total | *F* | *p* | Eta |
|---|---|---|---|---|---|---|---|---|---|---|
| Wave energy should be developed | 3.5[B] | 3.8[a B] | 3.0[abcde A] | 3.8[be A] | 4.4[c] | 4.4[d] | 3.7 | 4.41 | .001 | .257 |
| Would be supportive if done correctly | 3.4[a] | 4.2[a] | 3.7 | 3.9 | 4.3 | 3.6 | 3.9 | .955 | .436 | .196 |

1. All numbers are means on a scale of 1 ‘strongly disagree’ to 5 ‘strongly agree’
2. Means with different superscripts in the same row are significant at p< .05 based on either LSD (abc) or Tahame’s T2 (ABC) post hoc tests

In Table 4 respondents were then asked the first of eight questions regarding what it means to them to develop wave energy 'correctly' with the question: “prove wave energy technology in laboratories not in Oregon’s ocean.” The interest groups were completely neutral with the statement (total mean = 3.0) with recreation and environmental groups (mean = 2.9) slightly on the disagreeable side. Energy developers (mean = 2.4) were the least supportive of proving wave energy in laboratories and overall differences between the stakeholders were not significant (p=.556).

The next question stated: “test wave energy through monitored experimental projects in Oregon’s ocean,” and showed general support (total mean = 4.0) by the groups. The statement, “expand to commercial scale if experimental projects meet expectations” acknowledged some consensus (total mean = 3.8) across all interest groups, with the exception of commercial fishing (mean = 3.4) who were least supportive of this concept. Energy developers and recreation group representatives agreed most strongly with the statement, followed by the control group of public respondents (mean = 4.0).

Results in Table 4 indicate differences among groups for the development of wave energy. Results show that while respondents from the energy sector advocate for expansion, testing, and minimizing impacts, they also somewhat disagree with requiring unanimous stakeholder support (mean = 2.0) and ensuring no environmental impacts (mean = 2.0). There was consensus between all groups for testing wave energy in the ocean, but disagreement about requiring unanimous support of stakeholders. "With respect to consensus versus unanimity of consent, while unanimity is rarely required as a decision option, the approach to generating it is the same as for building consensus" (Kayser, 2011, p. 94). In the case of wave energy development there was no unanimity, meaning everyone had the same opinion. However, there

was consensus because interest group parties did not necessarily have the same opinion but all supported the various outcomes because everybody understood the underlying differences and reasoning behind asking for the group preferences in the first place. According to Tromp (2005) consensus building in a collaborative exercise implies that all participants have the opportunity to participate and to convince the other participants of their point of view. As consensus represents general agreement amongst the involved parties, in this study consensus was still being reached but unanimity was not important to the interest groups surveyed.

Table 4. Comparison of Wave Energy Preferences by Interest Group Category

| Developing wave energy correctly means: | Workforce (labor union) | Recreation Groups | Commercial Fishing | Environmental (conservation) | Energy (developers/buyers) | Control (general public) | Total | *F* | *p* | Eta |
|---|---|---|---|---|---|---|---|---|---|---|
| Prove wave energy in labs | 3.3 | 2.9 | 3.3 | 2.9 | 2.4 | 3.2 | 3.0 | 0.80 | .556 | .199 |
| Test through experimental projects | 3.8 | 4.1 | 4.0 | 4.0 | 4.4 | 4.2 | 4.0 | 0.55 | .737 | .166 |
| Expand to commercial scale | 3.6 | 4.1$^{A}$ | 3.4$^{A}$ | 3.9 | 4.2 | 4.0 | 3.8 | 1.78 | .124 | .291 |
| Ensure no environmental impacts | 3.3 | 3.6$^{a\ A}$ | 3.6$^{b\ B}$ | 3.7$^{c\ C}$ | 2.0$^{abcd\ ABC}$ | 3.8$^{d}$ | 3.5 | 1.98 | .089 | .305 |
| Minimize environmental impacts | 4.0$^{a\ A}$ | 3.5 | 3.3$^{b}$ | 3.0$^{ac\ A}$ | 4.4$^{bc}$ | 3.8 | 3.4 | 2.43 | .041 | .333 |
| Ensure no user impacts | 3.5$^{a}$ | 3.3$^{bc}$ | 4.1$^{bdef\ A}$ | 3.3$^{d}$ | 2.0$^{ace\ A}$ | 2.8$^{f}$ | 3.4 | 3.93 | .003 | .412 |
| Require unanimous support of stakeholders | 2.5 | 2.5$^{a}$ | 3.2$^{ab}$ | 2.6$^{b}$ | 1.6$^{b}$ | 2.4 | 2.6 | 2.15 | .066 | .317 |
| Allow groups to participate but not block | 3.5 | 3.3 | 2.8$^{a}$ | 3.5$^{a}$ | 4.0$^{a}$ | 3.8 | 3.3 | 2.41 | .042 | .333 |

1. All numbers are means on a scale of 1 ‘strongly disagree’ to 5 ‘strongly agree’
2. Means with different superscripts in the same row are significant at $p < .05$ based on either LSD (abc) or Tahame’s T2 (ABC) post hoc tests

Each question above showed general support except the groups who expressed a neutral perspective when proving wave energy in laboratories and not the ocean. They seemed unsure about that question. Additionally, the workforce and commercial fishing groups were least supportive of developing wave energy in Oregon's ocean but expressed an interest in more testing.

Table 5 presents response means from the question discussing the most important uses of wave energy according to interest groups as well as an indicator for their preferences about jobs on the coast. Interest groups were again asked on a Likert scale from 1 = Strongly Disagree to 5 = Strongly Agree the question: "achieving energy independence for the coast of Oregon." Responses to this question indicate differences ($p < .05$) between the recreation, commercial fishing, and public interest groups (means $\leq 3.4$ ) who generally agree and workforce and energy developers who generally do not (means $\leq 2.9$).

Overall, these results suggest that becoming a leader in renewable energy is an important reason generally agreed upon by most groups but that achieving energy independence for the coast and combating climate change are not as gratifying.

Table 5. Comparison of Reasons to Develop Wave Energy

| | Workforce (labor union) | Recreation Groups | Commercial Fishing | Environmental (conservation) | Energy (developers/ buyers) | Control (general public from YBYC) | *F* | *p* | Eta |
|---|---|---|---|---|---|---|---|---|---|
| (n=100) | 8 | 23 | 25 | 34 | 5 | 5 | | | |
| Achieving energy independence for the coast of Oregon | 2.9 | 3.4 | 3.2 | 3.1 | 2.4 | 3.2 | .927 | .467 | .217 |
| Achieving energy independence for all of Oregon | 3.5 | 3.8 | 2.9 | 3.4 | 2.6 | 2.8 | 2.341 | .047 | .331 |
| Combating climate change | 3.0 | 3.6 | 2.6 | 4.4 | 3.0 | 3.4 | 8.455 | .000 | .557 |
| Creating new jobs on the coast | 3.9 | 4.0 | 3.5 | 3.9 | 3.4 | 3.6 | .920 | .472 | .217 |
| Oregon becoming a leader in renewable energy | 3.5 | 3.9 | 3.2 | 4.0 | 3.2 | 3.6 | 2.289 | .052 | .329 |

All numbers are means on a scale of 1 'strongly disagree' to 5 'strongly agree'

Across all 5 interest group categories the interviews revealed a longer-term focus of three or more years when referring to group perceptions about the development of small-scale wave energy farms. The following is a short description of each interest groups' basic perceptions toward wave energy and their outlook in terms of their views on a long or short-term timeframe. This data was derived from the interview process only.

Workforce represented the group of interests who were the skilled workers and laborers. They felt motivated by the idea of being the part of industry to design, build, and deploy wave buoys and other technology. The workforce perspective was short-term on testing devices and long-term going to commercial-scale.

Commercial fishing were remaining pro-wave development but guarded as coastal residence were most widely represented in this interest group. Commercial fishing perception was wave energy was an immature technology and they wanted a better effort of stakeholder engagement. Commercial fishing still maintained a long-term outlook toward going commercial-scale with wave parks.

Environmental groups were somewhat muted (neutral and mixed perspective) about wave energy as their members represented the inland residents and valued community development, jobs, and ecology. As environmental groups were only beginning to formulate strategies to address wave energy their perception was neither long or short-term in focus.

Recreation groups had a long-term perspective. Recreation groups amplified their presence through forming coalitions and hiring lobbyists. Recreation groups deeply desired to have on-site demonstrations, they were supportive of collaborative research between industries, not just through universities.

And lastly, energy developers had a short-term perspective with an emphasis on jobs and the influence on electric utilities and economy. Energy developers also viewed wave energy as only one piece of a larger alternative energy portfolio in Oregon.

Lobbying

A research question asked how wave energy is perceived by interest groups and lobbyists. Unfortunately, directly equating the perception of lobbyists was not in the scope of how the study progressed. A different discovery arose from this inquiry about lobbyists. Seven categories of repeated ideas brought forth during content analysis led to this discovery in that there were state lobbyists for even small groups with a veritably insignificant membership size and some large interest groups who do not have a lobbyist at the state level. Smaller recreational interest groups with 150 members have sections within their membership that have registered lobbyists in Salem, Oregon. Recreation groups amplified their presence through forming coalitions and hiring lobbyists. To help move their preferences recreation groups also used judicial processes following existing land-use laws to inform the proper process to follow to engage with their membership.

In contrast, larger environmental groups had no lobbyist when their membership was nearly 1,500 people. The environmental interest groups comprised a large populace in comparison to other interest group categories. Some groups had no lobbyist to advocate for their concerns about wave energy at the state government or coastal caucus which makes it harder to communicate their group policy preferences.

Interest Group Strategies

Using content analysis two inquiries were made to find out interest group strategies and their sources of information. The study proceeded under the assumption that the primary sources of information that were used to formulate interest group strategies were also used to promote their preferences. Content analysis from interviews narrowed down six strategies used to promote interest group preferences: 1) community development, 2) conferences and meetings, 3) education and outreach, 4) on-site demonstrations, 5) telephone, and 6) written communication via email or another form. Across all five of the interest group categories the primary strategies from the interviews were analyzed by hand first using Microsoft excel. The statements describing group strategies were also used in QDA Miner software to analyze the frequency of responses and determine their sources of information.

Using Microsoft Excel to create a spreadsheet of categories derived from reading interest group interviews the findings from content analysis found 12 primary themes and data mining occurred by using hand tabulation. Rows and columns in the spreadsheet showed the themes used, for instance, one of the 12 themes was labeled 'strategies' referring to when statements were made suggesting or hinting at any strategies the groups used internally in their organization. Interviews were searched for any statements referring to the group strategies. The content analysis phase found the primary strategies based on the number of interviews in a specific interest group category where the informant mentioned one of the six strategies. This determined the importance of the specific strategy mentioned by the group based on the number of times a group representative commented on a strategy.

Figures 4 through 8 depict the strategies for each interest group category based on the frequency of their statements. The number of interviews used in determining their strategies are

noted, for example, there were two interviews with workforce groups( n=2). Figure 4 indicates the workforce interest group primary strategies were community development, written, conferences and meetings, and education and outreach. Figure 5 indicates the commercial fishing interest groups used community development, conferences and meetings, and the telephone. Figure 6 indicates the environmental interest groups used community development, education and outreach, and on-site demonstrations. Figure 7 indicates the recreational groups used conferences and meetings, education and outreach, and on-site demonstrations. Lastly, figure 8 show the energy developers used education and outreach, community development, conferences and meetings, and written forms to express their preferences and also as a strategy.

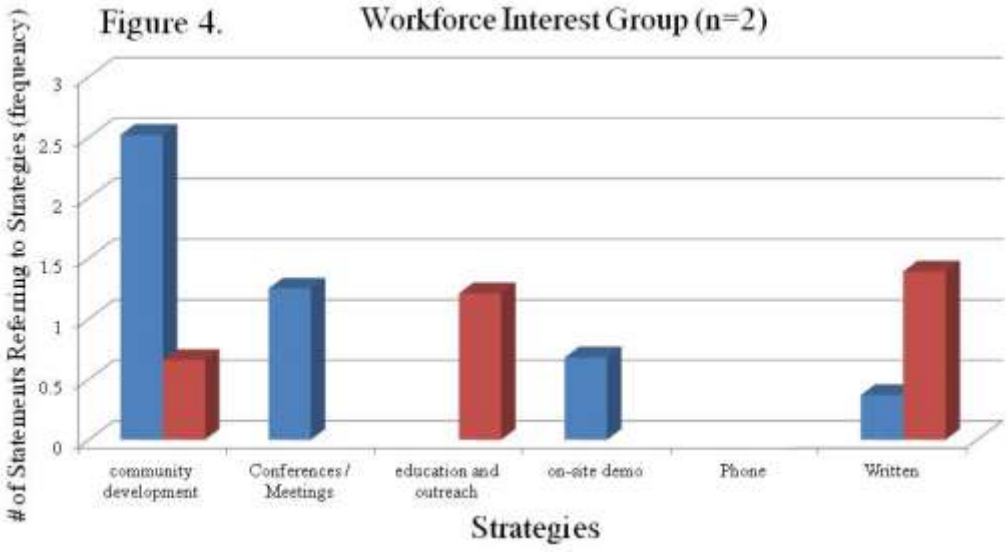


Figure 5.

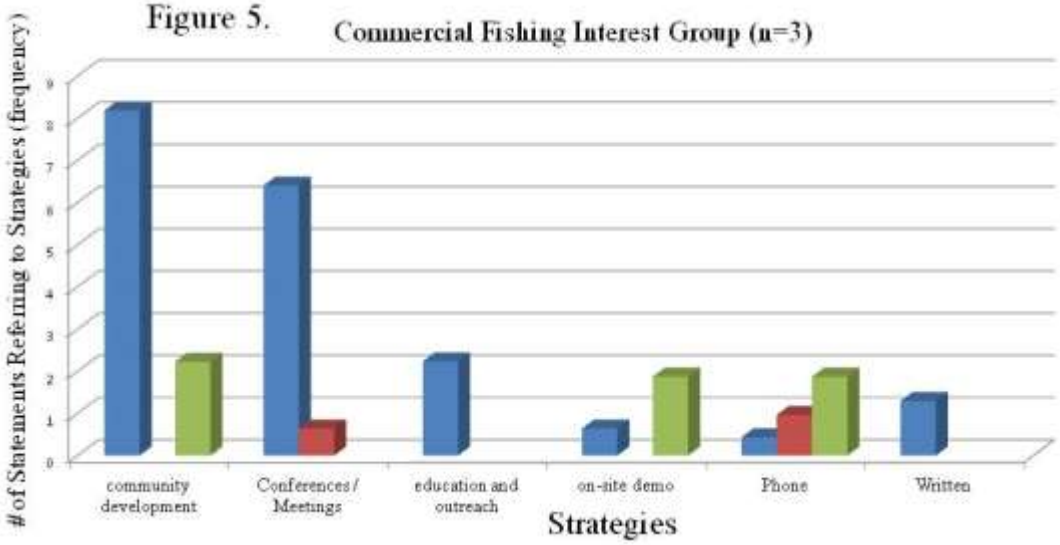



Figure 6.

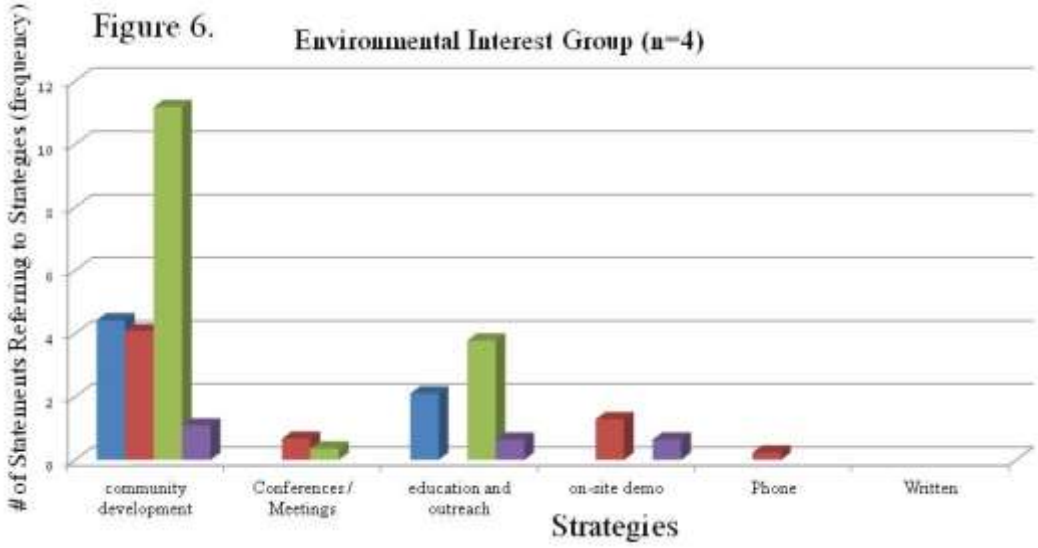


Figure 7.

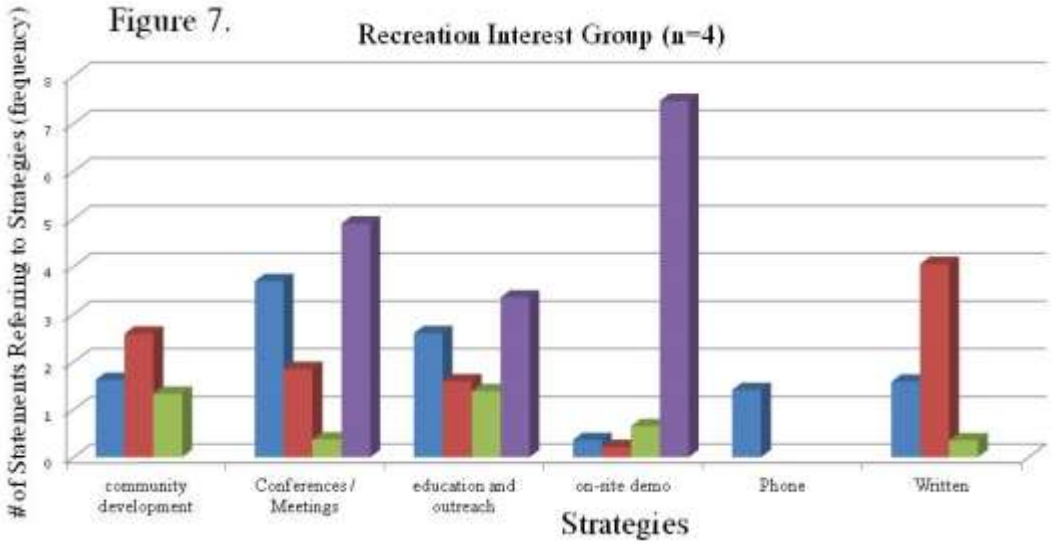
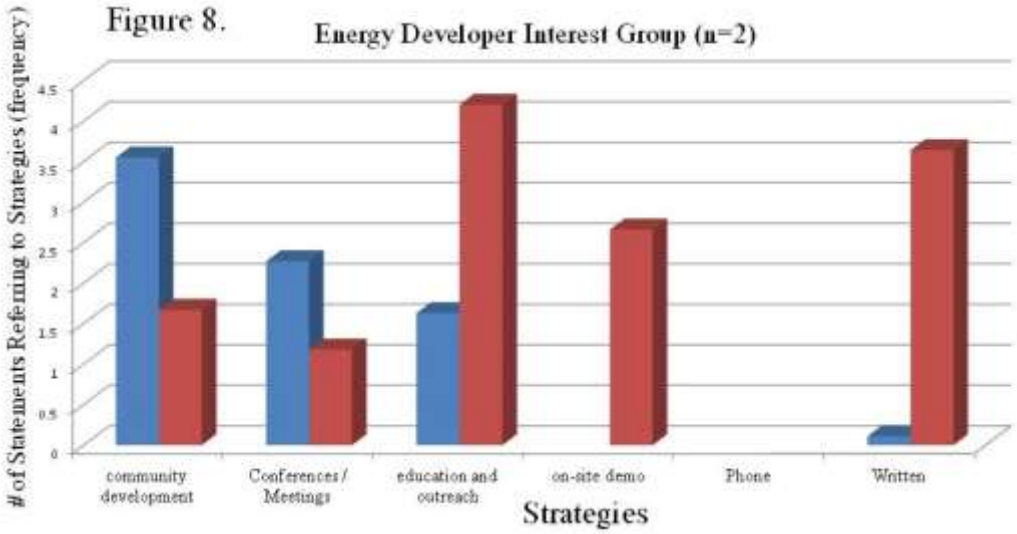



Figure 8.




Group strategies help to define their perceptions of wave energy because the sources of information they use to learn about wave energy may limit the degree to which groups in different sectors are invited into discussions with groups in other sectors when they are unaware of other information sources. Interest group perceptions of other groups can present opportunities for enhanced future collaboration efforts because their sources of information and strategies may have some aspects in common and make it possible for interest groups to work together.

Interest Group Sources of Information

The six strategies interest groups used to promote their preferences were connected to the information sources they used through another analysis of textual interview data. Eighteen total sources of information were analyzed. The primary sources of information indicated in figures 9 through 13 are shown. Figure 9 shows that out of the eighteen sources of information workforce used primarily the wave energy industry itself, their own clients, and recreational fishers for their information. Figure 10 shows the primary sources of information the commercial fishing groups used were other commercial fishers, the wave energy industry, and state government. Figure 11 shows the primary sources of information the environmental groups used were the Internet, television, and universities. Figure 12 shows the primary sources of information the recreation groups used were the legal and judicial system, Federal government, and commercial fishers. Lastly, figure 13 depicts the sources of information the energy developers used were the wave energy industry, commercial fishers, and universities.

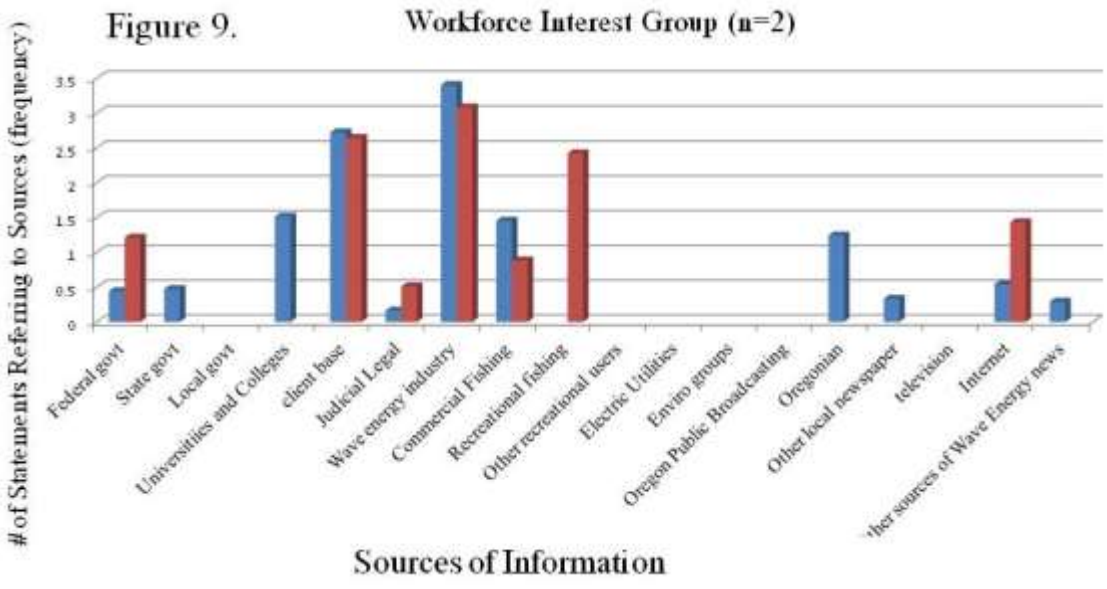


Figure 10. Commercial Fishing Interest Group (n=3)

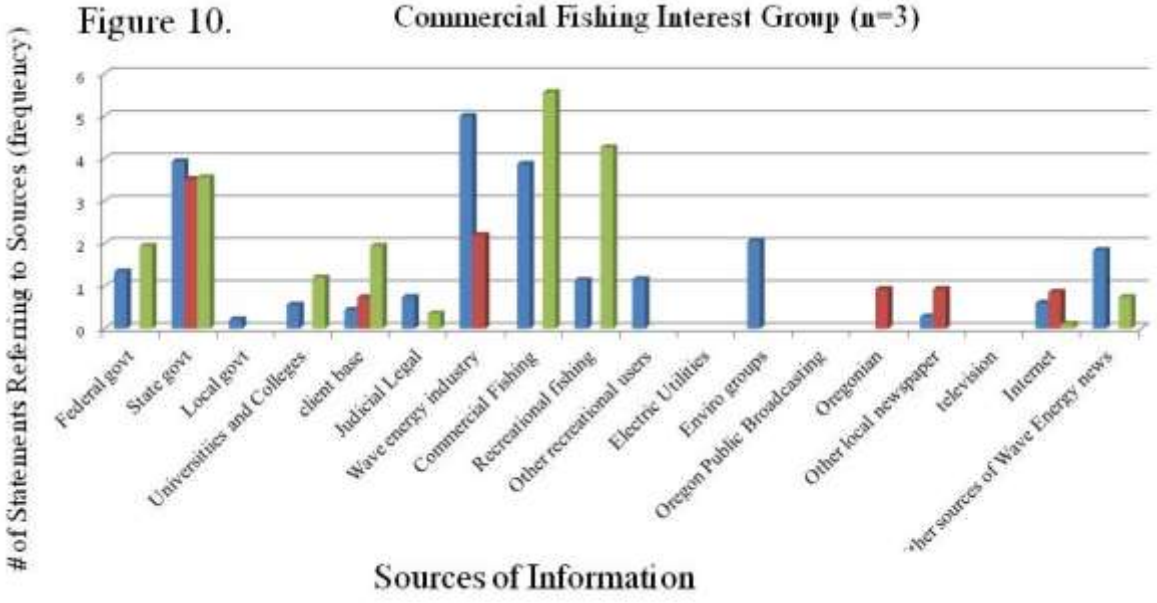



Figure 11. Environmental Interest Group (n=4)

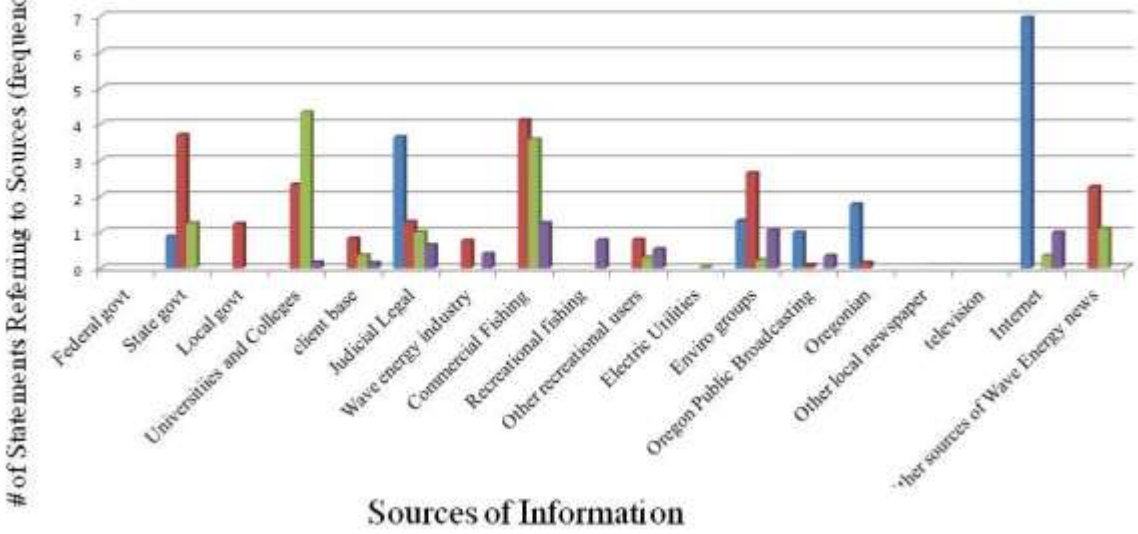


Figure 12. Recreation Interest Group (n=4)

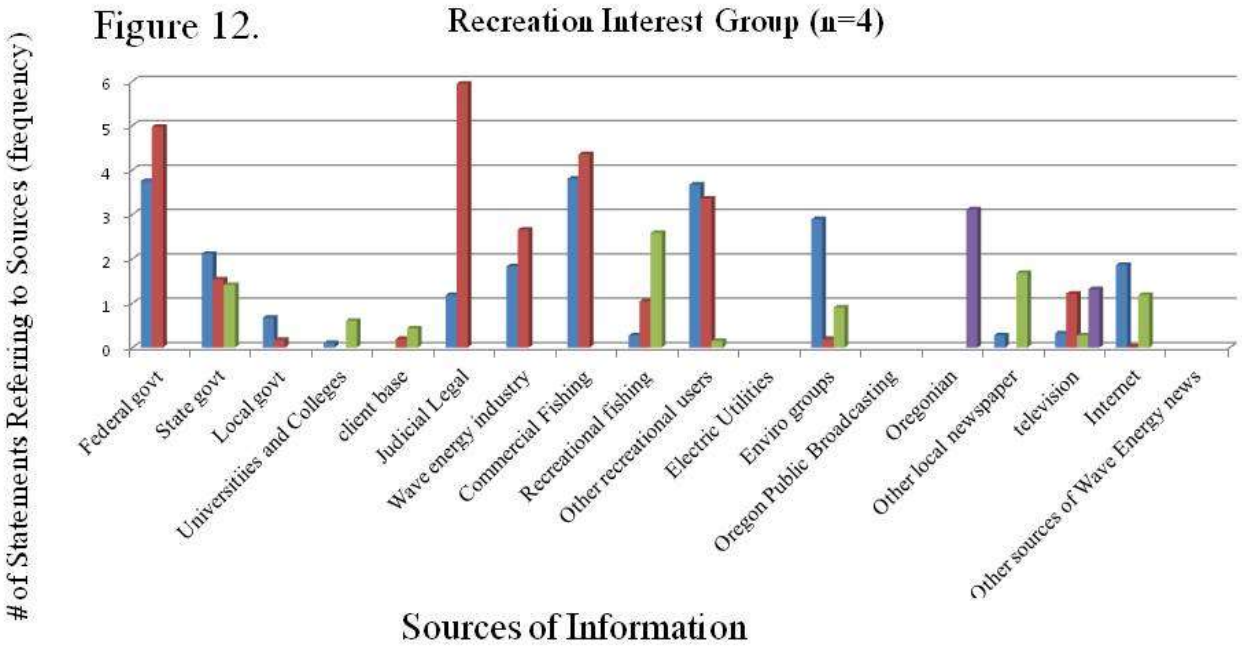
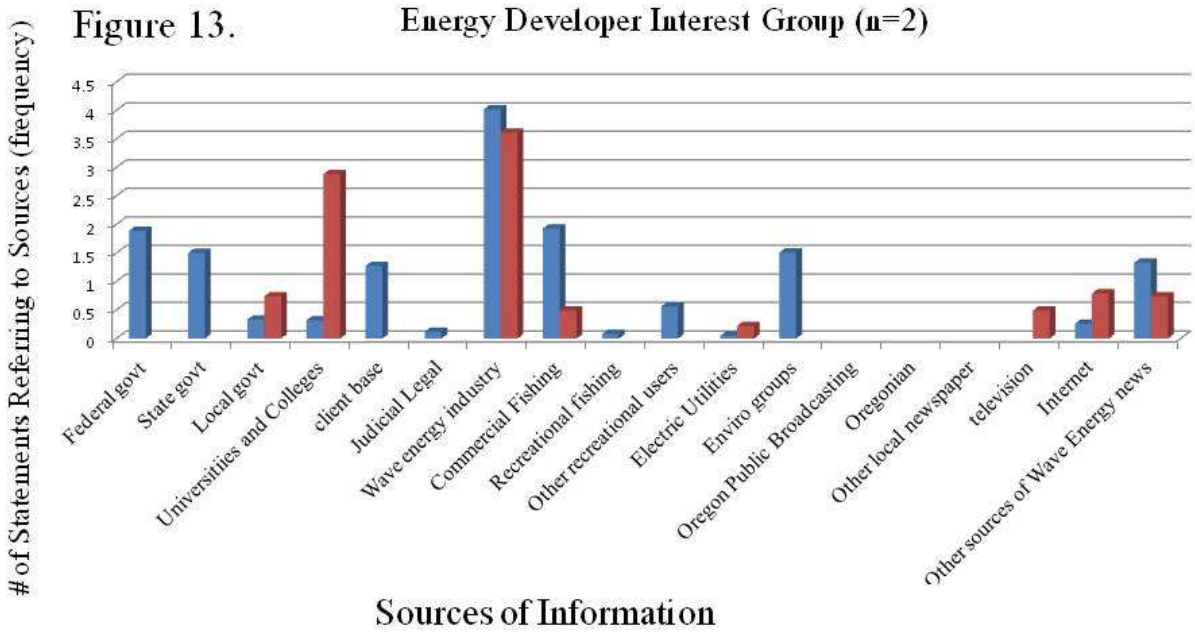



Figure 13. Energy Developer Interest Group (n=2)




Environmental groups and the energy developers used colleges and universities as a primary source of information for wave energy and commercial fishing, workforce, and recreation groups did not use colleges and universities as much. In the latter stage, using QDA Miner software, the reason for this was discovered. Commercial fishing, workforce, and recreation groups did not use colleges as a primary source of information because their members,

clients, and constituents lived primarily on the coast where larger colleges are less accessible. For instance, when interest groups were asked if science methods provided the best technique for understanding the natural world on the mail survey the same two interest group categories shown above, environmental and energy developer groups, leaned toward colleges and universities. This could indicate the environmental and energy developer groups always use colleges and universities as a source of their information, not just with regard to wave energy.

Sources of Information (Survey Results)

Interest group representatives were also asked about the sources of information they currently used or would use to learn more about wave energy. The survey question read, "we would like to know which of the following information sources you currently use or would use to learn more about wave energy in Oregon?" A list of 15 different sources of information were available to select including television, radio, newspapers, universities and the Internet, etc. Respondents were given a set of four choices: "never," "infrequently," "frequently," and "very frequently." They were asked to circle the number of how frequently they used a source.

Among all of the information sources interest groups used to learn about wave energy technology environmental groups, television, and Oregon Public Broadcasting (OPB) turned out to be important sources of information in Oregon according to surveys. Responses also indicated the Internet was widely used by interest groups. Regression estimates on sources of information with wave energy technology are presented in Table 6. The Chi-Square of the model was *($\chi 2$*= 29.169, *p*=0.202). However, the pseudo $R^2$ shows that some 20.1% of respondents' sources of information were explained by the model variables.

Table 6. Logistic Regression for Sources of Information about Wave Energy

| | Sources with Wave Energy |
|---|---|
| | *Coefficient (SE)* |
| Television news programs and specials | -.203* (.168) |
| Oregon Public Broadcasting | .133 (.156) |
| The *Oregonian* newspaper | .034 (.143) |
| Other local newspapers | -.095 (.170) |
| Internet | .110 (.155) |
| Local government | -.005 (.285) |
| State government | .040 (.303) |
| Federal government | .020 (.243) |
| Utilities and Colleges | .068 (.191) |
| Electric utilities | .010 (.215) |
| Judicial / legal entities | .001 (.233) |
| Commercial fishing | .001 (.210) |
| Recreational fishing | -.079 (.243) |
| Other recreational users | -.113 (.234) |
| Environmental or conservation groups | .259** (.169) |
| Wave energy industry | .115 (.175) |
| Constant | 2.637 |
| Chi-Square | 29.169 |
| Nagelkerke $R^2$ | .201 |
| N | 101 |

Significance level *p≤.05; Significance level **p≤.01
Note: Survey question asked with "never" up to "very frequently"

Surveys indicated the primary sources of information to be, 1) environmental or conservation groups, 2) television news programs and specials, 3) Oregon Public Broadcasting (OPB), 4) wave energy industry, and 5) the Internet, respectively. While OPB was the third-most popular source of information from survey results, the content analysis only found OPB to be mentioned by environmental groups. Environmental groups themselves were cited as a primary source of information from surveys, so it could be possible they mentioned OPB during interviews because they were affiliated or have content with programs on OPB at the time.

Role of Science

Interview discussions revealed how science was playing a role in interest groups decision making to participate in wave energy. A lack of scientific data to help them form appropriate

strategies was present by-and-large. Access to scientific information showed how some groups portrayed themselves as more informed.

Table 7 asked interest groups on the survey whether science helps us understand the natural world, if scientific experts are supportive of their own personal values, if local preferences should prevail over scientific experts, and if the best strategy for resolving environmental issues should be consensus based. Representatives of the interest groups were asked on a Likert scale from 1 = Strongly Disagree to 5 = Strongly Agree the question, "scientific methods provide the best technique for understanding the natural world?" The energy developers (mean = 4.6) and environmental groups (mean = 4.4) agree most strongly, followed by recreation groups (mean = 4.3). This result also correlates to the interview data as the energy developers and environmental groups were the groups who utilized colleges and universities as a source of information. Energy developers' strategies to promote their preferences are fairly evenly distributed, e.g., they utilize science and other resources in a balanced way. Environmental groups lean more toward community development and education and outreach. This also somewhat fit with their agreement that science helps to understand the natural world. It is not so apparent with energy developers as they agree most with the statement. Less supportive of science to understand the natural world are commercial fishing (mean = 3.7) and workforce (mean = 3.5). A commercial fishing interest group comments on science.

*"I read a fair amount. Bits and pieces on the Internet, a lot of the periodicals. The base of my assumptions are from my experience that happens on the water. I'm somewhat skeptical and I cannot base my skepticism on any quantifiable science that's proven one way or the other about how viable these are, but I'm somewhat skeptical of the long term viability of these projects versus…in order to be competitive in the energy field they are going to have to prove themselves. And right now they are far more expensive than hydro as far as per kilowatt."*

*- Commercial Fishing Interest Group*

Table 7. Interest Group Perception of Science and Local Consensus

| *General Management Preferences:* | Workforce (labor union) | Recreation Groups | Commercial Fishing | Environmental (conservation) | Energy (developers /buyers) | Control (general public from YBYC) | Total | *F* | *p* | Eta |
|---|---|---|---|---|---|---|---|---|---|---|
| Pro-Science | 3.5 | 4.3 | 3.7 | 4.4 | 4.6 | 4.0 | 4.1 | 3.7 | .004 | .210 |
| Anti-Science | 4.0 | 3.3 | 3.9 | 2.9 | 2.8 | 3.2 | 3.3 | 3.4 | .007 | .266 |
| Pro-Local | 2.9 | 2.2 | 2.9 | 1.6 | 1.6 | 2.4 | 2.2 | 2.8 | .000 | .299 |
| Pro-Consensus | 4.4 | 3.9 | 4.3 | 3.4 | 3.2 | 3.6 | 3.8 | 4.0 | .007 | .374 |

All numbers are means on a scale of 1 ‘strongly disagree’ to 5 ‘strongly agree’

There was a large difference between groups on the next survey question, which was, “scientific experts often look for data which supports their own personal values.” Strongest agreement came from workforce (mean = 4.0) and commercial fishing (mean = 3.9), and differed from environmental (mean = 2.9) and energy developers (mean = 2.8), as recreation fell within a slightly agreeable position (mean = 3.3). The last two questions look at local preferences and consensus-oriented efforts. The first reads “local preferences should ultimately prevail, even when they conflict with the judgment of scientific experts.” Responses were more muted than above but one difference did emerge. For example, workforce and commercial fishing both have a subtle disagreement (mean = 2.9) as environmental and energy developers (mean = 1.6) disagree most with the statement. The final prompt in Table 7 states, “the best strategy for resolving environmental issues is consensus-based negotiations among stakeholders, including agencies and scientists." There was wide agreement among groups on this question (total mean = 3.8).

Within the interest groups the recreation groups, for example, viewed wave energy development itself as another way to maintain connectedness and remain supportive because it brings together different groups. Recreation groups expressed science as well as the judicial and legal frameworks regarding decisions, mitigation, and decommissioning and incremental build-out. The recreation groups were worried of equity and loss of opportunity to ocean access as well as wanting to see more on-site demonstrations of wave energy. They wanted environmentalists and scientists to get what they wanted. Recreation groups also suggest environmental groups can collaborate with fishery independent studies more often to maintain a protectionist philosophy as a goal for sustainable harvest. Recreation groups also made comments comparing wind power

and solar to wave energy, saying it was advantageous to expand access through other avenues, like getting larger representation with outside groups.

The interest groups do not have the resources like the oil industry for wave energy development. A energy developer said in terms of perceptions that wave energy was a "deliverable" in Oregon's portfolio because rapid energy expansion could meet 10% of Oregon's energy needs as wind energy is about 2-3% of the current portfolio. Energy developers had sobering comments about the challenges but also recognized wave energy as only a portion of the total energy portfolio, because they were focused on a breadth of issues. The issues and pressures faced within the actionable steps groups took were related to changes in industry and a lack of scientific data. One energy developer noted wave energy as no panacea to our energy needs. The same energy developer stated;

*"Net gain in energy, net gain in environmental protection, and net gain in economic development. But again, the burden of proof is on the industry, if you can't prove that, no one's buying that but until you can prove it you are not going to get that buy-in that you really need to make the industry move forward."*

*- Energy Developer*

Science is most readily available to those groups who participate and maintain relationships with the environmental groups and energy developers because of their involvement with universities as a primary source of information. A bridge also recognized in connecting science with industry was with recreational groups and lobbyists as these groups have some experience with policy and enhancing their community voice through lobbying at the state government level. Commercial fishing groups utilized state government as one of their sources of information and are concerned with impacts comparable to environmental groups. All groups expressed the need to stay informed in terms of possible socio-economic displacement. Thus,

connecting the relevant science to industry pursuits will entail a cross-group communication with information exchange and venues to share new information.

Environmental Advocates on Wave Energy

Environmental groups were increasingly dependent on understanding which side of the fence their members sat regarding topics they express as important. Environmental groups were proactive about many topics and somewhat muted about wave energy. Previous participation in communities made wave energy a "touch and go" topic. Interest group representatives didn't want to ignite their membership and lose their support without having the delicate and yet relevant knowledge to participate in public hearings and community projects. The informants were aware of the issues and attended some meetings and conferences.

Environmental groups represented the inland residents in Oregon and generally spoke of community development, jobs, and ecology. Of all the interest groups they seemed to have goals to pursue many projects, but their focus was only beginning with wave energy.

Environmental groups wanted clear and careful planning first and foremost. To accomplish this some have institutionalized their efforts to deal with the pressing issue of wave energy. However, most environmental groups were still watching wave energy from the sidelines. They didn't have the resources to get involved yet. They had some common ground with commercial fishing however, when it came to two areas regarding wave energy. First, environmental groups could solicit the help of fishermen if they could work out a partnership of funding to assess vulnerable areas of the ocean environment. Second, baseline social data collected is the same data that could be used to enhance and expand fishing opportunities in the territorial sea through creating maps for monitoring and management of the ocean resource.

The glaring difference between the membership of commercial fishing groups being the coastal residents and environmental groups being represented by inland residents characterized why most environmental groups did not take a stance on wave energy. Even though sustainable and alternative energy development were topics the environmental groups were active in, wave energy was not yet on the table for them.

It is important to keep in mind that within the sample sizes environmental groups had a larger membership size compared to other groups. Smaller groups indicated a more political orientation to amplify the voices of their membership through lobbying and the large interest groups were protecting their membership by subscribing to a more neutral stance. The proximity of environmental advocates membership to the coast was farther away than the members of other groups, and it seems the expected impacts to their members could be less than members on the coast.

# CHAPTER V

# CONCLUSION

In conclusion, this study offers an analysis of interest groups using a grounded theory approach. This approach was useful because a systematic process was followed to extrapolate the subjective experiences of groups as it required compressing disparate sources of information and comments. Interest groups were just beginning to form their strategies and perspective about wave energy. This study adds a layer to the socio-economic data tools available in Oregon. Plus, having a comprehensible catalogue of interest group preferences and their perceptions could assist other groups to synthesize an objective approach to weigh making better choices about wave energy in the future.

The findings from this study show environmental groups and the energy developers used colleges and universities as a primary source of information whereas the other groups did not. Survey data also corroborated this information about environmental and energy developer groups and could indicate the environmental and energy developer groups always use colleges and universities as a source of their information, not just with regard to wave energy. Survey results indicated environmental groups, television news, and Oregon Public Broadcasting (OPB) were primary sources of information for interest groups. While OPB was the third most popular source of information from survey results, textual interview data found OPB to be mentioned by environmental groups. Environmental groups themselves were cited as a primary source of information from surveys, so it could be possible they mentioned OPB during interviews because they were affiliated or had content with programs on OPB at the time.

Workforce interest groups represented the group of interests who were the skilled workers and laborers. They felt motivated by the idea of being the part of industry to design, build, and deploy wave buoys and other technology.

Commercial fishing interest groups were remaining pro-wave development but guarded as coastal residence were most widely represented in this interest group. Commercial fishing perception was wave energy was an immature technology and they wanted a better effort of stakeholder engagement.

Environmental groups were somewhat muted (neutral and mixed perspective) about wave energy as their members represented the inland residents and valued community development, jobs, and ecology. Environmental groups were only beginning to formulate strategies to address wave energy.

Recreation groups amplified their presence through forming coalitions and hiring lobbyists. Recreation groups deeply desired to have on-site demonstrations, they were supportive of collaborative research between industries, not just through universities.

Energy developers emphasized jobs and the influence on electric utilities and economy. Energy developers also viewed wave energy as only one piece of a larger alternative energy portfolio in Oregon.

The findings in this study have some limitations. The contextual nuances that arise in performing a content analysis suggest that all interpretation of data results should be stalled until the completion of a systematic approach has come to an end. While it is helpful to get multiple repeated ideas from every interview and the text the tendency to compare results before completing all the interviews can be a mistake. Survey questionnaires should be designed with the procedure of the analysis in mind. This study used a survey with questions geared to make a

comparison to the interview data but as the results showed the interviews have some instances whereby the repeated ideas and themes are difficult to compare to the survey data.

Future studies may consider taking the exploratory and sequential mixed-mode design of this study a little further by looking at membership size and political orientation in relation to wave energy information sources and use of lobbying.

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APPENDIX A

# Codebook of Content Analysis

**Academic**
- Colleges and certified smarties
  KEYWORDS: OSU, OREGON_STATE_UNIVERSITY, UNIVERSITY_OF_WASHINGTON, UW, OREGON_SEAGRANT, COLLABORAT*, EDUCAT*, KNOWLEDGE_EXCHANGE,

**Economic**
- Marketplace
  KEYWORDS: VALUE_ADDED, VALUE*, PRODUCT, INSTITUTIONAL*, PARTNERSHIP*, ECONOM*, HEADS_ABOVE_WATER, ECONOMIC_TIMES, DO_THE_WORK

**Industry category**
- commercial fishers
- energy developers
- environmental
- recreational users
- workforce

**Membership**
- Coastal Residence
  KEYWORDS: ASTORIA, SEASIDE, CANNON_BEACH, MANZANITA
- Number of members
  KEYWORDS: CONSTITUENT*, CLIENT*, PARTNER*, MEMBER*,

**Outlook**
- long-term
  KEYWORDS: PARTNER*, COLLABOR*, PERMANENCE*
- short-term

**Process**
- goals
  KEYWORDS: CLEAR, STAKEHOLDER*, CONCISE, PLAN*, COMMIT*, MANAGE*, CAPITAL*, INVOLVE*, WHAT_WE_CARE_ABOUT, DEAL, DESCRIPTIVE, PROACTIVE, RESILIENT, SOLUTION*, PLACE*, TRUST*, PLACE_BASED, RELY, RISK*, INTO_PLAY, COMPLICAT*, EMPLOY*, OPPORTUN*, LIBERAL, CONSERVATIVE, DEMOCRATIC, REPUBLICAN, BEST_USE, PUBLIC*, EVERYBODY_HAPPY, CLEAR_AND_CAREFUL, KEYWORDS: ONE_OFF, REGULAT*, PROPRIETARY, HURDLE*, FRAMEWORK*, BROAD*, CRISIS*, FRANKLY,
- what's the process
  KEYWORDS: RATIONAL*, REACT*, ENGAGE*, COMPREHENSIV*, CHALLENGE*, INDUSTR*, QUICK*, FEAR*, GRASSROOT*, UPWARD*, REPLICATE*
- who owns the resource
  KEYWORDS: SUBSIDIZE*, COMPET*, ACCESS*, 3_MILES, 200_MILES, SPATIAL*, SPATIAL_PLANNING, ZONING, FENCE, DIVVY,

**Renewables**
- Types other than wave
  KEYWORDS: WIND*, GEOTHERM*, BIOMASS, SOLAR, TIDAL, MARINE_RESERVE*, MPA*, MARINE_PROTECTED_AREA*, NATIONAL_MARINE_SANCTUARY*,

**Sources of Information**
- Commercial Fishing
  KEYWORDS: NATURAL_HARVESTER*
- Electric Utilities
- Enviro groups
- Federal govt
- Internet
  KEYWORDS: MESSAGE_BOARD, EMAIL*, BLOG*, LIST_SERVE*
- Judicial Legal
- Local govt
- Oregon Public Broadcasting
  KEYWORDS: OPB, NEWS
- Oregonian
- Other sources of Wave Energy news
  KEYWORDS: METAL*, MANUFACTUR*, COALITION*
- Recreational fishing
- State govt
- television
- Universitiies and Colleges
- Wave energy industry
  KEYWORDS: OWET, SEAGRANT, PELAMIS, WAVEGEN, FINAVERA, BUOY*
- client base
  KEYWORDS: CLIENT, CONSTITUENT, PARTNER*

**Story**
- Stories

**Strategies**
- community development
  KEYWORDS: PARTNER*, INSTITUTION*, COMMODITY, DRIVEN, BYLAW*,
- Conferences / Meetings
- education and outreach
- Phone
  KEYWORDS: TELEPHONE*
- Written
  KEYWORDS: NEWSLETTER*, GRANTS, LETTER*, WRITING*, WRITTEN_COMMUNICATION

**Wave Energy**
- Not come up
- Come up
- PERCEPTION
  KEYWORDS: EXCITED, CAUTIOUS, TRICKY, SKEPTICAL, RATION*
- connectedness
  KEYWORDS: MANAGE*, LEGISLAT*, NEARSHORE, COASTAL_RANGE, 3_MILES, TERRITORIAL_SEA, ANGER*, FRUSTRATION*, ANXIETY*, FORCES_PEOPLE, TAKE_SIDE*, CONNECT*, INTERCONNECT*, FALLACY, REGULAT*, CHALLENG*, OPPOSITION, THOSE_TWO, NICHE, CONCERN*, BUY_LOCAL, STRATEGIC_PARTNERSHIP*, SUBCONTRACT*
- ecological
  KEYWORDS: ENVIRONMENT*, ECOLOGICAL, IMPACT*, NEGATIVE, POSITIVE, OTHER_USER*, USER*, NET, CUMULATIVE, GREY_WHALE*, WHALE*
- heritage
  KEYWORDS: HERITAG*, COMMUNITY, CRAB*, DUNGENESS, FRONTIER, MAINSTAY, LONG_STANDING_HISTORY, LEGACY, KIDS, GRANDKIDS, FUTURE_GENERATION*
- siting
  KEYWORDS: SITING, LOCAT*, BEST, WORST, PLACE*, OFF_LIMIT*, END_OF_THE_DAY, CRITIC*
- anchoring system
  KEYWORDS: ANCHOR*, SYSTEM, COMPLEXIT*, RESIST*, SOFT_SANDY, BOTTOM, REEF*, PALAT*, GROUNDFISH*, TRAWL*, IRELAND

**Wave energy position**
- aPolitical
  KEYWORDS: NOT_ORGANIZED
- against
- supportive
  KEYWORDS: COASTAL_COMMUNIT*, JOB_CREATION, SUPPORT*, GUT, MORASS, CHALLENG*, EFFECTIV*, DIALOGUE, MANIFEST*, DOESN'T_TAKE_AWAY,