AN ABSTRACT OF THE THESIS OF

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Protected area creation, including creation of marine reserves (MRs), is increasingly molded by ecosystem based management (EBM) that integrates biological and social information in the pre and post establishment phases. Collecting social data from large and representative samples of the public (as opposed to other stakeholder groups) before establishing a MR would provide information about residents proximal and more distant to the reserve. These data are currently lacking for Oregon's system of five newly established MRs. This thesis examines coastal resident knowledge, intentions, attachment, and attitudes toward these reserves, and their perceived similarity and social trust in agencies responsible for managing these areas. This information may inform management of Oregon's MRs, help create a scientifically grounded description of resident perceptions of MRs in this state, and fill an important component of the EBM approach. Policy creation and public engagement based on this information will yield more inclusive protected area creation and management strategies, increasing the probability of conserving resources in a socially acceptable manner. This thesis, therefore, contains two standalone articles based on a mail survey

of Oregon coastal residents (n = 595) that sought to understand their knowledge, trust, attitudes, and intentions associated with MRs in this state, and how these cognitions vary depending on geographic proximity and level of attachment to these areas.

The first article examined the influence of coastal resident proximity and place attachment on their self-assessed and factual knowledge associated with these MRs. Residents tended to report higher self-assessed knowledge than factual knowledge, which was low with 65% answering half or fewer of the 16 factual questions correctly. Self-assessed and factual knowledge did not differ between communities proximate to and more distant from these MRs. Factual knowledge also did not differ substantively based on attachment to the reserves, but attachment did influence some aspects of self-assessed knowledge about the MRs where those with higher attachment to these areas felt that they had slightly higher self-assessed knowledge.

The second article examined relationships among resident knowledge about the MRs, their perceived similarity and trust in the agency currently responsible for these areas, and their attitudes and behavioral intentions associated with the areas. Residents expressed relatively high similarity and trust in the agency, with those living closest to the MRs expressing the highest similarity and trust. The majority of residents had favorable attitudes toward possible benefits of these MRs and would vote in support of these reserves (69%). Residents living in communities of place nearest these reserves had the most positive attitudes and would be the most likely to vote in support of these areas (82%). Path modeling showed that residents who perceived themselves to share similar goals and opinions as the agency were most likely to trust this agency. Those

with higher trust in this agency also had more favorable attitudes toward possible benefits of the MRs, and had less agreement with potential constraints of these areas. Residents who expressed more favorable attitudes toward potential benefits of the MRs would be most likely to vote in support of these areas, whereas those who agreed with potential constraints would be less likely to vote in support. Management and research implications of results presented in both of these articles are discussed.

Perceptions of Protection: Coastal Resident Cognitions Concerning New Marine Reserves in Oregon

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Dean of the Graduate School

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

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Elizabeth E. Perry, Author

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CONTRIBUTION OF AUTHORS

Drs. Mark Needham and Lori Cramer were involved in the overall conceptual design of this research. Dr. Mark Needham provided feedback and statistical support on chapters two and three. Dr. Mark Needham also assisted with detailed editing of chapters one, two, three, and four.

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CHAPTER 1 -- INTRODUCTION

There has been a steady increase in calls for the creation of marine protected areas (MPAs) over the past 30 years (Pita, Pierce, Theodossiou, & Macpherson, 2011). Countries worldwide have responded to this call, increasing the number of formal MPAs from a few hundred in the 1980s (Silva, Gately, & Desilvestre, 1986) to about 6,500 today (Wood, 2007). International interest in protecting marine environments has also surged over the past decade, with the amount of ocean within MPAs increasing by more than 150% since 2003 (Toropova, Meliane, Laffoley, Matthews, & Spalding, 2010). Terrestrial protected areas have a long history, but MPAs are a more recent phenomenon. The United States (U.S.) Congress, for example, took the lead in establishing the world's first national terrestrial park 1872 (i.e., Yellowstone), but it took Congress another 100 years to establish the first MPA legislation, the Marine Protection, Research, and Sanctuaries Act of 1972 that was later renamed the National Marine Sanctuaries Act. In this same year, the first well-known national MPA was established in Australia (i.e., Great Barrier Reef Marine Park).

There are various reasons for creating and establishing MPAs, depending on the local context (Pollnac, Crawford, & Gorospe, 2001) and a MPA may refer to different areas, protection levels, and conservation strategies (Pita et al., 2011). Many types of MPAs exist, from "multiple use" MPAs allowing fishing in some areas and protection in others, to "no-take" marine reserves (MRs) prohibiting any extractive use. MPAs generally have less stringent restrictions than MRs and are "areas of the

ocean designated to enhance conservation of marine resources" (Lubchenco, Palumbi, Gaines, & Andelman, 2003, p. S3) where prohibitions and allowances exist on a case-by-case basis. This thesis will use the term MPA as a broad inclusive term referring to many different types of protected areas and the term MR when specifically referring to areas with restrictions on extraction.

A major international goal was to create a representative network of MPAs encompassing 10% of the global marine environment and 20-30% of each key coastal and marine biome and biodiversity rich area by 2012 (CBD, 2002; IUCN, 2003). Given that only 1.6% of the world's marine environments were classified within MPAs by this target date (Bertzky et al., 2012), however, a steep increase in both the amount of ocean within MPA status and rate of creating these MPAs is necessary to meet the revised goal date of 2020 (Bertzky et al., 2012). Although there are arguably few pristine marine ecosystems remaining and most have been touched or impacted by humans (Grorud-Colvert, Lester, Airame, Neeley, & Gaines, 2010), fully protected no-take MRs have witnessed some success in protecting and restoring marine environments in a few areas of the world (Grorud-Colvert et al., 2010) such as the Las Cruces Reserve in Chile, Bongalonan Reserve in the Philippines, and Governor Island Reserve in Australia (Lester et al., 2009).

In the U.S., the 1972 National Marine Sanctuaries Act still serves as a basis for marine conservation, wise use, and an evolving national system of marine biodiversity conservation areas (Chandler & Gillelan, 2004). There is currently a strong emphasis

on valuing and communicating the importance of coastal and marine environments on national and global scales, with conservation initiatives and a focus on greater public understanding of these environments permeating many levels of policy (e.g., President Obama's 2010 Executive Order on stewardship of the oceans [Obama, 2010]). Many states have also begun establishing MPAs and MRs to address this conservation initiative. In Oregon, for example, Senate Bill 1510 was enacted in 2012 requiring state natural resource agencies to establish, evaluate, and enforce regulations on five new MRs in state coastal waters (Johnson et al., 2012).

Planning a protected area, however, requires having a shared vision of the area's future and commitment to follow through on this vision (Cho, 1998). Furthermore, the more that a managing agency's mandate is aligned with the broad goals and objectives for a MPA, the more likely that the process of establishing the MPA will follow a clear, focused direction (Osmond, Airame, Caldwell, & Day, 2010). The success of a MPA in accomplishing management goals, therefore, seems at least partially based on how similar the managing agency's mission is to goals of the MPAs and how well these aspects align with other stakeholder cognitions concerning the agency, the MPAs, and the desired future state of the area.

This thesis, therefore, focuses on Oregon coastal resident cognitions about new MPAs in this state. In Oregon, MPAs are defined as "any area of the marine environment that has been reserved by Federal, State, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural

resources therein" (Oregon Ocean Policy Advisory Council [OPAC], 2008a, p. 5). Although an official definition of a MPA exists (IUCN, 2003), the actual designation criteria and constraints of a MPA are usually modified for the local environment and situation (Rosendo, Brown, Joubert, Jiddawi, & Mechisso, 2011; Salz & Loomis, 2004), as demonstrated in Oregon's definitions. MPAs in this state may allow some specific extraction activities only if they complement the overall goals for these areas (Murphy et al., 2012). Most of the territory contained in Oregon's MPAs, however, is designated as no-take MRs, which are generally defined as "areas of the ocean completely protected from all extractive and destructive activities" (Lubchenco et al., 2003, p. S3) where explicit prohibitions against removing marine resources exist, except for permitted research (Scholz & Fujita, 2001). In Oregon, MRs are defined as "an area within Oregon's Territorial Sea or adjacent rocky intertidal area that is protected from all extractive activities, including the removal or disturbance of living and non-living marine resources, except as necessary for monitoring or research to evaluate reserve condition, effectiveness, or impact of stressors" (Murphy et al., 2012, p. 1). Lack of clear definitions and understanding by all parties about these definitions can lead to confusion and dissent over the status of designation (Weible, 2008).

Globally, MPAs are primarily designed for co-managing biological and social conditions (i.e., ecosystem based management [EBM]) and are supposed to be based on the best available science examining multiple scales of impact (D'Agrosa, Gerber, Sala, Wielgus, & Ballantyne IV, 2007; Gray, Canessa, Rollins, Dearden, & Keller,

2010; Lynch et al., 2004; Rosendo et al., 2011). EBM encourages a holistic viewpoint of interrelationships among these conditions, accomplished by information collecting and sharing across sectors and a breadth of disciplines (e.g., economics, social science, ecology, climatology) (McLeod & Leslie, 2009; Steel & Weber, 2001). MPAs guided by EBM have often been created in response to anthropogenic pressures on the environment, and have goals to continue providing for human populations through enforced sustainable catch measures (McLeod & Leslie, 2009).

Despite this holistic or integrated emphasis of EBM, most studies have focused on the collection of single-species biological baseline data in a MPA or series of MPAs (Boersma & Parrish, 1999; Coleman et al., 2011; D'Agrosa et al., 2007; Sowman, Hauck, van Sittert, & Sunde, 2011; Thomassin, White, Stead, & David, 2010). This biological information is important, but not a complete representation of the best scientific information. The peopled seascape (i.e., emphasis on social-ecological systems where "humans and their activities are fully integrated into marine [EBM]" [Shackeroff, Hazen, & Crowder, 2009, p. 33]) is routinely mentioned as an issue for future research, but systematically collected social data related to MRs, especially in the pre-establishment phase, are sparse (Lynch et al., 2004; Osmond et al., 2010; Pita et al., 2011).

In studies addressing social concerns related to MRs, data have been primarily collected from only a few specific stakeholder groups after MR creation (Carneiro, 2011; Cocklin, Craw, & Mcauley, 1998; Dimech, Darmanin, Philip Smith, Kaiser, &

Schembri, 2009; Himes, 2007; Trivourea, Karamanlidis, Tounta, Dendrinos, & Kotomatas, 2011). These studies aid in understanding issues arising in a coupled social-ecological system (e.g., user conflicts, compliance with regulations, perceptions of management), with most focusing on the expressed intent of creating better areas of zoning and other site-specific regulations to alleviate concerns (Davos et al., 2007; Harriott, 2002; Lynch et al., 2004; Needham, Szuster, & Bell, 2011; Needham, 2010; O'Mahony, Gault, Cummins, Kopke, & O'Suilleabhain, 2009; Petrosillo, Zurlini, Corlianò, Zaccarelli, & Dadamo, 2007; Pollnac et al., 2001). There is some indication that these concerns partially depend on the length of time that a MR has been established (Cocklin et al., 1998; Voyer, Gladstone, & Goodall, 2012), suggesting that gathering information in the pre-establishment phase (i.e., before the MR is formally implemented or created) would be useful for establishing baseline data that can be monitored to see how perceptions and other cognitions may change over time (Pita et al., 2011).

Studies examining this pre-establishment phase have tended to focus on specific, economically invested stakeholders (e.g., commercial and recreational anglers) who are often purposively sampled (Evans, Brown, & Allison, 2011; Gray, Canessa, Rollins, Keller, & Dearden, 2010; Himes, 2007; Lédée, Sutton, Tobin, & De Freitas, 2012; Lynch et al., 2004; Petrosillo et al., 2007; Pita et al., 2011; Salz & Loomis, 2004; Scholz & Fujita, 2001; Sowman et al., 2011; Stevenson, Sikich, & Gold, 2012; Wolfenden, Cram, & Kirkwood, 1994). What has received limited

attention in the literature is whether these groups are representative of all populations potentially affected by MRs. Studies focusing on proposed MRs have shown that these stakeholder groups have strong opinions (Salz & Loomis, 2004), but little is known about whether these opinions are echoed throughout the public (Thomassin et al., 2010). For many newly formed MPAs, representative local involvement has often been difficult to obtain, as opposition tends to be a stronger motivator than support for involvement (Cocklin et al., 1998; Wolfenden et al., 1994) and, as a result, opinions voiced may not represent the range of perceptions across all groups. Studies have examined the effectiveness of including local resident opinions in the creation process for terrestrial protected areas (e.g., Hirschnitz-Garbers & Stoll-Kleemann, 2011; Kessler, 2004; Mackinson, Wilson, Galiay, & Deas, 2011), but studies with representative samples of the public remain scarce, especially in the context of MPAs. Research suggests that studies of single stakeholders often come to different conclusions based on the group examined (Heck, Dearden, & McDonald, 2011; Heck & Dearden, 2012), implying that systematic collection of information on cognitions of a larger audience may yield a more complete picture of affected populations.

Given that Oregon's new MPAs and MRs are similarly structured around EBM, understanding the range of opinions present in affected populations is important. The Oregon legislation that created this network of protected areas and reserves states that societal, economic, and ecological impacts must be considered in their selection, regulation, and monitoring (Oregon Ocean Policy Advisory Council

[OPAC], 2008b). Many sites were initially considered for pilot implementation of a MPA and MR system along the Oregon coast. After preliminary consideration of these sites, the Oregon Department of Fish and Wildlife (ODFW) was directed to collect baseline data at Cape Falcon, Cascade Head, and Cape Perpetua, which joined the Redfish Rocks and Otter Rock MR pilot sites for a total of five MRs in the state (Figure 1.1). Within some of these areas are MPAs with varying levels of restriction on uses, and these areas are adjacent to the core MRs.

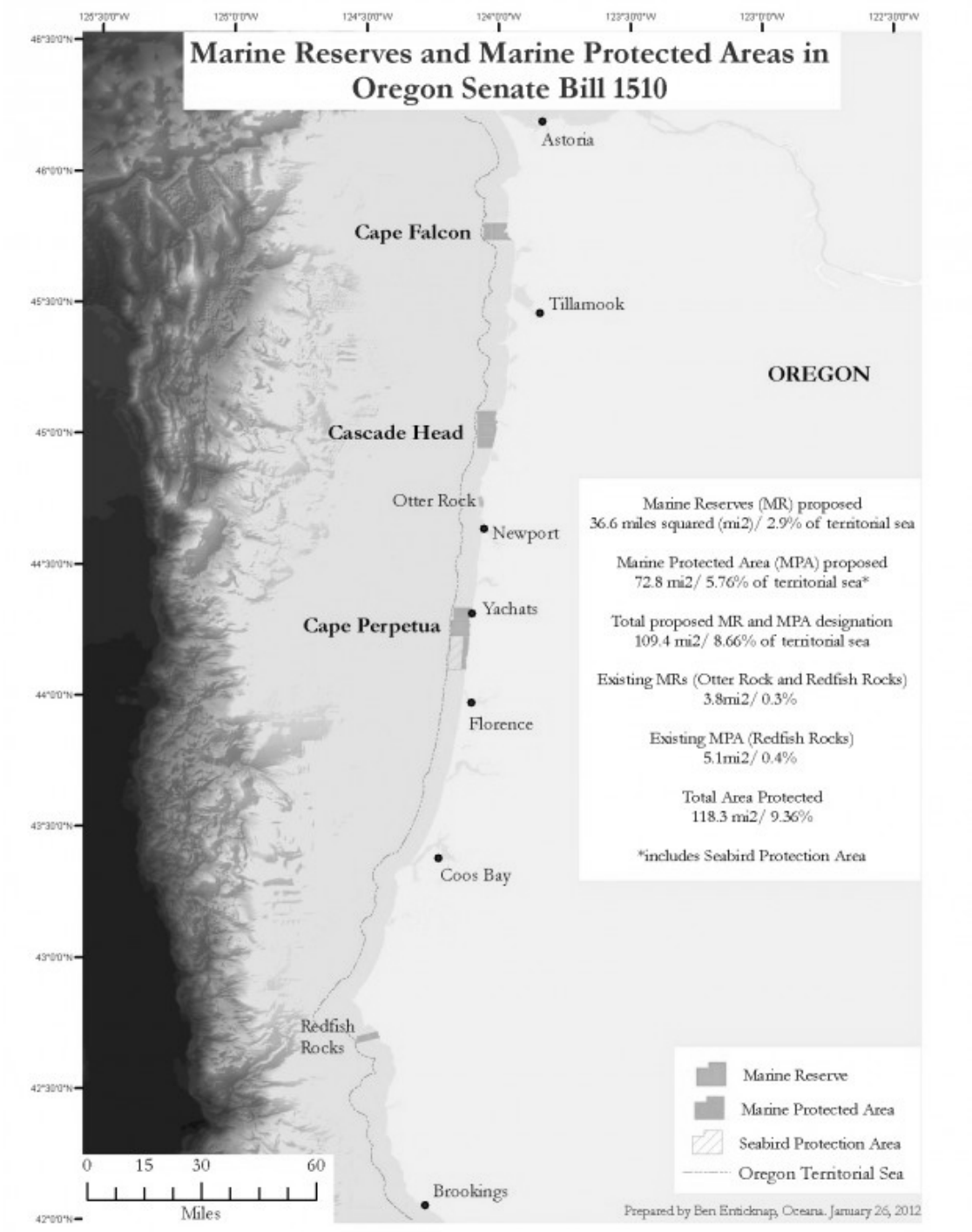

Figure 1.1. Map of Oregon's marine reserves and protected areas in Oregon Senate Bill 1510 (Enticknap, 2012)

Past research on these areas in Oregon has focused on single species and abiotic processes (Gallagher & Heppell, 2010; Lanier, Romsos, & Goldfinger, 2007), and a few specific stakeholders (Murphy, 2010, 2011; Murphy et al., 2012; Norman, United States National Marine Fisheries Service., & Northwest Fisheries Science Center [U.S.], 2007; Package & Conway, 2010a, 2010b). This is in line with other studies associated with MPAs and MRs, which have found that most social science data are routinely collected after biological information, when targets are sometimes already set (Rosendo et al., 2011; Scholz & Fujita, 2001; Teh & Teh, 2011). Although some data have included opinions from specific groups of stakeholders economically invested in Oregon's MRs (i.e., limited generalizability beyond these populations), no comprehensive study has assessed public awareness and perceptions associated with these proposed areas in Oregon (Murphy et al., 2012). Collecting representative data on issues such as coastal resident attachment, knowledge, attitudes, and intentions associated with MRs in Oregon, as well as their perceived similarity and trust in the agency (i.e., ODFW) currently responsible for these areas, would describe more fully the potential societal impacts of these MRs, including possible conflicts they could create (e.g., Fulton, Manfredo, & Lipscomb, 1996; Tuan, 1974, 1980; Vaske & Donnelly, 1999; Whittaker, Vaske, & Manfredo, 2006).

Thesis Purpose and Organization

The objective of this thesis, therefore, is to understand Oregon coastal resident knowledge, attitudes, and intentions regarding new MRs in this state and how these

cognitions vary depending on attachment and proximity to these areas, and perceived similarity and trust in the agency currently responsible for managing these areas (i.e., ODFW). These issues will be addressed in two separate standalone articles using data from a mail survey of residents living along the Oregon coast.

The first article describes resident knowledge about the new Oregon MRs and relationships between this knowledge and both geographic proximity and attachment to these areas. This article explores four research questions informed by previous studies in other contexts (e.g., Booth, Gaston, & Armsworth, 2009; Gray, Canessa, Rollins, Dearden, et al., 2010; Gray, Canessa, Rollins, Keller, et al., 2010; Jones, Panagiotidou, Spilanis, Evangelinos, & Dimitrakopoulos, 2011; Olomi-Sola, Zorondo-Rodriguez, Triguero-Mas, Jha, & Reyes-Garcia, 2012; Steel, Lovrich, Lach, & Fomenko, 2005; Steel, Smith, Opsommer, Curiel, & Warner-Steel, 2005; Tuan, 1980; Williams, Patterson, Roggenbuck, & Watson, 1992; Williams & Vaske, 2003; Wynveen, Kyle, Absher, & Theodori, 2011), yet relatively unexplored in the particular setting and context of this investigation. The first question asks whether resident self-assessed knowledge about Oregon's MRs differs between proximate and more distant populations, and the second question asks if this self-assessed knowledge also differs based on attachment to one or more of these areas. The third question asks whether factual knowledge about these MRs differs between proximate and more distant populations, and the fourth question asks if this factual knowledge also differs based on attachment to one or more of these areas.

The second article builds on this first article by examining the influence of this proximity and knowledge on a range of other cognitions, including trust, attitudes, and intentions. This article tests five hypotheses partially supported by earlier research in other contexts (e.g., Cvetkovich & Winter, 2003; Earle & Cvetkovich, 1995; Jones et al., 2011; Needham & Rollins, 2009; Needham & Vaske, 2008; Siegrist, Cvetkovich, & Roth, 2000; Vaske, Absher, & Bright, 2007; Vaske & Donnelly, 1999; Whittaker et al., 2006; G. Winter, Vogt, & McCaffrey, 2004). The first hypothesis predicts that trust in the managing agency (i.e., ODFW) will be influenced by perceived similarity with the agency and factual and self-assessed knowledge about Oregon's MRs, with residents who perceive themselves to share similar goals, thoughts, and opinions as the agency, and those with lower self-assessed and factual knowledge about the MRs being more likely to trust this agency.

The second hypothesis predicts that attitudes toward potential benefits of these MRs will be influenced by trust in this agency and factual and self-assessed knowledge about the MRs, with a positive relationship between attitudes toward benefits and these three concepts. The third hypothesis predicts that attitudes toward potential constraints of these MRs will also be influenced by trust in this agency and factual and self-assessed knowledge about the MRs. Residents with higher factual knowledge about the MRs will have more agreement with these constraints, whereas those with higher trust in the agency and self-assessed knowledge about the MRs will have less agreement with these constraints.

The fourth hypothesis predicts that behavioral intentions regarding these MRs will be influenced by attitudes toward the potential benefits and constraints of these areas, with residents who express more favorable attitudes toward the potential benefits of the MRs being more likely to vote in support of these MRs, and those who agree with the potential constraints being less likely to vote in support of these MRs. The fifth hypothesis predicts that these relationships among concepts will differ based on proximity to the MRs (i.e., communities of place, rest of coast).

Conclusions drawn from this thesis may help to support the long-term EBM and resiliency of the MRs in Oregon's state waters, as this information will complement previous efforts and provide representative baseline data about coastal resident attitudes, knowledge, and intentions regarding the MRs. This information will help to create a scientifically grounded description of perceptions of these populations toward the MRs, which managers and policy-makers may use to understand the societal concerns expressed (Needham & Rollins, 2009), the suite of potential and actual impacts resulting from MR establishment in Oregon, and what similarities may exist with informing the MPA creation process in other locations. Furthermore, policy creation and public engagement based on this study's results may yield more acceptable, inclusive, and effective protected area creation and management (CBD, 2002; Chandler & Gillelan, 2004; IUCN, 2003; Obama, 2010; Pita et al., 2011; Wood, 2007). These baseline data may also be revisited in future assessments to permit comparisons over time.

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CHAPTER 2 – COASTAL RESIDENT KNOWLEDGE OF MARINE RESERVES IN OREGON: THE IMPACT OF PROXIMITY AND ATTACHMENT

Introduction

There is a strong connection between humans and the ocean. Although humans are terrestrial creatures, we are also a species affiliated with the coast, with the majority of human populations residing along the world's coastlines (United Nations, 2005). Often, however, humans neglect to consider their ties to ocean issues and processes (Alessa, Bennett, & Kliskey, 2003; Steel, Smith, et al., 2005; United Nations, 2005). Many humans interact with oceans in a fundamentally different way than with terrestrial areas, and technology often influences interactions between humans and oceans (Shackeroff et al., 2009). Knowledge of coral reefs and collection of data about reefs, for example, coincide with the availability of scuba technology (Knowlton & Jackson, 2001). For the average person, this removal from actually physically engaging with oceans and a general apathy toward ocean issues (Steel, Lovrich, & Pierce, 1993) may factor into low public knowledge of marine conservation issues, even those specific to an individual's location (Duda et al., 2007).

The increasing call for public literacy about oceans, coupled with demand for ocean conservation in the form of marine protected areas (MPA) [1], forces

[1] A MPA may refer to many different areas, protection levels, and conservation strategies (Pita, Pierce, Theodossiou, & Macpherson, 2011). Many types of MPAs exist, from "multiple use" MPAs allowing fishing in some areas and protection in others, to "no-take" marine reserves (MRs) prohibiting all extractive uses. MPAs generally have less stringent restrictions than MRs and are "areas of the ocean designated to enhance conservation of marine resources" (Lubchenco, Palumbi, Gaines, & Andelman, 2003, p. S3), where prohibitions and allowances exist only on a case-by-case basis. This article uses the

consideration of these connections. Despite human connections to the ocean and agency interest in including social factors in ocean and MPA management (i.e., ecosystem based management [EBM]) (CBD, 2002; Chandler & Gillelan, 2004; IUCN, 2003; McLeod & Leslie, 2009; Obama, 2010; Pita et al., 2011), humans remain generally unaware of the ocean and details about conservation efforts to protect these areas (Snider et al., 2010; Snider, Hill, Luo, Buerger, & Herstine, 2011; Thomassin et al., 2010). Much has been said about the need to involve and account for local resident knowledge and attachment in the MPA planning process (e.g., Gray, Canessa, Rollins, Dearden, et al., 2010; Gray, Canessa, Rollins, Keller, et al., 2010; Heck et al., 2011; Pita et al., 2011). Past studies, however, have mainly focused on how to include various stakeholder groups adequately in the MPA planning process (Compas, Clarke, Cutler, & Daish, 2007; Rosendo et al., 2011; Stevenson et al., 2012; Togridou, Hovardas, & Pantis, 2006), rather than assessing how proximity and attachment of these groups toward MPAs may factor into their knowledge of this process.

This article investigates resident proximity and attachment to a protected area, and the extent that these factors influence knowledge about the area. These factors are examined in the context of a system of new MPAs in Oregon. Understanding and incorporating resident knowledge and attachment in the early stages of MPA implementation may foster more inclusive and socially acceptable planning and management (Gray, Canessa, Rollins, Dearden, et al., 2010; Gray, Canessa, Rollins,

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term MPA as a broad, inclusive term referring to many different types of protected areas, and the term MR when specifically discussing areas where there are restrictions on extraction.

Keller, et al., 2010; Heck et al., 2011; Marshall, Marshall, & Abdulla, 2009; Pollnac et al., 2001; Stevenson et al., 2012; Togridou et al., 2006; Winter, Palucki, & Burkhardt, 1999; Xu, Chen, Lu, & Fu, 2006). Given that stakeholders express differences in understanding conservation goals of MPAs (Heck et al., 2011), investigating relationships between proximity, attachment, and knowledge regarding these areas may elucidate reasons why knowledge of certain characteristics associated with these areas may be higher or lower than others.

Conceptual Foundation

Knowledge

Managing natural resources is difficult if the public lacks knowledge and understanding of managerial goals (Snider et al., 2010; Xu et al., 2006). Knowledge is multidimensional with concurrent personal, situational, and socially constructed dimensions (Guzman, 2009), and may have multiple meanings and interpretations depending on the context in which it is considered. Knowledge, therefore, is highly subjective and there are two common measures of this concept (Guzman, 2009). First, self-assessed or perceived knowledge is subjective and ambiguous where the person believes that he or she is knowledgeable and providing the correct answer (Wann & Branscombe, 1995). This may be measured, for example, by asking "How aware do you feel about this issue?" Second, factual knowledge is more concrete where the person either does or does not know the information and there is a factually correct answer (Wann & Branscombe, 1995). Factual questions may take the form of a quiz

assessment with true / false or multiple choice answers, with only one answer being correct at the time.

Individuals interested in a particular subject have been shown to know or remember more facts about that subject (Wann & Branscombe, 1995). This expertise in particular topics assists encoding and remembering matters pertaining to the subject (Wann & Branscombe, 1995), and facilitates a positive relationship between memory and knowledge. Therefore, those who are more interested in a subject are often better at remembering factual information about that subject and have a higher level of factual knowledge about the issue than those who are less interested.

In addition to background interest, the situation-specific explanation for knowledge suggests that individuals may actively seek out and attain knowledge on a subject depending on the situational circumstances (Steel, Lovrich, et al., 2005). Some situations that have been described as leading to this quest for knowledge are those where an individual is emotionally or financially committed to a policy outcome and discusses the subject with others (Steel, Lovrich, et al., 2005; Steel, Smith, et al., 2005). In their study on U.S. public knowledge of marine issues, Steel, Lovrich, et al. (2005) found that situation specific variables affected both self-assessed and factual knowledge of respondents.

Public Knowledge about Protected Areas

Pubic knowledge of protected areas is generally low (Booth et al., 2009; Jones et al., 2011; Xu et al., 2006). Even when knowledge rates appear to be higher in some

situations, this knowledge is often cursory. In studies, for example, where self-assessed knowledge about a nearby protected area has been examined, there has often been high general knowledge about the existence of the area, but a lack of specific knowledge about particular features and management of the area (Jones et al., 2011; Ressurreição, Simas, Santos, & Porteiro, 2012; Sladonja, Brscic, Poljuha, Fanuko, & Grgurev, 2012). Self-assessed knowledge about a protected area also seldom translates into factual knowledge about that area. For example, although 85% of respondents in Croatia thought of themselves as knowledgeable about nearby protected areas, only 23% could correctly name the managing agency (Sladonja et al., 2012). Although it may be reasonable to expect that onsite visitors report higher levels of knowledge, studies have found that merely visiting a site one or more times does not always equate to a high level of either self-assessed or factual knowledge about the site (Booth et al., 2009; Smaldone, 2008).

There is ambiguity regarding whether resident proximity to a protected area is related to their knowledge of that area (e.g., boundaries, size, management agency, goals). General knowledge of protected areas may vary by proximity of residence to that area, with residents closer to protected areas generally reporting greater knowledge than those living farther away (Jim & Xu, 2002; Mangun, Degia, & Davenport, 2009; Olomi-Sola et al., 2012). Studies measuring knowledge in proximate and more distant communities around protected areas have also found, however, that although the majority of respondents knew of the protected areas, there was little

awareness of any detailed information about these areas (Jim & Xu, 2002; Mangun et al., 2009; Olomi-Sola et al., 2012). Furthermore, public knowledge concerning the protected areas and specifics of their existence decreased with distance from the area, indicating a relationship between proximity and knowledge. Higher knowledge in more proximate populations may be due to a number of factors, including traditional stakeholder involvement in the planning process where local communities may have been more intensively sought after and included, thus having greater knowledge due to this inclusion, rather than proximity alone. Beyond general awareness, however, there has been no conclusive relationship between proximity and specific knowledge associated with protected areas, with varying levels of awareness to detailed issues across both proximate and distant populations (Booth et al., 2009; Jim & Xu, 2002; Jones et al., 2011; Mangun et al., 2009; Olomi-Sola et al., 2012; Xu et al., 2006).

The trend of cursory self-assessed knowledge and scant factual knowledge about protected areas in general has also been found for public knowledge about MPAs in particular (Dimitrakopoulos et al., 2010; Fiallo & Jacobson, 1995; Kafyri, Hovardas, & Poirazidis, 2012; Parnell, Lennert-Cody, Geelen, Stanley, & Dayton, 2005; Snider et al., 2011; Stevenson et al., 2012). In studies of public knowledge of protected areas in general and MPAs in particular, factual knowledge is consistently low. Although there have been investigations of visitor and local resident self-assessed knowledge about MPAs, studies specifically examining whether or not factual

knowledge about MPAs varies between more proximate and more distant populations are less prevalent (Snider et al., 2010, 2011; Thomassin et al., 2010).

Studies of local and non-local visitors to MPAs show a wider distribution of knowledge levels among these individuals than studies of visitors to terrestrial protected areas. Self-assessed general knowledge levels have been reported as high as 90% for onsite visitors (Petrosillo et al., 2007), but even within a MPA system there may be differences in knowledge of visitors at the site level (Dimitrakopoulos et al., 2010; Snider et al., 2010), suggesting specific and localized knowledge issues and factors. Other studies, however, allude to a poor overall knowledge level as a main reason behind MPA ineffectiveness (Gray, Canessa, Rollins, Dearden, et al., 2010; Gray, Canessa, Rollins, Keller, et al., 2010).

Public Knowledge about Oceans

Just as public knowledge of protected areas appears to be cursory, their knowledge of oceans is also generally superficial; people generally know that issues are affecting ocean health, but do not report knowledge on details beyond this vague notion even when issues are put into a local context (Belden Russonello & Stewart & American Viewpoint, 1999; Duda et al., 2007; Steel, Smith, et al., 2005; Steel & Weber, 2001). In two studies, for example, Americans answered correctly an average of only two out of five factual knowledge questions about oceans (Belden Russonello & Stewart & American Viewpoint, 1999; Steel, Lovrich, et al., 2005) and about 40% answered zero or only one question correctly (Belden Russonello & Stewart &

American Viewpoint, 1999). Public knowledge about oceans is lacking when compared to knowledge about terrestrial environments (Compas et al., 2007).

Although ocean literacy (i.e., the ability to understand ocean science, communicate it, and make informed decisions affecting oceans [Cudaback, 2008; West, 2004]) is generally low overall, there does appear to be a relationship between higher self-assessed and factual knowledge, and proximity to the ocean. Steel, Smith, et al. (2005) surveyed American households about ocean and coastal issues. Self-assessed informedness was not high for either coastal or inland populations, but residents of coastal states were significantly less likely to rate themselves as "not informed" than residents of non-coastal states, indicating perceived knowledge based on relative proximity to the ocean (Steel, Smith, et al., 2005). Another study grouped a population by driving distance to the coast and found that those within a two-hour drive to the coast were slightly more knowledgeable about ocean issues (Belden Russonello & Stewart & American Viewpoint, 1999). Both studies, however, found that for the factual or objective knowledge questions, there was low knowledge across both proximate and distant populations, with the difference in knowledge among populations being statistically insignificant in the study by Steel, Smith, et al. (2005). In questions of self-assessed versus factual knowledge, the literature suggests that familiarity is limited to basic concepts, and that subjective evaluations of knowledge are more optimistic than quiz results demonstrate (Belden Russonello & Stewart &

American Viewpoint, 1999; Booth et al., 2009; Steel, Lovrich, et al., 2005; Steel, Smith, et al., 2005).

The overall low level of ocean literacy, compounded by this disconnect between self-assessed and factual knowledge about issues related to oceans (Steel, Lovrich, et al., 2005), indicates a fertile area for understanding what perpetuates this lack of knowledge. Policy-relevant knowledge is important in democracies (Steel, Lovrich, et al., 2005) and as ocean policy and management continues to be relevant, it is necessary to understand public knowledge about these issues. A need exists to explore variables that may influence ocean literacy because there is a direct relationship between an individual's knowledge about oceans and their support for ocean conservation and stewardship (Compas et al., 2007; Cudaback, 2008; Steel, Lovrich, et al., 2005; Steel, Smith, et al., 2005; West, 2004).

Place Attachment

In addition to proximity, place attachment is another variable that can influence knowledge. The concept of place is integral to human experiences and can hold many different meanings for people (Cheng, Kruger, & Daniels, 2003). Place encompasses biophysical attributes and processes, social and cultural meanings, and political processes (Cheng et al., 2003; Stedman, 2002). The socially constructed concept of place attachment is concerned with the intensity of connection between humans and locations (Tuan, 1980; Wynveen et al., 2011). Place attachment differs from "sense of place" in that attachment is concerned with the strength of bonds to a

place, whereas sense of place is more concerned with factors that create specific bonds (Smaldone, 2008; Stedman, 2002).

Studies of place attachment have expanded from examining how locals view the built environment around them to how people interact with and develop special connections to many different places, including natural environments (Warzecha & Lime, 2001; Williams & Vaske, 2003). There are two main components of place attachment with a strong foundation in the literature, place identity and place dependence (Manning, 2011; Williams et al., 1992; Williams & Vaske, 2003), although other related measures have also received attention (e.g., place bonding, rootedness, sense of place). Place identity refers to emotional ties to a place, can develop over time, and is related to symbolic meanings of an area (Manning, 2011; Proshansky, 1978). Place dependence is the functionality associated with an area and is represented by its physical characteristics and attributes (Manning, 2011; Snider et al., 2011; Williams & Vaske, 2003).

Place attachment and its dimensions fit into EBM and planning, as this approach accounts for more than just the tangible environment. To foster a more effective and inclusive view of linkages between people and places, EBM places an emphasis on understanding symbolic and subjective components (e.g., emotional, spiritual) (Williams et al., 1992; Williams & Vaske, 2003), as well as the attachment that people have to a place. Furthermore, natural resource issues often stem from meanings of places that are prioritized over others in a particular setting (Cheng et al.,

2003; Shindler & Cramer, 1999). Although people often unite and collaborate for a common place-based goal (Cheng et al., 2003), an understanding of the differing levels of attachment that people have is imperative for informing management.

Place meanings and attachment have been investigated in protected areas (e.g., Stedman, 2002; Warzecha & Lime, 2001), but the literature is limited on if and how place attachment factors into knowledge about these areas. Given that factual knowledge an individual retains about a subject may be related to his or her interest in the subject (Ressurreição et al., 2012; Wann & Branscombe, 1995), there may be a relationship between attachment and knowledge regarding a specific place (Ryan, 2005). Needham and Little (2013), for example, found that visitor attachment to a particular ski area influenced their factual knowledge about management approaches at this area. Other studies, however, have found somewhat contradictory findings where attachment to a place may not correspond to specific knowledge of that place (Alam, 2011; Ressurreição et al., 2012; Smaldone, 2008). Over half of visitors to a terrestrial protected area in the U.S. (Smaldone, 2008) and almost all local coastal residents adjacent to a MPA in Portugal (Ressurreição et al., 2012), for example, reported strong attachment to these places, yet the majority were unaware of issues that management had deemed and communicated as critical. Given these mixed results, it may be expected that an individual's place attachment to and knowledge about an area are influenced by the site and other situation-specific factors.

In the context of place attachment to marine areas, the seascape as a place rather than strictly a functioning biophysical environment has received little attention (Gee & Burkhard, 2010). Some studies have focused on the dependence of the ocean to particular user groups (Evans et al., 2011; Gray, Canessa, Rollins, Dearden, et al., 2010; Gray, Canessa, Rollins, Keller, et al., 2010; Himes, 2007; Lédée et al., 2012; Pita et al., 2011; Salz & Loomis, 2004; Tallis et al., 2012; Teh & Teh, 2011). There is some indication, however, that people may feel an identity associated with the ocean in a similar way that they feel attached to the concept of terrestrial wilderness. Participants surveyed about proposed offshore wind farming in Germany (Gee & Burkhard, 2010), seafloor exploration and mining in Australia (Mason, Paxton, Parr, & Boughen, 2010), and boater zoning in Canada (Gray, Canessa, Rollins, Dearden, et al., 2010), for example, all expressed views of the sea as a wild, mysterious place of both emotional and functional importance. Aesthetic values combined with specific functions of the ocean (e.g., cultural heritage, ecosystem roles) can create a "sensual appreciation of the sea" at a specific unique environment in a manner that people may ascribe meaning, identity, and attachment with tangible and intangible values and associations (Gee & Burkhard, 2010, p. 354).

Research Questions

This article explores four research questions examining the extent that proximity and place attachment are associated with coastal resident knowledge of MRs in Oregon. First, does self-assessed knowledge about these MRs differ between

proximate and more distant populations? Second, does self-assessed knowledge about these MRs differ based on attachment to one or more of these reserves? Third, does factual knowledge about these MRs differ between proximate and more distant populations? Fourth, does factual knowledge about these MRs differ based on attachment to one or more of these reserves?

Methods

Study Sites and Context

Data were obtained from residents living along the Oregon coast. Although definitions of "coast" vary, Oregon's Coastal Range mountain boundary a few miles inland provides a natural delineation. Three reasons make this an ideal location for investigating how the population knows about and perceives establishment of MRs. First, Oregon is in the early stages of implementing a system of new MRs. Second, although a few specific communities and stakeholder groups have been involved in discussions about creating MRs in this state, input from a more representative sample of the public has not been ascertained. Third, the enabling legislation and monitoring plans for these reserves explicitly state that baseline social data will be collected and considered in tandem with biological data (Murphy, 2011).

Over the past decade, the state of Oregon has sought to increase conservation and public awareness of marine resources in the state's territorial sea (i.e., waters within three miles of the state's coastline). In 2000, the Ocean Policy Advisory Council (OPAC) examined the potential for state MR locations that "individually or

collectively, are to be large enough to allow scientific evaluation of ecological effects, but small enough to avoid significant adverse social and economic impacts on ocean users and coastal communities" (Oregon Ocean Policy Advisory Council (OPAC), 2008a, 2008b), representing a compromise between ecological health and socio-economic goals. With the states of Washington to the north and California to the south already having systems of MPAs, the ecological and geographical gap in Oregon's waters was noticeable. Major drivers for ecosystem conservation within these marine habitats are the ground fisheries, especially recruitment of rockfish. In 2009, six sites were selected for consideration of establishing MRs in Oregon. Two of these sites (Otter Rock, Redfish Rocks) were implemented as pilot sites, and three of the other four (Cape Falcon, Cape Perpetua, Cascade Head) followed suite in early 2012.

During the MR creation process, multiple agencies and institutions sought stakeholder opinions to complement existing biological research. Sea Grant, National Oceanic and Atmospheric Administration (NOAA), and Oregon Department of Fish and Wildlife (ODFW) had responsibilities for gathering baseline social data about communities and livelihoods that may be impacted directly by these reserves. These data first took the form of community profiles for coastal towns (Norman et al., 2007; Package & Conway, 2010a, 2010b) and three community evaluation teams comprised of stakeholders primarily representing eight groups (e.g., commercial anglers, conservation groups, scientists, local government). In addition, town hall meetings, interviews, and unstructured questionnaires were sent to a small number of specific

stakeholder groups (Connor, Stauffer, & Harte, 2007; Murphy, 2010). These social data captured the socio-economic concerns of a select portion of Oregon residents, interest groups, and other vocal citizens.

In this study, however, an attempt was made to gain a more comprehensive and representative perspective of the social concerns of coastal residents in Oregon, beyond those with just direct socio-economic interests associated with the reserves (Gray, Canessa, Rollins, Keller, et al., 2010). Given that concrete regulations and management agencies are yet to be formally established and finalized for the MR sites, assessing current knowledge and perceptions of Oregon's coastal residents may offer insight into how best to implement and regulate these MRs.

Data Collection

Questionnaires were administered by mail in late 2012 and early 2013 to a sample of residents along the Oregon coast selected randomly from postal records. A sample of 2,600 addresses was equally divided into two main subpopulations: (a) residents of communities of place, and (b) residents along the rest of the coast (Figure 2.1). Communities of place is a term that implies a collective identity and perhaps different perceptions and reactions to a management program (Winter et al., 1999). The 1,300 addresses in these communities of place were distributed equally among five area-specific frames (i.e., 260 addresses each) corresponding to each current MR location. A 10 mile radius was drawn around the land point nearest to the center of each MR. Communities within this radius were included in the communities of place

delineation. The exact size and location of these samples were adjusted slightly in cases where they would split communities inside and outside of the sample, and in cases where they overlapped with another reserve's community of place so that communities were not split or overlapping. The other half (i.e., 1,300) of the sample addresses was spread throughout the rest of the coast and included areas seaward of the Coast Range excluding those in the five predefined communities of place.

This type of delineation of subpopulations by proximity is common in research addressing public concerns regarding protected areas and other natural resource management issues. Several studies have divided groups based on proximity to protected areas (e.g., Jim & Xu, 2002; Winter et al., 1999) with the division, although subjectively determined, set to investigate whether people who live geographically closer to a place differ from those living farther away. Issues with delineating a local community, or community of place, have been noted in the literature (e.g., Cocklin et al., 1998) where delineations may not crisply capture people in a local versus a more distant community and their associated concerns. Although these delineations are generally subjective, they are set a priori and relate to the research questions and situational context. Distance is a common method and employed here, although there are other means of delineation such as by time-on-roads distance to a MPA (Thomassin et al., 2010) or affectedness to the marine issue and ocean dependence (e.g., fishing, tourism) (Gee & Burkhard, 2010).

Questionnaires were administered using three mailings (Leedy & Ormrod, 2010; Salant & Dillman, 1994). The first and third mailings (November 9, 2012 and January 11, 2013, respectively) consisted of a cover letter explaining the purpose of the study, the questionnaire, and a prepaid business reply envelope. The second mailing (November 30, 2012) consisted of a postcard reminder to those who had not responded to the first mailing. The third mailing was not sent to addresses that had responded or had been returned undeliverable in the first or second mailings (Vaske, 2008). The sample size (Table 2.1) was $n = 595$, with 326 (55% of the sample) from the communities of place and 269 (45%) from the rest of the coast, representing a 27% response rate. A telephone non-response bias check was administered to a random sample of non-respondents with landline telephone numbers ($n = 202$) and there were no substantive differences between those who responded to the mail survey and those who did not (i.e., those who completed the telephone non-response bias check).

Table 2.1. Sample sizes and response rates for each site

Site	Mailed Questionnaires	Undeliverable Questionnaires	Completed Questionnaires (*n*)	Response Rate (%)
Cape Falcon	260	30	70	30
Cascade Head	260	54	50	24
Otter Rock	260	34	69	31
Cape Perpetua	260	44	63	29
Redfish Rocks	260	51	74	35
Rest of the Coast	1300	144	269	23
Total	2600	357	595	27

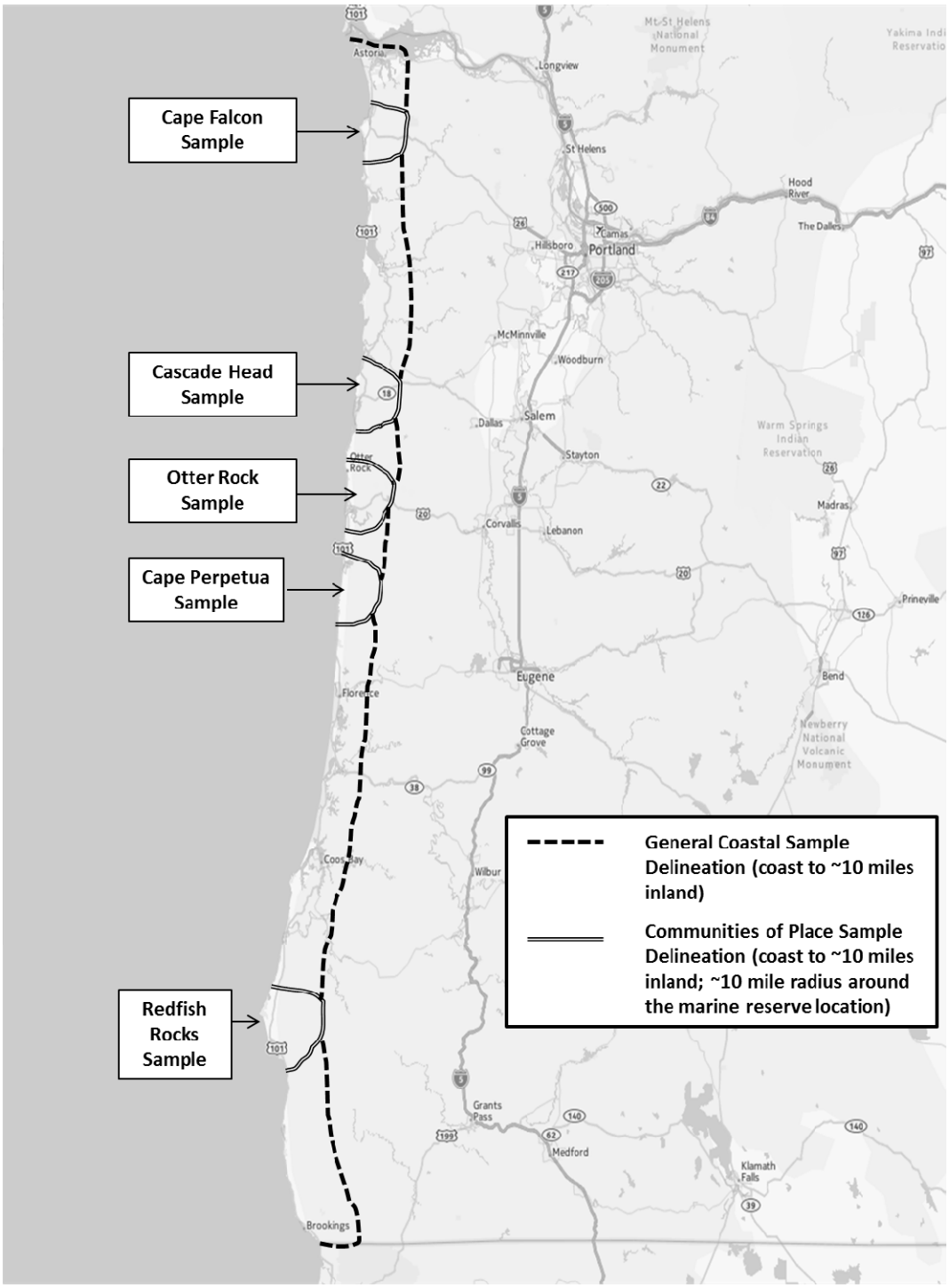

Figure 2.1. Generalized map of sampling frame for surveyed population. Actual sample delineation followed more detailed boundaries.

Analysis Variables

The questionnaires contained items measuring place attachment and knowledge. Scales for measuring place attachment were identical to those in other studies (Williams & Vaske, 2003). These items were in a skip pattern portion of the survey where respondents only answered if they had visited one or more of the proposed MR locations. A map of the Oregon coast and the five sites was provided to assist respondents who were asked: "thinking about one or more of the five marine sites identified on the map on the previous page, do you disagree or agree with each of the following?" Three place identity items were: (a) "at least one of these marine sites is very special to me," (b) "I am very attached to at least one of these marine sites," and (c) "I identify strongly with at least one of these marine sites." Three place dependence items were: (a) "at least one of these marine sites is one of the best places for doing what I like to do," (b) "I would not substitute any other area for doing the types of things that I do in at least one of these marine sites," and (c) "doing what I do in at least one of these marine sites is more important to me than doing it in any other place." These six items were measured on five-point scales from 1 "strongly disagree" to 5 "strongly agree."

Knowledge was measured using both self-assessed and factual questions. The self-assessed questions pertained to how an individual rated his or her level of knowledge about the Oregon MRs. Self-assessed knowledge focused on informedness, perceived knowledge, and understanding. Informedness was measured with the

question “how well informed do you feel about the topic of marine reserves in Oregon” with responses coded on a four-point scale from 1 “not informed” to 4 “extremely informed.” Perceived knowledge was measured by asking “how knowledgeable do you feel about the topic of marine reserves in Oregon” with responses on a four-point scale from 1 “not knowledgeable” to 4 “extremely knowledgeable.” Understanding was measured by asking respondents how much they felt they understood about: (a) “the purpose of marine reserves in Oregon,” (b) “how marine reserves would be managed in Oregon,” (c) “rules / regulations of marine reserves in Oregon,” (d) “where marine reserves are located in Oregon,” (e) “the role of science in marine reserves in Oregon,” and (f) “the role of public involvement in marine reserves in Oregon.” Responses were measured on nine-point scales from 0 “do not understand” to 8 “fully understand.”

Factual knowledge questions were informed by information on ODFW’s website, in newspapers, and from other sources of factual information. Three types of questions measured this knowledge. First, 10 true / false (or unsure) questions about Oregon MRs were asked: “In Oregon: (a) the government has been considering marine reserves for the past several years (true), (b) the government has approved marine reserves for this state (true), (c) commercial fishing would be allowed in all marine reserves (false), (d) all marine reserves would include coastal lands such as beaches and coastlines (false), (e) the government has established five marine reserve sites (true), (f) new developments such as wave energy or fish farms would be allowed in

all marine reserves (false), (g) non-extractive recreation / tourism activities (e.g., surfing, swimming, diving) would be allowed in all marine reserves (true), (h) keeping fish caught in marine reserves would be allowed in all reserves (false), (i) only scientists and no other people would be allowed in all marine reserves (false), and (j) there have been opportunities for public involvement in agency discussions about marine reserves (true)."

Second, respondents were asked "what one agency or organization do you think is currently responsible for marine reserves in Oregon" with the following choices: National Oceanic and Atmospheric Administration, US Fish and Wildlife Service, US Coast Guard, Pacific Fishery Management Council, Oregon Parks and Recreation Department, Oregon Department of Fish and Wildlife (i.e., correct answer), Oregon Marine Board, and Unsure.

Third, respondents were asked "both marine reserves and marine protected areas have been proposed for Oregon. These designations are not the same thing. Do you think each of the following activities would be allowed in Oregon's marine reserves (MRs), marine protected areas (MPAs), both of these types of areas, or neither of these types of areas?" Five items were listed: (a) commercial fishing (MPAs), (b) recreational fishing (MPAs), (c) scientific research (both), (d) removing any species or habitat would *not* be allowed (MRs), and (e) non-extractive recreation / tourism activities (e.g., surfing, swimming, diving; both). Respondents were given the

option of selecting marine reserves, marine protected areas, both marine reserves and protected areas, neither marine reserves or protected areas, or unsure for each.

Data Analysis

Proximity (i.e., communities of place, rest of the coast) and place attachment were the independent variables, and the dependent variables were self-assessed and factual knowledge. The factual knowledge questions were recoded to give a standardized score for each respondent representing the number of correctly answered questions out of 16 (i.e., 0 to 16). This approach is consistent with other studies (Needham & Little, 2013; Vaske, Needham, Stafford, Green, & Petchenik, 2006). Cronbach alpha reliability analysis assessed reliabilities of questions measuring both place attachment and self-assessed knowledge. A mean composite index was then created for self-assessed knowledge. K-means cluster analysis was used for grouping respondents according to their degree of attachment, and this approach has been used for grouping local residents by their attachment (Warzecha & Lime, 2001). Bivariate statistical analyses were conducted to test the four research questions. Chi-square (χ^2) tests and one-way analyses of variance (ANOVA) with corresponding post-hoc tests were conducted to examine differences in both self-assessed and factual knowledge among the place attachment groups revealed by the cluster analysis. Chi-square and independent samples *t*-tests were also conducted to examine differences in both self-assessed and factual knowledge between those living proximate to the MRs (i.e., communities of place) and those living farther from these areas (i.e., rest of the coast).

Effect size statistics (e.g., eta [η], Cramer's *V*, phi [ϕ], point-biserial correlation [r_{pb}]) were also reported to examine the strength of any differences in knowledge based on proximity and attachment (Cohen, 1988; Vaske, 2008). To allow for generalizability to the appropriate scope of inference, data were weighted by population proportions based on the 2010 U.S. Census statistics on communities along the Oregon coast.

Results

The first research question focused on the extent that self-assessed knowledge about the new MRs in Oregon differs between proximate and distant populations. In total, the majority of respondents indicated some degree of feeling informed and having general knowledge about these MRs, with 85% reporting themselves to be either slightly (41%), moderately (40%), or extremely (4%) informed about the topic. In addition, 82% believed they were slightly (42%), moderately (37%), or extremely (3%) knowledgeable about these reserves. This pattern of relatively high general knowledge and feeling informed was consistent across both the communities of place and rest of the coast, $t = 1.37$ to 1.51, $p = 0.133$ to 0.172, $r_{pb} = 0.05$ to 0.06.

Across all eight variables measuring self-assessed knowledge, however, respondents felt, on average, only slightly informed and knowledgeable, and that they only slightly understood these issues related to the MRs (Table 2.2). Respondents felt that they most strongly understood the purpose of having MRs in Oregon ($M = 3.74$), whereas they were least likely to understand specific rules and regulations of these areas ($M = 2.27$). There were no significant differences between proximate (i.e.,

communities of place) and distant populations (i.e., rest of coast) in mean responses to each of these eight variables measuring self-assessed knowledge, informedness, and understanding, $t = 0.07$ to 1.58, $p = 0.116$ to 0.945, $r_{pb} = 0.01$ to 0.07.

These eight variables measuring self-assessed knowledge had a Cronbach alpha coefficient of 0.93 and deleting any variables did not improve reliability (Table 2.3). A Cronbach alpha of 0.65 or larger indicates that variables are measuring the same concept and justifies combining them into a single index to represent the concept (Vaske, 2008). There were no statistically significant differences in this self-assessed knowledge index between proximate and distant residents, $t = 0.09$, $p = 0.925$, $r_{pb} = 0.004$. Taken together, these results show that self-assessed knowledge about the MRs in Oregon does not currently differ between proximate and distant populations.

Table 2.2. Comparison of self-assessed knowledge regarding marine reserves (MRs) in Oregon by proximity to these MRs

	Communities of Place (55%)	Rest of Coast (45%)	Total	*t*	*p*	r_{pb}
How well informed do you feel about the topic of MRs in Oregon[1]	2.27	2.37	2.34	1.51	0.133	0.06
How knowledgeable do you feel about the topic of MRs in Oregon[2]	2.18	2.27	2.25	1.37	0.172	0.06
How much do you understand about purpose of MRs in Oregon[3]	3.94	3.67	3.74	1.58	0.116	0.07
How much do you understand about how MRs would be managed in Oregon[3]	2.41	2.42	2.42	0.07	0.945	0.01
How much do you understand about rules / regulations of MRs in Oregon[3]	2.30	2.25	2.27	0.31	0.757	0.01
How much do you understand about where MRs are located in Oregon[3]	2.69	2.61	2.63	0.44	0.661	0.02
How much do you understand about role of science in MRs in Oregon[3]	3.37	3.22	3.25	0.83	0.405	0.04
How much do you understand about role of public involvement in MRs in Oregon[3]	2.62	2.65	2.64	0.16	0.873	0.01

[1] Responses measured on a 4-point scale of 1 = Not Informed to 4 = Extremely Informed.
[2] Responses measured on a 4-point scale of 1 = Not Knowledgeable to 4 = Extremely Knowledgeable.
[3] Responses measured on a 9-point scale of 0 = Do Not Understand to 8 = Fully Understand.

Table 2.3. Reliability analyses of self-assessed knowledge and place attachment related to marine reserves (MRs) in Oregon

	Item total correlation	Alpha if deleted	Cronbach alpha
Self-assessed Knowledge			0.93
How well informed do you feel about the topic of MRs in Oregon[1]	0.66	0.92	
How knowledgeable do you feel about the topic of MRs in Oregon[2]	0.68	0.92	
How much do you understand about purpose of MRs in Oregon[3]	0.77	0.91	
How much do you understand about how MRs would be managed in Oregon[3]	0.82	0.91	
How much do you understand about rules / regulations of MRs in Oregon[3]	0.83	0.90	
How much do you understand about where MRs are located in Oregon[3]	0.83	0.90	
How much do you understand about role of science in MRs in Oregon[3]	0.78	0.91	
How much do you understand about role of public involvement in MRs in Oregon[3]	0.78	0.90	
Place Attachment[4]			0.92
At least one of these marine sites is very special to me	0.76	0.90	
At least one of these marine sites is one of the best places for doing what I like to do	0.76	0.90	
I am very attached to at least one of these marine sites	0.84	0.89	
I would not substitute any other area for doing the types of things that I do in at least one of these marine sites	0.68	0.91	
I identify strongly with at least one of these marine sites	0.83	0.89	
Doing what I do in at least one of these marine sites is more important to me than doing it in any other place	0.71	0.91	

[1] Responses measured on a 4-point scale of 1 = Not Informed to 4 = Extremely Informed.
[2] Responses measured on a 4-point scale of 1 = Not Knowledgeable to 4 = Extremely Knowledgeable.
[3] Responses measured on a 9-point scale of 0 = Do Not Understand to 8 = Fully Understand.
[4] Responses measured on a 5-point scale of 1 = Strongly Disagree to 5 = Strongly Agree.

The second research question focused on whether this self-assessed knowledge about MRs in Oregon differs based on attachment to one or more of these areas. The six variables measuring place attachment had a Cronbach alpha coefficient of 0.92 and deleting any of them did not improve reliability (Table 2.3). K-means cluster analysis revealed three subgroups of respondents based on patterns in their responses to these variables, labeled: low, neutral, and high attachment. In total, 13% of respondents were in the low attachment group (i.e., lowest scores on all variables), 60% were in the neutral attachment group, and 27% were in the high attachment group (i.e., highest scores on all variables).

For seven of the eight variables measuring self-assessed knowledge, those in the high attachment group considered themselves to be the most knowledgeable and informed, and have the highest level of understanding about Oregon's MRs (Table 2.4). This pattern in differences among place attachment groups, however, was statistically significant for only three variables, $F = 3.47$ to 6.74, $p = 0.032$ to 0.001. Tamhane's T2 post-hoc tests for unequal variances showed that those with highest attachment felt most informed and knowledgeable about MRs in Oregon, and were most likely to understand the role of public involvement in these reserves. The eta effect sizes for these three variables ($\eta = 0.14$ to 0.19) were "small" to "medium" (Cohen, 1988) or "minimal" to "typical" (Vaske, 2008). Responses to the other five variables measuring self-assessed knowledge, however, did not differ among place attachment groups, $F = 0.42$ to 2.70, $p = 0.069$ to 0.657, $\eta = 0.05$ to 0.12. In addition,

there were no significant differences in the self-assessed knowledge index (i.e., all eight variables combined) among attachment groups, $F = 2.91$, $p = 0.055$, $\eta = 0.13$. Taken together, these results show that attachment influenced some, but not all, aspects of self-assessed knowledge about MRs in Oregon; those with high attachment to these MRs felt they had slightly more self-assessed knowledge about these areas.

Table 2.4. Comparison of mean responses to self-assessed knowledge measures by place attachment to the marine reserve (MR) sites in Oregon

	Place Attachment Clusters[4]					
	Low Attachment (13%)	Neutral Attachment (60%)	High Attachment (27%)	*F*	*p*	η
How well informed do you feel about the topic of MRs in Oregon[1]	2.32[a]	2.35[a]	2.67[b]	6.74	0.001	0.19
How knowledgeable do you feel about the topic of MRs in Oregon[2]	2.25[ab]	2.27[a]	2.53[b]	4.01	0.019	0.15
How much do you understand about purpose of MRs in Oregon[3]	4.47	4.01	4.10	1.10	0.334	0.08
How much do you understand about how MRs would be managed in Oregon[3]	2.62	2.59	2.86	0.73	0.484	0.07
How much do you understand about rules / regulations of MRs in Oregon[3]	2.44	2.38	2.88	2.32	0.100	0.12
How much do you understand about where MRs are located in Oregon[3]	2.82	2.93	3.13	0.42	0.657	0.05
How much do you understand about role of science in MRs in Oregon[3]	3.65	3.45	4.08	2.70	0.069	0.12
How much do you understand about role of public involvement in MRs in Oregon[3]	2.70[a]	2.73[ab]	3.36[b]	3.47	0.032	0.14

[1] Responses measured on a 4-point scale of 1 = Not Informed to 4 = Extremely Informed.
[2] Responses measured on a 4-point scale of 1 = Not Knowledgeable to 4 = Extremely Knowledgeable.
[3] Responses measured on a 9-point scale of 0 = Do Not Understand to 8 = Fully Understand.
[4] Cell entries with different letter superscripts across each row differ at $p < 0.05$ using Tamhane's T2 post-hoc tests for unequal variances.

The third research question focused on the extent that factual knowledge about MRs in Oregon differs between residents more proximate to these reserves and those living in more distant communities. The factual knowledge question answered correctly the greatest number of times (80% correct) was that scientific research would be allowed in both MPAs and MRs, whereas the question answered correctly the least was that commercial fishing would be allowed in MPAs, but not MRs (7% correct; Table 2.5). The total factual knowledge score out of 16 questions showed that this knowledge was low across respondents with 65% answering half or fewer of the 16 questions correctly, only 1% answering 15 of the 16 questions correctly, and no respondents answering all 16 questions correctly. The average score was 6.80 out of 16 answered correctly (43% correct) and the mode was 9 out of 16 (56%) correct.

Overall, there were no clear differences between residents in communities of place and the rest of the coast regarding questions answered correctly. In fact, there was a significant difference between these groups for only one of the 16 questions; those living in the communities of place (17%) were more likely than those on the rest of the coast (10%) to know where recreational fishing would be allowed, $\chi^2 = 5.28$, $p = 0.022$. The phi effect size ($\phi = 0.10$), however, suggested that this difference between groups was "small" (Cohen, 1988) or "minimal" (Vaske, 2008). There were no significant differences between these proximate and distant groups in answers to the other 15 questions, $\chi^2 = 0.01$ to 2.17, $p = 0.141$ to 0.954, $\phi = 0.01$ to 0.06. In addition, the total factual knowledge score out of 16 questions did not differ between

communities of place (6.72 / 16; 42% correct) and the rest of the coast (6.83 / 16; 43% correct), $t = 0.37$, $p = 0.713$, $r_{pb} = 0.02$. Taken together, factual knowledge about MRs in Oregon does not currently differ between proximate and distant populations.

Table 2.5. Oregon coastal residents factual knowledge of marine reserves (MRs) in Oregon by proximity to these MRs

MR knowledge statements[1]	Correct Response[1]	Percent answered correctly (%)			χ^2	p	ϕ
		Communities of Place (55%)	Rest of Coast (45%)	Total			
Are each of the following statements related to MRs in Oregon true or false?							
The government has been considering MRs for the past several years	True	68	72	71	0.97	0.326	0.04
The government has approved MRs for this state	True	43	47	46	1.18	0.278	0.05
Commercial fishing would be allowed in all MRs	False	62	68	67	2.02	0.155	0.06
All MRs would include coastal lands such as beaches and coastlines	False	36	34	34	0.40	0.589	0.03
The government has established five MR sites	True	29	30	30	0.13	0.718	0.02
New developments such as wave energy or fish farms would be allowed in all MRs	False	36	36	36	0.01	0.954	0.01
Non-extractive recreation / tourism activities (e.g., surfing, swimming, diving) would be allowed in all MRs	True	32	34	34	0.16	0.688	0.02
Keeping fish caught in MRs would be allowed in all reserves	False	59	57	58	0.07	0.797	0.01
Only scientists and no other people would be allowed in all MRs	False	54	54	54	0.01	0.942	0.01
There have been opportunities for public involvement in agency discussions about MRs	True	60	58	58	0.29	0.588	0.02
What agency organization is currently responsible for MRs in Oregon?	ODFW	30	35	34	1.75	0.186	0.06
Would the following activities be allowed in Oregon's MRs, marine protected areas (MPAs), both of these types of areas, or neither of these types of areas?							
Commercial fishing would be allowed in…	MPAs	8	6	7	1.04	0.309	0.04
Recreational fishing would be allowed in…	MPAs	17	10	12	5.28	0.022	0.10
Scientific research would be allowed in…	Both	79	80	80	0.07	0.789	0.01
Removing any species or habitat would not be allowed in…	MRs	13	9	10	2.17	0.141	0.06
Non-extractive recreation / tourism activities (e.g., surfing, swimming, diving) would be allowed in…	Both	38	40	39	0.23	0.631	0.02
Total factual knowledge score (average % correct)[2]		42	43	43	0.37	0.713	0.02

[1] All questions also included an "Unsure" response category, which was coded as "incorrect" in the analysis.
[2] Tests of statistical significant are *t*-tests with point-biserial correlation effect sizes.

The fourth research question examined whether factual knowledge about MRs in Oregon differs among residents with greater attachment to one or more of these reserves than those with less attachment. Those who reported low attachment to the MR sites answered 12 of the 16 questions correctly slightly more often than those reporting neutral or high place attachment (Table 2.6). However, there were statistical differences among place attachment groups for only two of the 16 questions, both of which addressed aspects of non-extractive recreation in MRs, $\chi^2 = 6.21$ to 10.37, $p = 0.006$ to 0.045, $V = 0.13$ to 0.18. For the other 14 questions, there were no differences among attachment groups in the proportion of respondents who answered correctly, $\chi^2 = 0.30$ to 4.86, $p = 0.088$ to 0.861, $V = 0.03$ to 0.12. In addition, the total factual knowledge score out of 16 questions did not differ among low (8 / 16; 50% correct), neutral (7 / 16; 44% correct), and high attachment groups (7.48 / 16; 47% correct), $F = 1.79$, $p = 0.168$, $\eta = 0.10$. Taken together, these results show that place attachment did not substantially influence factual knowledge about MRs in Oregon.

Table 2.6. Comparison of mean responses to factual knowledge measures by place attachment to the marine reserve (MR) sites in Oregon

MR knowledge statements[1]	Correct Response	Percent answered correctly (%)			χ^2	*p*	*V*
		Low Attachment (13%)	Neutral Attachment (60%)	High Attachment (27%)			
Are each of the following statements related to MRs in Oregon true or false?[1]							
The government has been considering MRs for the past several years	True	80	75	72	1.15	0.562	0.06
The government has approved MRs for this state	True	60	46	52	3.60	0.166	0.10
Commercial fishing would be allowed in all MRs	False	82	68	73	4.02	0.134	0.10
All MRs would include coastal lands such as beaches and coastlines	False	29	41	29	4.64	0.098	0.12
The government has established five MR sites	True	44	31	36	3.12	0.210	0.10
New developments such as wave energy or fish farms would be allowed in all MRs	False	46	40	33	2.60	0.272	0.09
Non-extractive recreation / tourism activities (e.g., surfing, swimming, diving) would be allowed in all MRs	True	44	31	44	6.21	0.045	0.13
Keeping fish caught in MRs would be allowed in all reserves	False	62	56	67	3.42	0.181	0.10
Only scientists and no other people would be allowed in all MRs	False	67	59	59	1.09	0.579	0.06
There have been opportunities for public involvement in agency discussions about MRs	True	69	65	66	0.30	0.861	0.03
What agency organization is currently responsible for MRs in Oregon?	ODFW	40	35	29	1.98	0.372	0.08
Would the following activities be allowed in Oregon's MRs, marine protected areas (MPAs), both of these types of areas, or neither of these types of areas?							
Commercial fishing would be allowed in…	MPAs	11	9	4	3.55	0.169	0.10
Recreational fishing would be allowed in…	MPAs	19	14	27	4.13	0.127	0.11
Scientific research would be allowed in…	Both	79	86	83	1.45	0.484	0.07
Removing any species or habitat would not be allowed in…	MRs	16	11	5	4.86	0.088	0.12
Non-extractive recreation / tourism activities (e.g., surfing, swimming, diving) would be allowed in…	Both	48	35	56	10.37	0.006	0.18
Total factual knowledge score (average % correct) [2]		50	44	47	1.79	0.168	0.10

[1] All questions also included an "Unsure" response category, which was coded as "incorrect" in the analysis.
[2] Tests of statistical significant are ANOVA (*F*) with eta effect sizes.

Discussion

This article examined the influence of coastal resident proximity and place attachment on their self-assessed and factual knowledge associated with new MRs in Oregon. Residents tended to report higher self-assessed knowledge than factual knowledge, which was low with 65% answering half or fewer of the 16 factual questions correctly. Self-assessed and factual knowledge did not differ between communities proximate to and more distant from these MRs. Factual knowledge also did not differ substantially based on attachment to these reserves, but place attachment did influence some aspects of self-assessed knowledge about the MRs where those with high attachment to these areas felt that they had slightly more self-assessed knowledge. These results have implications for both management and future research.

Implications for Management

From a management perspective, discerning potential characteristics (e.g., proximity, attachment) that may influence how knowledgeable people are or perceive themselves to be is important in natural resource decision making and information dissemination. In the context of Oregon MRs, managers may value knowing where the public feels that they are knowledgeable, where they actually are knowledgeable, and if there are any disconnects in knowledge of topic areas. Results, for example, showed that people adjacent to the MRs and along the rest of the coast believed that they understand the purpose of the MRs and the role of science in the creation of these areas more than they understand other aspects of the reserves. Questions measuring

factual knowledge also showed that most residents know that government agencies have considered MRs in Oregon and scientific research would be allowed in Oregon's system of MRs and MPAs. Taken together, these results suggest that the public feels adequately informed about the purpose of these reserves and the role of science in their implementation. With increasing calls for public ocean literacy and knowledge about ocean conservation, these areas where people feel knowledgeable and have factual knowledge may serve as an appropriate base or starting point for further public engagement in MR implementation and management processes. Managers may benefit from examining the methods by which these subject areas were presented to the public, and employ them for information dissemination on other MR topics.

For natural resource management issues, dissemination strategies are routinely tailored to specific audiences and settings, with potentially different communication avenues for groups with more or less understanding of an issue. Results presented here, however, demonstrated a generally low level of factual knowledge across both geographic distances from the MRs and attachment to these areas. Coastal residents are generally not knowledgeable about the factual details of the MR system in Oregon. Information campaigns are needed, therefore, to inform and educate the public about these areas. Education and engagement catered to different audiences and settings, however, may not be needed because similarities in factual knowledge between place attachment groups and proximate and distant populations suggest that managers may not need to invest in communications aimed at different audiences based solely on

proximity or attachment. These results also suggest that any targeted communications thus far to these more proximate populations may not have succeeded in increasing this population's self-assessed or factual knowledge levels in comparison to their more distant neighbors.

Feeling highly attached to a MR site was not enough by itself to account for whether respondents had greater self-assessed or factual knowledge about these sites than those with less attachment. This finding suggests that even though people may identify and depend on these sites, they may not be any more motivated to retain factual knowledge about protection of these sites. Given that the MR creation process in Oregon did elicit themes of attachment from various stakeholder groups (e.g., commercial and recreational anglers), managers may want to examine what specific attachments beyond those tested in this study factor into facilitating a connection to and greater understanding of these reserve locations.

Of particular relevance to managers is how to engage non-locals and disinterested locals who may have visited the reserve locations, but do not express an attachment to these places. In total, 13% of residents had a low attachment and 60% had a neutral level of attachment to these sites (i.e., neither agreed nor disagreed with the place attachment variables). Managers may find that the neutral attachment group represents individuals with whom the greatest advances in education and engagement could be made. This large proportion of coastal residents who have visited one of these areas in the past (60%), but do not indicate either an attachment or distinct

disattachment, may not see or understand the salience of these areas to their coastal experiences. This neutral or somewhat ambivalent group indicated a similar level of knowledge about these areas, yet did not indicate a preference for or against attachment to the MR locations. It is with this neutral group that perhaps the most relevant connections to EBM may be made. In emphasizing the management approach that accounts for the biological and social aspects of the environment, and by building a narrative around the importance of these places that perhaps do not have identifiable emotional or physical characteristics, managers may be able to increase awareness and understanding of the MR locations and system, and their interconnections to marine conservation and human well-being.

Implications for Research

From a research perspective, this work explored the influence of proximity and place attachment on self-assessed and factual knowledge in a non-terrestrial setting. Although these concepts have been examined individually in terrestrial protected areas and for specific user groups in MPAs, this study examined whether these concepts can be transferred to a marine setting where human interactions are often fundamentally different than with land (Shackeroff et al., 2009**)**. Results suggest that proximity, attachment, and knowledge have relevance in marine settings such as MPAs and MRs.

Similar to other research on factual knowledge about protected areas and related natural resource issues (e.g., Booth et al., 2009; Jones et al., 2011; Xu et al., 2006**)**, this study found that public knowledge of facts about the MRs in Oregon is

generally low. Residents were knowledgeable about general facts such as MRs have been considered for the Oregon coast for several years, but were less knowledgeable of specific details about these reserves (e.g., if commercial fishing would be allowed, if these areas would include beaches and coastlines). This pattern of cursory knowledge, where general broad facts are known but specifics are not, supports past literature on this phenomenon at terrestrial (Jones et al., 2011, Ressurreicao et al., 2012, Sladonja et al., 2012) and other marine protected areas (Dimitrakopoulos et al., 2010; Fiallo & Jacobson, 1995; Kafyri, Hovardas, & Poirazidis, 2012; Parnell, Lennert-Cody, Geelen, Stanley, & Dayton, 2005; Snider et al., 2011; Stevenson et al., 2012). This study also builds on this literature by showing that this lack of detailed factual knowledge about protected areas exists despite both attachment and proximity of residence to these areas. The lack of significant differences in factual knowledge by proximity to the reserves does contradict findings of some previous studies mostly conducted in terrestrial areas (Jim & Xu, 2002; Mangun et al., 2009; Olomi-Sola et al., 2012; Steel, Smith, et al., 2005) and indicates that perhaps there may be situational factors that make this context unique. This finding, for example, may be attributed to the relatively short time that the Oregon MRs have been in existence, that they are marine and not terrestrial protected areas, or that they are temperate rather than tropical MRs. Research is needed to investigate these issues in more detail.

In this study, the high levels of self-assessed knowledge and disconnects between this high knowledge and low factual knowledge are consistent with past

research detailing public knowledge of oceans and protected areas (Belden Russonello & Stewart & American Viewpoint, 1999; Booth et al., 2009; Sladonja et al., 2012; Steel, Lovrich, et al., 2005; Steel, Smith, et al., 2005). Past research in terrestrial protected areas has shown that subjective knowledge is generally high and people may know a few overarching facts about an area, but not specifics of its management (Jim & Xu 2002; Mangun et al., 2009; Olomi-Sola et al., 2012). This study demonstrated the same phenomenon with residents in coastal communities near MRs, and suggests that people may feel that acquaintance with an issue through mere exposure to it creates a subjective or perceived level of knowledge, but this knowledge is not borne out when examined using a factual test. The recent establishment of the MRs in Oregon may be a factor in why factual knowledge is not prevalent among the public and self-assessed knowledge in this case may be higher than reported in other studies for similar reasons. The newness of the legislation and previous process to implement these MRs has heightened exposure of this issue in the media and, as a result, people may feel that they are more aware of the topic than they factually are in actuality.

Although relationships between proximity to and knowledge about marine protected areas have been tested in various contexts (Dimitrakopoulos et al., 2010; Fiallo & Jacobson, 1995; Kafyri, Hovardas, & Poirazidis, 2012; Parnell, Lennert-Cody, Geelen, Stanley, & Dayton, 2005; Snider et al., 2010; Snider et al., 2011; Stevenson et al., 2012; Tomassin et al., 2010), examination of place attachment to these areas has been less prevalent. This study sought to add to the knowledge of

whether the concept of place attachment was transferrable to a marine setting where direct interaction with the resource is limited. Results showed that overall, the majority (60%) of respondents who had visited at least one of these newly protected MRs did not agree nor disagree with the place attachment measures. Instead, they indicated a neutral or somewhat ambivalent attachment to these areas. Given that people tend to remember more factual information about issues that they have a stronger interest in or attachment to (Ressurreicao et al., 2012; Wann & Branscombe, 1995), it follows that perhaps the 27% of respondents who expressed an attachment to these MRs might be more factually knowledgeable about these areas. Instead, there were few significant differences in factual and self-assessed knowledge based on attachment. Past studies have reported mixed relationships between place attachment and knowledge (e.g., Alam, 2011; Needham & Little, 2013; Alam, 2011; Ressurreicao et al., 2012; Smaldone, 2008), and the results presented here add to this complexity and the potential role of site-specific factors in these relationships.

The concept of place attachment and connections that people make to a marine environment may not be the same as in terrestrial studies, especially among a wide range of stakeholders with different motivations for attachment and specificity of use. The insignificant relationships between place attachment and knowledge also suggest that other factors may influence assessments of knowledge. Research is needed, therefore, on whether place attachment to marine environments facilitates connections to these areas that influence knowledge levels, if established protected area status

influences attachment, and whether people who do not express an attachment are apathetic to the importance of a particular marine site or all marine sites in their lives.

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CHAPTER 3 – SMALL RIPPLES OR LARGE WAVES? RELATIONSHIPS AMONG COASTAL RESIDENT COGNITIONS REGARDING NEW MARINE RESERVES IN OREGON

Introduction

The act of establishing protected areas implies that these areas may be under current or potential threats from continuing with the status quo. Given the current international push to recognize the vulnerability of marine areas to a range of direct and indirect human actions, increasing expanses of oceans are under consideration for new or expanded marine protected areas (MPAs)[2] (CBD, 2002; Chandler & Gillelan, 2004; IUCN, 2003; Obama, 2010; Pita et al., 2011; Wood, 2007). Disagreement over the necessity of these areas and what constitutes adequate management has led to some conflicts among stakeholders and mixed success of current MPAs (including marine reserves [MRs]) and the process of considering and establishing these conservation designations (Evans et al., 2011; Gray, Canessa, Rollins, Dearden, et al., 2010; Gray, Canessa, Rollins, Keller, et al., 2010; Himes, 2007; Pita et al., 2011; Salz & Loomis, 2004; Scholz & Fujita, 2001; Sowman et al., 2011).

Agencies worldwide have struggled with implementing MPAs in a manner agreeable to all stakeholders (Evans et al., 2011; Gray, Canessa, Rollins, Dearden, et al., 2010; Gray, Canessa, Rollins, Keller, et al., 2010; Himes, 2007; Pita et al., 2011;

[2] MPAs may refer to many different areas, protection levels, and conservation strategies(Pita et al., 2011). Many types of MPAs exist, from "multiple use" allowing fishing in some areas and protection in others, to "no-take" marine reserves (MRs) prohibiting all extractive uses. MPAs generally have less stringent restrictions than MRs and are "areas of the ocean designated to enhance conservation of marine resources" (Lubchenco et al., 2003, p. S3), where prohibitions and allowances exist on a case-by-case basis. This article uses the term MPA as a broad, inclusive term referring to many different protected area types, and MR when specifically discussing areas where there are restrictions on extraction.

Salz & Loomis, 2004; Scholz & Fujita, 2001; Sowman et al., 2011). MPAs affect nearby communities because they exist primarily to regulate human behavior, with effects mainly to locals rather than populations elsewhere (Voyer et al., 2012). Although user conflicts and other use and zoning issues arise after MPAs have been established, the success of these areas is often determined by issues (e.g., stakeholder attitudes, local community support) that can take root prior to establishment (Kessler, 2004).

Community participatory processes prior to MPA establishment (e.g., economic assessments, perceptions of specific stakeholder groups) help negate some of these concerns (Heck & Dearden, 2012; Pita et al., 2011) by giving stakeholders an opportunity to be heard, understood, and valued while management is at a relatively malleable stage (Thomassin et al., 2010), thereby aiding in effective management after implementation (Dimech et al., 2009; Durrant & Shumway, 2004; Heylings & Bravo, 2007; Himes, 2007; Liu, Ouyang, & Miao, 2010; Salz & Loomis, 2004). Studies have shown that perceptions toward MPAs and their management vary among specific stakeholder groups (e.g., commercial anglers, conservationists, recreational boaters), with more negative perceptions expressed by those who feel that their livelihoods will be most negatively impacted (Evans et al., 2011; Fiallo & Jacobson, 1995; Grorud-Colvert et al., 2010; Heck et al., 2011; Himes, 2007; Lédée et al., 2012; Marshall et al., 2009; Pita et al., 2011; Salz & Loomis, 2004; Trivourea et al., 2011). Although a large stakeholder group collectively, the public usually fails to have a collective voice

in potential MPA planning and establishment unless each individual is counted in one of these specific stakeholder groups.

Given that MPAs are a human construct, different groups are likely to have different attitudes and intentions about the protected area designation and nature of regulations (Heck & Dearden, 2012; Himes, 2007). Two possible influences on attitudes and intentions toward MPAs are how much an individual knows about these areas and how much trust he or she has in the agency responsible for implementing and managing these areas. In the context of MPA establishment, issues of ocean literacy or knowledge and perceived similarity with the managing agency may influence these public attitudes toward MPAs and trust in agencies to manage these areas (Weible, 2008). This article, therefore, examines coastal resident knowledge about new MPAs in Oregon, perceived similarity and trust in the agency currently responsible for these areas, and their attitudes and behavioral intentions associated with these areas.

Conceptual Foundation

Attitudes and Behavioral Intentions

An attitude is the extent of disfavor or favor toward an object, situation, or issue (Ajzen & Fishbein, 1980; Vaske & Donnelly, 1999). Attitudes may range from general to specific with both affective (i.e., emotional) and belief components comprising attitudes (Ajzen & Fishbein, 1980). A number of theories propose that attitudes are part of a larger structure of cognitions (e.g., cognitive hierarchy [Rokeach, 1973],

theory of reasoned action [Ajzen & Fishbein, 1980]). For example, the most immediate determinant of any given behavior is thought to be the intention to perform or not perform that behavior (Ajzen & Fishbein, 1977; Fulton et al., 1996; Rokeach, 1973), and these intentions are often influenced by underlying related attitudes (Ajzen & Fishbein, 1980; Homer & Kahle, 1988; Needham & Rollins, 2009; Vaske & Donnelly, 1999; Whittaker et al., 2006). Documenting public attitudes toward protected areas, such as whether people favor or disfavor specific techniques for managing these areas, can be useful for agencies to understand how people feel about the area and its management (Needham & Rollins, 2009). It is also important to understand behavioral intentions, such as whether the public would vote in support or opposition of establishing new protected areas or revising regulations in existing areas, because this allows agencies to make decisions and operate within public tolerance limits.

Factual and Self-Assessed Knowledge

These attitudes may be influenced by both factual and self-assessed knowledge. Factual knowledge is more concrete where the individual either does or does not know the information and there is actually a factually correct answer (Wann & Branscombe, 1995). Factual questions may take the form of a quiz assessment with true / false or multiple choice answers, with only one answer being correct at the time. Self-assessed knowledge, on the other hand, is more subjective and ambiguous where there is no correct answer and the individual simply believes that he or she is

knowledgeable and providing a correct answer (Wann & Branscombe, 1995). This may be measured by asking, for example, “How aware do you feel about this issue?”

It is important to examine knowledge when studying attitudes toward protected areas because knowledge frames the context and may influence these other cognitions (Olomi-Sola et al., 2012). In several studies, the connection between knowledge and attitudes about protected areas involves the availability of information and opportunities to learn more about these areas and their management, which can increase positive attitudes about these areas (e.g., Htun, Mizoue, & Yoshida, 2012; Rastogi, Badola, Hussain, & Hickey, 2010). Studies have found, for example, that attitudes of local residents toward protected areas are shaped by their knowledge of these areas (Htun et al., 2012; Jim & Xu, 2002), with positive relationships generally found between knowledge and favorable attitudes.

Knowledge about protected areas, however, tends to be low, especially factual knowledge about these areas (Booth et al., 2009; Jones et al., 2011; Sladonja et al., 2012; Xu et al., 2006). This phenomenon has even been found in local populations neighboring protected areas (Jim & Xu, 2002; Mangun et al., 2009; Olomi-Sola et al., 2012). Low public knowledge is especially evident for MPAs where the public may not have access to technology (e.g., boats, scuba gear, scientific instruments) to access and learn directly about these places and issues (Dimitrakopoulos et al., 2010; Fiallo & Jacobson, 1995; Kafyri et al., 2012; Parnell et al., 2005; Ressurreição et al., 2012; Snider et al., 2011; Stevenson et al., 2012). Given the high degree of ocean illiteracy

coupled with public difficulty comprehending the complex physical, biological, and economic factors associated with marine areas, trust in the agency responsible for managing these areas may be an important surrogate for lack of knowledge regarding MPAs and other marine issues (Belden Russonello & Stewart & American Viewpoint, 1999; Compas et al., 2007; Cudaback, 2008; Duda et al., 2007; Steel, Lovrich, et al., 2005; Steel, Smith, et al., 2005; Steel & Weber, 2001).

Social Trust

Social trust may be influenced by knowledge and also inform attitudes. Social trust refers to the willingness to rely on those with formal decision-making responsibility to take actions that represent public interests (Earle & Cvetkovich, 1995; Needham & Vaske, 2008; Siegrist et al., 2000). The person making the trust attribution often does not have to personally know specific individuals in the agencies being trusted or distrusted (Siegrist et al., 2000). There are inconsistencies in the measurement of social trust. Some researchers, for example, suggest that trust consists of multiple dimensions such as fairness, caring, responsibility, and competence (e.g., Johnson, 1999; Poortinga & Pidgeon, 2003). This view presumes that processes underlying social trust are complex and that a requisite level of knowledge about a managing agency's actions is needed to make cognitively detailed judgments of trust. An alternative view proposes that social trust simply consists of either trust or distrust (e.g., Cvetkovich & Winter, 2003; Needham & Vaske, 2008; Siegrist & Cvetkovich, 2000; Siegrist, 2000).

Detailed knowledge of specific natural resource issues is important to consider when examining public trust in agencies responsible for managing these issues (Steel et al., 1993). In the context of protected areas, for example, low knowledge and the inability to discern factually correct information may be a large factor in perceptions of social trust (Steel et al., 1993). Social trust may act as one way of assessing a management decision if knowledge of that decision is low or lacking. A lack of detailed scientific and technological knowledge often factors into attributions of social trust (Siegrist et al., 2000), as people may rely on perceptions of trust in those responsible in instances where their own knowledge about a specific issue is limited (Earle & Cvetkovich, 1995; Siegrist & Cvetkovich, 2000). The strength of this inverse relationship between these concepts may influence how new information is interpreted (Siegrist, Cvetkovich, & Gutscher, 2001).

Trust in natural resource management agencies is also thought to influence attitudes toward agency policies and related management actions (Cvetkovich & Winter, 2003; Vaske et al., 2007). Vaske et al. (2007), for example, showed that trust positively influenced favorable attitudes toward acceptance of wildfire management strategies, and suggested that building and maintaining public trust is important for resource management agencies. Other studies have also demonstrated this relationship between trust and attitudes toward natural resource issues, such as management of protected areas (e.g., Jones et al., 2011; Stern, 2008; Treffny & Beilin, 2011) and

federal forest lands (e.g., Cvetkovich & Winter, 2003; Nyaupane, Graefe, & Burns, 2009; Winter et al., 2004; Winter et al., 1999).

The relationship between trust and attitudes, however, is not always this clear because trust has nuances of scale (Vaske et al., 2007). Although trust in an agency can be linked to attitudes, such as acceptance of the agency's actions (Nyaupane et al., 2009), trust afforded to an agency may vary depending on the level and region of governance. An inverse relationship, for example, has been shown between levels of government and trust where the public has expressed greater trust in lower or more local levels of government than in higher national levels of government (Pijawka & Mushkatel, 1991). Trust in the same entity and on the same subject may also vary by region (Cvetkovich & Winter, 2003; Winter et al., 2004), indicating possible contextual factors influencing trust, such as knowledge, newness, and experience (Vaske et al., 2007).

Perceived Similarity

Decisions about trusting an agency often involve a cognitive link between an individual's perceptions of that agency and trust in its actions (Needham & Vaske, 2008; Siegrist et al., 2000; Winter et al., 1999). In other words, trust is influenced by perceptions of shared values, goals, and opinions; people often trust managing agencies that are perceived to share similar views (Cvetkovich & Winter, 2003; Needham & Vaske, 2008; Siegrist et al., 2000, 2001). Social trust, therefore, can be based on perceived similarity rather than on carefully reasoned attributions of trust or

direct knowledge of the managing agency (Siegrist et al., 2000, 2001). This approach has been referred to as either attributes of salient value similarity, perceived shared values, or perceived similarity, and it frequently predicts social trust (Cvetkovich & Winter, 2003; Needham & Vaske, 2008; Siegrist et al., 2000, 2001).

This approach differs from the traditional view of how judgments of trust are made. The traditional view is that trust is based on an individual's confidence in the agency's competence, objectivity, fairness, consistency, and caring (Earle & Cvetkovich, 1995), which assumes that there is a level of knowledge about the agency that allows for a judgment of trust to be made and the time to formulate this judgment (Winter et al., 1999). Conversely, research has shown that many individuals lack the knowledge, time, or willingness to investigate these complex issues, and instead base trust decisions largely on perceptions of similar goals, values, and actions (Earle & Cvetkovich, 1995; Needham & Vaske, 2008; Siegrist et al., 2000; Winter et al., 1999).

Hypotheses

Based on this literature, this article tests the following five hypotheses in the context of coastal resident cognitions about new marine reserves (MRs) in Oregon and the agency currently responsible for managing these areas (i.e., Oregon Department of Fish and Wildlife [ODFW]; Figure 3.1):

H_1: Trust in the managing agency will be influenced by perceived similarity with the agency and factual and self-assessed knowledge about these MRs. Residents who perceive themselves to share similar goals, thoughts, and opinions as the

agency, and those with lower self-assessed and factual knowledge about the MRs will be more likely to trust this agency.

H_2: Attitudes toward potential benefits of these MRs will be influenced by trust in the agency and factual and self-assessed knowledge about the MRs. Residents with higher trust in the agency and factual and self-assessed knowledge about the MRs will have more favorable attitudes toward benefits of the MRs.

H_3: Attitudes toward potential constraints of these MRs will be influenced by trust in the agency and factual and self-assessed knowledge about the MRs. Residents with higher factual knowledge about the MRs will have more agreement with these constraints, whereas those with higher trust in the agency and self-assessed knowledge about the MRs will have less agreement with these constraints.

H_4: Behavioral intentions regarding these MRs will be influenced by attitudes toward potential benefits and constraints of the MRs. Residents who express more favorable attitudes toward potential benefits of the MRs will be more likely to vote in support of the MRs, whereas those who agree with potential constraints will be less likely to vote in support of the MRs.

H_5: These relationships among concepts will differ based on geographic proximity of residents to these MRs (i.e., communities of place, rest of the coast).

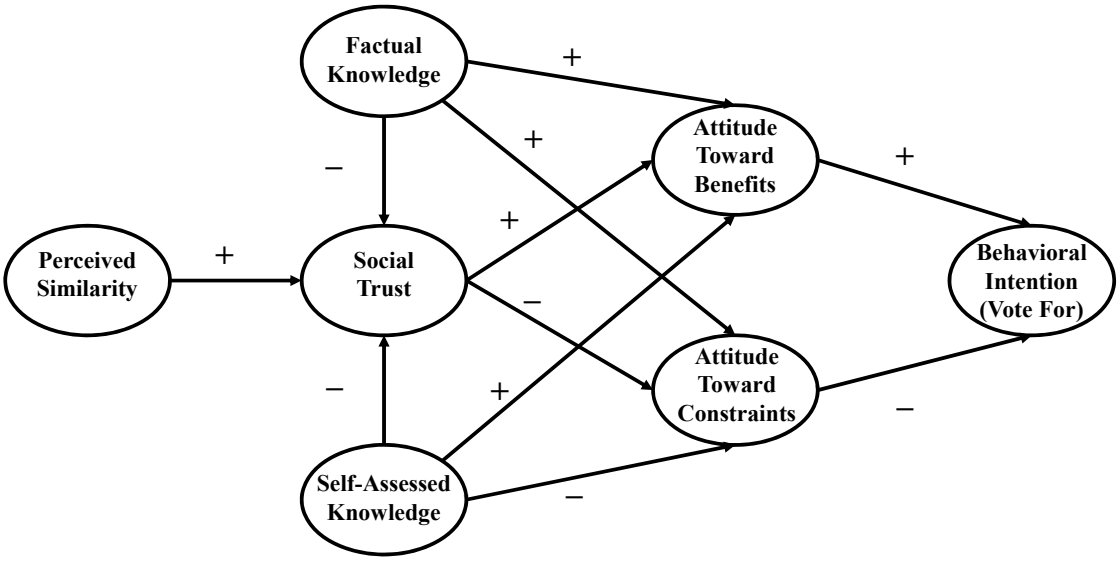

Figure 3.1. Hypothesized model of relationships among concepts for coastal resident cognitions about new marine reserves in Oregon and the agency currently responsible for managing the reserves.

Methods

Study Sites and Context

Data were obtained from residents living along the Oregon coast. Although definitions of "coast" vary, Oregon's Coastal Range mountain boundary a few miles inland provides a natural delineation. Three reasons make this an ideal location for investigating how the population knows about and perceives establishment of MRs. First, Oregon is in the early stages of implementing a system of new MRs. Second, although a few specific communities and stakeholder groups have been involved in discussions about creating MRs in this state, input from a more representative sample of the public has not been ascertained. Third, the enabling legislation and monitoring plans for these reserves explicitly state that baseline social data will be collected and considered in tandem with biological data (Murphy, 2011).

Over the past decade, the state of Oregon has sought to increase conservation and public awareness of marine resources in the state's territorial sea (i.e., waters within three miles of the state's coastline). In 2000, the Ocean Policy Advisory Council (OPAC) examined the potential for state MR locations that "individually or collectively, are to be large enough to allow scientific evaluation of ecological effects, but small enough to avoid significant adverse social and economic impacts on ocean users and coastal communities" (Oregon Ocean Policy Advisory Council (OPAC), 2008a, 2008b), representing a compromise between ecological health and socio-economic goals. With the states of Washington to the north and California to the south already having systems of MPAs, the ecological and geographical gap in Oregon's waters was noticeable. Major drivers for ecosystem conservation within these marine habitats are the ground fisheries, especially recruitment of rockfish. In 2009, six sites were selected for consideration of establishing MRs in Oregon. Two of these sites (Otter Rock, Redfish Rocks) were implemented as pilot sites, and three of the other four (Cape Falcon, Cape Perpetua, Cascade Head) followed suite in early 2012.

During the MR creation process, multiple agencies and institutions sought stakeholder opinions to complement existing biological research. Sea Grant, National Oceanic and Atmospheric Administration (NOAA), and Oregon Department of Fish and Wildlife (ODFW) had responsibilities for gathering baseline social data about communities and livelihoods that may be impacted directly by these reserves. These data first took the form of community profiles for coastal towns (Norman et al., 2007;

Package & Conway, 2010a, 2010b) and three community evaluation teams comprised of stakeholders primarily representing eight groups (e.g., commercial anglers, conservation groups, scientists, local government). In addition, town hall meetings, interviews, and unstructured questionnaires were sent to a small number of specific stakeholder groups (Connor, Stauffer, & Harte, 2007; Murphy, 2010). These social data captured the socio-economic concerns of a select portion of Oregon residents, interest groups, and other vocal citizens.

In this study, however, an attempt was made to gain a more comprehensive and representative perspective of the social concerns of coastal residents in Oregon, beyond those with just direct socio-economic interests associated with the reserves (Gray, Canessa, Rollins, Keller, et al., 2010). Given that concrete regulations and management agencies are yet to be formally established and finalized for the MR sites, assessing current knowledge and perceptions of Oregon's coastal residents may offer insight into how best to implement and regulate these MRs.

Data Collection

Questionnaires were administered by mail in late 2012 and early 2013 to a sample of residents along the Oregon coast selected randomly from postal records. A sample of 2,600 addresses was equally divided into two main subpopulations: (a) residents of communities of place, and (b) residents along the rest of the coast (Figure 3.2). Communities of place is a term that implies a collective identity and perhaps different perceptions and reactions to a management program (Winter et al., 1999).

The 1,300 addresses in these communities of place were distributed equally among five area-specific frames (i.e., 260 addresses each) corresponding to each current MR location. A 10 mile radius was drawn around the land point nearest to the center of each MR. Communities within this radius were included in the communities of place delineation. The exact size and location of these samples were adjusted slightly in cases where they would split communities inside and outside of the sample, and in cases where they overlapped with another reserve's community of place so that communities were not split or overlapping. The other half (i.e., 1,300) of the sample addresses was spread throughout the rest of the coast and included areas seaward of the Coast Range excluding those in the five predefined communities of place.

This type of delineation of subpopulations by proximity is common in research addressing public concerns regarding protected areas and other natural resource management issues. Several studies have divided groups based on proximity to protected areas (e.g., Jim & Xu, 2002; Winter et al., 1999) with the division, although subjectively determined, set to investigate whether people who live geographically closer to a place differ from those living farther away. Issues with delineating a local community, or community of place, have been noted in the literature (e.g., Cocklin et al., 1998) where delineations may not crisply capture people in a local versus a more distant community and their associated concerns. Although these delineations are generally subjective, they are set a priori and relate to the research questions and situational context. Distance is a common method and employed here, although there

are other means of delineation such as by time-on-roads distance to a MPA (Thomassin et al., 2010) or affectedness to the marine issue and ocean dependence (e.g., fishing, tourism) (Gee & Burkhard, 2010).

Questionnaires were administered using three mailings (Leedy & Ormrod, 2010; Salant & Dillman, 1994). The first and third mailings (November 9, 2012 and January 11, 2013, respectively) consisted of a cover letter explaining the purpose of the study, the questionnaire, and a prepaid business reply envelope. The second mailing (November 30, 2012) consisted of a postcard reminder to those who had not responded to the first mailing. The third mailing was not sent to addresses that had responded or had been returned undeliverable in the first or second mailings (Vaske, 2008). The sample size (Table 3.1) was $n = 595$, with 326 (55% of the sample) from the communities of place and 269 (45%) from the rest of the coast, representing a 27% response rate. A telephone non-response bias check was administered to a random sample of non-respondents with landline telephone numbers ($n = 202$) and there were no substantive differences between those who responded to the mail survey and those who did not (i.e., those who completed the telephone non-response bias check).

Table 3.1. Sample sizes and response rates for each site

Site	Mailed Questionnaires	Undeliverable Questionnaires	Completed Questionnaires (*n*)	Response Rate (%)
Cape Falcon	260	30	70	30
Cascade Head	260	54	50	24
Otter Rock	260	34	69	31
Cape Perpetua	260	44	63	29
Redfish Rocks	260	51	74	35
Rest of the Coast	1300	144	269	23
Total	2600	357	595	27

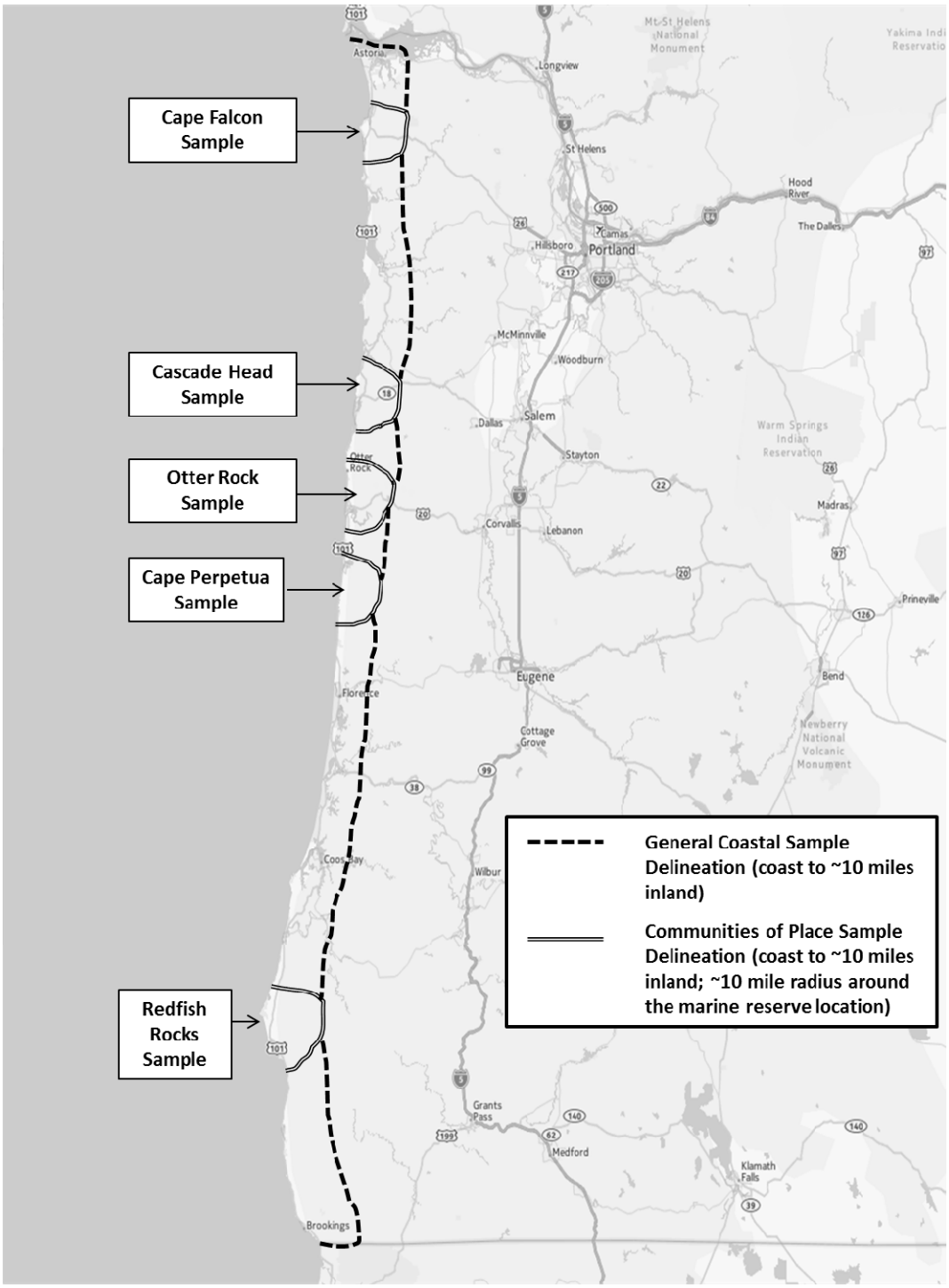

Figure 3.2. Generalized map of sampling frame for surveyed population. Actual sample delineation followed more detailed boundaries.

Analysis Variables

The questionnaires contained items measuring perceived similarity, trust, self-assessed and factual knowledge, attitudes, and intentions. *Perceived similarity* was operationalized identical to studies in other contexts (Needham & Vaske, 2008; Siegrist et al., 2000). Respondents were asked if they felt that ODFW: (a) "shares similar values as I do," (b) "shares similar opinions as I do," (c) "shares similar goals as I do," (d) "thinks in a similar way as I do," and (e) "takes similar actions as I would." Responses were measured on five-point scales of 1 "strongly disagree" to 5 "strongly agree."

Social trust was measured with nine items, several of which were based on similar wording in other studies (e.g., Needham & Vaske, 2008; Vaske et al., 2007). Respondents were asked the extent that they trusted ODFW to: (a) "provide the best available information about marine reserves," (b) "provide timely information about marine reserves," (c) "provide truthful information about marine reserves," (d) "provide me with enough information to decide what actions I should take regarding marine reserves," (e) "manage marine reserves using the best available information about non-human species in these areas (e.g., fish, birds)," (f) "manage marine reserves using the best available information about human uses of these areas," (g) "work with other organizations to inform management of marine reserves," (h) "use public input to inform management of marine reserves," and (i) "make good decisions

regarding management of marine reserves." These items were measured on the same five-point agreement scale used for measuring perceived similarity.

Knowledge was measured using both self-assessed and factual questions. The self-assessed questions pertained to how an individual rated his or her level of knowledge about the Oregon MRs. *Self-assessed knowledge* focused on informedness, perceived knowledge, and understanding. Informedness was measured with the question "how informed do you feel about the topic of marine reserves in Oregon" with responses coded on a four-point scale from 1 "not informed" to 4 "extremely informed." Perceived knowledge was measured by asking "how knowledgeable do you feel about the topic of marine reserves in Oregon" with responses on a four-point scale from 1 "not knowledgeable" to 4 "extremely knowledgeable." Understanding was measured by asking respondents how much they felt they understood about: (a) "the purpose of marine reserves in Oregon," (b) "how marine reserves would be managed in Oregon," (c) "rules / regulations of marine reserves in Oregon," (d) "where marine reserves are located in Oregon," (e) "the role of science in marine reserves in Oregon," and (f) "the role of public involvement in marine reserves in Oregon." Responses were measured on nine-point scales from 0 "do not understand" to 8 "fully understand."

Factual knowledge questions were informed by information on ODFW's website, in newspapers, and from other sources of factual information. Three types of questions measured this knowledge. First, 10 true / false (or unsure) questions about

Oregon MRs were asked: "In Oregon: (a) the government has been considering marine reserves for the past several years (true), (b) the government has approved marine reserves for this state (true), (c) commercial fishing would be allowed in all marine reserves (false), (d) all marine reserves would include coastal lands such as beaches and coastlines (false), (e) the government has established five marine reserve sites (true), (f) new developments such as wave energy or fish farms would be allowed in all marine reserves (false), (g) non-extractive recreation / tourism activities (e.g., surfing, swimming, diving) would be allowed in all marine reserves (true), (h) keeping fish caught in marine reserves would be allowed in all reserves (false), (i) only scientists and no other people would be allowed in all marine reserves (false), and (j) there have been opportunities for public involvement in agency discussions about marine reserves (true)."

Second, respondents were asked "what one agency or organization do you think is currently responsible for marine reserves in Oregon" with the following choices: National Oceanic and Atmospheric Administration, US Fish and Wildlife Service, US Coast Guard, Pacific Fishery Management Council, Oregon Parks and Recreation Department, Oregon Department of Fish and Wildlife (i.e., correct answer), Oregon Marine Board, and Unsure.

Third, respondents were asked "both marine reserves and marine protected areas have been proposed for Oregon. These designations are not the same thing. Do you think each of the following activities would be allowed in Oregon's marine

reserves (MRs), marine protected areas (MPAs), both of these types of areas, or neither of these types of areas?" Five items were listed: (a) commercial fishing (MPAs), (b) recreational fishing (MPAs), (c) scientific research (both), (d) removing any species or habitat would *not* be allowed (MRs), and (e) non-extractive recreation / tourism activities (e.g., surfing, swimming, diving; both). Respondents were given the option of selecting marine reserves, marine protected areas, both marine reserves and protected areas, neither marine reserves or protected areas, or unsure for each.

Measurement of *attitudes* was context-specific and combined both affective evaluations and belief questions about 11 possible benefits and seven possible constraints associated with outcomes of the Oregon MRs. To measure beliefs, respondents were asked if they believed that MRs in Oregon would: (a) "benefit marine areas in general," (b) "not be effective in conserving marine areas," (c) "protect the diversity of marine species," (d) "increase marine species populations," (e) "allow depleted marine species populations to recover," (f) "cause some species to become overpopulated," (g) "improve the economy," (h) "increase tourism," (i) "benefit people in local communities," (j) "prevent people from using the reserve areas," (k) "reduce recreational fishing," (l) "reduce commercial fishing," (m) "improve scientific understanding of marine areas," (n) "allow scientists to monitor marine areas over time," (o) "improve our understanding of marine areas," (p) "be difficult to enforce," (q) "cost a lot to manage," and (r) "improve the ability to manage marine areas." Responses were measured on five-point scales of 1 "strongly disagree"

to 5 “strongly agree.” To measure affective evaluations, respondents were asked if they felt that each of these possible outcomes of MRs in Oregon would be good or bad on five-point scales of 1 “very bad” to 5 “very good.” This approach to measuring attitudes is identical to studies in other natural resource contexts (e.g., Pate, Manfredo, Bright, & Tischbein, 1996; Whittaker et al., 2001).

Behavioral intentions were measured with multiple questions. Respondents were asked “if you were to be given an opportunity to vote for or against establishing marine reserves in Oregon, how would you vote” with respondents answering either “I would vote for establishing marine reserves in Oregon” or “I would vote against establishing marine reserves in Oregon.” Respondents were then asked “how certain are you that you would vote this way” with responses on a four-point scale of 1 “not certain” to 4 “extremely certain.” This approach to measuring behavioral intentions is identical to other natural resource studies (e.g., Pate et al., 1996; Vaske & Donnelly, 1999). Respondents were also asked the extent that they agreed or disagreed with three other statements: (a) “I intend to support having marine reserves in Oregon,” (b) “I am against establishing marine reserves in Oregon” (reverse coded for analysis), and (c) “I would likely be in favor of implementing marine reserves in Oregon.” These items were measured on five-point scales of 1 “strongly disagree” to 5 “strongly agree.”

Data Analysis

The latent concepts of perceived similarity, social trust, self-assessed knowledge, attitudes, and behavioral intentions were measured using mean indices

based on their respective variables. The factual knowledge questions were recoded as 0 “not correct” or 1 “correct” and combined into a standardized score for each respondent representing the number of correctly answered questions out of 16 (i.e., 0 to 16). This approach is consistent with other studies (e.g., Needham & Little, 2013; Vaske et al., 2006). Also consistent with previous studies (e.g., Whittaker et al., 2001) and following techniques developed by Ajzen and Fishbein (1980), attitude scores were developed by multiplying beliefs by their corresponding affective evaluations for the possible outcomes associated with MRs in Oregon. Behavioral intentions regarding the MRs included intended voting behavior multiplied by their certainty of this vote to provide a continuous measure of strength of their behavioral intentions (e.g., Pate et al., 1996; Whittaker et al., 2001), as well as intentions to support establishing, implementing, and having MRs in Oregon.

Analysis involved both descriptive (e.g., frequencies) and bivariate statistics (e.g., chi-square tests, independent sample *t*-tests) comparing cognitions between residents living in the communities of place and along the rest of the coast. Reliability of multi-item concepts was examined using Cronbach alpha reliability coefficients. Predicted multivariate relationships among concepts in H_1 through H_4 (Figure 3.1) were examined using Ordinary Least Squares (OLS) regression path analysis. Significant paths and strengths of relationships were compared among models to describe differences based on proximity (H_5). To allow for generalizability to the

appropriate scope of inference, data were weighted by population proportions based on the 2010 U.S. Census statistics on communities along the Oregon coast.

Results

Descriptive Findings

Perceived similarity with the managing agency (i.e., ODFW) was measured with five variables and means across all respondents ranged from $M = 3.05$ ("ODFW takes similar actions as I would") to $M = 3.38$ ("ODFW shares similar values as I do), indicating slight agreement with each statement (Table 3.2). Agreement for all of these variables was highest in the communities of place, but only two variables statistically differed based on proximity, $t = 2.29$ to 2.37, $p = 0.018$ to 0.022. The point-biserial correlation effect size for these differences, however, was $r_{pb} = 0.10$, indicating only "small" (Cohen, 1988) or "minimal" (Vaske, 2008) strength of these differences.

These five variables measuring perceived similarity had a Cronbach alpha coefficient of 0.95 and deleting any of them did not improve reliability. A Cronbach alpha of 0.65 or larger indicates that variables are measuring the same concept and justifies combining them into a single index to represent the concept (Vaske, 2008). When aggregated into a single index, perceived similarity was significantly higher for communities of place ($M = 3.35$) than the rest of the coast ($M = 3.18$), $t = 2.14$, $p = 0.032$. The effect size ($r_{pb} = 0.09$), however, suggested that this difference was only "small" (Cohen, 1988) or "minimal" (Vaske, 2008).

Table 3.2. Response means and reliability analysis of perceived similarity measures for residents in both geographic delineations and overall, regarding the Oregon Department of Fish and Wildlife (ODFW)

Perceived similarity measures	Mean response[1]			Item Total Correlation	Alpha if Item Deleted[2]
I feel that the ODFW…	Communities of Place	Rest of Coast	Total		
Shares similar values as I do	3.49	3.35	3.38	0.85	0.94
Shares similar opinions as I do	3.37	3.23	3.26	0.88	0.94
Shares similar goals as I do[3]	3.45	3.25	3.30	0.86	0.94
Thinks in a similar way as I do[4]	3.25	3.05	3.10	0.89	0.94
Takes similar actions as I would	3.17	3.02	3.05	0.86	0.94

[1] Responses measured on a 5-point scale of 1 = Strongly Disagree to 5 = Strongly Agree. Aggregate scale means = 3.35/5.00 (communities of place), 3.18/5.00 (rest of coast), 3.22/5.00 (total). Significant difference in mean overall perceived similarity between communities of place and the rest of the coast, $t = 2.14$, $p = 0.032$, $r_{pb} = 0.09$.
[2] Overall Cronbach alpha reliability = 0.95.
[3] Differs between communities of place and rest of the coast, $t = 2.29$, $p = 0.022$, $r_{pb} = 0.10$.
[4] Differs between communities of place and rest of the coast, $t = 2.37$, $p = 0.018$, $r_{pb} = 0.10$.

Social trust was measured using nine variables and average responses ranged from $M = 3.24$ ("I trust ODFW to use public input to inform management of MRs") to $M = 3.60$ ("I trust ODFW to provide truthful information about MRs"), suggesting slight to moderate trust in the agency responsible for MRs in Oregon (i.e., ODFW; Table 3.3). Mean agreement with each variable was higher among residents in the communities of place compared to those on the rest of the coast, but these differences were not statistically significant ($p > .05$). The Cronbach alpha reliability coefficient of 0.97 justified combining these measures into a social trust index, and again trust was higher among residents in the communities of place ($M = 3.56$) than along the rest of the coast ($M = 3.41$), but this difference was not significant, $t = 1.77$, $p = 0.078$, $r_{pb} = 0.08$.

Table 3.3. Response means and reliability analysis of social trust measures for residents in both geographic delineations and overall, regarding the Oregon Department of Fish and Wildlife (ODFW)

Social trust measures	Mean response[1]			Item Total Correlation	Alpha if Item Deleted[2]
I trust the ODFW to…	Communities of Place	Rest of Coast	Total		
Provide the best available information about MRs	3.64	3.45	3.50	0.87	0.96
Provide timely information about MRs	3.49	3.34	3.37	0.86	0.96
Provide truthful information about MRs	3.72	3.55	3.60	0.84	0.96
Provide me with enough information to decide what actions I should take regarding MRs	3.53	3.36	3.40	0.80	0.96
Manage MRs using the best available information about non-human species in these areas (e.g., fish, birds)	3.67	3.56	3.59	0.88	0.96
Manage MRs using the best available information about human uses of these areas	3.57	3.43	3.46	0.85	0.96
Work with other organizations to inform management of MRs	3.57	3.40	3.44	0.84	0.96
Use public input to inform management of MRs	3.29	3.22	3.24	0.84	0.96
Make good decisions regarding management of MRs	3.50	3.35	3.39	0.88	0.96

[1] Responses measured on a 5-point scale of 1 = Strongly Disagree to 5 = Strongly Agree No significant differences between communities of place and rest of the coast for all variables, $p > .05$.

[2] Overall Cronbach alpha reliability = 0.97.

Aggregate scale means = 3.56/5.00 (communities of place), 3.41/5.00 (rest of coast), 3.45/5.00 (total). No significant difference in mean social trust between communities of place and the rest of the coast, $t = 1.77$, $p = 0.078$, $r_{pb} = 0.08$.

Factual knowledge was measured with 16 items and the question answered correctly the greatest number of times (80% correct) was that scientific research would be allowed in both MPAs and MRs, whereas the question answered correctly the least was that commercial fishing would be allowed in MPAs, but not MRs (7% correct; Table 3.4). The total factual knowledge score out of 16 questions showed that this knowledge was low across respondents with 65% answering half or fewer of the 16 questions correctly, only 1% answering 15 of the 16 correctly, and no respondents

answering all 16 questions correctly (Table 3.5). The average score was only 6.80 out of 16 answered correctly (43% correct) and the mode was 9 out of 16 (56%) correct.

Overall, there were no clear differences between residents in communities of place and the rest of the coast regarding questions answered correctly. In fact, there was a significant difference between these groups for only one of the 16 questions; those living in communities of place (17%) were more likely than those on the rest of the coast (10%) to know where recreational fishing would be allowed, $\chi^2 = 5.28$, $p = 0.022$. The phi effect size ($\phi = 0.10$), however, suggested that this difference between groups was "small" (Cohen, 1988) or "minimal" (Vaske, 2008). There were no significant differences between these proximate and distant groups in answers to the other 15 questions, $\chi^2 = 0.01$ to 2.17, $p = 0.141$ to 0.954, $\phi = 0.01$ to 0.06. In addition, the total factual knowledge score out of 16 questions did not differ between communities of place (6.72 / 16; 42% correct) and the rest of the coast (6.83 / 16; 43% correct), $t = 0.37$, $p = 0.713$, $r_{pb} = 0.02$.

Table 3.4. Oregon coastal residents' (communities of place and the rest of the coast) factual knowledge of marine reserves (MRs) in Oregon

MR knowledge statements	Correct Response[1]	Percent answered correctly (%) Communities of Place	Rest of Coast	Total	χ^2	p	ϕ
Are each of the following statements related to MRs in Oregon true or false?[1]							
The government has been considering MRs for the past several years	True	68	72	71	0.97	0.326	0.04
The government has approved MRs for this state	True	43	47	46	1.18	0.278	0.05
Commercial fishing would be allowed in all MRs	False	62	68	67	2.02	0.155	0.06
All MRs would include coastal lands such as beaches and coastlines	False	36	34	34	0.40	0.589	0.03
The government has established five MR sites	True	29	30	30	0.13	0.718	0.02
New developments such as wave energy or fish farms would be allowed in all MRs	False	36	36	36	0.01	0.954	0.01
Non-extractive recreation / tourism activities (e.g., surfing, swimming, diving) would be allowed in all MRs	True	32	34	34	0.16	0.688	0.02
Keeping fish caught in MRs would be allowed in all reserves	False	59	57	58	0.07	0.797	0.01
Only scientists and no other people would be allowed in all MRs	False	54	54	54	0.01	0.942	0.01
There have been opportunities for public involvement in agency discussions about MRs	True	60	58	58	0.29	0.588	0.02
What agency organization is currently responsible for MRs in Oregon?	ODFW	30	35	34	1.75	0.186	0.06
Would the following activities be allowed in Oregon's MRs, marine protected areas (MPAs), both of these types of areas, or neither of these types of areas?							
Commercial fishing would be allowed in…	MPAs	8	6	7	1.04	0.309	0.04
Recreational fishing would be allowed in…	MPAs	17	10	12	5.28	0.022	0.10
Scientific research would be allowed in…	Both	79	80	80	0.07	0.789	0.01
Removing any species or habitat would not be allowed in…	MRs	13	9	10	2.17	0.141	0.06
Non-extractive recreation / tourism activities (e.g., surfing, swimming, diving) would be allowed in…	Both	38	40	39	0.23	0.631	0.02
Total factual knowledge score (average % correct)[2]		42	43	43	0.37	0.713	0.02

[1] All questions also included an "Unsure" response category, which was coded as "incorrect" in the analysis.
[2] Tests of statistical significant are *t*-tests with point-biserial correlation effect sizes.

Table 3.5. Total factual knowledge scores related to marine reserves in Oregon[1]

Correct response/ total statements	Communities of Place	Rest of Coast	Total
0/16	5	5	5
1/16	7	5	5
2/16	6	2	3
3/16	8	7	7
4/16	4	6	6
5/16	8	9	9
6/16	6	8	8
7/16	8	11	10
8/16	10	13	13
9/16	13	13	13
10/16	12	9	10
11/16	6	3	4
12/16	4	4	4
13/16	2	3	3
14/16	0	1	1
15/16	1	1	1
16/16	0	0	0
Total correct (mean)[2]	6.72	6.83	6.81

[1] Cell entries are percentages (%) unless specified as means. No significant difference in percent factual knowledge between communities of place and the rest of the coast, $\chi^2 = 17.26$, $p = 0.303$, $V = 0.18$.

[2] No significant difference in mean factual knowledge between communities of place and the rest of the coast, $t = 0.37$, $p = 0.713$, $r_{pb} = 0.02$.

Self-assessed knowledge about MRs in Oregon was measured with eight variables. In total, the majority of respondents indicated some degree of feeling informed and having general knowledge about these MRs, with 85% reporting themselves to be either slightly (41%), moderately (40%), or extremely (4%) informed about the topic. In addition, 82% believed that they were either slightly (42%), moderately (37%), or extremely (3%) knowledgeable about these reserves. This pattern of relatively high general knowledge and feeling informed was consistent across both the communities of place and rest of the coast. On average, however, respondents felt only slightly informed and knowledgeable, and that they only slightly understood these issues related to the MRs (Table 3.6). Respondents felt that they

most strongly understood the purpose of having MRs in Oregon (M = 3.74), whereas they were least likely to understand rules and regulations of these reserves (M = 2.27). There were no significant differences between proximate (i.e., communities of place) and distant populations (i.e., rest of coast) in mean responses to these eight variables measuring self-assessed knowledge, informedness, and understanding ($p > .05$). The Cronbach alpha reliability coefficient of 0.93 justified combining these items into an index of self-assessed knowledge, and there were no significant differences in index scores between proximate and distant residents, $t = 0.09$, $p = 0.925$, $r_{pb} = 0.004$.

Table 3.6. Means comparison of self-assessed knowledge regarding marine reserves (MRs) in Oregon by proximity to the MRs

Self-assessed knowledge measures	Mean response[1]			Item Total Correlation	Alpha if Item Deleted[5]
	Communities of Place	Rest of Coast	Total		
How well informed do you feel about the topic of MRs in Oregon[2]	2.27	2.37	2.34	0.66	0.92
How knowledgeable do you feel about the topic of MRs in Oregon[3]	2.18	2.27	2.25	0.68	0.92
How much do you understand about purpose of MRs in Oregon[4]	3.94	3.67	3.74	0.77	0.91
How much do you understand about how MRs would be managed in Oregon[4]	2.41	2.42	2.42	0.82	0.91
How much do you understand about rules / regulations of MRs in Oregon[4]	2.30	2.25	2.27	0.83	0.90
How much do you understand about where MRs are located in Oregon[4]	2.69	2.61	2.63	0.83	0.90
How much do you understand about role of science in MRs in Oregon[4]	3.37	3.22	3.25	0.78	0.91
How much do you understand about role of public involvement in MRs in Oregon[4]	2.62	2.65	2.64	0.78	0.90

[1] No significant differences between communities of place and rest of the coast for all variables, $p > .05$. No significant difference in mean total self-assessed knowledge overall between communities of place and the rest of the coast, $t = 0.094$, $p = 0.925$, $r_{pb} = 0.004$.
[2] Responses measured on a 4-point scale of 1 = Not Informed to 4 = Extremely Informed.
[3] Responses measured on a 4-point scale of 1 = Not Knowledgeable to 4 = Extremely Knowledgeable.
[4] Responses measured on a 9-point scale of 0= Do Not Understand to 8 = Fully Understand.
[5] Overall Cronbach alpha reliability = 0.93.

Attitudes toward potential benefits resulting from the MRs were measured with 11 statements that were each computed into a 25-point scale where 1 represents "strongly disagreeing" with the benefit multiplied by an evaluation of the same benefit as "very bad" (1 * 1 = 1), and 25 represents "strongly agreeing" with the benefit multiplied by an evaluation of the same benefit as "very good" (5 * 5 = 25). All respondents taken together had the most favorable evaluation of the potential for the MRs to improve understanding of marine areas (M = 17.10), and the least favorable evaluation of their potential to improve the economy (M = 12.48; Table 3.7). For each measure, residents living in the communities of place had a more favorable attitude than those along the rest of the coast toward these benefits of the MRs. Communities of place were more likely to agree that a potential benefit of these MRs may occur and this benefit is good. This pattern was statistically significant for eight of the 11 items, t = 2.76 to 3.97, p = 0.006 to < 0.001. The effect sizes (r_{pb} = 0.12 to 0.17) suggested that these differences were between "small" or "minimal" and "medium" or "typical" (Cohen, 1988; Vaske, 2008). The Cronbach alpha coefficient of 0.96 justified combining these computed items into an index of attitudes toward benefits, and those living in the communities of place had significantly more favorable attitudes (M = 16.33) than those living elsewhere along the coast (M = 14.94) toward these benefits of the MRs, t = 3.37, p = 0.001. Again, the effect size (r_{pb} = 0.14) suggested that this difference was between "small" or "minimal" and "medium" or "typical" (Cohen, 1988; Vaske, 2008).

Table 3.7. Response means and reliability analysis of attitudes toward potential ***benefits*** resulting from implementing marine reserves (MRs) in Oregon

Attitude toward Benefits	Mean response[1]			Item Total Correlation	Alpha if Item Deleted[2]
On the Oregon coast, MRs would…	Communities of Place	Rest of Coast	Total		
Benefit marine areas in general[3]	17.64	15.65	16.15	0.85	0.95
Protect the diversity of marine species[4]	17.46	15.87	16.27	0.86	0.95
Increase marine species populations[5]	16.82	15.38	15.74	0.79	0.96
Allow depleted marine species populations to recover[6]	18.11	16.73	17.08	0.82	0.96
Improve the economy	12.82	12.37	12.48	0.70	0.96
Increase tourism	12.67	12.51	12.55	0.73	0.96
Benefit people in local communities	14.02	13.42	13.57	0.74	0.96
Improve scientific understanding of marine areas[7]	18.07	16.06	16.56	0.86	0.95
Allow scientists to monitor marine areas over time[8]	18.24	16.50	16.93	0.85	0.95
Improve our understanding of marine areas[9]	18.39	16.67	17.10	0.87	0.95
Improve the ability to manage marine areas[10]	14.86	13.46	13.81	0.80	0.96

[1] Responses measured on a computed 25-point scale of 1 = Strongly Disagree and Very Bad to 25 = Strongly Agree and Very Good. Aggregate scale means = 16.33/25.00 (communities of place), 14.94/25.00 (rest of coast), 15.28/25.00 (total). Significant difference in mean attitudes toward benefits between communities of place and the rest of the coast, $t = 3.37$, $p = 0.001$, $r_{pb} = 0.14$.
[2] Overall Cronbach alpha reliability = 0.96.
[3] Differs between communities of place and rest of the coast, $t = 3.87$, $p < 0.001$, $r_{pb} = 0.16$.
[4] Differs between communities of place and rest of the coast, $t = 3.25$, $p = 0.001$, $r_{pb} = 0.14$.
[5] Differs between communities of place and rest of the coast, $t = 3.12$, $p = 0.002$, $r_{pb} = 0.13$.
[6] Differs between communities of place and rest of the coast, $t = 2.98$, $p = 0.003$, $r_{pb} = 0.13$.
[7] Differs between communities of place and rest of the coast, $t = 3.97$, $p < 0.001$, $r_{pb} = 0.17$.
[8] Differs between communities of place and rest of the coast, $t = 3.48$, $p < 0.001$, $r_{pb} = 0.15$.
[9] Differs between communities of place and rest of the coast, $t = 3.38$, $p = 0.001$, $r_{pb} = 0.14$.
[10] Differs between communities of place and rest of the coast, $t = 2.76$, $p = 0.006$, $r_{pb} = 0.12$.

Attitudes towards potential constraints associated with the MRs were measured with five statements that were each computed into a 25-point recoded scale where 1 represents "strongly disagreeing" with the constraint multiplied by an evaluation of the same constraint as "very good" (1 * 1 = 1), and 25 represents "strongly agreeing" with the constraint multiplied by an evaluation of the same constraint as "very bad" (5 * 5 =

25). The evaluations (i.e., good, bad), therefore, were reverse coded. Attitudes toward seven constraints were originally measured, but two (i.e., "the MRs would not be effective in conserving marine areas," "the MRs would be difficult to enforce") had poor scale reliability, so were excluded from further analyses. All respondents taken together were most concerned about the potential for the MRs to be costly to manage (M = 14.17) and were least concerned with their potential to cause species to become overpopulated (M = 10.93; Table 3.8). Compared to residents in the communities of place, those living along the rest of the coast were more likely to agree that each of these five potential constraints may occur and these constraints are bad. This pattern was statistically significant for four of the five scales, t = 2.50 to 2.72, p = 0.007 to 0.013, r_{pb} = 0.11 to 0.12. The Cronbach alpha reliability coefficient of 0.81 justified combining the five computed items into an index of attitudes toward constraints, and those living on the rest of the coast had significantly more negative attitudes (i.e., agreed with the constraints and believed they were bad; M = 12.53) than those living in the communities of place (M = 11.58), t = 2.65, p = 0.008, r_{pb} = 0.11. The effect sizes for these tests, however, suggested that these differences were relatively "small" (Cohen, 1988) or "minimal" (Vaske, 2008).

Table 3.8. Response means and reliability analysis of attitudes toward potential ***constraints*** resulting from implementing marine reserves (MRs) in Oregon

Attitude toward Constraints	Mean response[1]			Item Total Correlation	Alpha if Item Deleted[2]
On the Oregon coast, MRs would…	Communities of Place	Rest of Coast	Total		
Cause some species to become overpopulated	10.85	11.15	10.93	0.41	0.81
Prevent people from using the reserve areas[3]	10.60	11.85	11.54	0.62	0.76
Reduce recreational fishing[4]	11.75	13.00	12.69	0.76	0.72
Reduce commercial fishing[5]	11.21	12.55	12.22	0.69	0.74
Cost a lot to manage[6]	13.18	14.50	14.17	0.52	0.80

[1] Responses measured on recoded computed 25-point scale of 1 = Strongly Disagree and Very Good to 25 = Strongly Agree and Very Bad (i.e., evaluations were reverse coded). Aggregate scale means = 11.58/25.00 (communities of place), 12.53/25.00 (rest of coast), 12.29/25.00 (total). Significant difference in mean attitudes toward constraints between communities of place and the rest of the coast, $t = 2.65$, $p = 0.008$, $r_{pb} = 0.11$.
[2] Overall Cronbach alpha reliability = 0.81.
[3] Differs between communities of place and rest of the coast, $t = 2.52$, $p = 0.012$, $r_{pb} = 0.11$.
[4] Differs between communities of place and rest of the coast, $t = 2.50$, $p = 0.013$, $r_{pb} = 0.11$.
[5] Differs between communities of place and rest of the coast, $t = 2.72$, $p = 0.007$, $r_{pb} = 0.12$.
[6] Differs between communities of place and rest of the coast, $t = 2.56$, $p = 0.011$, $r_{pb} = 0.11$.

Behavioral intentions were measured with four scales related to intentions to support or oppose MRs in Oregon. Across all four measures, respondents were, on average, likely to support these MRs (Table 3.9). In total, for example, 69% of all respondents stated that they would vote to support MRs in Oregon. For all of these measures, residents in the communities of place would be significantly more likely than those living along the rest of the coast to support or vote in favor of establishing MRs in Oregon, $t = 3.83$ to 4.97, $p < 0.001$. For example, 82% of residents in the communities of place and 65% of those along the rest of the coast would vote for the MRs. The effect sizes ($r_{pb} = 0.16$ to 0.21) suggested that these differences were between "small" or "minimal" and "medium" or "typical" (Cohen, 1988; Vaske, 2008). The Cronbach alpha reliability coefficient of 0.93 justified combining these

four scales into a single index of behavioral intentions, and those in the communities of place were significantly more likely than those living elsewhere along the coast to intend to support the MRs, $t = 5.05$, $p < 0.001$. Again, the effect size ($r_{pb} = 0.21$) suggested that this difference based on proximity was between "small" or "minimal" and "medium" or "typical" (Cohen, 1988; Vaske, 2008).

Table 3.9. Response means and reliability analysis of behavioral intentions toward marine reserves (MRs) in Oregon

Behavioral intention measures	Mean response[1]			Item Total Correlation	Alpha if Item Deleted[6]
	Communities of Place	Rest of Coast	Total		
Voting index (vote * certainty)[2]	2.27	1.01	1.32	0.82	0.92
I intend to support having MRs in Oregon[3]	3.80	3.31	3.43	0.87	0.78
I am against establishing MRs in Oregon[4]	3.94	3.54	3.64	0.76	0.81
I would likely be in favor of implementing MRs in Oregon[5]	3.81	3.38	3.49	0.88	0.78

[1] Significant difference in mean behavioral intention overall between communities of place and the rest of the coast on a computed scale of behavioral intention, $t = 5.05$, $p < 0.001$, $r_{pb} = 0.21$.
[2] Responses measured on a computed scale of -4 = Extremely certain to vote against MRs in Oregon to 4 = Extremely certain to vote for MRs in Oregon. Differs between communities of place and rest of the coast, $t = 4.97$, $p < .001$, $r_{pb} = 0.21$
[3] Responses measured on a 5-point scale of 1 = Strongly Disagree to 5 = Strongly Agree. Differs between communities of place and rest of the coast, $t = 4.89$, $p < .001$, $r_{pb} = 0.21$.
[4] Responses measured on a 5-point scale of 1 = Strongly Disagree to 5 = Strongly Agree. Variable reverse coded. Differs between communities of place and rest of the coast, $t = 3.83$, $p < .001$, $r_{pb} = 0.16$.
[5] Responses measured on a 5-point scale of 1 = Strongly Disagree to 5 = Strongly Agree. Differs between communities of place and rest of the coast, $t = 4.21$, $p < .001$, $r_{pb} = 0.18$.
[6] Overall Cronbach alpha reliability = 0.93.

Path Model Findings

A series of OLS regressions tested the hypotheses illustrated in the path model (Figure 3.1). These regressions were run for the total coastal population (i.e., all respondents), communities of place, and rest of the coast. For the total coastal population, six of the 11 hypothesized paths were supported (Figure 3.3). Behavioral intention was influenced by attitudes toward both benefits and constraints potentially

resulting from the MRs, and these two measures explained 76% of the variance in intentions ($R^2 = 0.76$). Attitudes toward benefits were positive and stronger predictors of behavioral intention ($\beta = 0.69$, $p < 0.001$) than the negative influence of attitudes toward constraints ($\beta = -0.26$, $p < 0.001$). Social trust explained 26% of the variance in attitudes toward benefits ($R^2 = 0.26$) with trust positively influencing these attitudes ($\beta = 0.51$, $p < 0.001$). Social trust also explained 17% of the variance in attitudes toward constraints ($R^2 = 0.17$) with trust negatively related to these attitudes ($\beta = -0.41$, $p < 0.001$). Perceived similarity and factual knowledge collectively explained 47% of the variance in social trust ($R^2 = 0.47$) with similarity positively related to trust ($\beta = 0.68$, $p < 0.001$) and factual knowledge negatively related to this trust ($\beta = -0.09$, $p = 0.020$).

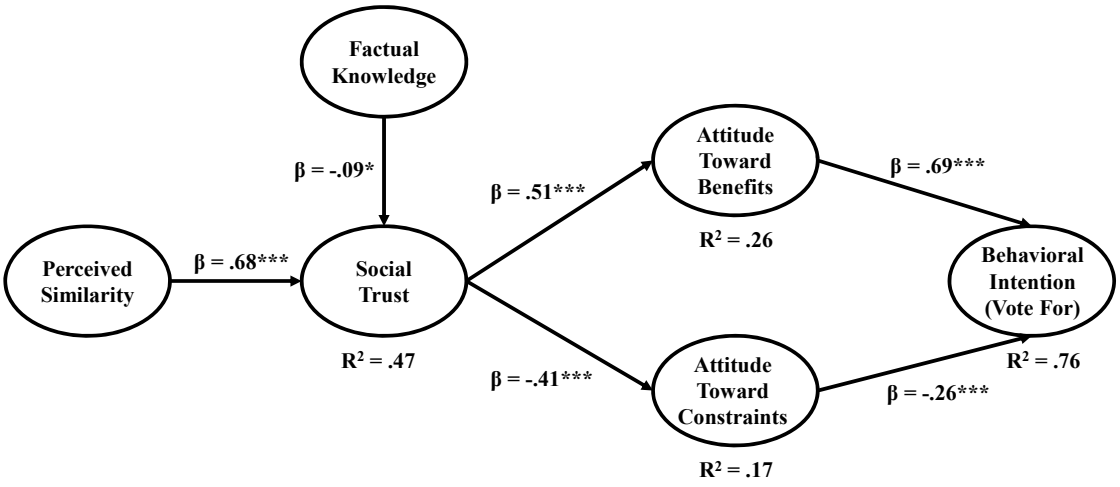

Figure 3.3. Observed relationships among concepts for the ***total coastal population***. * significant at $p < 0.05$; *** significant at $p < 0.001$; all paths are standardized beta coefficients. Insignificant paths are not shown, $p > .05$.

For residents living in the communities of place, seven of the 11 hypothesized paths were supported (Figure 3.4). Behavioral intentions were influenced by attitudes toward both benefits and constraints potentially resulting from the MRs, with these two attitude measures explaining 73% of the variance in intentions ($R^2 = 0.73$). Although both of these attitude measures influenced behavioral intention, the positive relationship with attitudes toward benefits ($\beta = 0.68$, $p < 0.001$) was a stronger predictor than the negative relationship with attitudes toward constraints ($\beta = -0.24$, $p < 0.001$). Both social trust ($\beta = 0.54$, $p < 0.001$) and self-assessed knowledge ($\beta = 0.17$, $p < 0.001$) positively influenced attitudes toward benefits of the MRs and collectively explained 32% of the variance in these attitudes ($R^2 = 0.32$). Likewise, both trust ($\beta = -0.41$, $p < 0.001$) and self-assessed knowledge ($\beta = -0.11$, $p = 0.015$) negatively influenced attitudes toward constraints and combined to explain 18% of the variance in these attitudes ($R^2 = 0.18$). Perceived similarity was positively related to trust ($\beta = 0.79$, $p < 0.001$) and explained 62% of the variance in trust ($R^2 = 0.62$).

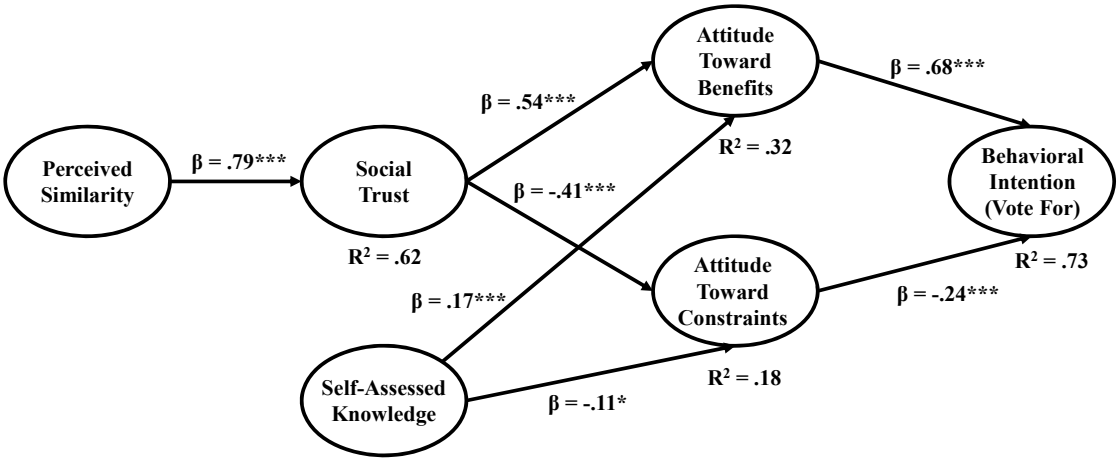

Figure 3.4. Observed relationships among concepts for the ***communities of place*** population.
* significant at p < 0.05; *** significant at $p < 0.001$; all paths are standardized beta coefficients.
Insignificant paths are not shown, $p > .05$.

For residents living along the rest of the coast, five of the 11 hypothesized paths were supported (Figure 3.5). Behavioral intentions were influenced by attitudes toward both benefits and constraints potentially resulting from the MRs, with these two measures explaining 76% of the variance in intentions ($R^2 = 0.76$). Attitudes toward benefits were positive and stronger predictors of behavioral intentions ($\beta = 0.70$, $p < 0.001$) than the negative influence of attitudes toward constraints ($\beta = -0.26$, $p < 0.001$). Social trust explained 25% of the variance in attitudes toward benefits ($R^2 = 0.25$) with trust positively influencing these attitudes ($\beta = 0.50$, $p < 0.001$). Trust also explained 16% of the variance in attitudes toward constraints ($R^2 = 0.16$) with trust negatively related to these attitudes ($\beta = -0.40$, $p < 0.001$). Perceived similarity

explained 44% of the variance in trust ($R^2 = 0.44$) and was positively related to trust ($\beta = 0.67$, $p < 0.001$).

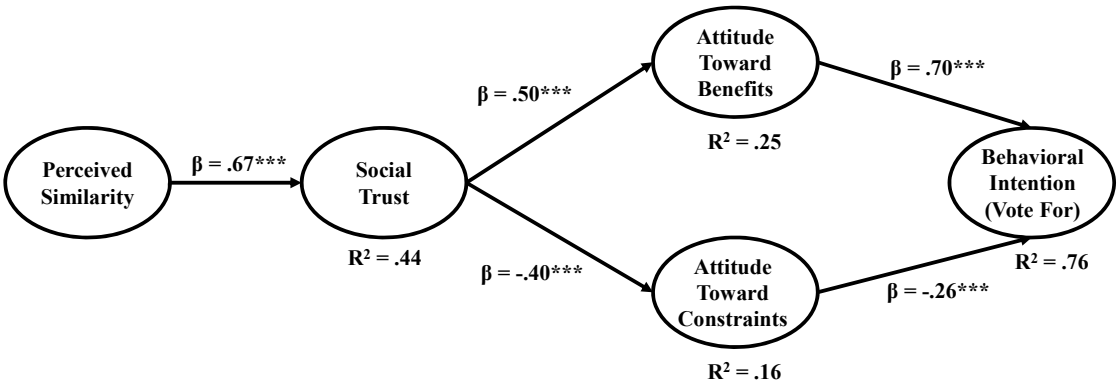

Figure 3.5. Observed relationships among concepts for the ***rest of the coastal population***. * significant at $p < 0.05$; *** significant at $p < 0.001$; all paths are standardized beta coefficients. Insignificant paths are not shown, $p > .05$.

Taken together, these results support some of the hypotheses and not others. Across all three models, social trust in the managing agency was positively influenced by perceived similarity with similarity explaining up to 62% of trust. Residents who perceived themselves to share similar goals and opinions as the agency were more likely to trust this agency. For the coastal population as a whole (i.e., entire sample), trust was also negatively influenced by factual knowledge. Self-assessed knowledge, however, did not significantly influence social trust in any of the models. The first hypothesis (H_1), therefore, was only partially supported.

Attitudes toward benefits potentially resulting from the MRs were positively influenced by social trust in all three models, explaining more than 25% of these

attitudes. Residents with higher trust in the managing agency had more favorable attitudes toward possible benefits of the MRs. A positive relationship between these attitudes and self-assessed knowledge was found only for the communities of place, but not for residents along the rest of the coast or the entire population as a whole. Factual knowledge did not significantly influence attitudes toward benefits in any of the models. The second hypothesis (H_2), therefore, was also only partially supported.

Attitudes toward constraints potentially resulting from the MRs were negatively influenced by social trust in all of the models, explaining more than 16% of these attitudes. Residents with higher trust in the managing agency had less agreement with potential constraints of the MRs. A negative relationship between these attitudes and self-assessed knowledge was found only for the communities of place, but not for residents along the rest of the coast or the entire population as a whole. Factual knowledge did not significantly influence attitudes toward constraints of the MRs in any of the models. The third hypothesis (H_3), therefore, was partially supported.

Across all three models, behavioral intentions associated with the MRs were positively influenced by attitudes toward benefits potentially resulting from the MRs, and negatively influenced by attitudes toward constraints associated with these reserves. Residents who expressed more favorable attitudes toward potential benefits of the MRs would be more likely to vote in support of these MRs, whereas those who agreed with potential constraints would be less likely to vote in support of these areas. The fourth hypothesis (H_4), therefore, was supported.

There were at least two main differences among the models for communities of place, rest of the coast, and the total coastal population. First, the influence of both factual and self-assessed knowledge on attitudes differed among these populations. Second, the variance explained and strength of relationships among concepts differed slightly depending on proximity. Hypothesis five (H_5), therefore, was supported.

Discussion

This article examined relationships among coastal resident knowledge about new MRs in Oregon, their perceived similarity and trust in the agency currently responsible for these areas (i.e., ODFW), and their attitudes and behavioral intentions associated with these areas. Residents expressed relatively high similarity and trust in the agency, with those living closest to the MRs expressing the highest similarity and trust. The majority of residents had favorable attitudes toward possible benefits of these MRs and would vote in support of these reserves (69%). Residents living in communities of place nearest these reserves had the most positive attitudes and would be most likely to vote in support of these areas (82%). Path models showed that residents who perceived themselves to share similar goals and opinions as the agency were most likely to trust this agency. Those with higher trust in this agency also had more favorable attitudes toward possible benefits of the MRs and had less agreement with potential constraints of these areas. Residents who expressed more favorable attitudes toward potential benefits of the MRs would be most likely to vote in support of these

areas, whereas those who agreed with potential constraints would be less likely to vote in support. These results have implications for management and future research.

Implications for Management

From a management perspective, understanding concepts that influence attitudes and behavioral intentions may aid in crafting and communicating acceptable natural resource policies. This understanding may also assist in building and maintaining social trust, a perpetual challenge for many managing agencies. In the context of MRs in Oregon, assessing the strength of relationships modeled may be particularly useful when investigating the desired potential outcomes of the MRs.

Overall, residents with more factual knowledge had slightly less social trust in the managing agency (i.e., ODFW), but this relationship was a weaker predictor of trust than perceived similarity. This negative relationship was expected, as those who factually know more about an issue can be less likely to put their trust in decisions of a formal entity such as ODFW. Given that factual knowledge was relatively low across most respondents, however, managers may want to investigate means of engaging and informing the public that work to build trust in the agency's processes and decisions regarding MR implementation. Managers also may want to pinpoint messages and facts about the MRs and convey these to the public, as there may be some facts that are deemed critical or more important than others for the public to understand. Grasping these points may be a more meaningful metric of factual knowledge to the agency than whether the public knows the majority of facts presented about the MRs.

The strong positive relationship between perceived similarity and social trust is something that managers should consider. Results showed that respondent trust in ODFW to properly manage MRs in the state can be heavily explained by how much the communities of place (62%) and the rest of the coast (44%) consider themselves to be similar to this agency. Perceived similarity was a stronger predictor of trust for the communities of place compared to the rest of the coast, which may be a result of the increased presence and efforts of ODFW to reach out to the most proximate communities and engage them in the MR creation process. Knowing public perceptions of similarity to the agency and social trust in its decisions may aid in assessing the social acceptance of future MRs and other natural resource efforts.

Social trust is also important, especially because it factors into attitudes toward potential effects of MRs. When attitudes are informed by trust, as demonstrated here, maintaining trust with affected populations may help to increase favorable attitudes. Trust positively influenced attitudes toward benefits of the MRs and explained more than 25% of the variance in these attitudes. This positive relationship suggests that when people trust the management agency, their attitudes toward benefits associated with an issue for which the agency is responsible will increase. Managers, therefore, should seek positive relationships with residents and actively generate and foster trust.

The negative relationship between social trust and attitudes toward potential constraints of the MRs is also an area where managers should concentrate engagement opportunities with the public. Those with low trust in ODFW had more negative

attitudes because they were more likely to agree with possible constraints of these reserves and feel that these constraints are bad. These constraints, however, are important and realistic because there will always be costs associated with placing marine areas under protected area designation. People with low levels of trust in ODFW's management of the reserves may recognize these constraints to a greater degree and may not trust that this agency's actions will lessen or prevent these constraints. Conversely, people with high trust in ODFW may not recognize these potential constraints and may be under the assumption that this agency will effectively mitigate any constraints and ensure positive benefits of the MRs. Both viewpoints suggest that more communication about potential constraints of MR establishment, and the realistic role that ODFW may play in assessing and mitigating these concerns, could potentially influence attitudes about these reserves and lessen the risk of user group conflicts and ineffective management of the reserves after their establishment.

Self-assessed knowledge influenced attitudes toward benefits and constraints only for residents in the communities of place. How much these residents felt they knew about the MRs in Oregon may not be substantiated by how much they actually know (i.e., factual knowledge), but this perception still influences their attitudes about the reserves. Managers should concentrate efforts to increase factual knowledge about the MRs and their potential outcomes in these areas closest to the reserve locations to lessen any assumptions that the public has as part of this self-assessed knowledge. Lessening public reliance on self-assessed knowledge to inform their attitudes toward

both the benefits and constraints of these areas may help to reduce management concerns in the future if the realities of these benefits and constraints are different than what people assume they know at this early stage of MR implementation.

The connection between attitudes and behavioral intentions is also of particular relevance to managers, as protected area success is often dependent on public support of the area's protection designation and associated management goals. In this context, the intention to support or vote for MRs in Oregon was strongly predicted (73-76%) by attitudes toward possible benefits and constraints. As expected, those with a more negative attitude (i.e., agree with the constraints) are less likely to support MRs, whereas those with positive attitudes (i.e., agree with the benefits) are more likely to support MRs. The strong margin of support for these reserves (69% would vote for these areas [82% in the communities of place]), however, indicates that attitudes toward benefits are a stronger predictor of support than attitudes toward constraints.

Implications for Research

From theoretical and research perspectives, linkages between perceived similarity, social trust, attitudes, and behavioral intentions regarding natural resource management issues have received some attention (e.g., Needham & Rollins, 2009; Vaske & Donnelly, 1999; Whittaker et al., 2006). The influence of factual and self-assessed knowledge on these concepts and the impact of geographic proximity of respondents to the natural resource issue have received less empirical attention. The concepts explored and the relationships among them have research implications.

Factual knowledge, for example, was low, which is consistent with other studies regarding knowledge about protected areas and other natural resource issues (Booth et al., 2009; Jones et al., 2011; Sladonja et al., 2012; Xu et al., 2006). Similar to studies showing low ocean literacy (Belden Russonello & Stewart & American Viewpoint, 1999; Duda et al., 2007; Steel, Lovrich, et al., 2005; Steel, Smith, et al., 2005) and factual knowledge about MPAs (e.g., Dimitakopoulos et al., 2010; Snider et al., 2011), this study here found that across the populations sampled, factual knowledge about MRs in Oregon is low. This knowledge also did not significantly factor into attributions of social trust for the communities of place or rest of the coast. Future research using purposefully sampled stakeholder groups who may have higher exposure to and knowledge of MR processes may elicit a clearer understanding of whether or not a relationship exists between factual knowledge and social trust.

For the entire sample of coastal residents, a negative relationship between factual knowledge and social trust was found in this study. This negative relationship has been proposed (e.g., Earle & Cvetkovich, 1995; Siegrist & Cvetkovich, 2000; Siegrist et al., 2000), but has received little attention in protected areas in general and MPA management in particular. This study also supported findings of other studies regarding the reliability of concepts and strong relationships between perceived similarity and social trust, and this trust and attitudes toward management (e.g., Needham & Vaske, 2008; Vaske et al., 2007). In addition, this article lends support to the transferability of these concepts from terrestrial to marine environments. As the

call for increasing ocean protection prompts the creation of more formalized MPAs, exploring how similar residents feel to managing agencies and how much trust they place in these entities to manage these areas may become increasingly relevant to the future success of these areas and their management.

One area that warrants further exploration involves the relationships between self-assessed knowledge and attitudes toward benefits and constraints of MRs that were found for the communities of place. That this result was significant in the communities of place, but not in the rest of the coastal population is intriguing. Perhaps distant populations are more reliant on trust in the managing agency to inform their attitudes about potential outcomes of the MRs, whereas more proximate residents give more emphasis to their own knowledge to inform their attitudes, even if this knowledge is self-reported and may not be supported by factual knowledge. This greater attribution of personal knowledge among the most proximate population would be valuable to explore in other protected area contexts, especially to investigate whether proximity to the protected resource creates a sense of "insider information" that factors into attitudes about protection and management.

Scales measuring knowledge and attitudes toward MRs were created in this study. The self-assessed knowledge scales, for example, were created to examine specifics of this knowledge beyond just general understanding and awareness. Many studies (e.g., Booth et al., 2009; Jones et al., 2011; Sladonja et al., 2012) have investigated a few general self-assessed knowledge measures (e.g., familiarity,

understanding), but more detailed assessments of this knowledge are less prevalent. High reliability of the scale created here supports using self-assessed knowledge metrics that integrate additional dimensions of an individual's assessment of their own knowledge on a topic.

Similarly, attitudes toward potential outcomes of MRs were separated into two distinct components of benefits and constraints, and high reliability metrics supported this approach. By parsing out these two distinct dimensions of attitudes, significant patterns were found between these attitudes and other concepts, and this has relevance to other research examining attitudes. All paths between attitudes toward constraints of the MRs and the other concepts (i.e., social trust, behavioral intentions) were negative. Conversely, all paths between attitudes toward benefits of the MRs and these other concepts were positive. This important distinction should be investigated in future studies because an individual may hold varying attitudes about potential outcomes of a protected area and may evaluate these differently.

This distinction between attitudes toward benefits and constraints of MRs also influenced behavioral intentions associated with these reserves. Strong relationships between intentions and attitudes that have been detailed in the literature (Ajzen & Fishbein, 1977; Fulton et al., 1996; Rokeach, 1973) were also found here. These relationships, however, have received little attention in the context of marine protection where interactions with the environment are fundamentally different than on land and often mitigated by technology and access. This study lends support to the

validity of these concepts and relationships among them in a non-terrestrial context. Future research, however, is needed to examine the extent that findings here generalize to other marine environments and contexts.

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CHAPTER 4 -- CONCLUSION

The preceding chapters advanced the field of protected area management by exploring proximate and distant coastal residents': (a) place attachment and self-assessed and factual knowledge related to newly established state marine reserves (MRs); and (b) perceived similarity and social trust in the managing agency, attitudes toward potential benefits and constraints resulting from these MRs, and behavioral intentions regarding these reserves. This chapter briefly summarizes major findings of this thesis and their implications for management and research.

Summary of Findings

Considerable research has focused on specific stakeholder groups in the management of marine protected areas (MPAs), especially in the context of post-establishment beliefs and conflicts among these stakeholders. Substantial research has also investigated relationships among proximity, knowledge, attachment, trust, attitudes, and behavioral intentions, but in terrestrial protected area contexts. Comparatively little research, however, has explored these concepts from a large representative sample of the public in the pre-establishment phase before or shortly after MR creation, and how different subgroups interact with these MRs and the managing agencies. This thesis helped to address some of these knowledge gaps.

The second chapter examined coastal resident self-assessed and factual knowledge about MRs, and the influence of both proximity and attachment to these sites. Results showed that self-assessed knowledge was higher than factual knowledge,

with 85% of respondents indicating that they felt informed about state MRs and 82% believing they were knowledgeable about these reserves, but 65% correctly answering only half or fewer of the factual questions about this topic. There were no substantial differences in this self-assessed or factual knowledge based on both proximity and attachment to these MRs.

The third chapter built on these results by examining how cognitions such as knowledge, perceived similarity, and social trust influenced attitudes and behavioral intentions toward these MRs. Residents who perceived more similarity with the current managing agency (i.e., Oregon Department of Fish and Wildlife [ODFW]) had more trust in this agency to properly manage these MRs and those with greater trust had more favorable attitudes toward potential benefits of these MRs and greater concerns about potential constraints of these reserves. Residents who expressed these favorable attitudes toward potential benefits of the MRs would also be most likely to vote in support of these areas, whereas those who agreed with these potential constraints would be less likely to vote in support.

For the entire sample of coastal residents taken together, factual knowledge about these MRs was negatively related to trust in ODFW. In other words, less knowledgeable residents had more trust in this managing agency. This relationship between concepts, however, was not evident in the communities of place or rest of the coast. Self-assessed knowledge about these MRs was found to have a positive influence on attitudes toward potential benefits of the MRs and a negative relationship

with attitudes toward their potential constraints. This relationship between concepts was only evident among residents in the communities of place, but not in the rest of the coast. Results from chapters two and three have implications for management, theory, and future research.

Managerial Implications

Factual knowledge about the new MRs in Oregon was low among coastal residents, both within the communities of place and along the rest of the coast. From a managerial perspective, this indicates that perhaps past public engagement efforts did not result in a much more informed public and that future information and education campaigns are needed and have room for success. If past engagement efforts were targeted specifically to residents in communities adjacent to the MRs, results here suggest that these efforts did not substantively improve factual knowledge about these reserves in neighboring populations. Results also showed that although some people are more attached to these MR locations, this higher attachment did not reflect in substantive factual knowledge. Managers, therefore, may not want to base education and engagement efforts solely on proximity or place attachment. Instead, they may want to target efforts on those with low factual knowledge across the population and particularly on the large group of people who expressed neutral or ambivalent attachment to these areas. By weaving a narrative around facts and place to engage multiple audiences who may be uninformed and / or uninterested, managers may

express the linked social-biological concepts of ecosystem based management in a manner that increases knowledge, attachment, and trust associated with these places.

Although factual knowledge was not shown to vary between communities of place and the rest of the coast, trust and perceived similarity with ODFW did vary between populations. Residents living more proximate to the MR locations expressed a higher degree of similarity and trust in this agency than those living farther from the reserves. This may assist managers in fostering ways to build trust with all coastal communities regarding these new protected areas. Focusing on what may have been done differently or more inclusively with the more proximate residents may yield information on how to apply trust building measures to other more distant populations.

Tying together elements of trust and knowledge are important for managers when considering their influence on attitudes and behavioral intentions. Trust positively influenced attitudes toward potential MR benefits, which, in turn, positively influenced intentions to vote in support of these reserves. Managers should focus on these relationships and how to maintain them to ensure future success and cooperation regarding management of these reserves. The negative relationship between trust and attitudes toward potential constraints is also an area that managers should consider. Those with less trust in ODFW tended to be more concerned about potential constraints of the MRs, which, in turn, influenced intentions to vote in opposition to these reserves. Managers, therefore, should focus on this relationship and examine where greater communication and engagement on these topic areas may be possible.

Although it may be beyond a manager's purview or the reality of the situation to diminish the magnitude of these real constraints and / or exaggerate the benefits of these reserves, managers should continually reassess how well the information being presented to the public matches current realities of the MR implementation process and future management alternatives.

Theoretical and Research Implications

Chapter two used the concepts of place attachment and self-assessed and factual knowledge to explore whether relationships existed between these concepts in the context of coastal residents living adjacent to MRs and elsewhere along the coast. Chapter three built on this by testing additional conceptual relationships among this knowledge, perceived similarity, social trust, attitudes, and behavioral intentions. Results from these two chapters have implications for theory and future research.

Chapter two showed that proximity and place attachment were not strongly linked to self-assessed and factual knowledge associated with MRs in Oregon. As MPAs are an increasingly popular method for ocean conservation and coastal populations will be asked to become part of the conversation on the protection and management of these areas, understanding factors that influence public knowledge will become increasingly important. The degree that concepts examined in terrestrial settings are applicable to marine settings such as MPAs will impact the generalizability of theories and methods. Findings in chapter two suggest that more research is warranted applying these concepts to marine settings. It is possible, for

example, that attachment may have a distinctly terrestrial connotation and factors other than attachment may be better suited for unique conditions of marine settings.

Chapters two and three both examined the concept of knowledge and variables used for measuring both self-assessed and factual knowledge were created in this study that extend the literature beyond the routinely asked questions of general knowledge. Reliability of these metrics adds to the understanding of the depth of these concepts and potential metrics for use in future studies. In this study, findings related to self-assessed and factual knowledge support past studies of these concepts in the context of protected area and ocean literacy. In particular, this study found that self-assessed knowledge tends to be higher than factual knowledge, which is a disconnect between types of knowledge that has been seen in many contexts.

Factual questions measuring knowledge about specifics of MRs were also answered correctly less of the time than questions measuring general characteristics of MRs or their creation process. This implies that, although there were no differences in knowledge based on proximity and attachment, more research is needed on factors that may be influencing these low levels of factual knowledge, especially specific factual knowledge when respondents rate their self-assessed knowledge much higher.

The influence of self-assessed knowledge on attitudes regarding MR potential benefits and constraints is intriguing. This finding was evident for residents living in the communities of place nearby the MRs, and suggests that proximate communities are taking a personal ownership of their perceived level of knowledge and using this

knowledge to inform their attitudes on this topic, whereas more distant populations are not. This distinction in knowledge between proximate and distant communities has been noted to varying extents elsewhere in other contexts, but routinely focuses almost exclusively on factual knowledge. These results illustrating this relationship in self-assessed, but not factual knowledge suggest that the multidimensional nature of knowledge as a concept may play out differently in various situations and should not be limited solely to investigations of factual knowledge.

Building on these findings, chapter three examined relationships among concepts that have been examined for terrestrial resource management concerns, but received little attention in marine areas in general and MPAs in particular. Positive relationships among perceived similarity, social trust, attitudes, and behavioral intentions support past research in terrestrial environments. The negative relationship between factual knowledge and social trust, however, has received little attention in and this study offers a starting point for exploring complexities of relationships between these concepts. Parsing attitudes toward potential benefits and constraints of MRs, and finding a negative relationship between trust and concerns about potential constraints also opens an area for further research on dimensions of attitudes and how they may vary with other contextual factors.

Finally, this thesis explored original research questions and hypotheses in the context of coastal resident cognitions concerning new state MRs. Findings, however, are limited to the context of MRs in Oregon and may not generalize to other terrestrial

or marine protected area contexts. Contextual characteristics associated with the Oregon MR creation process may affect generalizability to other conservation sites. In addition, these areas are in temperate, less visited, and less commercially valuable settings than other MRs such as those in tropical areas and in more heavily utilized temperate areas. Research is needed to examine whether findings here are applicable to other coastal locations and at different points in the MR establishment and management process (e.g., pre-establishment, post-establishment).

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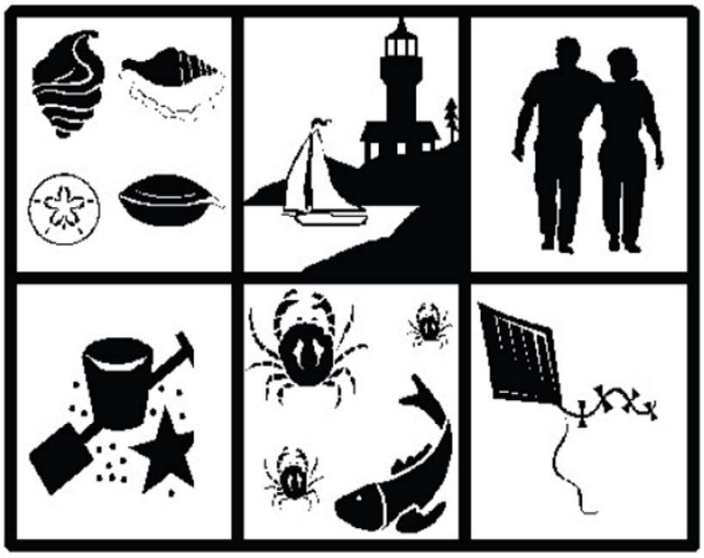
APPENDIX

APPENDIX A. SURVEY INSTRUMENT

Your Opinions About Marine Areas in Oregon

Important Questions for Oregon Residents



Please Complete this Survey and Return it in the Envelope as Soon as Possible

Participation is Voluntary and Responses are Confidential

Thank You for Your Participation

A Study Conducted by:

OSU Oregon State University

NATURE Natural Resources, Tourism and Recreation Studies Lab

We are conducting this survey to learn about your opinions regarding marine areas and their management in Oregon. Marine areas are primarily offshore consisting of ocean / sea, not land. Your input is important and will assist resource managers. ***Please complete this survey and return it in the addressed postage-paid envelope as soon as possible.***

1. Please check the activities in which you have ever participated at marine areas in Oregon. **(check *ALL THAT APPLY*)**

- ☐ ***A.*** Sightseeing
- ☐ ***B.*** Swimming
- ☐ ***C.*** Viewing marine animals (e.g., birds, whales, sea lions)
- ☐ ***D.*** Exploring tidepools
- ☐ ***E.*** Surfing / boogie boarding
- ☐ ***F.*** Scuba diving / snorkeling
- ☐ ***G.*** Non-charter recreational fishing
- ☐ ***H.*** Charter recreational fishing
- ☐ ***I.*** Commercial fishing
- ☐ ***J.*** Non-motorized boating (e.g., canoe, kayak)
- ☐ ***K.*** Motorized boating
- ☐ ***L.*** Other (write response) _____

2. From Question 1 above, what ***ONE*** *activity* have you participated in most often at marine areas in Oregon? **(write the letter)**

   Letter for activity _____

3. How much do you believe that each of the following is a threat to marine areas in Oregon? **(circle one number for *EACH*)**

	No Threat		Slight Threat		Moderate Threat			Extreme Threat	
Water pollution.	0	1	2	3	4	5	6	7	8
Other types of pollution (e.g., marine trash, debris).	0	1	2	3	4	5	6	7	8
Overfishing.	0	1	2	3	4	5	6	7	8
People who fish recreationally.	0	1	2	3	4	5	6	7	8
People who fish commercially.	0	1	2	3	4	5	6	7	8
People who purchase / consume seafood.	0	1	2	3	4	5	6	7	8
Wildlife viewers getting too close to marine animals.	0	1	2	3	4	5	6	7	8
Loss or disturbance of marine / coastal habitat.	0	1	2	3	4	5	6	7	8
Invasive / exotic species.	0	1	2	3	4	5	6	7	8
Dams.	0	1	2	3	4	5	6	7	8
Naval or other military operations.	0	1	2	3	4	5	6	7	8
Oil / gas exploration or transport.	0	1	2	3	4	5	6	7	8
Wave energy / power development.	0	1	2	3	4	5	6	7	8
Global climate change.	0	1	2	3	4	5	6	7	8
Changes in water temperature.	0	1	2	3	4	5	6	7	8
Ocean acidification (lower pH, higher acidity).	0	1	2	3	4	5	6	7	8
Rise in sea level.	0	1	2	3	4	5	6	7	8
Tsunamis.	0	1	2	3	4	5	6	7	8

4. To what extent do you disagree or agree with each of the following statements? **(circle one number for *EACH*)**

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
The condition of marine areas in Oregon has improved in recent years.	1	2	3	4	5
The government should do more to help protect marine areas in Oregon.	1	2	3	4	5
Laws protecting marine areas in Oregon are already too strict.	1	2	3	4	5
Managers are doing everything they can to protect marine areas in Oregon.	1	2	3	4	5
Fishing is *not* harming marine areas in Oregon.	1	2	3	4	5
People who fish recreationally are harming marine areas in Oregon.	1	2	3	4	5
People who fish commercially are harming marine areas in Oregon.	1	2	3	4	5
People who purchase / consume seafood are harming marine areas in Oregon.	1	2	3	4	5

5. How much ***influence*** do you believe each of the following individuals or groups ***should have*** in contributing to management of marine areas in Oregon? **(circle one number for *EACH*)**

	No Influence		Some Influence			Moderate Influence		Strong Influence	
People who recreate in marine areas.	0	1	2	3	4	5	6	7	8
People who fish recreationally.	0	1	2	3	4	5	6	7	8
People who fish commercially.	0	1	2	3	4	5	6	7	8
People who live along the Oregon coast.	0	1	2	3	4	5	6	7	8
People who *do not* live along the Oregon coast.	0	1	2	3	4	5	6	7	8
Environmental organizations.	0	1	2	3	4	5	6	7	8
University researchers.	0	1	2	3	4	5	6	7	8
Local port authorities.	0	1	2	3	4	5	6	7	8
Local governments.	0	1	2	3	4	5	6	7	8
Tribal authorities / governments.	0	1	2	3	4	5	6	7	8
Oregon Department of Fish and Wildlife.	0	1	2	3	4	5	6	7	8
Oregon Parks and Recreation Department.	0	1	2	3	4	5	6	7	8
Oregon Marine Board.	0	1	2	3	4	5	6	7	8
Oregon State Police.	0	1	2	3	4	5	6	7	8
Governor of Oregon.	0	1	2	3	4	5	6	7	8
Pacific Fishery Management Council.	0	1	2	3	4	5	6	7	8
US Coast Guard.	0	1	2	3	4	5	6	7	8
US Fish and Wildlife Service.	0	1	2	3	4	5	6	7	8
National Oceanic and Atmospheric Administration.	0	1	2	3	4	5	6	7	8

6. How much ***trust*** do you have in each of the following individuals or groups to positively contribute to management of marine areas in Oregon? **(circle one number for *EACH*)**

	No Trust		Some Trust			Moderate Trust		High Trust	
People who recreate in marine areas.	0	1	2	3	4	5	6	7	8
People who fish recreationally.	0	1	2	3	4	5	6	7	8
People who fish commercially.	0	1	2	3	4	5	6	7	8
People who live along the Oregon coast.	0	1	2	3	4	5	6	7	8
People who *do not* live along the Oregon coast.	0	1	2	3	4	5	6	7	8
Environmental organizations.	0	1	2	3	4	5	6	7	8
University researchers.	0	1	2	3	4	5	6	7	8
Local port authorities.	0	1	2	3	4	5	6	7	8
Local governments.	0	1	2	3	4	5	6	7	8
Tribal authorities / governments.	0	1	2	3	4	5	6	7	8
Oregon Department of Fish and Wildlife.	0	1	2	3	4	5	6	7	8
Oregon Parks and Recreation Department.	0	1	2	3	4	5	6	7	8
Oregon Marine Board.	0	1	2	3	4	5	6	7	8
Oregon State Police.	0	1	2	3	4	5	6	7	8
Governor of Oregon.	0	1	2	3	4	5	6	7	8
Pacific Fishery Management Council.	0	1	2	3	4	5	6	7	8
US Coast Guard.	0	1	2	3	4	5	6	7	8
US Fish and Wildlife Service.	0	1	2	3	4	5	6	7	8
National Oceanic and Atmospheric Administration.	0	1	2	3	4	5	6	7	8

Some places around the world have protected certain marine areas by designating them as **marine reserves**. A marine reserve is an area of the marine environment that is protected from specific uses, especially those that remove or disturb marine life. Around the world, marine reserves have been designated for different purposes such as for research, rebuilding fish populations, protecting habitat, and promoting sightseeing and recreation. Concerns about marine reserves include potential negative impacts to the fishing industry and costs for management and enforcement. The following questions ask about your opinions of marine reserves.

7. Indicate on each of the following scales how you feel about the idea of marine reserves *in general*. **(circle a number for *EACH*)**

Dislike	1	2	3	4	5	Like
Bad	1	2	3	4	5	Good
Negative	1	2	3	4	5	Positive
Harmful	1	2	3	4	5	Beneficial

8. Indicate on each of the following scales how you feel about the idea of establishing marine reserves *in Oregon*. **(circle for *EACH*)**

Dislike	1	2	3	4	5	Like
Bad	1	2	3	4	5	Good
Negative	1	2	3	4	5	Positive
Harmful	1	2	3	4	5	Beneficial

9. What is your opinion regarding the protection or human utilization (use) of marine areas in Oregon? **(check *ONE*)**

- ☐ We should fully utilize marine areas with almost no protection
- ☐ We should mostly utilize marine areas with just a little protection
- ☐ We should mostly protect marine areas with just a little utilization
- ☐ We should fully protect marine areas with almost no utilization

10. If you were to be given an opportunity to vote for or against establishing marine reserves in Oregon, how would you vote? **(check *ONE*)**

- ☐ I would vote **for** establishing marine reserves in Oregon
- ☐ I would vote **against** establishing marine reserves in Oregon

11. How certain are you that you would vote this way? **(check *ONE*)**

☐ Not Certain ☐ Slightly Certain ☐ Moderately Certain ☐ Extremely Certain

12. To what extent do you disagree or agree with each of the following statements? **(circle one number for *EACH*)**

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
Most people who are important to me would want me to support establishing marine reserves in Oregon.	1	2	3	4	5
Doing what most people who are important to me would want me to do matters to me.	1	2	3	4	5
Other people would expect me to oppose establishing marine reserves in Oregon.	1	2	3	4	5
I am usually motivated to do what other people expect me to do.	1	2	3	4	5
The people in my life whose opinions I value the most would want me to favor establishing marine reserves in Oregon.	1	2	3	4	5
Doing what people in my life whose opinions I value the most would want me to do is important to me.	1	2	3	4	5

13. To what extent do you disagree or agree that marine reserves in Oregon would cause each of the following outcomes? **(circle one number for *EACH*)**

On the Oregon coast, marine reserves would …	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
… benefit marine areas in general.	1	2	3	4	5
… not be effective in conserving marine areas.	1	2	3	4	5
… protect the diversity of marine species.	1	2	3	4	5
… increase marine species populations.	1	2	3	4	5
… allow depleted marine species populations to recover.	1	2	3	4	5
… cause some species to become overpopulated.	1	2	3	4	5
… improve the economy.	1	2	3	4	5
… increase tourism.	1	2	3	4	5
… benefit people in local communities.	1	2	3	4	5
… prevent people from using the reserve areas.	1	2	3	4	5
… reduce recreational fishing.	1	2	3	4	5
… reduce commercial fishing.	1	2	3	4	5
… improve scientific understanding of marine areas.	1	2	3	4	5
… allow scientists to monitor marine areas over time.	1	2	3	4	5
… improve our understanding of marine areas.	1	2	3	4	5
… be difficult to enforce.	1	2	3	4	5
... cost a lot to manage.	1	2	3	4	5
… improve the ability to manage marine areas.	1	2	3	4	5

14. To what extent do you believe each of the following possible outcomes of marine reserves in Oregon would be bad or good? **(circle one number for *EACH*)**

	Very Bad	Bad	Neither	Good	Very Good
Benefitting marine areas in general would be…	1	2	3	4	5
Not being effective in conserving marine areas would be…	1	2	3	4	5
Protecting the diversity of marine species would be…	1	2	3	4	5
Increasing marine species populations would be…	1	2	3	4	5
Allowing depleted marine species populations to recover would be…	1	2	3	4	5
Causing some species to become overpopulated would be…	1	2	3	4	5
Improving the economy would be…	1	2	3	4	5
Increasing tourism would be…	1	2	3	4	5
Benefitting people in local communities would be…	1	2	3	4	5
Preventing people from using the reserve areas would be…	1	2	3	4	5
Reducing recreational fishing would be…	1	2	3	4	5
Reducing commercial fishing would be…	1	2	3	4	5
Improving scientific understanding of marine areas would be…	1	2	3	4	5
Allowing scientists to monitor marine areas over time would be…	1	2	3	4	5
Improving our understanding of marine areas would be…	1	2	3	4	5
Difficult enforcement would be…	1	2	3	4	5
Costly management would be…	1	2	3	4	5
Improving the ability to manage marine areas would be…	1	2	3	4	5

15. Before receiving this survey, were you familiar with the topic of marine reserves in Oregon? **(check *ONE*)** ☐ No ☐ Yes

16. How well informed do you feel about the topic of marine reserves in Oregon? **(check *ONE*)**

☐ Not Informed ☐ Slightly Informed ☐ Moderately Informed ☐ Extremely Informed

17. How knowledgeable do you feel about the topic of marine reserves in Oregon? **(check *ONE*)**

☐ Not Knowledgeable ☐ Slightly Knowledgeable ☐ Moderately Knowledgeable ☐ Extremely Knowledgeable

18. Do you believe that each of the following statements related to marine reserves in Oregon is true or false? Circle "U" for "unsure" if you are not sure if the statement is true or false. **(circle one letter for *EACH*)**

In Oregon …	True	False	Unsure
… the government has been considering marine reserves for the past several years.	T	F	U
… the government has approved marine reserves for this state.	T	F	U
… commercial fishing would be allowed in all marine reserves.	T	F	U
… all marine reserves would include coastal lands such as beaches and coastlines.	T	F	U
… the government has established five marine reserve sites.	T	F	U
… new developments such as wave energy or fish farms would be allowed in all marine reserves.	T	F	U
… non-extractive recreation / tourism activities (e.g., surfing, swimming, diving) would be allowed in all marine reserves.	T	F	U
… keeping fish caught in marine reserves would be allowed in all reserves.	T	F	U
… only scientists and no other people would be allowed in all marine reserves.	T	F	U
… there have been opportunities for public involvement in agency discussions about marine reserves.	T	F	U

19. How often have you done each of the following related to marine reserves in Oregon? **(circle one number for *EACH*)**

	Never		Sometimes		Often
A. Read newspaper articles about marine reserves in Oregon.	0	1	2	3	4
B. Listened to radio news / programs about marine reserves in Oregon.	0	1	2	3	4
C. Watched television news / programs about marine reserves in Oregon.	0	1	2	3	4
D. Read magazine articles or books about marine reserves in Oregon.	0	1	2	3	4
E. Read about marine reserves in Oregon on government agency websites.	0	1	2	3	4
F. Read about marine reserves in Oregon on social websites (e.g., Facebook, Twitter).	0	1	2	3	4
G. Read about marine reserves in Oregon on any other websites.	0	1	2	3	4
H. Read about marine reserves in Oregon fishing regulations brochures.	0	1	2	3	4
I. Discussed marine reserves in Oregon with government agency employees.	0	1	2	3	4
J. Learned about marine reserves in Oregon from environmental or community groups.	0	1	2	3	4
K. Learned about marine reserves in Oregon from work or school.	0	1	2	3	4
L. Discussed marine reserves in Oregon with friends or family members.	0	1	2	3	4
M. Attended meetings or presentations about marine reserves in Oregon.	0	1	2	3	4

20. From the list in Question 19 (above), please state the ***ONE*** **source** from which you would ***prefer*** to obtain information about marine reserves in Oregon. **(write the letter)**

Letter for source _____

21. What ***ONE*** agency or organization do you think is currently responsible for marine reserves in Oregon? **(check *ONE*)**

- ☐ National Oceanic and Atmospheric Administration
- ☐ US Fish and Wildlife Service
- ☐ US Coast Guard
- ☐ Pacific Fishery Management Council
- ☐ Oregon Parks and Recreation Department
- ☐ Oregon Department of Fish and Wildlife
- ☐ Oregon Marine Board
- ☐ Unsure

22. How much do you feel that you understand about each of the following? **(circle one number for *EACH*)**

	Do Not Understand		Slightly Understand		Moderately Understand			Fully Understand	
Purpose of marine reserves in Oregon.	0	1	2	3	4	5	6	7	8
How marine reserves would be managed in Oregon.	0	1	2	3	4	5	6	7	8
Rules / regulations of marine reserves in Oregon.	0	1	2	3	4	5	6	7	8
Where marine reserves are located in Oregon.	0	1	2	3	4	5	6	7	8
Role of science in marine reserves in Oregon.	0	1	2	3	4	5	6	7	8
Role of public involvement in marine reserves in Oregon.	0	1	2	3	4	5	6	7	8

23. To what extent do you disagree or agree with each of the following statements? **(circle one number for *EACH*)**

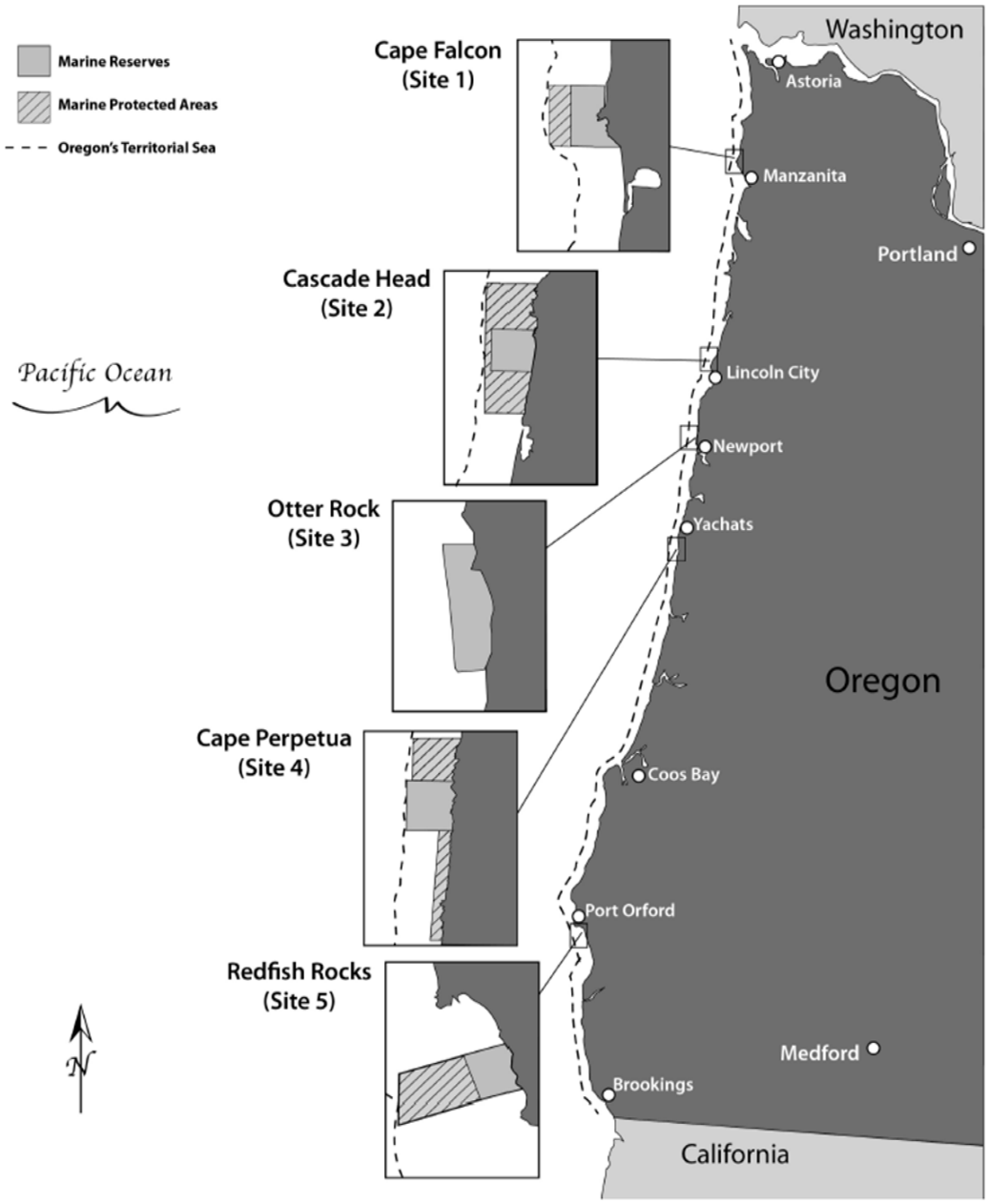
	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
Commercial fishing should be allowed in marine reserves in Oregon.	1	2	3	4	5
Recreational fishing should be allowed in marine reserves in Oregon.	1	2	3	4	5
Non-extractive recreation / tourism activities (e.g., surfing, swimming, diving) should be allowed in marine reserves in Oregon.	1	2	3	4	5
Scientific research should be allowed in marine reserves in Oregon.	1	2	3	4	5

24. To what extent do you believe that each of the following groups could be impacted by marine reserves in Oregon? **(circle one number for *EACH*)**

	Strongly Harmed by Reserves	Slightly Harmed by Reserves	Not Impacted by Reserves	Slightly Benefit from Reserves	Strongly Benefit from Reserves
People who recreate in marine areas.	1	2	3	4	5
People who fish recreationally.	1	2	3	4	5
People who fish commercially.	1	2	3	4	5
Local businesses.	1	2	3	4	5
People who live along the Oregon coast.	1	2	3	4	5
People who *do not* live along the Oregon coast.	1	2	3	4	5
Government agencies.	1	2	3	4	5
Scientists / researchers.	1	2	3	4	5

25. To what extent do you disagree or agree with each of the following statements? **(circle one number for *EACH*)**

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
I intend to support having marine reserves in Oregon.	1	2	3	4	5
Managers have done a good job communicating with the public about marine reserves in Oregon.	1	2	3	4	5
I am against establishing marine reserves in Oregon.	1	2	3	4	5
It is easy to access / find information about marine reserves in Oregon.	1	2	3	4	5
I would likely be in favor of implementing marine reserves in Oregon.	1	2	3	4	5


Marine Reserves
Marine Protected Areas
Oregon's Territorial Sea
Pacific Ocean
Cape Falcon
(Site 1)
Cascade Head
(Site 2)
Otter Rock
(Site 3)
Cape Perpetua
(Site 4)
Redfish Rocks
(Site 5)
N
Washington
Astoria
Manzanita
Portland
Lincoln City
Newport
Yachats
Oregon
Coos Bay
Port Orford
Medford
Brookings
California

On the previous page is a map of five marine sites in Oregon. ***These sites are shown as boxes that are lightly shaded or with lines, and are primarily offshore consisting of ocean / sea, not land***. Please answer questions on this page based on these sites.

26. Have you ever visited one or more of the five marine sites identified on the map on the previous page (*areas offshore that are lightly shaded or with lines, as shown on the map*)? **(check *ONE*)**

☐ No → if no, skip to question 31 below
☐ Yes

27. Which of the five marine sites identified on the map on the previous page have you ever visited (*areas offshore that are lightly shaded or with lines, as shown on the map*)? **(check *ALL THAT APPLY*)**

☐ Site 1 ☐ Site 2 ☐ Site 3 ☐ Site 4 ☐ Site 5

28. Please check the activities in which you have ever participated at one or more of the five marine sites identified on the map on the previous page (*areas offshore that are lightly shaded or with lines, as shown on the map*). **(check *ALL THAT APPLY*)**

☐ ***A***. Sightseeing
☐ ***B***. Swimming
☐ ***C***. Viewing marine animals (e.g., birds, whales, sea lions)
☐ ***D***. Exploring tidepools
☐ ***E***. Surfing / boogie boarding
☐ ***F***. Scuba diving / snorkeling
☐ ***G***. Non-charter recreational fishing
☐ ***H***. Charter recreational fishing
☐ ***I***. Commercial fishing
☐ ***J***. Non-motorized boating (e.g., canoe, kayak)
☐ ***K***. Motorized boating
☐ ***L***. Other (write response) _____

29. From Question 28 above, what *ONE activity* have you participated in most often at one or more of the five marine sites identified on the map on the previous page (*areas offshore that are lightly shaded or with lines, as shown on the map*)? **(write the letter)**

Letter for activity _____

30. Thinking about one or more of the five marine sites identified on the map on the previous page (*areas offshore that are lightly shaded or with lines shown on the map*), do you disagree or agree with each of the following? **(circle one number for *EACH*)**

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
At least one of these marine sites is very special to me.	1	2	3	4	5
At least one of these marine sites is one of the best places for doing what I like to do.	1	2	3	4	5
I am very attached to at least one of these marine sites.	1	2	3	4	5
I would not substitute any other area for doing the types of things that I do in at least one of these marine sites.	1	2	3	4	5
I identify strongly with at least one of these marine sites.	1	2	3	4	5
Doing what I do in at least one of these marine sites is more important to me than doing it in any other place.	1	2	3	4	5

31. If one or more of the five marine sites identified on the map on the previous page (*areas offshore that are lightly shaded or with lines, as shown on the map*) is designated as a marine reserve, how unlikely or likely would you do each of the following?

	Very Unlikely	Unlikely	Neither	Likely	Very Likely
Visit the marine sites(s) more often.	1	2	3	4	5
Visit the marine sites(s) the same amount.	1	2	3	4	5
Visit the marine sites(s) less often.	1	2	3	4	5
Never visit the marine sites(s) again.	1	2	3	4	5
Participate in a different primary activity in the marine sites(s).	1	2	3	4	5
Go to other nearby or adjacent marine areas instead.	1	2	3	4	5
Go to other marine areas on the Oregon coast instead.	1	2	3	4	5

32. The Oregon Department of Fish and Wildlife is currently responsible for marine reserves in Oregon. To what extent do you disagree or agree with each of the following statements about this agency? **(circle a number for *EACH*)**

I feel that the Oregon Department of Fish and Wildlife …	Strongly Disagree	Slightly Disagree	Neither	Slightly Agree	Strongly Agree
… shares similar values as I do.	1	2	3	4	5
… shares similar opinions as I do.	1	2	3	4	5
… shares similar goals as I do.	1	2	3	4	5
… thinks in a similar way as I do.	1	2	3	4	5
… takes similar actions as I would.	1	2	3	4	5

33. To what extent do you disagree or agree with each of the following statements about this agency? **(circle a number for *EACH*)**

I trust the Oregon Department of Fish and Wildlife to …	Strongly Disagree	Slightly Disagree	Neither	Slightly Agree	Strongly Agree
… provide the best available information about marine reserves.	1	2	3	4	5
… provide timely information about marine reserves.	1	2	3	4	5
… provide truthful information about marine reserves.	1	2	3	4	5
… provide me with enough information to decide what actions I should take regarding marine reserves.	1	2	3	4	5
… manage marine reserves using the best available information about non-human species in these areas (e.g., fish, birds).	1	2	3	4	5
… manage marine reserves using the best available information about human uses of these areas.	1	2	3	4	5
… work with other organizations to inform management of marine reserves.	1	2	3	4	5
… use public input to inform management of marine reserves.	1	2	3	4	5
… make good decisions regarding management of marine reserves.	1	2	3	4	5

34. Both marine reserves and marine protected areas have been proposed for Oregon. These designations are not the same thing. Do you think each of the following activities would be allowed in Oregon's marine reserves, marine protected areas, both of these types of areas, or neither of these types of areas? Circle "unsure" if you are not sure. **(circle one number for *EACH*)**

	Marine Reserves	Marine Protected Areas	Both Marine Reserves and Protected Areas	Neither Marine Reserves nor Protected Areas	Unsure
Commercial fishing would be allowed in …	1	2	3	4	5
Recreational fishing would be allowed in …	1	2	3	4	5
Scientific research would be allowed in …	1	2	3	4	5
Removing any species or habitat would ***NOT*** be allowed in …	1	2	3	4	5
Non-extractive recreation / tourism activities (e.g., surfing, swimming, diving) would be allowed in …	1	2	3	4	5

35. How ecologically healthy do you believe each of the following is in Oregon? **(circle one number for *EACH*)**

	Not Healthy		Slightly Healthy		Moderately Healthy			Very Healthy	
Rivers and streams in Oregon.	0	1	2	3	4	5	6	7	8
Bays and estuaries in Oregon.	0	1	2	3	4	5	6	7	8
Marine areas (ocean) in Oregon.	0	1	2	3	4	5	6	7	8
Marine fish in Oregon.	0	1	2	3	4	5	6	7	8
Other marine animals in Oregon.	0	1	2	3	4	5	6	7	8
Wildlife in Oregon.	0	1	2	3	4	5	6	7	8
Forests in Oregon.	0	1	2	3	4	5	6	7	8

36. To what extent do you disagree or agree with each of the following statements? **(circle one number for *EACH*)**

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
I am aware of impacts that humans can have on marine areas.	1	2	3	4	5
My own personal actions can impact marine areas.	1	2	3	4	5
I know that my own behaviors can cause problems in marine areas.	1	2	3	4	5
I feel a personal obligation to help protect marine areas.	1	2	3	4	5
I feel a responsibility to help educate others about protecting marine areas.	1	2	3	4	5
I can do more to help protect marine areas.	1	2	3	4	5

37. To what extent do you disagree or agree with each of the following statements? **(circle one number for *EACH*)**

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
The needs of humans are more important than those of marine areas.	1	2	3	4	5
The primary value of marine areas is to provide benefits for humans.	1	2	3	4	5
Marine areas exist primarily to be used by humans.	1	2	3	4	5
Marine areas should be protected for their own sake rather than to simply meet the needs of humans.	1	2	3	4	5
Marine areas have value whether humans are present or not.	1	2	3	4	5
I would be offended or upset if there were more limits on human use of marine areas.	1	2	3	4	5
Marine areas should have rights similar to the rights of humans.	1	2	3	4	5
I object to fishing, harvesting, or collecting species from marine areas because it violates the rights of these species.	1	2	3	4	5
The economic values that marine areas provide for humans are more important than the rights of species in these marine areas.	1	2	3	4	5
It is important to take care of marine areas for the future.	1	2	3	4	5
It is important that healthy marine areas exist.	1	2	3	4	5
It is important that future generations can enjoy marine areas.	1	2	3	4	5
I enjoy learning about marine areas.	1	2	3	4	5
It is important that people have a chance to learn about marine areas.	1	2	3	4	5
It is important that we learn as much as we can about marine areas.	1	2	3	4	5
I do *not* enjoy going to marine areas.	1	2	3	4	5
Some of my most memorable experiences occurred in marine areas.	1	2	3	4	5
Visiting marine areas is one of the reasons I take trips outdoors.	1	2	3	4	5

38. To what extent do you disagree or agree with each of the following statements? **(circle one number for *EACH*)**

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
Humans have the right to modify the natural environment to suit their needs.	1	2	3	4	5
Humans were meant to rule over the rest of nature.	1	2	3	4	5
The so-called ecological crisis facing humankind has been greatly exaggerated.	1	2	3	4	5
The earth has plenty of natural resources if we just learn how to develop them.	1	2	3	4	5
The balance of nature is very delicate and easily upset.	1	2	3	4	5
When humans interfere with nature, it often produces disastrous consequences.	1	2	3	4	5
Plants and animals have as much right as humans to exist.	1	2	3	4	5
Humans are severely abusing the environment.	1	2	3	4	5

Please turn over page →

39. Below are three separate groups of goals that people might prioritize differently.
For EACH group, please RANK the four goals in order of importance to YOU (NO TIES). **That is:**

1 = the goal that is most important to YOU
2 = the 2nd most important goal
3 = the 3rd most important goal
4 = the least important goal

Group 1. Rank these four goals from 1= most important to 4 = least important.
NO TIES **(DO NOT GIVE ANY OF THESE FOUR ITEMS THE SAME RANK).** **Rank**

- Maintain a high level of economic growth. _____
- See that people have more to say about how things are done at their jobs and in their communities. _____
- Make sure this country has strong defense forces. _____
- Try to make our cities and countryside more beautiful. _____

Group 2. Now repeat for this next set of four goals (1= most important, 4 = least important).
NO TIES **(DO NOT GIVE ANY OF THESE FOUR ITEMS THE SAME RANK).** **Rank**

- Maintain order in the nation. _____
- Give people more to say in important government decisions. _____
- Fight rising prices. _____
- Protect freedom of speech. _____

Group 3. Now repeat again for this final set of four goals (1 = most important, 4 = least important).
NO TIES **(DO NOT GIVE ANY OF THESE FOUR ITEMS THE SAME RANK).** **Rank**

- Maintain a stable economy. _____
- Progress toward a less impersonal and more humane society. _____
- Fight crime. _____
- Progress toward a society in which ideas count more than money. _____

40. Are you: **(check *ONE*)** ☐ Male ☐ Female

41. What is your age? **(write age)** _____ years old

42. Approximately how many years have you lived ***in Oregon***? **(write the number)** _____ year(s)

43. Approximately how many years have you lived ***on the Oregon coast***? **(write the number)** _____ year(s)

44. Do you own or rent / lease the residence where you currently live? **(check *ONE*)** ☐ Own ☐ Rent / Lease ☐ Other

45. Approximately how many years have you lived ***at this current address***? **(write the number)** _____ year(s)

46. Are you or anyone else in your household employed in the commercial fishing industry? **(check *ONE*)** ☐ No ☐ Yes

47. Are you a member of any environmental or marine related organizations (e.g., Sierra Club, Ducks Unlimited)? **(check *ONE*)**
☐ No
☐ Yes → if yes, what organization(s) are you a member of? **(write response)** _____

48. What is the ***highest*** level of education that you have achieved? **(check *ONE*)**
☐ Less than high school diploma
☐ High school diploma or GED
☐ 2-year associates degree or trade school
☐ 4-year college degree (e.g., bachelors degree)
☐ Advanced degree beyond 4-year degree (e.g., masters, Ph.D., medical doctor, law degree)

THANK YOU! PLEASE RETURN THIS COMPLETED SURVEY AS SOON AS POSSIBLE IN THE ENCLOSED ADDRESSED AND POSTAGE-PAID ENVELOPE