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## Nearshore Restoration in Puget Sound: Understanding Stakeholder Values and Potential Coalitions

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*Restoration of nearshore ecosystems presents many challenges for stakeholder involvement. Using surveys and interviews we examined stakeholder values, preferences, and potential coalitions surrounding nearshore restoration in the Whidbey sub-basin of Puget Sound. Most stakeholders in our study believe that Puget Sound nearshore problems are severe and urgent, and that it is worth investing in restoration. They do not agree on the causes of nearshore degradation, yet support stronger regulatory enforcement and increased public ownership as possible solutions to nearshore problems. Five potential stakeholder coalitions were identified based on shared values. These values reflect a varied spectrum of support for public sector solutions to nearshore problems and were labeled: No Government Intervention, Property Rights, Private Land Stewardship, Protect Undeveloped Areas, and Large Scale Restoration. The potential coalitions identified confirm the Advocacy Coalition Framework hypothesis that coalition members who share values do not necessarily share stakeholder demographics or preferences. This study demonstrates one method for understanding local stakeholders, and will help managers direct project resources, planning, and management, through reliance on both stakeholder and scientific input. In addition, managers can use information about stakeholder values and potential coalitions to more effectively frame communication products and stakeholder involvement activities.*

**Keywords** advocacy coalition framework, coastal restoration, restoration planning, stakeholder coalitions, stakeholder involvement

### Restoration in the Puget Sound Nearshore

Large-scale coastal restoration is an increasing trend, in response to loss of habitats and ecosystem services in increasingly developed coastal areas (Wilber et al. 2000; Steyer

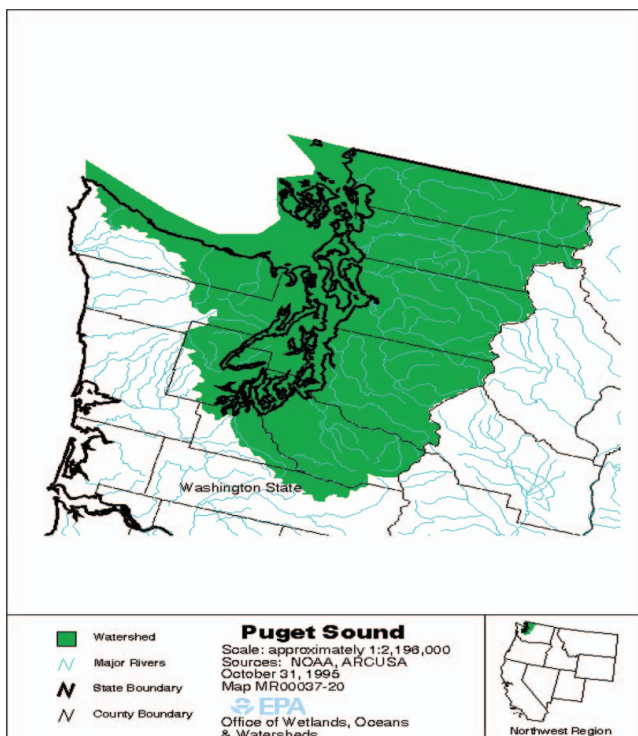
We thank the participants in our study for participating in the interviews and providing their insights on nearshore restoration. We also thank the anonymous reviewers who provided valuable comments that improved the article. The Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) provided partial funding for the study. The views expressed here are those of the authors alone.

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et al. 2003; Kareiva and Marvier 2007). Yet, restoration at large scales can be challenging. Although many of these challenges are scientific or technical (Cairns 1995; Van Cleave et al. 2004), there is growing recognition that public policy controversies are often driven more by value differences than by technical deficiencies (Weible 2007). With expanding coastal populations, and the poorly defined threat of climate change impacts in coastal areas, it is important to address social values and political concerns in the context of coastal restoration.

The “nearshore” is an ecotone, or transitional zone, between other major ecosystem types, including air, terrestrial, freshwater, and marine. The Puget Sound nearshore extends from the top of shoreline bluffs to the depth offshore where light penetrating the water no longer supports plant growth. It also extends upstream in estuaries to the head of tidal influence (PSNERP 2010). Many of the important and unique characteristics of Puget Sound (Figure 1) depend on the nearshore, including its high productivity, complex food webs, diverse habitats, and the great diversity of plants and animals that occupy these habitats (Kozloff 1973; Sound Science 2007). As the second-largest estuary system in the United States, Puget Sound supports more than 200 species of fish, including several native salmon species, and ten species of marine mammals (Gelfenbaum et al. 2006).

The 4,300 total miles of the Puget Sound nearshore provide many ecosystem services, which are direct or indirect benefits to human well-being from natural ecosystems (MEA 2005). Population growth and human development practices (e.g., diking, dredging, filling, armoring, and aquaculture) in the Puget Sound region have significantly altered the form



**Figure 1.** Puget Sound, including marine and watershed areas (color figure available online).  
 Source: <http://www.epa.gov/nep/programs/sheds/ps.gif>

and function of nearshore ecosystems. Changes in physical processes within the nearshore include depleted food and nutrient sources for marine life, deteriorating beach sediment movement, and altered flows of surface and groundwater. Changes to the freshwater portions of watersheds from activities such as agriculture and urban development have modified the quantity, quality, and timing of water, nutrients, woody debris, and sediments entering the nearshore. Chemical and nutrient inputs from commercial, industrial, and residential sources have also degraded water and sediment quality in many areas (Fresh et al. 2004).

Approximately 73% of the Puget Sound nearshore is privately owned (Trust for Public Land 2008). The remainder is managed by local, state, and federal government agencies as wildlife refuges, parks, historical reserves, and military forts. Governance of the nearshore is characterized by three key features: (1) management and regulatory responsibility for the nearshore is divided among cities, counties, tribes, and state and federal agencies; (2) in most cases, local government has substantial and primary authority for protecting shorelines, making state or federal intervention difficult even in cases where local government is not using its authority; and (3) limited understanding of the cumulative effects of many small nearshore modifications limits government agencies' ability to regulate and account for these effects (Broadhurst 1998). The relatively large percentage of privately owned land underscores the importance of effectively involving stakeholders in nearshore restoration throughout Puget Sound.

The Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) is a General Investigation study cost-shared between the U.S. Army Corps of Engineers and the Washington State Department of Fish and Wildlife. The project is designed to address the systemic problems affecting the Puget Sound nearshore through strategic restoration of nearshore ecosystem processes. PSNERP scientists and managers used comprehensive Change Analysis data to develop a Strategic Needs Assessment, which then became the basis for a set of eight restoration and protection objectives. Change Analysis suggested that nearshore ecosystems have been altered and degraded to such an extent that protection of intact areas alone would be insufficient to restore ecosystem processes throughout Puget Sound. PSNERP objectives are related to the strategic, Sound-wide, ecosystem process-based approach that the project's Science Team expects will be most effective in restoring the Puget Sound nearshore and its associated wildlife and ecosystem services (Fresh et al. 2004). The Army Corps of Engineers and the Washington Department of Fish and Wildlife have formal decision making authority for the PSNERP program.

This article presents results from an exploratory study of stakeholder values and preferences regarding restoration goals and strategies in the Whidbey sub-basin region of Puget Sound. Stakeholders are groups or individuals who may affect, or be affected by, a policy or management decision. Understanding stakeholder values and preferences is critical for effective coastal restoration planning and communication.

### ***Stakeholder Involvement in Restoration Planning***

A variety of social challenges are associated with large-scale ecosystem restoration (Berghofer, Wittmer, and Rauschmayer 2008). One challenge is that restoration requires value judgments, but traditional democratic structures do not correspond to the complexity and site-specificity such judgments warrant. In addition, an ecosystem approach is only precise at abstract levels and rarely provides concrete goals, policies, or structures (Berghofer, Wittmer, and Rauschmayer 2008). Given the complex interactions of social-ecological systems, climate change, and other uncertainties over large spatial and temporal scales,

restoration projects pose, but cannot always clearly answer, the question of what kind of system to restore or maintain (Harris et al. 2006).

Defining and assessing the probability of success, given multiple issues at the site and landscape scales, also presents challenges (Cairns 1995; NRC 2003). For example, success is often described as re-establishing a “healthy” ecosystem or restoring ecosystem “integrity” (Davis and Slobodkin 2004). These terms are frequently ascribed by scientists, and may seem vague or value-laden to stakeholders. Such terms tend to ignore the ways that social values interact with ecological theories, and ultimately affect restoration (Zweig and Kitchens 2010).

Successful ecosystem restoration requires that restored sites ultimately become self-sustaining and resilient to normal and catastrophic disturbances (SERI 2004; Hughes et al. 2005). Yet, resilience of ecological systems is linked with that of human systems. Linked social–ecological systems act as complex adaptive systems in which human economies, institutions, and policy decisions account for much of the success or failure of restoration (Costanza et al. 2001; Janssen, Anderies, and Walker 2004; Waltner-Toews and Kay 2005). Understanding social values attached to nearshore ecosystem restoration is critical to both defining and achieving restoration success.

There is little to no information currently available about the values and preferences of stakeholders in the Puget Sound region (Stinchfield, Koontz, and Sexton 2009). Most of the existing research focuses on stakeholder demographics, and these have been shown to be relatively weak predictors of environmental attitudes and behaviors (Dietz, Stern, and Guagnano 1998; Mertig and Dunlap 2001). Values tend to be better predictors of environmental attitudes and behavior than demographics (Kollmuss and Agyeman 2002; Teel et al. 2005). Ecosystem restoration projects have traditionally been relatively small and local. As such, they are usually “bottom-up” projects, developed and led by those most affected by their outcomes. Such projects are also typically opportunistic, meaning that restoration sites and actions are chosen because they are geographically proximate, affordable, or have willing landowner participants. Stakeholder involvement in smaller or more local restoration projects generally consists of project development by stakeholders, and recruitment of volunteers to conduct much of the actual restoration work. The local volunteer base participating in such restoration projects helps to continually infuse stakeholder input into decision-making about the projects (Gold et al. 2006).

The PSNERP program operates on a much larger scale, with a more formal, “top-down” organizational approach. Restoration sites and actions will be selected throughout Puget Sound and coordinated by government agencies. The intent of the PSNERP program is to conduct “strategic” restoration, focusing on areas with the greatest need, potential for recovery, and capacity to address outstanding scientific questions. Therefore, involving stakeholders will require an approach that meshes “bottom-up” input with “top-down” authority, producing the greatest possible social and environmental benefits (Throop 2000).

Stakeholder involvement can provide critical legitimacy and support for large-scale restoration projects, and agencies are urged to involve stakeholders in decision-making by providing information, dealing with conflict, and encouraging adaptation and change (Brunner et al. 2005; Dietz, Ostrom, and Stern 2003). However, limited planning budgets and timeframes often constrain the scope of stakeholder involvement (Stinchfield, Koontz, and Sexton 2009). Stakeholder involvement efforts may meet with resistance if they begin with pre-determined scientific definitions of environmental problems and solutions. Therefore, stakeholders should help to define environmental problems and devise questions to be resolved by adaptive management along with the scientists involved in a project (Lee 1999).

In practice, stakeholders are rarely involved at the beginning of an environmental management or restoration process. Often, stakeholder involvement may not be sought until near the end of a project's scoping phase. At this point, stakeholders may be simply asked to review one or more pre-determined options. Unfortunately, involving stakeholders this late in the process can prove to be expensive, both financially and politically, as new and important issues may be raised too late to be easily resolved (Johnson and Dagg 2003).

Restoration of the Puget Sound nearshore presents a unique opportunity to investigate stakeholder input in the "middle stage" of a restoration process—after scientific problem definition, but *before* the development of specific restoration options. PSNERP plans to restore nearshore ecosystems in the Whidbey sub-basin and six other sub-basins throughout Puget Sound, requiring input and support from stakeholders to ensure that the projects are relevant and successful. The results of the exploratory study reported here illuminate the values and preferences of stakeholders in the Whidbey sub-basin, with the goal of assisting the PSNERP program improve its site selection and stakeholder outreach efforts there. While our results reflect the Whidbey sub-basin, a similar approach for understanding local stakeholder values and preferences could be used in other rural estuarine basin systems.

### *Understanding Stakeholder Coalitions*

A coalition is an alliance of individual or organizational stakeholders that comes together to address a specific problem or issue and achieve common goals. Goals that focus on system-wide changes and collaborations and require a variety of expertise (such as restoration) are particularly well suited for coalitions to emerge. For a coalition to be successful, it must be able to achieve goals and objectives that its individual stakeholders would benefit from but would not be able to achieve on their own. Otherwise, its stakeholders would not be willing to invest the time and effort to participate in the coalition.

The Advocacy Coalition Framework (ACF) identifies beliefs as the causal driver for political behavior (Weible, Sabatier, and McQueen 2009), and proposes a hierarchical model of individual policy actors' (stakeholders') beliefs. The most immutable are called "deep core" beliefs, and the most changeable are called "secondary" beliefs. Mid-level beliefs, called "policy core" beliefs are those around which groups called "advocacy coalitions" tend to form. The framework suggests that stakeholders form coalitions around shared values (policy core beliefs), despite differences in preferences (secondary beliefs). These coalitions are expected to cross traditional stakeholder categories (Weible, Sabatier, and McQueen 2009).

Policy core beliefs can be normative and empirical. They are somewhat resistant to change, but much more pliable than deep core beliefs. Policy core beliefs include perspectives on the severity, causes, and potential solutions of problems (Sabatier and Weible 2007). Advocacy coalitions consist of "people from a variety of positions . . . who share a particular belief system—that is, a set of basic values, causal assumptions, and problem perceptions—and who show a non-trivial degree of coordinated activity over time" (Sabatier 1993, 25). The ACF has traditionally been used to identify the beliefs and membership of established coalitions. Most studies that apply ACF hypotheses examine policy processes in their latter stages, when advocacy coalitions have already formed (Weible, Sabatier, and McQueen 2009). However, Weible advocates ACF's greater use as a policy analysis tool (2007). Our study responds to this call, as it is situated in the middle stage of a policy process, and seeks to identify the types of coalitions that *may* form in the future in this subsystem. We used the ACF to frame an in-depth analysis of stakeholder

beliefs and potential coalitions in the Whidbey Sub-basin, focused on stakeholders' values (policy core beliefs) and preferences (secondary beliefs).

It is important for PSNERP decision makers to elicit and understand values and preferences that its stakeholders may share, and those that may prove contentious. The PSNERP program can use information about values and potential coalitions to frame communication products and stakeholder involvement activities that are more effective and less inflammatory (Laessoe 2007; Lakoff 1995). Little to no work has been done to identify Puget Sound nearshore stakeholders or their beliefs. Our exploratory study was designed to specifically address PSNERP's Whidbey sub-basin stakeholder input needs as an initial scoping of beliefs and potential coalitions. We focused on two specific research questions: (1) What are Whidbey sub-basin stakeholder values and preferences; and (2) Around what shared values might coalitions of stakeholders form? Using survey and interview data, we examined respondents' values and preferences, and grouped respondents into potential coalitions.

### **Research Methods**

A purposive (non-random) sampling methodology was chosen in order to focus in-depth on the subgroups of interest in our exploratory study, and to examine a heterogeneous target group reflecting the breadth of stakeholders (Patton 2002). Three to four respondents from each of 12 stakeholder categories were sampled. Stakeholder categories were identified from previous research (Iceland, Hanson, and Lewis 2008), conversations with PSNERP Science Team members, and Internet research. The stakeholders sampled represented an "attentive public" with an explicit stake in Puget Sound nearshore restoration. Our findings apply only to the Whidbey sub-basin area, and should not be generalized to the larger Puget Sound population. However, our method for understanding local stakeholder beliefs and preferences could be applied in similar settings, in order to help develop truly diverse focus groups (if the goal is negotiation of key decision points), or to devise surveys (if the goal is a breadth of information on stakeholder opinions).

The 12 stakeholder categories included: agriculture; aquaculture; development and home-building; environmental; fishing (recreational and commercial); governments; historical societies; nearshore homeowners; ports and marinas; recreation; tourism; and tribes. Agriculture, development, recreation, and tourism are major components of the nearshore economy in the Whidbey sub-basin. Agricultural stakeholders have opposed some past restoration projects in the area, while development stakeholders have opposed mitigation requirements (which often prompt restoration efforts). Environmental stakeholders included a small advocacy organization, a land trust, and an extension program for beach volunteers. The fishing category included representation from recreational, commercial, and fishery enhancement groups. Government representatives were from the state, county, and local level. Emailed requests to groups for interviews requested a reply from a representative of their choice. Typically, a senior-level individual within the group was interviewed, such as the Executive Director, Program Manager, or business owner.

All 38 respondents completed a short survey and an interview, both of which were pre-tested with similar respondents from Puget Sound nearshore areas not included in our sample. Surveys contained 20 scaled questions focused on values that may become "policy core" beliefs: beliefs about the severity of nearshore problems; beliefs about major types of nearshore problems; beliefs about the causes of nearshore problems; beliefs about potential solutions to nearshore problems; and beliefs about priorities for the nearshore environment. Three of these (severity, causes, and potential solutions to problems), are typical values

around which advocacy coalitions form (Sabatier 2007). The other two (types of problems and priorities for the nearshore) are important considerations for PSNERP managers as they continue their restoration planning and communication.

Interviews consisted of four to five open-ended questions focusing on aesthetic preferences, a vision for the future of the nearshore, ideas about ecosystem services, and beliefs about the role of science in restoration. Interview responses were transcribed and analyzed using content analysis, looking for patterns of responses and major themes (Patton 2002). A coding framework was developed and used to code and analyze the interview data by sorting codes into thematic groups (Rubin and Rubin 2005). This process also enabled examination of potential groups of respondents based on shared values.

Survey responses provided an opportunity to cluster respondents based on quantitative data, and the cluster analysis technique allowed us to analyze survey data for groups of stakeholders who responded similarly to the 20 scaled survey questions. Cluster analysis is an exploratory data analysis procedure that helps organize a sample into relatively homogenous groups (Aldenderfer and Blashfield 1984). The technique sorts different objects, variables, and/or people into groups in a way that the degree of association between two people (for purposes of our study) is maximal if they belong to the same group and minimal otherwise. The primary use for cluster analysis is to find groups of similar entities in a sample of data (Aldenderfer and Blashfield 1984). Cluster analysis can be used to discover structures in data without providing an explanation or interpretation, and it is especially suited for small sample sizes, which was the case for this study. We used a k-means, or iterative partitioning approach because it efficiently organizes small samples (in this case, 38 respondents and 20 variables). Unlike many other statistical procedures, cluster analysis methods are often used when researchers are not seeking to test hypotheses, but are still in the exploratory phase of research. Therefore, statistical significance testing is not appropriate, even in cases when  $p$ -levels are reported (as in k-means clustering). The clustering algorithms result in multiple “solutions” for potential groupings, and the researcher selects groupings based on defined similarity rules. We draw no generalized conclusions directly from the cluster analysis. Rather, we validated groups suggested by cluster analysis using qualitative analysis. Our goal was not to identify general trends in belief of all PSNERP stakeholders, but to identify potential patterns of stakeholder beliefs in a particular area to guide further PSNERP stakeholder involvement activities.

## Findings—Understanding Stakeholder Values

### *Beliefs about Severity and Types of Problems in the Puget Sound Nearshore*

The survey asked respondents to rank their level of agreement with statements about the severity and types of problems in Puget Sound (Table 1). Just over half of our respondents *disagree* that environmental quality of the Puget Sound nearshore is high (52.6%). More agree that it is worth investing money in nearshore restoration (92%), and think investing in restoration is important for future generations’ quality of life (95%). This contrasts with a previous study in which just 21% of respondents rated the environmental condition of waters in and around Puget Sound negatively, and only 39% thought there was a strong urgency to clean up and protect Puget Sound waters (FMMA 2008). It is possible that our study included a more-informed sample of respondents than the FMMA study, or that attitudes have changed given a few years of investment in public education and outreach about Puget Sound.



**Table 1**  
Beliefs about the severity and types of problems in the Puget Sound Nearshore

<i>Indicate your agreement with the following statements about the severity and types of problems in the Puget Sound shoreline</i>	Mean	Std. dev.	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
It is important to restore the Puget Sound shoreline so future generations can have a high quality of life ( <i>n</i> = 38)	4.45	0.69	0.0%	2.6%	2.6%	42.1%	52.6%
It is important to spend money to restore the Puget Sound shoreline ( <i>n</i> = 37)	4.30	0.70	0.0%	2.7%	5.4%	51.4%	40.5%
The environmental quality of the Puget Sound shoreline is high ( <i>n</i> = 38)	2.79	1.21	10.5%	42.1%	15.8%	21.1%	10.5%
Pollution is one of the biggest environmental problems in the Puget Sound shoreline ( <i>n</i> = 36)	4.00	0.99	0.0%	8.3%	22.2%	30.6%	38.9%
Too much human development is one of the biggest environmental problems in the Puget Sound shoreline ( <i>n</i> = 38)	3.92	1.12	2.6%	13.2%	10.5%	36.8%	36.8%
Loss of wildlife habitat is one of the biggest environmental problems in the Puget Sound shoreline ( <i>n</i> = 38)	3.87	0.91	0.0%	7.9%	23.7%	42.1%	26.3%
Fewer fish and shellfish available for harvest is one of the biggest environmental problems in the Puget Sound shoreline ( <i>n</i> = 37)	3.73	0.99	0.0%	10.5%	31.6%	28.9%	26.3%

While mean agreement was highest about *pollution* as a major problem, responses were more mixed about other environmental problems. This is an important finding because the PSNERP Science Team would likely agree most with the statement that “*too much human development* is one of the biggest problems.” The PSNERP program proposes to remove stressors in the nearshore to restore nearshore ecosystem processes. Removing stressors may indirectly promote wildlife habitat and water quality, but PSNERP managers will not measure program benefits in terms of habitat value or a reduction in pollution. Instead, PSNERP managers are using ecosystem services as their key benefit metric. Therefore, it is important that the concept of ecosystem services resonates with, and is well understood by, stakeholders.

Interview responses generally supported respondents’ beliefs that pollution is a major problem in the nearshore. Twenty-one respondents stated that water quality and pollution are central concerns, and five mentioned septic systems as a major issue. Respondents also frequently mentioned wildlife habitat as a major issue.

### ***Beliefs about Causes of and Solutions to Problems in the Puget Sound Nearshore***

The survey data indicates variation among respondents’ beliefs about the causes of and solutions to nearshore problems (Table 2). At least half of respondents agreed with each of the listed causes. Respondents more commonly blamed industrial activity for degradation than government mismanagement or private ownership and development. This may reflect the framing of environmental problems from a previous era, in which water quality was the central issue and point-source pollution was the major cause.

In interviews, the idea that private ownership and development are a major cause of nearshore environmental problems was often mentioned. Five respondents stated that private ownership of tidelands is a problem, and four thought that shoreline landowners are generally unaware of the effects of their land use choices. Six respondents stated that people regularly ignore or circumvent regulations. Nine respondents thought that farms in the nearshore are problematic because of their contribution of pollutants to the environment.

On the topic of government management, four respondents stated that governments are poor environmental managers. Yet, a majority of respondents supported stronger regulatory enforcement and increased public ownership as solutions to nearshore problems. Very few supported increased property rights. Seven respondents indicated that user groups often act selfishly (typically referring to recreational hunters, nearshore homeowners, or sport fishers).

### ***Beliefs about Priorities for the Puget Sound Nearshore***

The respondents in our study agree that maintaining both aesthetic beauty and traditional industries are important priorities for the nearshore (Table 3).

In interviews, respondents mentioned several priorities not included in the surveys. Nine respondents mentioned that they enjoy the scenic views in nearshore environments, and eleven said they value seeing and spending time in undeveloped areas. Five respondents cited wetlands as a priority. Recreation was important to many; 26 respondents mentioned interacting with Puget Sound shorelines recreationally. Nine respondents described some sort of mixed-use mosaic vision of the future nearshore, composed of habitat, recreation, and economic production.

**Table 2**  
Beliefs about the causes of and solutions to problems in the Puget Sound Nearshore

<i>Indicate your agreement with the following statements about the causes of and solutions to problems in the Puget Sound shoreline</i>	Mean	Std. dev.	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Industrial activity is a major cause of environmental problems in the Puget Sound shoreline ( <i>n</i> = 38)	3.55	0.92	0.0%	15.8%	26.3%	44.7%	13.2%
Mismanagement by government agencies is a major cause of environmental problems in the Puget Sound shoreline ( <i>n</i> = 38)	3.47	0.92	0.0%	15.8%	34.2%	36.8%	13.2%
Private ownership and development is a major cause of environmental problems in the Puget Sound shoreline ( <i>n</i> = 37)	3.43	1.24	8.1%	16.2%	21.6%	32.4%	21.6%
Stronger enforcement of existing regulations is a good way to improve the environmental quality of the Puget Sound shoreline ( <i>n</i> = 38)	3.84	0.89	0.0%	10.5%	15.8%	52.6%	21.1%
Increased public ownership is a good way to improve the environmental quality of the Puget Sound shoreline ( <i>n</i> = 38)	3.58	0.89	0.0%	10.5%	36.8%	36.8%	15.8%
Allocating resources like fishing rights and land rights more fairly is a good way to improve the environmental quality of the Puget Sound shoreline ( <i>n</i> = 38)	2.95	0.80	2.6%	23.7%	52.6%	18.4%	2.6%
Increasing private property rights is a good way to improve the environmental quality of the Puget Sound shoreline ( <i>n</i> = 38)	2.21	0.96	26.3%	36.8%	26.3%	10.5%	0.0%

**Table 3**  
Beliefs about priorities for the Puget Sound Nearshore

<i>Indicate your agreement with the following statements about priorities for the Puget Sound shoreline</i>	Mean	Std. dev.	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
It is important to maintain the aesthetic beauty of the Puget Sound shoreline ( <i>n</i> = 38)	4.24	0.63	0.0%	0.0%	10.5%	55.3%	34.2%
It is important to maintain the traditional industries of Puget Sound, like commercial fishing, aquaculture, and shipping ports ( <i>n</i> = 38)	4.13	0.67	0.0%	2.6%	7.9%	63.2%	26.3%
It is important to increase the number of places for the public to engage in recreation activities along the Puget Sound shoreline ( <i>n</i> = 38)	3.74	1.00	2.6%	10.5%	18.4%	47.4%	21.1%
It is important to promote tourism in the Puget Sound shoreline ( <i>n</i> = 38)	3.61	0.86	0.0%	10.5%	31.6%	44.7%	13.2%
It is important to maintain farmland along the Puget Sound shoreline ( <i>n</i> = 37)	3.59	0.93	2.7%	5.4%	37.8%	37.8%	16.2%
It is important to keep costs low to preserve businesses in the Puget Sound shoreline ( <i>n</i> = 38)	3.18	0.96	5.3%	13.2%	47.4%	26.3%	7.9%

**Table 4**  
Iterations in cluster analysis with five clusters

Iteration history*					
Change in Cluster Centers					
Iteration	1	2	3	4	5
1	3.240	2.966	2.958	3.097	3.391
2	.402	.458	.000	.426	.000
3	.000	.542	.000	.246	.000
4	.000	.000	.000	.000	.000

\*Convergence achieved due to no or small change in cluster centers. The maximum absolute coordinate change for any center is .000. The current iteration is 4. The minimum distance between initial centers is 6.083.

### *Identifying Potential Coalitions*

We identified potential stakeholder coalitions by first examining the values expressed in survey responses. Cluster analysis of the survey responses yielded 5 clusters, or groups of respondents, whose shared values differentiated them from the other groups (Table 4). K-means clustering requires the pre-determination of the number of clusters into which to sort the data. Of the scenarios that produced low  $p$ -values for most variables, five clusters proved optimal.

The five potential coalitions were labeled after inspection and analysis of the mean responses to the survey questions, as well as corresponding interview data (Table 5). Mean responses shaded and in bold are those that differentiate a group, or potential coalition, from other groups in terms of divergent values. Higher  $p$ -values indicate variables for which the differences between groups are less significant. The potential coalitions we identified and labeled are ordered from left to right based on their relative support for public sector solutions to nearshore problems. Although the potential coalitions differ on a number of factors, the label applied to each is based on the group's shared vision for the Puget Sound nearshore, supported by survey response data and statements made by respondents in interviews.

Understanding potential stakeholder coalitions in the Whidbey sub-basin, as well as other estuarine systems, can help PSNERP decision makers develop restoration goals and plans for that region. With information about the ways that different groups may frame issues, PSNERP managers can communicate scientific findings and plans in ways that are more likely to be perceived as neutral. They can also use this information to seek participation from an effectively diverse group of stakeholders. If potential coalitions can reflect the breadth of stakeholder views more comprehensively than categories like "environmental" or "agriculture," PSNERP managers can ensure broader input by targeting their efforts toward potential coalitions, *in addition to* specific stakeholder or stakeholder groups. Below we describe each potential coalition and their values and visions related to the Puget Sound nearshore.

*Potential Coalition 1: "No Government Intervention"—Government Intervention is the Problem and Deregulation is the Solution.* Members of this potential coalition focus on the inability of government to successfully manage the environment, yet acknowledge that

**Table 5**  
Average mean response to survey questions by coalition

Survey statement	Group 1 mean response. No government	Group 2 mean response. Property rights	Group 3 mean response. Private land stewardship	Group 4 mean response. Protect undeveloped areas	Group 5 mean response. Large scale restoration	P value
The environmental quality of the Puget Sound shoreline is high	4	4	4	3	<b>2</b>	.000
It is important to spend money to restore the Puget Sound shoreline	5	<b>3</b>	4	4	5	.000
It is important to restore the Puget Sound shoreline so future generations can have a high quality of life	4	<b>3</b>	4	5	5	.001
Pollution is one of the biggest environmental problems in the Puget Sound shoreline	5	<b>3</b>	4	4	5	.001
Loss of wildlife habitat is one of the biggest environmental problems in the Puget Sound shoreline	3	3	4	4	<b>5</b>	.000
Too much human development is one of the biggest environmental problems in the Puget Sound shoreline	2	2	<b>5</b>	4	4	.000
Private ownership and development is a major cause of environmental problems in the Puget Sound shoreline	2	2	4	3	<b>5</b>	.000
Increasing private property rights is a good way to improve the environmental quality of the Puget Sound shoreline	3	<b>4</b>	3	2	2	.000
Increased public ownership is a good way to improve the environmental quality of the Puget Sound shoreline	<b>2</b>	4	3	4	4	.017
Allocating resources like fishing rights and land rights more fairly is a good way to improve the environmental quality of the Puget Sound shoreline	3	<b>4</b>	3	3	3	.091
It is important to maintain the aesthetic beauty of the Puget Sound shoreline	4	4	4	4	<b>5</b>	.053
<b># of members per group</b>	<b>2</b>	<b>4</b>	<b>6</b>	<b>9</b>	<b>13</b>	

there are some environmental problems in the nearshore requiring attention. They believe nearshore environmental quality is high, but support spending money on restoration. They disagree that habitat loss and excessive development are major problems, but strongly agree that pollution is a problem. This group disagrees that private ownership is a cause of nearshore problems, and that increased public ownership is a good solution. Yet, they were ambivalent about increasing private property rights. In terms of nearshore priorities, this potential coalition values traditional industries and farmland most highly, and public recreation areas least. Members of this group were from the property rights and tourism stakeholder categories.

Interview data for these respondents indicates a dislike for government regulation and a belief that governments are poor environmental managers. Both stated that the priorities of governments change with funding, which means that stated goals are rarely accomplished. Both members believe the scientific community is largely focused on maintaining its own funding, and they are generally skeptical of science. Both see erosion as problematic (not as a natural ecosystem process), and are concerned about the unintended consequences of restoration. Finally, these respondents mentioned the importance of maintaining commerce and local wealth in order to preserve the tax base.

*Potential Coalition 2: "Property Rights and Development"—Private Ownership and Development of Puget Sound is Not a Problem; Environmental Quality is Fine.* Members of this potential coalition do not believe there is a problem with nearshore environmental quality, and do not support investing in restoration. They are the only group supportive of increasing private property rights and reallocating resources as solutions to nearshore problems. More than other potential coalitions, they disagree that there is a lack of fish and shellfish for harvest, and that pollution or excessive development are major problems. Members agree that industrial activity is a cause of nearshore problems, but disagree that private ownership and development is a cause. They particularly emphasized maintaining traditional industries. Members of this group were from the Development, Homeowner, and Recreation stakeholder categories.

In interviews, half of the members of this potential coalition mentioned an interest in cultural and natural history. Half stated that restoration sounds like "going backward," which is impossible. Two stated that human needs should take precedence over wildlife, and suggested simply concentrating nearshore degradation in certain areas. Two stated the importance of property owners being allowed to use their land in "reasonable ways," and that industrial areas can be mixed with public access.

*Potential Coalition 3: "Private Land Stewardship"—Private Landowners are Good Environmental Stewards; We Can Use Natural Resources Sustainably.* Members of this potential coalition emphasize excessive development as the major problem affecting the nearshore. They agree that the environmental quality of the nearshore is high, but support restoration. Members of this group agree with all of the proposed causes of nearshore problems, but only agree with stronger regulatory enforcement as a solution. They support all shoreline priorities, but strongly agree only with the need to maintain farmland. Members of this group were from the Agriculture, Aquaculture, Government, and Recreation stakeholder categories.

In interviews, members of this potential coalition frequently stated that natural resources should be sustainably used. Their favorite places are ones with which they have a long history of personal involvement. Half of this group's respondents mentioned houses right on the shoreline as a major problem, but many thought there were opportunities to

remove shoreline armoring. More than any other potential coalition, members of this one: think policies like the Endangered Species Act, and No Net Loss of Wetlands have failed to achieve their stated goals; have a personal desire to see wildlife; and wish to preserve bird habitat.

Respondents in this group perceived degradation of the nearshore as an ongoing trend, and restoration as something that should not be put on hold in the interest of further study. They thought the role of science should be monitoring outcomes. Two respondents (and none from any other group) questioned how we know if restoration is successful. Members of this group had strong opinions about farmland—two mentioned that farms get unfairly targeted for restoration because they have large tracts of land, and suggested that only unproductive farmland should be sacrificed to non-farming uses. Half of the respondents in this potential coalition stated that it is important to focus on different functions in different parts of the landscape. Members of this group, more than others, suggested that new bio-engineered solutions will be important in addressing nearshore problems. Two-thirds of this group stated that landowners can be good environmental stewards, and one-third thought incentives and recognition for good stewards are important.

*Potential Coalition 4: “Protect Undeveloped Areas”—The Public Sector Should Protect Undeveloped Areas of the Nearshore.* Members of this potential coalition agree that there are some problems with the nearshore that can be resolved through government intervention. However, they are mostly supportive of environmental protection and less confident about the benefits of restoration. In survey data, these respondents were ambivalent about nearshore environmental quality, but somewhat supportive of restoration. They were also ambivalent about the causes of nearshore problems, but supported regulatory and public ownership solutions over private property rights. They value both traditional industries and aesthetic beauty as priorities. Members of this group came from 7 of the 12 stakeholder categories.

In interviews four of five respondents stated that they value seeing and spending time in undeveloped areas. Respondents frequently mentioned interacting with Puget Sound shorelines by walking, and having a personal connection to beaches. This group was not confident that restoration is effective. Four of nine respondents in this potential coalition made some version of the statement that the built environment cannot become pristine. Seven respondents identified houses right on the shoreline as a major problem. They consistently stated that shoreline armoring is a major problem, and that buffers and setbacks are good solutions. They also stated that people tend to ignore and circumvent regulations, and that user groups tend to be selfish. Three members of this group stated that recreation can be environmentally harmful.

Members of this potential coalition frequently mentioned the need to consider habitat value, and especially salmon, in restoration planning. Nearly half of the respondents stated that “good science” is needed to justify environmental decisions. A key feature of this potential coalition is that they believe that it is more important to manage the impacts of stressors in the nearshore than to remove stressors (PSNERP scientists would disagree).

*Potential Coalition 5: “Large-Scale Restoration”—Puget Sound Nearshore Environmental Problems are Severe; the Public Sector Can and Should Fix Them Through a Major Restoration Effort.* Members of this potential coalition are strongly convinced of nearshore problems, and they support public sector solutions. They seem more convinced of the benefits of restoration and less focused on protection of the nearshore than the Protect Undeveloped Areas group. Survey responses indicate that they disagree more than other



groups that the nearshore has high environmental quality, and agree more than others that lack of wildlife habitat is a major problem. Members are most likely to: see private ownership and development as major causes of nearshore problems; agree with increasing public ownership and regulatory enforcement as solutions; and disagree with increasing private property rights. They strongly agree with aesthetic beauty as a priority for the nearshore, and agree that tourism and recreation are important. Seven of the 12 stakeholder categories were represented in this group.

Respondents in this group consistently mentioned in interviews that they value the nearshore for the dynamic and complex ecotone that it represents. More than any other group, they are convinced that manmade or developed places can become natural. Eight respondents see shoreline armoring as a major problem, but four thought that “softer solutions” are a good way to undo armoring. Five respondents thought habitat value should be a central consideration in restoration planning. More than any other group, members cited ecosystem processes and functions as key goals of nearshore restoration. They overwhelmingly stated a preference for large-scale restoration projects, and specifically mentioned key components of healthy nearshore ecosystems, including eelgrass and other native vegetation, feeder bluffs, and protection of wetlands. Members consistently mentioned the importance of educating landowners and the public to become better environmental stewards. They also stated that it is important to provide recreation and public access in the nearshore.

*Stakeholder Categories and Preferences within Potential Coalitions.* The potential coalitions identified in this study support the ACF hypothesis that coalition members who share values do not necessarily share demographics or preferences. For example, two respondents from the same organization gave radically different survey and interview responses, and were thus clustered into different coalitions. In addition, there was noticeable variation among individual coalition members in terms of preferences. Individual responses to some survey questions were widely different within each coalition. For example, within the Large-Scale Restoration coalition, responses ranged from “strongly disagree” to “agree” on the statement: “It is important to maintain farmland along the Puget Sound shoreline.” Likewise, members of the Private Land Stewardship coalition had very mixed ideas about the importance of promoting tourism. For these coalitions, such beliefs may reflect individual preferences rather than organizing values. Also, the potential coalitions identified through cluster analysis (and supported by interview data), are each made up of multiple categories of stakeholders with diverse demographic backgrounds.

As the issue of large-scale, top-down nearshore restoration evolves in Puget Sound, coalitions of Whidbey sub-basin stakeholders may form around shared values similar to the ones that are identified here. However, factors not considered in this research (political opportunities, finances) will be important in determining the actual structures and values of future coalitions (Weible and Sabatier 2009). Coalitions of stakeholders are dynamic and created based on not just shared values, but the ability to coordinate over time. The potential coalitions we identified are not composed of people who know each other, and we do not suggest that these specific individuals, or the organizations they represent, will necessarily form advocacy coalitions. Yet, the identification of *potential* coalitions with shared values offers PSNERP managers an opportunity to better understand the breadth of value systems, and more effectively tailor their stakeholder involvement activities, outreach efforts, and communication materials.

## Translating Science About Stakeholders into Coastal Restoration Policy

This research is situated within the broader management question, “How can an agency effectively involve stakeholders in the middle stage of a large-scale coastal restoration effort?” Our findings suggest several responses. First, collaborating at a high level is important. PSNERP managers have consistently involved large nonprofit organizations, state and federal agencies, county governments, and research scientists in their planning process. As such, they have formulated a restoration proposal that reflects the interests of those higher level stakeholders. This group of highly involved stakeholders has also helped PSNERP managers consider some of the concerns of less-involved stakeholder groups.

Second, our findings reflect the limited investment that the PSNERP program has made in outreach to local level stakeholders. Aside from three sparsely attended NEPA scoping meetings and a very simple website, the PSNERP program has conducted little public outreach. Many of the respondents in our study seemed unfamiliar with nearshore issues, degradation of ecosystem processes, and impairment of ecosystem services. In short, they were not aware of the PSNERP program’s problem definition, and had not heard about proposed PSNERP restoration solutions. Instead, respondents were focused on issues of wildlife, pollution, and managing impacts of ecosystem stressors (not removing them). For a project at the Puget Sound-wide scale to be successful, local level stakeholders should be aware of and support the proposed restoration project and its goals. This is particularly important due to the large amount of public funding that the PSNERP program intends to use for nearshore restoration. At this stage, involvement of more invested stakeholders, such as those who participated in our study, should focus on verifying site selection methods and criteria, as well as restoration objectives and methods. Restoration sites will be the visible product of the PSNERP program’s actions and expenditures. Obtaining the early input and support of all key stakeholder groups could improve overall support for and acceptance of restoration sites and goals.

Our exploratory study indicates that the PSNERP program’s stakeholder community is quite complex, and that assumptions about how certain stakeholders think are likely false or at least insufficient. The five potential coalitions identified, along with their survey and interview responses, suggest that most Whidbey sub-basin stakeholders consider themselves “environmental” to some extent, but also practical and fiscally responsible. Their definitions of this vary, especially in terms of how they frame issues of stewardship, regulation, and science. Working with diverse stakeholders requires ongoing two-way communication. Stakeholders should have ample opportunity to provide input and to know how their input will shape decision-making (Brunner 2005).

Understanding potential coalitions provides PSNERP managers and scientists a number of opportunities. First, it creates an opening for targeted outreach. Some groups were noticeably well-aligned with PSNERP than others in terms of their definitions of nearshore degradation and restoration. PSNERP can use information about potential coalitions’ different levels of understanding, as well as different values, to create specialized outreach materials and presentations. For example, some individuals, and one potential coalition, focused on water quality, and did not perceive development as a problem. A carefully neutral presentation of the problems with various nearshore stressors may be effective in working with these groups (Maharik and Fischhoff 1993). Another example is the Private Land Stewardship coalition, whose members suggested that farmland is important, and unfairly targeted in restoration efforts. They also questioned past regulatory efforts such as the Endangered Species Act. Outreach to individuals or organizations whose values align with this group should focus on efforts to harmonize farming activities and restoration.

Second, understanding potential coalitions allows restoration programs to better involve the breadth of stakeholders in planning and outreach efforts. Involving stakeholders by category or geographic location does not guarantee that the breadth of beliefs is represented. However, by considering those two factors, plus potential coalitions, restoration programs can reach a more representative group. For example, PSNERP managers could form Community Advisory Groups by county, and make sure all 12 stakeholder categories are represented (if not a few more). However, they should also make sure that all five potential coalitions are represented within the Advisory Groups. Potential coalition membership could be established using survey and interview materials similar to the ones in this study. By getting input from stakeholders representing the breadth of values (potential coalitions), PSNERP may avoid costly delays through unexpected appeals or litigation.

Third, the ACF suggests that once coalitions have formed in staunch opposition to one another, they tend to use scientific information to support their own arguments, regardless of the evidence (Weible and Sabatier 2009). A number of additional studies have confirmed coalitions' "... political use of science in bolstering preexisting beliefs to legitimize arguments against an opponent" (Weible, Sabatier, and McQueen 2009, 130). Providing tailored data and communications to stakeholders at an earlier stage could prevent the formation of uninformed, antagonistic coalitions. The ACF also suggests some potential problems with entrenched coalitions. One is that they tend to engage in a "devil shift" meaning that they exaggerate the bad intentions and unwavering positions of opposing coalitions (Sabatier, Hunter, and McLaughlin 1987). Once entrenched, separate coalitions often require a "hurting stalemate" in order to renegotiate. This means that both sides must be suffering from the status quo and thus view negotiation as better than the alternative (Sabatier and Weible 2007). Therefore, in addition to targeted communications and outreach, PSNERP managers should attempt to facilitate communication among stakeholders with different values *before* they form coalitions.

Workshops or focus groups leading to the establishment of Community Advisory Groups, in addition to greater public outreach, may be effective ways to prevent entrenched coalitions and share scientific information in a useful fashion. This method provides one way of understanding stakeholders' problem definition, and thereby helps direct planning and management with both stakeholder and scientific input. Finally, providing direct access to the data that PSNERP scientists have generated, and to the scientists and managers themselves, may facilitate learning and collaboration, rather than political gridlock. Working with stakeholders now should help the PSNERP program meet its mandate to foster broad understanding and support for its restoration programs.

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