

# Stakeholder Perspectives about Marine Oil Spill Response Objectives: A Comparative Q Study of Four Regions

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**Marine oil spills can cause major social, economic, and ecological disruptions. Spill response managers must weigh different options and objectives when deciding what to do. We investigated the ways in which preferences for spill response objectives vary among those who are responsible for oil spill contingency planning and response in Buzzards Bay, Delaware Bay, San Francisco Bay, and Washington State regions. We begin this paper with a discussion of the research method used in the study: the Q method. In Buzzards Bay, Delaware Bay, and San Francisco Bay three perspectives were identified in each case. In Washington State, two perspectives were identified. An analysis of the 11 case-specific perspectives reveals that they can be described by four 'composite' perspectives that describe how different stakeholders prioritize spill response objectives. These four perspectives are compared on several themes, including the emphasis they placed on mitigating economic impacts, protecting health and safety, mitigating ecological impacts, implementing a coordinated and timely response, addressing the needs and concerns of the affected public/communities, gaining public support for the response, mitigating cultural impacts, and mitigating social nuisance impacts. The implications for spill response planning and spill response evaluation are discussed.**

## 1. Introduction

**M**arine oil spills can cause major social, economic, and ecological disruptions. Recent experience with spills in the Mississippi River<sup>1</sup> and San Francisco Bay<sup>2</sup> underscores the point that even relatively small spills can result in significant impacts. As part of ongoing efforts to improve national, state, and local oil spill preparedness, extensive planning and coordinating efforts have been undertaken since the 1980s, culminating in the creation of the National Response Plan (NRP). In the case of oil spills, the NRP 'describes the lead coordination roles, the division and specification of responsibilities among Federal agencies under anticipated crisis scenarios and the national, regional, and

onsite response organizations, personnel, and resources that may be used to support response actions' (DHS, 2004, see also Caudle, 2005).

Various approaches have been proposed to assess the quality of contingency *plans*, using expert input about the appropriate criteria and measures to use (Haynes & Ott, 2001; Abordaif, Harrald, & Mazzuchi, 1995; Harrald & Mazzuchi, 1993). The question of how best to assess response successes and shortcomings *after actual events* has received more limited attention among planners (Kuchin & Hereth, 1999; Lindstedt-Siva, 1999). However, systematic assessment of contingency plans and evaluation of spill response performance are not easy tasks. First, establishing a baseline context to measure the effectiveness

of a response is extremely challenging (Grabowski et al., 1997). Second, while there may be a general agreement about the over-arching goals for spill response, the objectives that define these goals in specific incidents may vary and their relative priority may vary – from spill to spill and among those with a stake in the spill response (Abordaif et al., 1995; Lindstedt-Siva, 1999).

We investigated the ways in which preferences for spill response objectives vary among those who are responsible for planning and response in four regions: Buzzards Bay (MA), Delaware Bay, San Francisco Bay, and Washington State. We begin this paper with a discussion of the research method used in the study. This method allows the identification of perspectives about the relative importance of spill response objectives. An analysis of the case-specific perspectives reveals that they can be described by four archetype perspectives. These four perspectives are compared on several themes, including the emphasis they placed on mitigating economic impacts, protecting health and safety, mitigating ecological impacts, implementing a coordinated and timely response, addressing the needs and concerns of the affected public/communities, gaining public support for the response, mitigating cultural impacts, and mitigating social nuisance impacts. We conclude with a discussion of how understanding competing perspectives can inform contingency planning and efforts to evaluate and learn from experience with past spills.

## 2. Research methods

The purpose of this study was to identify perspectives among diverse stakeholders about the objectives that should drive oil spill response. Towards this end, we used the Q method, which has been used to investigate a variety of environmental and hazard management issues (McKeown & Thomas, 1988; Niemeyer, Petts, & Hobson, 2005; Tuler & Webler, 2006; Webler & Tuler, 2006). This is a type of discourse analysis that integrates quantitative and qualitative analyses to understand, in depth, the points of view on a subject that are present in a population of interest. In this section, we describe our choice of the four cases and our application of the Q method.

We selected four regions to study for which marine oil spills are a critical concern, and for which ecological risk assessments had been recently completed (i.e., within the last several years) or there was recent experience with an actual spill event. Ecological risk assessment consensus workshops (ERA) have been conducted in many regions of the United States (Aurand, Walko, & Pond, 2000; Walker, Scholz, Aurand, Pond, & Clark, 2001). They are designed to enable

federal, state, and local spill managers, trustees, and other stakeholders (e.g., local NGOs) to compare the environmental risks of spill response options and evaluate trade-offs. They typically involve three phases:

- (1) problem formulation, in which stakeholders select scenarios for further analysis,
- (2) analysis, in which research is performed and data are analysed to better characterize the scenarios, and
- (3) assessment and characterization of the ecological risks associated with different response options for the selected scenarios.

The four regional case studies were of

- Buzzards Bay, MA. Data for this case were gathered from 12 individuals during July–September 2006. It was chosen because the *Bouchard-120* spill occurred in this region during April 2003.
- San Francisco Bay. An ERA was completed for this region in 2000. Data for this case were gathered from 12 individuals during November 2006 (before the *Cosco Busan* spill).
- Delaware Bay region. A spill caused by the *Athos I* occurred during November 2004. An ERA was conducted in 2006 (Aurand & Coelho, 2006a). Data were gathered from 12 individuals during July 2007.
- Washington State. The Cape Flattery ERA was conducted in 2005 (Aurand & Coelho, 2006b). We call this the Washington state case study because we asked people about their preferences more broadly, not just in the Cape Flattery region. The data for this case study were gathered during September and October 2007. Thirteen people participated in our study in this case.

In all of the cases, we selected individuals to participate in our research who

- have been actively involved in spill response planning and implementation;
- represented different institutional affiliations; and
- were likely to have different views about spill response objectives.

In the Q method, researchers gain access to various perspectives on a subject – what Q practitioners often call ‘social perspectives’ – by having a small number of people with different, but well-thought-out opinions, sort a group of statements according to their personal opinions (Webler, Tuler, & Danielson, 2009). Participants in our case study were handed a set of small cards (about the size of a normal business card). Each card had a statement printed upon it that described a single objective that might be important to a spill response.

The statements sorted by the participants were chosen to represent the fullest possible extent of

content relative to the topic. As part of our earlier work, we identified objectives from two sources. First, we reviewed the relevant literature (e.g., Baker, 1999; Kuchin & Hereth, 1999; Ornitz & Champ, 2002; Pond, Aurand, & Kraly, 2000; USCG, 2005). Second, two case studies of spill responses (Tuler, Seager, Kay, & Linkov, 2007):

- The *Bouchard-120* spill occurred on 27 April 2003. Approximately 98,000 gallons of No. 6 home heating fuel oil were spilled just at the entrance to Buzzards Bay, MA.<sup>3</sup>
- The Chalk Point spill occurred on 7 April 2000, when an intrastate pipeline that transports oil to the Potomac Electric Power Company's Chalk Point electrical generating facility in Prince George's County released approximately 140,000 gallons of No. 2 and No. 6 home heating fuel oil into Swanson Creek and subsequently into the Patuxent River. The spill has been recorded as the worst environmental disaster in Maryland's history affecting wild-life, natural resources, and property owners.<sup>4</sup>

We grouped the identified objectives into broad categories, shown in Table 1. We then created statements describing these objectives, by sampling from the quotes we extracted from case-study interviews and literature. We ended up with the 42 statements listed in Table 3. It is important to note that in a Q study the sample is *not* the people who sort the statements; rather, the sample in a Q study is the set of Q statements, the population is the 'concourse' of utterances that have been made on the topic, and the completed Q sorts are the variables. This is just the opposite of standard survey techniques.

A sorting instruction specified the context under which a participant was asked to interpret and react to the Q statements. In all cases the sorting instruction was:

When you think about past oil spills, what do you think should be the objectives that guide responses to future oil spills in this area? Sort the statements to indicate what you would be *most unlikely* to

*emphasize* (−4) to *most likely to emphasize* (+4) in a future response.

This sorting instruction was designed to focus participants' thinking on the emergency phases of spill response (as opposed to latter response efforts, including restoration and damage assessment). We wanted to draw on each participants' experiences to date and at the same time get their ideas of what would be the most important objectives to guide a response in the future. We did not ask people to evaluate, for example, the *Bouchard-120* spill response, although we expected, of course, that their experiences would inform their ideas about a future effort.

This is how the Q sort happened. We asked each participant to read all the statements through once. Then we asked them to sort the statements into three piles, the left-hand pile being the statements they would least likely emphasize and the right-most pile being those they would most likely emphasize, and the middle pile being somewhere in between. They then continued by sorting the cards into a normal distribution as shown in Figure 1. Three cards could be placed in the two left-most columns, five in the third column, and so on. The scale was ordinal with the two endpoints subjectively anchored. In other words, a certain participant may have felt that *all* the statements were important, but he or she still had to differentiate between those that he or she would be *most unlikely* and *most likely* to emphasize. While this technique (like surveys) forces participants to provide information in a manner structured by the researcher, unlike surveys, items are ranked relative to each other. The participants are also free to define their own scale, such as at what point statements move from being important to neutral in relative ranking. For example, someone could have defined the rightmost seven columns as statements considered 'likely' or 'most likely' and relegate only the leftmost two columns as objectives 'unlikely to emphasize'. Moreover, objectives may be grouped by some underlying concept rather than strictly rank ordered. Participants can structure their rank ordering of statements in a manner that makes sense to them. We sought to gather information about such issues by asking the participants to reflect on the pattern of cards they created.

Q method data are analysed to reveal the content of the social perspectives present in the group of participants. The analysis also reveals the extent to which particular individuals believe or subscribe to the different perspectives. The assumption is that these social perspectives exist partially in the subjectivity of individuals, but they are also a product of social interaction. While individuals hold unique subjective perspectives, similarities among individual views make it possible to

Table 1. Themes for Q Statements

- |   |
|---|
| <ul style="list-style-type: none"> <li>• Address the needs and concerns of the affected public/communities</li> <li>• Establish a coordinated and effective response framework</li> <li>• Gain public support for the response</li> <li>• Implement an effective and timely response</li> <li>• Meet legal and regulatory requirements</li> <li>• Mitigate economic impacts</li> <li>• Mitigate social nuisance impacts</li> <li>• Protect cultural resources</li> <li>• Protect environment and mitigate environmental impacts</li> <li>• Protect worker and public health and safety</li> </ul> |
|---|

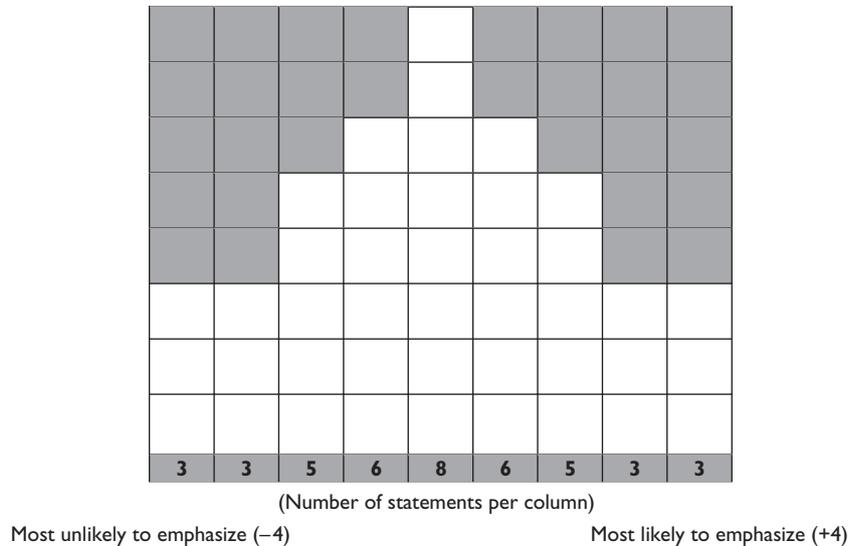


Figure 1. Layout for Q sort cards.

articulate a small number of archetype social perspectives on a topic.

We arrive at the meaning of each of the social perspectives by following two basic steps. First, we enter Q sort data into a computer program called MQMethod (this freeware program is available at <http://www.qmethod.org>). This program computes a correlational matrix among all the Q statements across sorts and also factor analyses the results. Factor solutions are expressed as idealized Q sorts, or social perspectives. The researchers represent each factor as a short narrative. Second, we asked the participant to interpret their sort and to explain how he or she interpreted specific Q statements. We used these comments to help interpret the statistical output when composing the perspective narratives.

Factor analysis lies at the heart of the Q method. A factor analysis is a way of identifying a handful of underlying variables that account for changes among a much larger group of measured variables. In each of the cases, the factor analysis reduced the complexity to two or three perspectives, which are represented as specific Q sorts. These represent 'ideal types' because they are not necessarily held by any individual, but are generated by studying the commonalities and differences among the sorts. Typically, the analysis reveals that each individual contributes significantly to shaping one perspective and has a minor influence over other perspectives. Occasionally, an individual may significantly shape two perspectives. The degree to which an individual's beliefs share features with a perspective is represented by 'factor loading scores'. A +1.00 indicates that a participant's sort exactly matched the factor, a 0 means there were no similarities at all, and a -1.00 indicates that a participant's sort was the exact opposite of the factor sort.

The results obtained via the Q method depend heavily on the statements included in the Q sorts. If researchers do not include relevant and important statements about the topic of interest, people may not be able to express their specific points of view – which may result in important social perspectives remaining hidden from view. Our four case studies provide some evidence that our 42 Q statements were adequate. Here 'adequate' means that the statements include the full range of objectives that stakeholders might believe are important for the emergency phases of oil spill response. To ensure the adequacy of our Q statements, we asked individuals whether there were any important objectives missing from the set of statements. In the Buzzards Bay case three gaps in the statements were suggested: (1) the importance of meeting policy and regulatory requirements, (2) addressing the political aspect of response, and (3) getting an estimate or a number (during the response) of the amount of oil that hit the shoreline, so that this could inform damage assessment later. In no other case did any participant suggest additional objectives/considerations that should have been included in the set of statements.

To begin our analysis, we analysed the Q sorts from each case separately (Tuler, Webler, & Kay, 2008 provides more details about the case-specific results). In each case study, our analysis yielded two or three factors/perspectives. We then treated each of these as a single Q sort and analysed them as a group because we wanted to investigate the similarities and differences across case studies. In the jargon of the Q method, this is called a 'second-order composite analysis'. It is second order, because it takes as input the factors/perspectives from the first-order analysis. It is composite because it uses all the project data.

### 3. Four archetype perspectives on oil spill response

Four second-order composite factors emerged from our analysis, which represent four perspectives about the objectives that should guide oil spill response (Table 2). The results show that Perspectives W and Y were found in each one of the cases. Perspective X, however, was only found in the Buzzards Bay and Delaware Bay cases. Perspective Z was only found in San Francisco Bay and Delaware Bay cases. Table 3 shows how each Q

statement is ranked in each of the four second-order factors/perspectives.

The narrative descriptions of the perspective represented by each factor are:

*Perspective W:* Implement a rapid, coordinated response guided by the contingency plan and gain public trust.

*Perspective W* prefers a response that is guided by the contingency plan and swiftly implements a highly coordinated response effort. This requires that local

Table 2. Second-Order Composite Factor Loading Scores for the Cross-Case Analysis

Case-specific perspective	Archetype perspectives (second-order factors)			
	Perspective W	Perspective X	Perspective Y	Perspective Z
Buzzards Bay A	<b>.76</b>	.12	.36	.34
Buzzards Bay B	.23	.10	<b>.83</b>	.03
Buzzards Bay C	.14	<b>.80</b>	.06	.24
San Francisco D	<b>.65</b>	.03	<b>.64</b>	.33
San Francisco E	.09	.33	-.06	<b>.83</b>
San Francisco F	-.03	.32	<b>.79</b>	-.19
Delaware Bay J	<b>.85</b>	.06	.38	.13
Delaware Bay K	.17	<b>.80</b>	.31	.10
Delaware Bay L	.37	.03	<b>.63</b>	<b>.56</b>
Washington M	<b>.53</b>	.10	<b>.73</b>	.28
Washington N	<b>.85</b>	.36	-.09	-.10
% variance explained	27%	15%	27%	13%

Bold font indicates significance at the .05 level.

Table 3. Factor Array for Archetype Perspectives (Second-Order Composite Factors)

Statement	Perspective W	Perspective X	Perspective Y	Perspective Z
1. Economic impacts to towns from costs of cleanup should be mitigated	-1	-2	0	0
2. Consumption of contaminated seafood should be prevented	0	-1	2	2
3. Get on with response efforts early for areas that have been pre-identified as sensitive areas	3	1	3	0
4. Even if a species is not native to this area, mitigate impacts to the local population	-3	-1	-4	-1
5. When faced with a spill, it is most important to protect the adults of a species at risk because the adults can come back next year and reproduce	-3	0	0	2
6. Give priority to protecting those areas that have multiple resource values, like those that are undeveloped, pristine, and that provide for recreation	1	4	0	0
7. Attention should be focused on protecting species that are especially critical for the functioning of an impacted ecosystem	1	4	3	4
8. Health and ecological impacts from cleanup activities should be mitigated	1	0	2	-1
9. The response should remove enough oil so that impacted species, habitats, and local communities can return to the way they were before the spill in a reasonable amount of time	0	3	2	3
10. Damage to cultural artefacts (e.g., shipwrecks) from oil and its cleanup should be prevented	-2	-2	1	-1
11. Economic impacts from lost recreation should be mitigated	-2	-1	0	-1
12. Inconveniences to local residents and tourists should be mitigated	-3	-3	-1	-2
13. The economic impacts to local commercial fishermen should be reduced, including impacts that might arise from people's perceptions (for example, about shellfish tainting)	0	-1	1	4

Table 3. (Contd.)

Statement	Perspective W	Perspective X	Perspective Y	Perspective Z
14. There should be no situations that threaten human health whatsoever during the response	0	-4	4	-3
15. Costs to the responsible party resulting from the response should be minimized	-4	-4	-4	-3
16. Getting cleanup contractors on-scene should ramp up quickly, even if there is uncertainty about how many gallons have been spilled	2	1	2	1
17. The cleanup should address aesthetic concerns – like oil stains on rocks	-4	-3	-4	-3
18. Get a good estimate of the amount of oil spilled	-1	1	0	2
19. Local responders/leaders should be integrated quickly into response planning because of their knowledge of local conditions, resources, etc.	4	2	1	2
20. Coordination among participating government agencies, contractors, etc. should be established rapidly	4	0	1	1
21. Establish meaningful ways of involving volunteers in the response	-1	0	-2	0
22. A well-organized unified command with a clear chain of command should be established	4	1	4	3
23. A well-coordinated expert scientific effort should drive the gathering of decision-relevant information, not public concerns and perceptions	1	2	-1	4
24. Implement the contingency plan	3	-2	3	-4
25. There should be no residual oil or buried oil that is going to show up later	-4	1	1	-4
26. Restoration planning should be tightly integrated with the response effort so that decisions are based on future restoration needs	-2	3	-2	0
27. As much on-water recovery and removal of oil as possible should be achieved	0	2	4	-4
28. Conduct monitoring of response activities, such as booming, to actually see whether things are working	2	4	2	1
29. Clear definitions of what counts as 'clean' should be used so that there is a clear end-point	-1	1	0	3
30. Tell members of the public about the things they want to know about	0	-4	-2	-2
31. Responders should listen to the publics' concerns, even if they cannot be addressed to their complete satisfaction	1	0	-2	-1
32. Unified Command should gain public support for the response effort	0	-2	-1	-1
33. Unified Command should develop and maintain trust with members of the public	2	2	-3	-2
34. Efforts to communicate with and engage with the community should be proactive and timely	3	1	0	0
35. Consistent and accurate information should be provided to the public	2	3	-1	-2
36. Response efforts should direct oil to a 'sacrificial area' – such as a sandy cove that will be easier to cleanup than other, more rocky areas	0	-1	-3	1
37. Unified Command should reconcile the preferences and points of views of all parties about what impacts are important to avoid.	-2	-1	-2	1
38. Unified Command should manage expectations about the cleanup so that they are reasonable	1	-4	-1	2
39. Responsible authorities should assign flexible and experienced decision makers – who can implement contingency plans right away and then step back and ask 'what do we need?'	2	-3	0	0
40. Response efforts need to avoid disrupting the integrity and culture of local communities	-2	-1	-3	0
41. Subsistence fishing and shellfishing areas should be protected	-1	0	1	-2
42. Make determinations of 'clean' with relevant stakeholders, including local residents	-1	0	-1	1

responders/leaders be integrated quickly into the effort, coordination be established among key organizations and agencies, a well-organized unified command with a clear chain of command be established, and cleanup crews

getting on-sight rapidly. There is little emphasis given to mitigating socially disruptive impacts (e.g., economic, aesthetic), but those responsible for implementing the response should inform the local community about the

response effort. They should do this in a way that both enhances trust and manages expectations about what the response can actually accomplish.

*Perspective X:* Protect ecological resources and gain public trust.

Perspective X strongly emphasizes the importance of mitigating adverse impacts to ecological resources that may be impacted from the spill. Primary attention should be paid to protecting those areas serving multiple purposes or values or that are especially critical for the functioning of an impacted ecosystem. The response should be driven by long-term thinking, making sure that *recovery* and *restoration* of impacted resources will be promoted. Given the goal of protecting ecological systems, it is vitally important to monitor response efforts to ensure they are getting the job done. Unlike Perspective W, following the contingency plan is not as important as having a response be driven by a well-coordinated expert scientific effort that gathers decision-relevant information. Like Perspective V, accurate and timely information should be provided to the public and trust should be developed with them, but there is little emphasis given to mitigating socially disruptive impacts (e.g., economic, aesthetic).

*Perspective Y:* Protect human health and safety by implementing a rapid, coordinated response guided by the contingency plan.

Perspective Y emphasizes many of the same features for a good response as Perspective W: implement the contingency plan, set up a clear chain of command, get cleanup crews on-site rapidly. Like Perspective X, it emphasizes the need to monitor the effectiveness of response actions and protect important ecological resources. But these are important so as to ensure that the health and safety of individuals are protected. Statements ranked more highly in here than in other perspectives include avoiding situations that could threaten health, lead to the consumption of contaminated seafood, cause additional harm from cleanup activities, or harm subsistence fishing. Towards this end, the response should be focused on recovery and removal of oil offshore before it has a chance to impact important local resources.

*Perspective Z:* Protect human communities using high-quality information to support decision-making.

Perspective Z emphasizes the protection of human communities and ecological resources. Alone among all the perspectives, this view emphasizes that economic impacts to local commercial fishermen should be reduced, including impacts that might arise from peo-

ple's perceptions (e.g., about shellfish tainting). In addition, consumption of contaminated seafood should be prevented because this could significantly impact the local fishing sector. The emphasis on community and the local economy is different from the focus on individuals' health and safety, which receives rather weak attention in this perspective (e.g., protection of *subsistence* fishing areas). This view is distinguished from Perspective Y because following the contingency plan is not as important as having a response be driven by a well-coordinated expert scientific effort that gathers decision-relevant information. Good decision-making requires good information (e.g., accurate estimate of the amount of oil spilled) and clear definitions (e.g., about endpoints and what constitutes 'clean').

## 4. Comparison of archetype perspectives

For each category of statements listed in Table 1, we created an index. For each category we summed the Z-scores of the statements included in the index and divided by the number of statements comprising the index. Z-scores are a relative measure of the importance of a statement in a factor/perspective. The indices reveal the relative importance of a particular category of objectives – or theme – across the four perspectives. The values of each index for the archetype perspectives are shown in Table 4 (in the following discussion statements from Table 3 are referred to by the statements numbers in parentheses).

### 4.1. Mitigate economic impacts

This index comprises three statements that address the costs of cleanup, losses to the recreation sub-sector, and losses to commercial fishing. Statement #15 about costs to the responsible party was ranked consistently very low. Because it was a consensus statement (there was no variation across the factors), this statement does not help distinguish the perspectives and is not included in this index.

Economic costs were not a major theme in any of the perspectives, except for one. Perspective Z stands out for expressing the strongest, but still modest level of concern about the economic impacts that may affect local businesses and communities. Here the score is completely driven by statement 13, mitigating economic impacts to fishermen.

Perspective Z is only found in San Francisco and Delaware Bay. In San Francisco, it is associated with Perspective E, which emphasized mitigation of long-term impacts to 'foundational' components of the

Table 4. Index Scores for Each Archetype Perspective

	Perspective W	Perspective X	Perspective Y	Perspective Z
Economic impacts index score (statements 1, 11, and 13)	-1.40	-1.54	-.14	1.35
Health and safety risks index score (statements 2, 8, 14, and 41)	-.05	-1.54	4.22	-1.80
Ecological impacts index score (statements 3, 5, 6, 7, 8, and 9)	.52	5.58	3.62	4.05
Establish coordinated response index score (statements 22, 23, 24, 26, 28, 29, and 39)	3.07	2.31	2.46	3.15
Implement timely response index score (statements 3, 16, 19, and 20)	6.21	2.31	3.83	1.80
Address community needs index score (statements 30, 31, 34, 35, 37, 38, and 42)	1.86	-1.28	-4.39	-.45
Public support and trust index score (statements 32, and 33)	1.10	.26	-1.71	-1.35
Cultural impacts index score (statements 10, 40, and 41)	-1.95	-1.79	-.53	-1.35
Social nuisance impacts index score (statements 12 and 17)	-2.85	-2.57	-2.29	-2.25

human-environment system, including fisheries and markets.

There is a remarkable parallel to a perspective in Delaware Bay, Perspective L, which emphasizes the need for a coordinated response supported by scientific expertise that focuses on the protection of health and safety and the long-term integrity of affected ecosystems.

#### 4.2. Protect health and safety

The index related to health and safety is based on statements 2, 8, 14, and 41. These include direct threats to people during the cleanup and indirect threats via consumption of contaminated seafood (e.g., subsistence fishing). Perspective Y placed the strongest emphasis on this theme. It ranked every one of these statements stronger than did the other perspectives.

Perspectives that emphasized health and safety were found in Buzzards Bay (B), Delaware Bay (L), and Washington State (M), suggesting that this is a widely important, although not universal theme. One tricky aspect of this theme is statement 14. This statement asserts, unconditionally, that there should be no conditions that threaten human health. In some case-specific perspectives, this statement was ranked low sometimes, not because people think safety is unimportant, but because they felt that zero risk is unobtainable.

#### 4.3. Mitigate ecological impacts

The index for ecological impacts is based on several different ideas: setting priorities (5, 6, 7), mitigation (8), initiation of action (3), and removing oil (9). Three of the four perspectives gave this index strong emphasis. It is not strongly emphasized in Perspective W, which is defined by San Francisco D and Washington State M case-specific perspectives. All three perspectives that ranked this theme significant pointed to protecting

critical species (7) and removing oil so that ecosystem functions are restored (9).

Addressing ecological impacts is especially important to Perspective X. This gave high scores to setting priorities to protect ecological resources, mitigation, initiation of protective activities, and getting oil out of the water. Statement #5 about focusing on saving adults of a species was somewhat controversial. The low score given to this by Perspective X reflects a disagreement about the ecological justification for doing this.

#### 4.4. Establish a coordinated response

Objectives related to establishing and implementing a coordinated response were emphasized in many of the case-specific perspectives. Although the index scores are moderate in the second-order composite factors associated with each perspective, there is widespread agreement about the importance of establishing a coordinated response. For example, there was often strong emphasis given to establishing a well-organized unified command with a clear chain of command (22). On the other hand, there were important differences among the perspectives within and across the cases on other objectives. First, Perspectives W and Y strongly emphasize implementing the contingency plan (24) while Perspectives X and Z de-emphasize this objective. Instead, Perspectives X and Z strongly emphasize establishing a well-coordinated expert scientific effort that drives the gathering of decision-relevant information (23). Perspectives W and Y give slight emphasis to this objective.

#### 4.5. Implement a timely response

An associated index consists of statements related to implementing a timely response. Some considerations related to implementing a timely response turned out to be important to all perspectives, such as integrating

local responders quickly (19). However, this theme was rated very strongly by Perspective W. Perspective Z ranks the objective of getting on with response efforts early for areas that have been pre-identified as sensitive areas (3) lowest among the four perspectives, which is consistent with its lack of support for implementing the contingency plan (24; this statement is part of the index for establishing a coordinated response).

#### 4.6. Address needs and concerns of the affected public/communities

Addressing public concerns was almost always ranked low. There were, however, some exceptions. In Perspective C from the Buzzards Bay case, it was very important to ensure that consistent and accurate information be provided to the public (32) and in San Francisco Bay's Perspective E it was important that Unified Command manage expectations about the cleanup so that they are reasonable (38). Perspective N from Washington State strongly emphasizes a number of objectives related to public communications. In general, the relative lack of emphasis on objectives related to public opinion and public satisfaction stands in contrast to the emphasis that they were given in earlier work (Tuler et al., 2007) and in the literature (e.g., Lindstedt-Siva, 1999).

This theme is not emphasized strongly in any of the perspectives from the cross-case analysis. Perspective W most strongly emphasizes this theme, although weakly, while Perspective Z strongly de-emphasizes this theme. In Perspective W, support is based on the importance it places on proactive and timely efforts to communicate with and engage with the community (34) and providing consistent and accurate information to the public (35). There is weak support for telling members of the public about the things they want to know about (30) in all factors. Perspective X rejects the idea that Unified Command should manage expectations about the cleanup so that they are reasonable (38), while Perspective Z supports it in spite of its low overall rating for this theme.

#### 4.7. Gaining public support and trust for the response

Perspective W also scores highest on the theme that Unified Command should strive to gain public support for the response effort, although the magnitude of the score is zero, and so, comparatively, it is not a very strongly emphasized theme. All other perspectives ranked the statement about getting public support as negative. It can be argued that gaining public support is related to how well the public's needs and concerns are addressed, which helps to explain why both themes are

emphasized by the same perspective/factor. While other perspectives rank some objectives related to this theme highly, they do not give them the same overall emphasis. Perspective X does not support gaining public support for the response effort, but stronger support for developing and maintaining trust with the public. Both Perspectives Y and Z strongly disagree with this objective.

#### 4.8. Mitigate cultural impacts

Mitigating impacts to cultural resources was not very salient in any case and it is not emphasized in any of the four perspectives associated with the cross-case analysis, as shown in Table 4. Statement 41 received moderate support in Factor Y, and it is related to protecting both health and cultural activities.

#### 4.9. Mitigate social nuisance impacts

Two statements were related to objectives for reducing the social nuisance impacts of oil spills:

12. Inconveniences to local residents and tourists should be mitigated and
17. The cleanup should address aesthetic concerns, such as oil stains on rocks.

Neither of these statements received much support in the cross-case perspectives or in any of the case-specific perspectives. These were not deemed important objectives during the initial phases of a spill response by those involved in our four case studies.

## 5. Discussion

Responses to marine oil spills necessarily involve a large number of stakeholders. Federal officials from the USCG and the USEPA, state environmental agency personnel, and fire chiefs, harbourmasters, shellfish wardens, and a host of other local government officials need to coordinate their actions. The responsible party and its contractors are also involved. Advocacy stakeholders for environmental, business, and community interests, as well as community residents, have vested interests in the response and need to be consulted and informed. With so many different kinds of people involved the potential for conflicts about cleanup goals and strategies is high.

Differences of opinion may arise over the response goals, the objectives associated with each goal, and the relative importance of the objectives. The context and specifics of the spill also come into play. Spill impacts and response strategies are determined by the characteristics of the oil released, the weather, the location

and timing of the release, and the kinds of resources in harm's way. Priorities for protection will vary with seasonal changes in tourism and local economies. When a spill occurs in the life cycle of sensitive species will also determine how much priority should be assigned to protective and remedial actions.

Our results show that people involved in oil spill planning and response have different perspectives about what objectives are most salient. This was true across many different regions of the country and even within a single case (Tuler et al., 2008). The four archetype perspectives reported here reveal important similarities and differences in the ways in which stakeholders emphasize objectives associated with oil spill response. For example, there were varying degrees of emphasis on implementing the contingency plan, protecting ecological resources, protecting public health and safety, and interacting with the public. Abordaif et al. (1995) and Lindstedt-Siva (1999) also found this to be the case.

We draw two conclusions from these findings that can inform future oil spill response planning.

### 5.1. First, a small set of archetype perspectives describe how a response effort should be implemented

In our study involving 54 stakeholders in four diverse regions that have experienced a range of spill events, we found all four of these perspectives present. However, our study does not allow us to remark on how widely held these perspectives are within a population. First, the Q method is not designed to gather data from a representative sample of individuals the way surveys do. Consequently, we do not know whether community residents had perspectives similar to the stakeholders we studied. Second, although we endeavoured to include in our study people with vastly different viewpoints, we may have missed something. The relatively low priority given to cultural resources may be an artefact of not including more people with a concern about these resources. Despite these qualifications, we have confidence in the robustness of these findings because we gathered data from a broad range of interested and engaged agency staff and other stakeholders in four different sites across the country. It seems likely that these perspectives would be found in other regions as well.

### 5.2. Second, spill planners, managers, and responders emphasize different components of contingency plans

Oil spill response contingency plans address issues of human health and safety, the natural environment, economic impact, public communication, stakeholder service and support, and the quality and effectiveness of the response organization. When people give different weight to objectives, this can lead to them emphasizing different aspects of a contingency plan. Our work provides additional empirical support for the claim made by others 'that the elements of a contingency plan are of very unequal importance' (Abordaif et al., 1995), and elaborates how they may rate relative to each other.

For example, we found that:

- No perspective rejected the need to convey information to the public during a response, but they did disagree about how much importance this activity should get in the context of other pressing needs (e.g., deploying cleanup crews). Perspective W focused the most emphasis on this outcome.
- Each perspective emphasizes the need to mitigate ecological impacts, but again, there are important differences. For Perspective W, following the contingency plan is thought to protect sensitive areas. Perspectives X, Y, and Z emphasize other ways of protecting sensitive species and habitats. For example, Perspective Y protects the environment by protecting local resource-based economic activities.
- Protection of health and safety is important for all perspectives. While perspectives X and Z de-emphasize the idea that 'there should be no situations that threaten human health whatsoever during the response', we learned that many do not believe all risk can be avoided by spill responders. By its very nature, a spill response forces people into situations that can threaten health. The imperative for responders is to minimize the risks.

The four perspectives can be further distinguished by the way they rank three particular statements (Table 5). Two perspectives (W and Y) focus on implementing the contingency plan. The other two perspectives (X and Z) give negative scores to implementing the contingency plan AND give positive emphasis to: obtaining a

Table 5. Comparison of Z Scores for Archetype Perspectives in Relation to Implementing the Contingency Plan vs. Gathering Information to Inform Response Actions

	Perspective W	Perspective X	Perspective Y	Perspective Z
24. Implement the contingency plan	1.37	-1.03	1.23	-1.80
18. Get a good estimate of the amount of oil spilled	-.51	.51	.09	.90
23. A well-coordinated expert scientific effort should drive the gathering of decision-relevant information, not public concerns and perceptions	.23	1.03	-.48	1.80

good estimate of the amount of oil spilled (18) and having a well-coordinated expert scientific effort, rather than public concerns and perceptions, to drive the gathering of decision-relevant information (23). Perspectives X and Y de-emphasize following the contingency plan because they want to be very sensitive to the specific, contextual features of a particular spill and response. Thus, they emphasize the need for Unified Command to be gathering decision-relevant information in a timely way.

## 6. Conclusion: implications of findings for spill response planning and evaluation

We investigated how people involved with spill response from varied organizations and government agencies think about the objectives that should guide responses to future oil spills. We used the same research instrument in four locales: Buzzards Bay, San Francisco Bay, Delaware Bay, and Washington State.

We identified the perspectives associated with spill responders in each region, and then we assessed the relationships among all of the perspectives. Generally speaking, both the 11 case-specific and four cross-case composite perspectives that emerged about oil spill response objectives reflect the over-arching goals of oil spill response as articulated in federal policy guidance:

- (1) maintain safety of human life;
- (2) stabilize the situation to preclude it from worsening (e.g., through a well-run and rapid response that seeks to remove oil before it reaches shore); and
- (3) minimize adverse environmental and socioeconomic impacts by coordinating all containment and removal activities to carry out a timely, effective response.

This research also documents that there are important differences about spill response objectives, a point that has been made by others as well (e.g., Lindstedt-Siva, 1999). Multiple perspectives about objectives were identified in each of our cases. The second-order composite analysis reveals important differences in the ways in which people emphasize or define the goals associated with oil spill response. While we have proposed four archetype perspectives to describe how a response effort should be implemented, they necessarily reflect the views of those who participated in our study. A different group of participants may have revealed other perspectives or emphases. For example, we did not study the viewpoints of the general public and very few Native Americans participated in our study. However, because these different perspectives showed up nationwide, we believe these are significant.

These findings have implications for both spill response planning and spill response evaluation. Our

findings point to a need for spill response managers to pay close attention to building agreement about objectives for spill response and for clarifying points of agreement and disagreement among responders in contingency planning. Following Alpaslan, Green, and Mitroff's (2008) discussion of a stakeholder theory of crisis management in corporate governance, spill response managers may benefit from adopting a more broadly inclusive stakeholder model for spill response planning, rather than a shareholder model wherein participation is restricted to those with a legal and regulatory responsibility (e.g., federal and state responders, trustees, and responsible parties). Such an approach is in line with the idea that contingency planning and response evaluation should support development of deeper understandings of agreements and differences to further consensus building.

Processes for spill response planning and evaluation should be based on the following underlying principles. First, the concerns of all stakeholders should be represented in the process. Second, the best available science should guide deliberations and decisions. Third, an atmosphere should be established that allows competing preferences to be revealed and debated. Collaborative planning has become a mainstay in many fields and it should continue to mature in the area of oil spill contingency planning. A wealth of advice exists to inform and educate spill managers on how to clarify and work through differences in perspective (Apostolakis & Pickett, 1998; Arvai & Gregory, 2003; Bradbury, Branch, & Malone, 2003; Daniels & Walker, 2001; Gregory & Failing, 2002; National Research Council, 1996; Webler & Tuler, 2008; Wood, Good, & Goodwin, 2002).

Finally, our work has implications for how spill response evaluations are conducted. There are many criteria on which judgements about the success or the failure of a response can be made (Tuler et al., 2007). Choices must be made about which criteria (or performance metrics) are most relevant and meaningful. Making these choices is not always easy, especially when people disagree about what should be done. Just because something can be measured does not mean that it is relevant to the success of a spill response or important to many stakeholders. The amount of boom deployed is a case in point. By developing a clear understanding of what matters most to people, better systems can be devised for gathering relevant data that will inform both response-related decision-making and post-response assessments and evaluations. The critical point is that in a context of competing perspectives and uncertain knowledge, planning and evaluation should respect the diversity of stakeholders' opinions. Becoming aware of stakeholder differences is but the first step in a journey to build stronger plans out of the plurality of the concerns, experiences, and knowledge of stakeholders.

1. See [http://www.noaa.gov/stories2008/20080724\\_oilspill.html](http://www.noaa.gov/stories2008/20080724_oilspill.html) for a discussion of this spill.
2. See <http://www.incidentnews.gov/incident/7708> for a discussion of this spill.
3. See <http://www.darrp.noaa.gov/northeast/buzzard/index.html>
4. See [http://www.darrp.noaa.gov/northeast/chalk\\_point/index.html](http://www.darrp.noaa.gov/northeast/chalk_point/index.html)

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