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Public Values and Attitudes toward Marine Reserves and Marine Wilderness

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ABSTRACT

This article examines public values and attitudes associated with the current marine reserves (MRs) in Oregon (United States), and how attitudes might change if these areas were to be designated as marine wilderness. Data were obtained from a representative survey of 530 residents of the most heavily populated region in Oregon. Twenty-one assigned values for Oregon's MRs were statistically grouped into three broader categories of values (environmental protection, emotional well-being, recreation) with respondents clearly preferring that these areas provide values fostering environmental protection over those providing for human emotional or recreational well-being. Respondents who considered environmental protection values to be important were likely to have more positive attitudes (e.g., like, good) about these MRs in general and also feel more positively about these areas if they were to be designated as marine wilderness in particular. Attitudes toward these MRs in general were also positively related to changes in specific attitudes with potential marine wilderness designation. Conversely, those who considered recreation values to be important were likely to have more negative attitudes about these MRs in general and the attitudes for these respondents would become even more negative if these areas were to be designated as marine wilderness.

KEYWORDS

attitudes; marine protected areas; marine reserves; marine wilderness; values

Introduction

Establishing marine protected areas (MPAs) is a management strategy that is gaining popularity worldwide (Boonzaier and Pauly 2016). MPAs are generally considered spatially explicit portions of the ocean with legally enforceable protections in place (National Academy of Sciences [NAS] 2001). MPAs are increasingly designated and managed within the context of ecosystem based management (EBM) with the goal of conserving ocean resources and human communities that depend on these resources (Christie 2011; Long, Charles, and Stephenson 2015). In recognizing the inescapable links between humans and marine environments, the EBM of MPAs should be informed equally by both the biophysical and social sciences, but often falls short of the

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ideal parity between these disciplines in practice (McLeod and Leslie 2009). Studies have highlighted the importance of incorporating more social science into MPA management and the relatively few instances when it is adequately achieved (e.g., Charles and Wilson 2009; Christie 2011; Suman, Shivlani, and Milon 1999; Thomassin et al. 2010).

Values and attitudes are among the many social science concepts that can impact the ability of MPAs to realize management objectives (Jefferson et al. 2015; Pike et al. 2010; Pita et al. 2011; Wolfenden, Cram, and Kirkwood 1994). Values can be described as preferences for modes of being (Rokeach 1973) or for one thing or attribute over another (Brown 1984). Values inform more specific cognitions such as attitudes, which are positive or negative evaluations of an object or idea (Fishbein and Ajzen 2010; Homer and Kahle 1988). Values can shape attitudes toward MPA designation and enforcement, and attitudes in turn can impact MPA management and compliance (Perry, Needham, and Cramer 2017; Thomassin et al. 2010; Voyer, Gollan, et al. 2015).

Most research investigating values and attitudes toward MPAs has focused on groups that are considered to be traditional stakeholders, such as commercial fishers, ocean recreationists, and communities living adjacent to these areas (e.g., Cole, Holland, and Donohoe 2015; Klain and Chan 2012; Pike et al. 2010; Pita et al. 2011; Suman, Shivlani, and Milon 1999; Thomassin et al. 2010; Voyer, Gollan, et al. 2015). Crucial as these stakeholders are, their values and attitudes are not necessarily reflective of the general public or broader societal dynamics. Although the general public is not always the focus of social science concerning MPAs (Barr and Lindholm 2000; Börger et al. 2014), it is an important stakeholder in the context of public resources, and public thoughts and actions can impact MPA success, particularly through democratic processes and political decisions. As countries such as the United States (US) place more emphasis on marine resource management (Boonzaier and Pauly 2016), including establishing more MPAs, attitudes of the general public and the values that shape them are increasingly important for MPA success.

Designating MPAs as marine wilderness is one example of a management strategy that might be affected by public values and attitudes. Wilderness in the US is generally defined in accordance with the 1964 Wilderness Act: "A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." In the US, this act has been applied to terrestrial areas formally designated as wilderness and a few marine areas immediately adjacent to these land-based wilderness areas. Outside the US, the IUCN defined wilderness as "large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, which are protected and managed to preserve their natural condition" (Dudley 2008, 14).

Although the wilderness concept is well-developed in terrestrial areas, application to the ocean was not widely discussed until the late 1980s and there has been little conformity in its conceptualization and implementation (Barr 2008; Sloan 2002). Early discussions of marine wilderness were mostly in academic and practitioner forums, and produced various definitions (Bohnsack et al. 1989; Kelleher and Kenchington 1991). The fourth World Wilderness Conference in 1987 defined marine wilderness as "marine

areas where little or no evidence of human intrusion is present or permitted, so that natural processes will take place unaffected by human intervention" (Kelleher and Kenchington 1991, 44). The IUCN said marine wilderness "should be sites of relatively undisturbed seascape, significantly free of human disturbance, […] works, or facilities, and capable of remaining so through effective management" (Day et al. 2012, 20). The North American Intergovernmental Committee on Cooperation for Wilderness and Protected Areas Conservation (NAWPA) offered a definition consistent with those for terrestrial wilderness: "marine and coastal areas that exist in a natural state … are treasured for their intrinsic value, and offer opportunities to experience natural heritage places through activities that require few, if any, rudimentary facilities or services" (NAWPA 2011, 1).

Given these definitions, the emphasis for marine wilderness has typically involved perpetuating natural conditions and processes, and evoking notions of areas being pure, pristine, highly biodiverse, unaltered, and untouched (Johnston et al. 2019; Jones et al. 2018). Although marine wilderness definitions have some overlap with those of MPAs and these terms have even been used synonymously (Brailovskaya 1998; Rockefeller 2008), MPAs can refer to a much wider range of different areas, protection levels, and conservation strategies from multiple-use areas that allow some fishing and other extractive activities, to no-take reserves prohibiting most development and extractive uses (Lubchenco et al. 2003). MPAs often necessitate some rules and regulations to help conserve marine areas or restore previously degraded areas, whereas designating places as marine wilderness may be seen as conferring even more environmental protections and possibly stricter management to ensure areas remain pristine and unaltered with high biodiversity (Barr 2008; Johnston et al. 2019; Jones et al. 2018; Lubchenco et al. 2003).

Despite widespread public support for terrestrial wilderness areas in the US, such as those within national forests (Cordell, Tarrant, and Green 2003; Watson et al. 2016), support is not unanimous and attitudes can be polarized (Durrant and Shumway 2004; Yung, Freimund, and Chandler-Pepelnjak 2008). Public attitudes and values concerning marine wilderness, however, have received little attention (Johnston et al. 2019). Understanding these cognitions is important because the public may react differently to new or changing management regimes, and designating marine areas as wilderness may be one way for managers to excite the interest of people who otherwise may not pay much attention to ocean issues, but whose opinions and actions may impact marine areas (Charles and Wilson 2009; Steel et al. 2005; Wolfenden, Cram, and Kirkwood 1994). This article explores public values and attitudes toward MPAs in Oregon (US), and how attitudes might change if these areas were to be designated as marine wilderness.

Conceptual foundation

Attitudes

Attitudes are commonly researched in marine resource management and offer insight into stakeholder views about MPAs and their management (e.g., Charles and Wilson 2009; Jefferson et al. 2015; Perry, Needham, and Cramer 2017; Pita et al. 2011). These

attitudes are wide-ranging and affected by several factors over which managers have varying degrees of control, including how long an MPA has existed (Pita et al. 2011), the MPA establishment process (Suman, Shivlani, and Milon 1999), and perceptions of ecosystem health (Thomassin et al. 2010).

Although there have been several studies on attitudes toward MPAs, there has been limited empirical work on attitudes toward marine wilderness, perhaps because so few of these areas have been designated. Studies on views about marine wilderness have tended to focus instead on the appropriateness of applying wilderness as a label and construct to the ocean. Shafer and Benzaken (1998) and Barr and Kliskey (2014), for example, reported that an overwhelming majority of their respondents (80% and nearly 76%, respectively) deemed wilderness to be an appropriate term for portions of the ocean. Given: (a) people may be willing to extend this label to the ocean; (b) the sporadic, but persistent consideration of marine wilderness among academics and practitioners (e.g., Barr and Lindholm 2000; Bohnsack et al. 1989; Graham and McClanahan 2013); and (c) the effort to establish more MPAs and related areas worldwide (Boonzaier and Pauly 2016), perhaps marine wilderness is an idea whose time has come. Public attitudes toward marine wilderness and how attitudes about existing MPAs would change with wilderness designation are important in determining whether this idea can be implemented successfully.

Marine reserves (MRs), also typically known as no-take areas, are a type of MPA similar to marine wilderness in a number of respects, especially given that both MRs and marine wilderness usually emphasize strict preservation of the natural environment and restrict harvest of marine resources (Lubchenco et al. 2003; NAS 2001). Some studies have focused on attitudes toward MRs (e.g., Perry, Needham, and Cramer 2017; Suman, Shivlani, and Milon 1999; Wolfenden, Cram, and Kirkwood 1994). Consistent with research on other MPAs, these studies have found that attitudes toward MRs can vary among situations and populations. Despite the similarities between MRs and marine wilderness, little MR research has taken into account the special place of wilderness in American culture (Barr 2008; Nash 2014; Watson et al. 2016) or how attitudes toward MRs would change if these areas were formally designated as wilderness.

Attitudes toward MRs in general and marine wilderness designation in particular may be related. In social psychology, both the rule of correspondence and the principle of specificity suggest that attitudes toward something general such as MRs can help to predict more specific attitudes about related issues (Fishbein and Ajzen 2010; Whittaker, Vaske, and Manfredo 2006). Positive or negative general attitudes toward MRs overall, therefore, are likely to be related to more specific attitudes such as reactions to designating these areas as marine wilderness.

Values

According to theories such as the Cognitive Hierarchy, general and specific attitudes can be influenced by more basic cognitions such as values (Fulton, Manfredo, and Lipscomb 1996; Homer and Kahle 1988; Schultz and Zelezny 1999; Vaske and Donnelly 1999; Whittaker, Vaske, and Manfredo 2006). To provide an understanding of public responses to MRs and marine wilderness, attitudes must be studied not in isolation, but

in relation to other cognitions such as values (Manfredo, Teel, and Bright 2004). Examining connections among values and both general and specific attitudes provides an understanding of what is valued or desired in an MPA or MR, how positively or negatively the area is viewed, and how these cognitions might change after implementing management decisions, such as designating an area as wilderness.

Values regarding natural resources have received substantial attention in environmental economics (e.g., Krutilla 1967; McLeod and Leslie 2009), social psychology (e.g., Inglehart 1995; Ives and Kendal 2014; Jones et al. 2016; Winter and Lockwood 2005), and marine resource management (e.g., Angulo-Valdés and Hatcher 2010; Cole, Holland, and Donohoe 2015). One consequence of this attention is the diverse conceptualizations of values (Jones et al. 2016; Seymour et al. 2010). Although values are often interpreted in economic terms, other social sciences generally focus on values that individuals and societies have, without translating them into monetary terms. This research has typically addressed two main types of values that Brown (1984) described as "held" and "assigned." Held values (e.g., honesty, fairness, respect for life) are central to an individual's worldview and describe an enduring concept of what is good or preferable (Jones et al. 2016; Rokeach 1973). The influence of held values on a general approach to life and the fact that these values are shared widely and change slowly (Brown 1984; Inglehart and Baker 2000; Schwartz 1992) led Kendal et al. (2015) to term them "core" human values.

Assigned values reflect comparative judgements about things (i.e., importance of some things in relation to others) and are more situation-specific and likely to change than held values (Brown 1984; Jones et al. 2016; McIntyre, Moore, and Yuan 2008). For example, an individual may respect other forms of life across contexts (held values), but the importance they place on habitat preservation versus non-consumptive recreation opportunities that conserve species (assigned values) may vary among settings (e.g., parks, sanctuaries, wilderness, fisheries areas).

This situation-specific nature of assigned values potentially makes them more useful for managers of MPAs (Kendal et al. 2015; Seymour et al. 2010). Not only are assigned values less abstract than held values (Kendal et al. 2015), but they also offer insight into attributes that are valued about a particular place (and to what degree), perhaps offering a clearer understanding of public perspectives of the place (Seymour et al. 2010). Knowledge about public values for an MPA can inform management goals to align with public sentiment, which can help managers anticipate conflicts when alignment is not possible (Angulo-Valdés and Hatcher 2010; Pike et al. 2010; van Riper et al. 2012). Given that assigned values address the relative importance of things, understanding these values assigned to MPAs is useful for informing decisions about tradeoffs that managers make, particularly in the context of EBM (McLeod and Leslie 2009).

Assigned values for protected areas

The utility of assigned values for examining characteristics of places has made these values frequent subjects of protected area research (e.g., Harmon and Putney 2003; Kendal et al. 2015; McIntyre, Moore, and Yuan 2008; van Riper et al. 2012; Winter and Lockwood 2005). Assigned values for terrestrial wilderness areas (i.e., "wilderness

values") in the US, for example, have received substantial attention (e.g., Cordell, Bergstrom, and Bowker 2005; Haas, Hermann, and Walsh 1986; Watson et al. 2016). Frequently studied categories of these values include aesthetic, moral, scientific, ecological, and recreational reasons why a wilderness area is valued (Brown and Alessa 2005; Winter and Lockwood 2005). Although similar value categories tend to appear across studies, there is little consistency in how these values are selected and measured.

Many studies have categorized wilderness values as direct use (e.g., recreation, research), indirect use (e.g., ecosystem services), and nonuse (e.g., intrinsic value, pleasure knowing wild places exist, option to visit in the future, bequests for future generations). Originating from environmental economics and used extensively in wilderness values research, this approach has been widely adopted and allows for fine-scale differentiation of specific values (e.g., protect water quality vs. biodiversity) while also enabling aggregation of assigned values into scales or categories (e.g., Haas, Hermann, and Walsh 1986; Harmon and Putney 2003; Johnson et al. 2004).

The dichotomy between use and nonuse values appears to be consistent across time (Cordell et al. 1998). People consistently consider some activities and benefits to be uses of wilderness areas that they value differently from nonuse values and benefits. What has changed over time is the relative importance of direct, indirect, and nonuse values. Early studies of wilderness values focused on recreation and showed that Americans valued this and other direct uses of wilderness most highly (Walsh, Loomis, and Gillman 1984; Watson and Cordell 2014). Over time, indirect and nonuse values have become important, often eclipsing use values (e.g., Brown and Alessa 2005; Cordell, Bergstrom, and Bowker 2005; Cordell, Tarrant, and Green 2003; Cordell et al. 1998). Intrinsic values (i.e., value wilderness in and of itself outside human benefits from it; Johnson et al. 2004), which are a subset of nonuse values, are now often ranked among the most important values people ascribe to wilderness (Brown and Alessa 2005; Harmon 2004). This represents a fundamental shift in societal relationships with wilderness (Nash 2014).

Almost all studies examining assigned values for wilderness and other protected areas have been conducted in the terrestrial context. The number of studies on values ascribed to the ocean, wild or not, is immensely outweighed by those examining values for terrestrial areas (Barr and Kliskey 2014; Börger et al. 2014; Cole, Holland, and Donohoe 2015). There is, however, a growing body of research on values for marine environments such as MPAs, and many values perceived as important for these settings are similar to those in wilderness and other terrestrial protected areas (Jefferson et al. 2015). These include intrinsic values (Cole, Holland, and Donohoe 2015), biodiversity preservation (Klain and Chan 2012), spirituality (Pike et al. 2010), personal well-being (Voyer, Gollan, et al. 2015), aesthetic beauty (Wynveen, Kyle, and Sutton 2010), and conservation of charismatic marine species (Börger et al. 2014). Among the few studies of marine wilderness, Davey and Gillespie (2014) and Barr and Kliskey (2014) found that marine areas were valued for the same indirect and nonuse values accorded to terrestrial wilderness. In contrast, Cole, Holland, and Donohoe (2015) did not include "wilderness" as a value in their typology because it was considered less relevant to coastal settings than ideas of "naturalness."

Most of this research, however, has identified values associated with MPAs and other marine and coastal areas without investigating how these values might relate to other

cognitions such as attitudes, despite the importance of positive attitudes for protected area success (Charles and Wilson 2009; Voyer, Gladstone, and Goodall 2015) and the known relationships between values and attitudes (Vaske and Donnelly 1999; Vaske and Needham 2007; Whittaker, Vaske, and Manfredo 2006). With the exception of Börger et al. (2014), most studies on assigned values for MPAs have also been conducted with direct users (e.g., Voyer, Gollan, et al. 2015; Wynveen et al., 2010), managers or scientists (e.g., Barr and Kliskey 2014; Pike et al. 2010), or other invested stakeholders (e.g., Cole, Holland, and Donohoe 2015; Davey and Gillespie 2014; Klain and Chan 2012). Despite calls for research that is more representative of public or societal values for marine areas in general and MPAs in particular (Börger et al. 2014; Jefferson et al. 2015), the issue of whether the general public shares similar values remains largely unexplored.

Research questions

This article examines public (i.e., resident) values and attitudes associated with MRs and marine wilderness in the state of Oregon (US). Four research questions are explored. First, what assigned values do residents have for Oregon's MRs? Second, can these values be categorized into broader groups? Third, what is the relationship between these values and general attitudes toward Oregon's MRs? Fourth, what is the relationship between these values and attitudes, and potential changes in specific attitudes if these MRs were to be designated as marine wilderness? Consistent with the rule of correspondence, the principle of specificity, and theories such as the Cognitive Hierarchy, it was predicted that values would be related to general attitudes toward Oregon's MRs, and these general attitudes would also be related to more specific changes in attitudes if these MRs were to be designated as marine wilderness.

Methods

Study context

Oregon recently had its first MRs designated at Cape Falcon, Cascade Head, Otter Rock, Cape Perpetua, and Redfish Rocks. These 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" (Oregon Ocean Policy Advisory Council (OPAC) 2008, 1). Although none of these MRs are labeled as wilderness, the emphasis on protection from extraction and limits on human impact is somewhat similar to many definitions for marine wilderness (Bohnsack et al. 1989). Although managers of Oregon's MRs have not seriously considered designating these areas as marine wilderness, the topic has been raised and discussed among some government agency personnel affiliated with Oregon's MRs and also in several other jurisdictions across the US (Barr and Kliskey 2014; Johnston et al. 2019). In addition, it is possible that such a change in designation could be considered in the future for these or other locations (Johnston et al. 2019).

With a few exceptions (e.g., Johnston et al. 2019; Perry, Needham, and Cramer 2017; Perry et al. 2014), most studies of Oregon's MRs have focused on the most invested or traditional stakeholders (e.g., commercial fishers, recreational anglers, scientists). Even Perry et al. (2014) and Perry, Needham, and Cramer (2017) oversampled coastal residents in communities of place nearest these MRs. Although these stakeholders and adjacent communities are likely to be most directly affected by the MRs, data from these populations are not necessarily reflective of dynamics in other regions of the state or of broader societal relationships with the ocean, which is a common limitation of most social science research on MPAs (Barr and Lindholm 2000; Börger et al. 2014). This article, therefore, investigates the cognitions of residents in the most heavily populated region of Oregon (i.e., Portland to Ashland between the Coast and Cascade Mountain Ranges). This non-coastal population is significant in that it constitutes the majority of Oregon's voting population and is more culturally, socially, politically, and economically diverse compared to some other areas of the state. Although this population is arguably not as invested in or affected by marine issues as more traditional stakeholder groups, studying this population provides managers of Oregon's MRs with insights into views held by residents of the most populous region of the state, which adds a needed facet to the understanding of human-ocean relationships in this state.

Data collection

Data were obtained from a mixed-mode survey (internet, mail) of residents in this region in 2016. The sample was drawn randomly from postal records delineated by census blocks. Questionnaires were administered using four mailings (Dillman, Smyth, and Christian 2014). The first mailing was a postcard notification with an option to complete the questionnaire on the internet using individual access codes. Those who did not complete the questionnaire on the internet received the second mailing, which consisted of a letter, questionnaire, and postage-paid return envelope. This was followed by a postcard reminder (with the option to complete on the internet) and then a second full mailing (letter, questionnaire, envelope) to those who had not responded. This survey approach is relatively consistent with some other social science studies of MPAs in the US Pacific Northwest (e.g., Christie et al. 2018; Hard et al. 2012; Hoelting et al. 2013; Johnston et al. 2019; Perry, Needham, and Cramer 2017; Perry et al. 2014).

Of the 2,800 households contacted, 530 completed questionnaires (77 completed on the internet, 453 completed by mail) for a response rate of 20% after accounting for undeliverables (e.g., incorrect address, moved). A telephone non-response bias check was conducted with 75 residents who did not complete the questionnaire to determine any potential differences between non-respondents and respondents. This non-response bias check contained 11 questions from the questionnaire and no substantive differences were found between those who completed the questionnaire versus this non-response bias check. More details about this non-response bias check are reported in Needham, Cramer, and Johnston (2016). Regardless, demographics (e.g., age, sex [male/female]) of all respondents were compared with the most recent census information and the data were weighted by these demographic variables to ensure representativeness of the sample.

Analysis variables

To measure assigned values associated with Oregon's MRs, respondents were asked how important it is to them that these areas provide 21 different values frequently examined in MPA and other protected area research (e.g., protect water quality, protect habitat for marine species, provide spiritual inspiration, provide recreation opportunities). These items are listed in Table 1 and were based on an extensive literature review of assigned values for MPAs, wilderness areas, and other protected areas. Responses were on nine-point scales of 0 "not important" to 8 "extremely important" with an "I do not know" option. Unipolar importance scales such as this are common for assessing values for protected areas (e.g., Cordell, Tarrant, and Green 2003; Cordell et al. 1998; Haas, Hermann, and Walsh 1986; Kendal et al. 2015). Respondents were also asked to select up to three of these values they considered most important for Oregon's MRs to provide.

Attitudes toward Oregon's MRs were assessed by asking on three, five-point semantic differential scales (i.e., opposing pairs of words on scales) what respondents thought about these reserves ("dislike" – "like," "bad" – "good," "negative" – "positive"). These types of scales are commonly used for measuring attitudes (Fishbein and Ajzen 2010; Vaske 2019). The extent that attitudes would change if these MRs were designated as marine wilderness was measured with two items, each on five-point scales. The first asked if their opinions of these areas would be more negative (1 on scale), not change (3), or be more positive (5). The second asked if respondents would like Oregon's MRs less (1 on scale), not change their opinion (3), or like these reserves more (5) if they were to be designated as marine wilderness. The following background information was provided in the questionnaire to help inform responses: "Although Oregon's marine reserves are not officially designated as 'wilderness,' some people believe wilderness exists on not only land, but also in the ocean. However, other people believe wilderness only exists on land and does not include the ocean. Wilderness has many possible definitions, but for the purposes of the rest of this survey, it can generally be considered as places where natural processes dominate and intentional human modification of the environment is minimal."

Results

Among the 21 items assessing assigned values for Oregon's MRs, "protect water quality" (Mean [M] = 6.81), "protect endangered species" ($M = 6.75$), and "protect habitat for marine species" ($M = 6.72$) had the highest average importance (Table 1). The least important values were "provide spiritual inspiration" ($M = 3.28$), "provide income for the tourism industry" ($M = 4.41$) and "provide opportunities to maintain or regain physical or mental health through contact with nature" ($M = 4.69$). When asked directly which values were the most important, "protect marine species, water, or plants that have value even if humans do not benefit from them" (29%) and "protect habitat for marine species" (28%) were cited most, and "protect symbols of America's heritage or culture" and "provide spiritual inspiration" were cited least (2%; Figure 1).

Principal axis exploratory factor analysis (EFA) with oblique rotation was conducted on responses to the assigned values to categorize them into factors or groups, and this

Table 1. Descriptive and reliability analyses of value and attitude scales associated with Oregon's MRs.

	Mean	Standard Deviation	Item Total Correlation	Alpha if Deleted	Cronbach Alpha
Environmental Protection Values[a]					.97
Protect water quality	6.81	1.72	.87	.97	
Protect endangered species	6.75	1.83	.91	.97	
Protect habitat for marine species	6.72	1.70	.92	.97	
Preserve unique wild plants or animals	6.71	1.75	.91	.97	
Protect endangered places	6.58	1.84	.92	.97	
Protect marine species, water, or plants that have value even if humans do not benefit from them	6.53	1.84	.90	.97	
Preserve natural areas for scientific discovery or study	6.41	1.76	.80	.97	
Protect air quality	6.19	2.30	.85	.97	
Knowing that future generations will have MRs	6.15	2.21	.89	.97	
Foster a moral or ethical obligation to respect or protect nature or other living things	6.08	2.45	.88	.97	
Protect other natural resources that humans may have to use in the future	5.96	2.00	.76	.97	
Protect nature to ensure human well-being or survival	5.95	2.32	.82	.97	
Provide a place of minimal human impact or intrusion into the natural environment	5.61	2.16	.71	.97	
Emotional Well-Being Values[a]					.90
Provide scenic beauty	5.90	2.10	.73	.88	
Knowing that I will have the ability to visit MRs in the future	5.54	2.17	.70	.88	
Protect places that provide a sense of place, community, or belonging	5.31	2.29	.83	.86	
Protect symbols of America's heritage or culture	5.17	2.49	.69	.88	
Provide opportunities to maintain or regain physical or mental health through contact with nature	4.69	2.38	.77	.87	
Provide spiritual inspiration	3.28	2.62	.64	.89	
Recreation Values[a]					.67
Provide recreation opportunities	4.70	2.26	.50	–	
Provide income for the tourism industry	4.41	2.20	.50	–	
Attitude toward MRs in Oregon[b]					.97
Dislike to like	4.29	1.01	.92	.96	
Bad to good	4.28	.96	.93	.96	
Negative to positive	4.29	.96	.94	.95	
Attitude Change with Wilderness Designation					.91
Opinion would be more negative / positive[c]	3.25	.89	.83	–	
Would like Oregon's MRs less / more[d]	3.21	.86	.83	–	

[a]Measured on 9-point scales: 0 "not important" to 8 "extremely important."
[b]Measured on 5-point semantic differential scales: 1 "dislike" / "bad" / "negative" to 5 "like" / "good" / "positive."
[c]Measured on 5-point scale: 1 "my opinion of Oregon's MRs would be more negative if they were designated as wilderness" to 5 "my opinion of Oregon's MRs would be more positive if they were designated as wilderness."
[d]Measured on 5-point scale: 1 "I would like Oregon's MRs less if they were designated as wilderness" to 5 "I would like Oregon's MRs more if they were designated as wilderness."

EFA revealed three factors with all loadings exceeding .40 (Table 2). This type of factor analysis is commonly used in social science research involving questionnaires containing continuous scales (Vaske 2019). The first factor included 13 values generally related to environmental protection (e.g., "protect water quality," "protect endangered species"), the second factor contained six values related to emotional well-being (e.g., "provide opportunities to maintain or regain physical or mental health through contact with

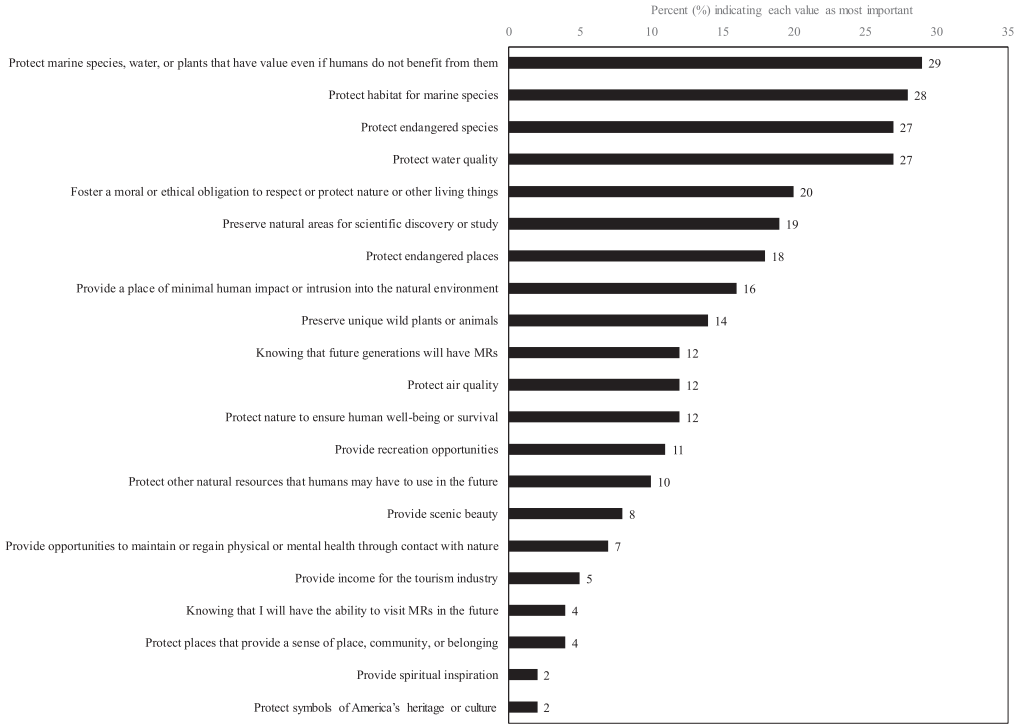

Figure 1. Percent (%) of respondents indicating each value was most important for Oregon's MRs to provide. Respondents were allowed to select up to three values, so percentages do not sum to 100%.

nature," "provide spiritual inspiration"), and the third factor contained two values related to recreation ("provide recreation opportunities," provide income for the tourism industry"). Taken together, these three factors explained 77% of the variance in values assigned to Oregon's MRs. Cronbach alpha reliability analysis tested the measurement reliability of variables in these factors to determine if they could be combined into indices. Alpha coefficients of .60 to .65 or above suggest that variables are measuring the same concept and may be combined (Vaske 2019). Cronbach alphas for the three factors ranged from .67 (factor 3 "recreation values") to .97 (factor 1 "environmental protection values") and deletion of any items would not have improved reliability (Table 1).[1]

Attitudes toward Oregon's MRs were, on average, generally positive ($M = 4.28$ to 4.29), and most respondents also indicated their attitudes would either not change or change somewhat positively with wilderness designation of these areas ($M = 3.21$ to 3.25; Table 1). Cronbach alpha reliabilities were high for the three items measuring general attitudes toward these MRs (.97) and the two items measuring attitude change in response to wilderness designation (.91; Table 1).

Ordinary least squares (OLS) multiple regression path analysis tested relationships among values for Oregon's MRs, attitudes toward these areas in general, and how attitudes would change with marine wilderness designation. This type of regression path analysis is often used in social science research with continuous scales (Vaske 2019). The three value factors were positively correlated with each other ($r = .31$ to .57;

Table 2. Exploratory factor analysis of values associated with Oregon's MRs.

	Factor Loadings[a,c]		
Values[b]	Factor 1: Environmental Protection Values	Factor 2: Emotional Well-Being Values	Factor 3: Recreation Values
Protect habitat for marine species	.99		
Protect marine species, water, or plants that have value even if humans do not benefit from them	.99		
Preserve unique wild plants or animals	.99		
Protect endangered species	.98		
Protect endangered places	.95		
Preserve natural areas for scientific discovery or study	.93		
Protect water quality	.83		
Knowing that future generations will have MRs	.79		
Foster a moral or ethical obligation to respect or protect nature or other living things	.79		
Protect air quality	.73		
Protect other natural resources that humans may have to use in the future	.71		
Protect nature to ensure human well-being or survival	.68		
Provide a place of minimal human impact or intrusion into the natural environment	.59		
Provide spiritual inspiration		.92	
Provide opportunities to maintain or regain physical or mental health through contact with nature		.72	
Protect places that provide a sense of place, community, or belonging		.59	
Knowing that I will have the ability to visit MRs in the future		.57	
Protect symbols of America's heritage or culture		.50	
Provide scenic beauty		.41	
Provide recreation opportunities			.92
Provide income for the tourism industry			.67
Eigenvalue	12.61	8.00	3.63

[a]Principal axis factor analysis with oblique rotation. Only factors with eigenvalues ≥ 1 and items with loadings $\geq .40$ were retained.
[b]Measured on 9-point scales: 0 "not important" to 8 "extremely important."
[c]Total cumulative percent (%) of variance explained = 77%.

Figure 2).[2] Both environmental protection and recreation values were related to general attitudes toward Oregon's MRs, whereas there was no statistical relationship between these attitudes and emotional well-being values (standardized beta [β] = $-.03$, $p = .657$). Environmental protection values were positively related to general attitudes toward the MRs in Oregon, and a stronger predictor ($\beta = .71$, $p < .001$) compared to recreation values, which were negatively related to these attitudes ($\beta = -.28$, $p < .001$). In other words, respondents who considered protecting environmental attributes to be important had more positive attitudes toward these MRs, whereas those who considered human recreation and tourism uses to be important had more negative attitudes. Taken together, these value factors explained 42% of the variance in just general attitudes toward the MRs in Oregon.

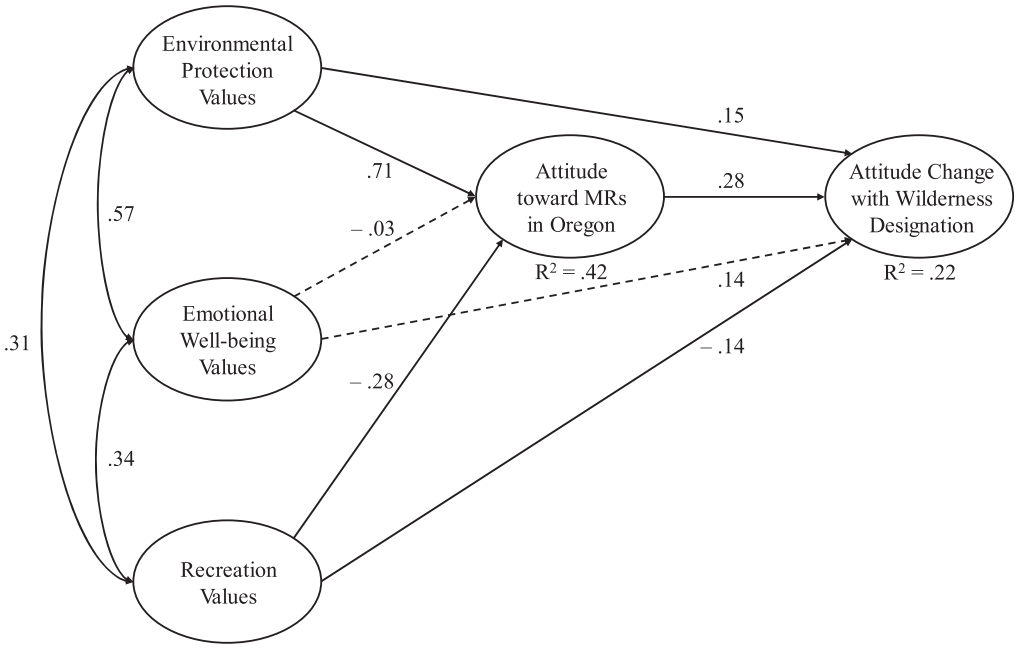

Figure 2. Final path model. Paths are standardized beta coefficients (β). The standardized beta coefficients represent direct relationships between concepts with other paths in the model controlled. Significant paths ($p < .05$) are solid lines; insignificant paths ($p > .05$) are dashed. R^2 = variance explained.

These general attitudes toward the MRs in Oregon were positively related to changes in attitudes with potential wilderness designation of these areas ($\beta = .28$, $p < .001$). Environmental protection values were also positively related to attitude change with wilderness designation, but to a lesser extent ($\beta = .15$, $p < .001$) than general attitudes. Mediation analyses (Baron and Kenny 1986) showed that this relationship between environmental protection values and attitude change was partially mediated by general attitudes toward the MRs in Oregon (i.e., strength of relationship declined after general attitudes were included). Recreation values were negatively related to attitude change with wilderness designation ($\beta = -.14$, $p < .001$) and this relationship was also partially mediated by general attitudes toward the MRs in Oregon. In other words, those who most strongly valued environmental protection would be likely to change their attitudes more positively if these MRs were to be designated as wilderness, whereas those who most strongly appreciated recreation values would be likely to feel more negatively about these MRs if they were designated as wilderness. However, relationships between values and attitude change with wilderness designation were not as strong as the relationship between general attitudes toward the MRs and this change in attitudes. There was no statistically significant relationship between emotional well-being values and attitude change ($\beta = .14$, $p = .052$). Environmental protection values, recreation values, and general attitudes toward the MRs in Oregon collectively explained 22% of the variance in changes in attitudes toward the MRs with potential wilderness designation.

Discussion

Management implications

These results showed the importance of environmental protection values associated with Oregon's MRs, as these values were the most important to respondents and had a strong, positive relationship with overall attitudes toward these reserves. As Oregon's MRs were established with a goal of conserving marine habitats and biodiversity (OPAC 2008), managers should be encouraged that residents of the most heavily populated region of the state valued the very things that these MRs were designated to protect. Given the importance placed on these values, this population may respond favorably to communications from mangers about the environmental protection aspects of these MRs (e.g., endangered species, water quality), rather than opportunities for activities directly benefitting humans (e.g., recreation, spiritual inspiration).

Opponents of protected areas often cite restrictions on access and extractive uses as primary grievances (e.g., Durrant and Shumway 2004; Wolfenden, Cram, and Kirkwood 1994). Although results here did not delegitimize such concerns, they demonstrated that onsite access and use (e.g., recreation, tourism) were not highly important to most members of the public in this study's context. It is worth noting, however, the negative relationships between recreation values and both general and specific attitudes. Although these values were not as important as environmental protection values, those who considered recreation values as important had more negative attitudes toward the MRs and these attitudes would become even more negative if these areas were to be designated as wilderness. Although many MPAs and MRs prohibit consumptive activities such as fishing, non-consumptive uses such as diving, boating, and swimming are often permitted, and could presumably be permitted in marine wilderness areas as well. Managers of MPAs and those seeking to establish marine wilderness areas, therefore, may need to work diligently to counteract any public perceptions that such areas are a barrier to some recreation.

Although managers of Oregon's MRs are not seriously considering designating these areas as marine wilderness, such a change in designation could be considered in the future or in other locations. If this action were ever to be taken, it would be important to note that results here may inform how wilderness designation could alter attitudes. This study showed that attitudes would remain the same or experience slight positive change with wilderness designation. This "marine wilderness" designation and label, therefore, is unlikely to inspire major public backlash. The nature of relationships between values and attitudes toward the MRs would also likely remain unchanged if these areas were to be designated as marine wilderness, as both environmental protection and recreation values maintained similar relationships with general attitudes as they did with changes in attitudes from wilderness designation. That is, marine wilderness may be seen more as an extension of the protections and opportunities offered by an MR. Communication strategies used in the context of an MR that focus on environmental protection and attempt to mitigate concerns about impediments to recreation values could also potentially be effective for a marine wilderness area. Although statistically insignificant, potential positive relationships between emotional well-being and marine wilderness ($\beta = .14$, $p = .052$), as opposed to MRs ($\beta = -.03$, $p = .657$) opens the

possibility of managerial focus also on the personal benefits that can be gleaned from contact with marine wilderness areas.

Research implications

Although respondents differentiated among three broad categories of values described as environmental protection, emotional well-being, and recreation values, these categories were moderately correlated and respondents did not distinguish the full range of all value types (e.g., nonuse, indirect use, direct use, option, bequest) identified by theory (Jones et al. 2016; Krutilla 1967; Walsh, Loomis, and Gillman 1984). There was some overlap, however, between these theoretically-derived types of values and the value factors that emerged here. The environmental protection value factor, for example, had several values that would otherwise be described as nonuse (e.g., "foster a moral or ethical obligation to respect or protect nature or other living things," "provide a place of minimal human impact or intrusion into the natural environment") or indirect use (e.g., "protect nature to ensure human well-being or survival," "protect water quality"). The emotional well-being factor contained elements of direct (e.g., "provide opportunities to maintain or regain physical or mental health through contact with nature") and indirect use values (e.g., "provide spiritual inspiration"). Option and bequest values (e.g., "knowing that future generations will have MRs," "knowing that I will have the ability to visit MRs in the future") were distributed between the environmental protection and emotional well-being factors, and the recreation factor focused on direct uses for recreation and tourism. The positive correlations among these three broad categories of values are consistent with other research on assigned values showing that respondents who highly value some aspects of protected areas (e.g., environmental protection) also value other related aspects of these areas (e.g., emotional well-being, indirect, option, bequest values; Cordell, Bergstrom, and Bowker 2005; Cordell et al. 1998; Haas, Hermann, and Walsh 1986; Watson et al. 2016).

Rather than distinguishing among types, timing, or location of values (e.g., direct use [onsite, present] vs. indirect use [off-site, present or future]), respondents focused more on implications or outcomes of values. Respondents differentiated these outcomes as: (a) environmental health and protection, both for the sake of the environment and for humans (environmental protection values); (b) positive impacts to human emotional or cultural well-being (emotional well-being values); and (c) use of MPAs for recreation and tourism (recreation values). Respondents showed a strong preference for environmental protection values, whereas they rated emotional well-being and recreation values as less important. In other words, respondents did not consider values that confer benefits predominantly to humans (emotional well-being, recreation) as important as values more focused on protection and preservation of the natural environment (environmental protection), regardless of any incidental benefits to humans. This finding is consistent with other studies (e.g., Börger et al. 2014; Cordell et al. 1998; Voyer, Gollan, et al. 2015) showing the public now typically places less importance on direct uses of protected areas and human benefits from these uses than has been assumed in the past. Results also reflected past research suggesting that intrinsic values are, in many instances, considered among the most important (Winter and Lockwood 2005). For example,

the questionnaire item "protect marine species, water, or plants that have value even if humans do not benefit from them" was cited most frequently by respondents as the single most important value that Oregon's MRs could provide (Figure 1).

Results also supported theoretical relationships among values, general attitudes, and specific attitudes (Vaske and Donnelly 1999; Whittaker, Vaske, and Manfredo 2006). Consistent with theories such as the Cognitive Hierarchy (Fulton, Manfredo, and Lipscomb 1996; Homer and Kahle 1988; Vaske and Donnelly 1999; Whittaker, Vaske, and Manfredo 2006), values that people assigned for Oregon's MRs were related to their general attitudes toward these areas, and these attitudes were related to how specific attitudes would change with wilderness designation. People who placed importance on environmental protection values of the MRs were more likely to have positive attitudes toward these areas and specify positive attitude change with wilderness designation. Conversely, those who appreciated recreation values of the MRs were more likely to have negative attitudes toward these areas and specify negative attitude change with wilderness designation. It is possible that this negative relationship between recreation values and both general attitudes and changes in attitudes existed because both MRs and marine wilderness areas, given their emphasis on ecological protection, were seen as a constraint to recreation activities.

Although the Cognitive Hierarchy predicts the same relationships among cognitions (i.e., values, general attitudes, specific attitudes) as what was found in this study, general attitudes toward the MRs only partially mediated the relationship between assigned values and specific attitude change associated with possible wilderness designation. A portion of the relationship between specific attitude change and both environmental protection and recreation values existed independent from general attitudes toward the MRs. This is perhaps indicative of the special relationship that exists between Americans and the concept of wilderness, and the strong images and emotions that the term "wilderness" can evoke (Nash 2014). Regardless of general attitudes toward the MRs, specific attitudes associated with a possible change to "marine wilderness" had their own distinct associations with both environmental protection and recreation values.

The special place of wilderness is perhaps also demonstrated by the emotional well-being values. The potential relationship between these values and general attitudes was insignificant ($\beta = -.03$, $p = .657$), indicating that whether or not individuals feel it is important that these MRs provide emotional well-being has minimal bearing on their attitudes toward these areas, possibly indicating a belief that MRs will neither enhance nor impede the provision of emotional well-being values. In contrast, the potential relationship between emotional well-being values and changes in attitudes with wilderness designation was nearly statistically significant ($\beta = .14$, $p = .052$) and, in fact, basically as strong as the relationships that the other values had with attitude change. This suggests that respondents who rated emotional well-being values as important did not see MRs as more or less positive or negative. With wilderness designation, however, these respondents were somewhat more likely to experience positive attitude change, suggesting that a wilderness area, by virtue of this designation, could be more capable of providing the emotional well-being values they consider important. In the future when more marine wilderness areas are potentially designated, a direct comparison between

assigned values for a MR and those for a marine wilderness area might help to demonstrate whether this association between wilderness designation and environmental protection, emotional well-being, and recreation values indeed exists, or if other values are more salient to an MPA already designated as marine wilderness.

Results also showed that the value factors alone explained 42% of the variance in general attitudes toward Oregon's MRs, and these value factors coupled with general attitudes toward the MRs in Oregon collectively explained 22% of the variance in specific attitude change with potential wilderness designation of these areas. This suggests that other cognitions not measured here also shape these attitudes. Beliefs about whether or not MRs or marine wilderness areas actually provide values that are considered important should be studied, as beliefs are a foundation of attitudes (Fishbein and Ajzen 2010; Fulton, Manfredo, and Lipscomb 1996). Research has also shown that trust in managers is related to attitudes about MPAs, terrestrial wilderness, and other conservation actions (e.g., Perry, Needham, and Cramer 2017; Vaske, Absher, and Bright 2007), but this has yet to be demonstrated in the context of marine wilderness. Although results provide evidence for the utility of assigned values in the Cognitive Hierarchy, held values and value orientations are also related to attitudes (Vaske and Needham 2007; Whittaker, Vaske, and Manfredo 2006). Research should explore the interplay among held and assigned values for an MPA, and attitudes toward marine wilderness designation.

This article also adds to the relatively small body of literature empirically examining the idea of marine wilderness and is among the first to investigate the cognitions of a more general public concerning this designation (Johnston et al. 2019). Similar to the responses of managers and scientists studied by Barr and Kliskey (2014), results here showed that nonuse and intrinsic values of marine wilderness are important. However, respondents here placed more emphasis on values that protect or conserve the environment regardless of whether these were indirect use, direct use, or nonuse values. This article is also among the first to examine attitudes toward marine wilderness in the context of other cognitions. Although attitude change in response to potential marine wilderness designation is related to attitudes toward existing MPAs, wilderness designation has its own relationships with environmental protection, recreation, and perhaps eventually emotional well-being values. Future research should continue exploring how attitudes and values associated with marine wilderness differ from or relate to those for MPAs.

Conclusion

This article sheds light on public values and attitudes related to MPAs, and the potential designation of these areas as marine wilderness, by addressing some of the scientific and cultural uncertainty that, according to Sloan (2002), surrounds marine wilderness. Public appreciation of the environmental protection values of Oregon's MRs reflects broad societal trends away from uses of protected areas that solely benefit humans directly, such as recreation and emotional well-being values. Attitudes toward potential marine wilderness designation were related to these environmental protection values as well as, to a lesser extent, recreation values. This designation also appears to have a noteworthy, though statistically insignificant, relationship with values that foster

emotional well-being. Marine wilderness designation, then, is perhaps one way to tap into public support for the environmental protection and emotional benefits offered by protected areas in general and wilderness areas in particular. As ocean conditions decline, conservation designations such as MPAs and marine wilderness areas might be approaches to serve the most important values of the public and the marine ecosystems on which humans depend.

Notes

1. Principal components EFA with varimax rotation of all variables in this article (values, attitudes, attitude change) produced separate factors reflecting basically identical concepts, and all loadings were $\geq .40$. In addition, a single EFA without rotation with the number of factors fixed to one showed that the factor explained less than 50% of the variance. These approaches represent Harman single factor tests (Podsakoff et al. 2003) and suggest that common method variance or bias was generally absent.
2. Although there were some moderate correlations among these value factors (i.e., exogenous or independent concepts [Figure 2]), there was no evidence of multicollinearity with these value factors included in regressions with the variables measuring both attitudes toward Oregon's MRs in general and changes in attitudes with marine wilderness designation in particular, as the Variance Inflation Factors (VIF) were all ≤ 3.2 (Vaske 2019).

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