Social and Environmental Research Institute
278 Main Street, Suite 404
Greenfield, MA 01301
(413) 773-9955 www.seri-us.org

Comparing stakeholders' objectives for oil spill response: A Q study of four regions

A technical report submitted to the Coastal Response Research Center by

S.P. TULER, T. WEBLER, and R. KAY

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Abstract

This report describes the results of a study about the relative importance of objectives to stakeholders, from varied organizations and government agencies. We investigated the views of people involved in response planning and in spill responses 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, Q method. Then, the results from the four regions are discussed separately. In Buzzards Bay, Delaware Bay, and San Francisco Bay three perspectives were identified in each case. In Washington State two perspectives were identified. We conclude with a comparison of the findings from the four regions. *An analysis of the case-specific perspectives reveals that they can be described by four "composite" perspectives.* The*se 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 nee*ds and concerns of the affected* public/communities, gaining public support for the response, mitigating cultural impacts, and mitigating social nuisance impacts.

TABLE OF CONTENTS

1. Introduction

This report describes the results of a study about the relative importance of objectives to stakeholders in four regions for which marine oil spill response is a critical issue. This study has been performed as part of a larger research project whose goal was to better understand the role of performance metrics in oil spill response planning and to propose a process by which oil spill response planning can integrate views about response objectives and performance metrics from multiple stakeholders.

As part of the empirical component of our research project we addressed a series of questions:

1) what do people think ought to be the objectives that guide marine oil spill response?
2) what are the relative priorities given to those objectives by different people?
3) what performance metrics do people think should be used to evaluate oil spill response?

A report describing our findings about the first and third questions has been prepared and is available (Tuler et al. 2006a, 2006b). Our findings regarding the second question in two initial cases, Buzzards Bay and San Francisco Bay regions, are presented in an earlier report (Tuler and Kay 2007).

In this report we present findings about the relative priorities given to spill response objectives from four case studies: Buzzards Bay, Delaware Bay, San Francisco Bay, and Washington State. We begin this paper with a discussion of the research method used in the study, Q method. Then, the results from the four regions are discussed separately. We conclude with a comparison of the findings from the four regions.

2. Research Methods

The purpose of this study was to identify perspectives among diverse stakeholders (including federal officials) about the objectives that should drive oil spill response. Toward this end we used Q method, which has been used to investigate a variety of environmental and hazard management issues (Brown 1986, 1996, McKeown and Thomas 1988, Kalof 1998, Niemeyer et al. 2005, Tuler et al. 2005, Tuler and Webler 2006, Webler and 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. By inquiring of people with unique points of view, Q researchers reveal patterns in how elements of perspectives are related. In this section we describe our choice of the four cases and our application of Q method.

2.1 Selection of case studies

In an earlier phase of our project, we conducted two case studies of oil spill response on the Atlantic coast. We conducted interviews with people concerned about oil spill responses associated with two recent spills: Chalk Point, MD and Bouchard-120, Buzzards Bay, MA. Findings from these case studies are documented in an interim report (Tuler et al. 2006a, 2006b).

For this Q study we wanted to return to one of the initial case studies and gather data from new cases. Thus, we first returned to conduct a Q study in Buzzards Bay and we met with many of the same people that were interviewed initially. We chose this case because the Bouchard-120 spill was relatively recent, there was quite a bit of diversity among research subjects about the quality of the spill response, and the research subjects were willing to give us more of their time to participate in our Q study. In addition, we were able to identify and include additional research subjects in large part because of the work of Rebecca Kay, our graduate student, on her master's thesis. Data for this case were gathered during July – Sept. 2006.

For our additional cases we sought information from people in new regions. This would allow us to test the robustness of the protocol that we developed for the Q study, including the applicability of the set of Q statements (see below, Table 1). We approached selection of the new case in two ways. First, we identified those regions for which ecological risk assessments had been recently completed (i.e., within the last several years). Second, we asked CRRC and NOAA staff[1] for assistance to identify a point of contact that could help us identify research participants efficiently. Ultimately, this led us to three regions:

- San Francisco Bay. An ERA was completed for this region in 2000. Data for this case were gathered during November 2006.
- Delaware Bay region. An ERA was conducted in 2006 (Aurand and Coelho 2006a). Data were gathered for this case study during July 2007.
- Washington state. The Cape Flattery ERA was conducted in 2005 (Aurand and 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.

2.2 Selection of research subjects

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 Buzzards Bay case we were familiar with government officials and regional and local stakeholders from our earlier work and the masters thesis work of our graduate student research assistant.

In the case of San Francisco Bay we discussed our needs with Jordan Stout, NOAA Scientific Support Coordinator (SSC) for the region. He helped us by providing background information about the region and spill response planning and by identifying a diverse group of people to include in our Q study. Only two of the research participants had been involved in the San Francisco ERA.

In the Delaware Bay and Washington state cases we selected individuals to participate in our research who had participated in recent ERA efforts. We began with the list of people who attended each ERA. Next we spoke with NOAA and Coast Guard spill managers in each area to gain further insight into who might be appropriate participants. Finally, as we made initial contact with people and after describing the purpose of our study we asked for further suggestions about whom to invite to participate.

The identified individuals were approached via telephone or email and introduced to the project and told how they were selected. We described our data collection procedures and what we wanted them to do. We told people we would visit them at a time and place convenient to them and that the entire process would take about one and one-half hours. Our response rates in Massachusetts, Delaware, and San Francisco were very high. In Washington state we had several people who refused to participate, even after we made a case for the importance of the

[1] We are assisting staff from the Emergency Response Division to develop an evaluation of ERAs. We wanted to investigate how past participants in ERAs think that future ones should be organized. Because we wanted input representing a diversity of experiences we selected two ERAs for which there had been very different feedback. We also investigated preferences for objectives in these two cases.

research. In the end we successfully recruited a diverse group of people to participate in our research, but it took more effort (including extra travel) in Washington (the implications of this for our findings are discussed below).

2.3 Q Method

In 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-formed opinions sort a group of statements according to their personal opinions. 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 full list of "Q statements" is given in Table 1.

The statements sorted by the participants were chosen by the research team to represent the fullest possible extent of content relative to the topic. As part of our case studies about the Bouchard-120 and Chalk Point spills we identified objectives that research subjects cared about in those spill responses (see Tuler et al. 2006a, 2006b for more details). We found that many different objectives for the response to these two oil spills were important to our interviewees (although they were not shared uniformly among all research subjects in each of the cases). We grouped them into the following broad categories:

- Address the needs and concerns of the affected public/communities;
- Establish a coordinated and effective response framework;
- Gain public support for the response;
- Implement an effective and timely response;
- Meet legal and regulatory requirements;
- Mitigate economic impacts;
- Mitigate social nuisance impacts;
- Protect cultural resources;
- Protect environment and mitigate environmental impacts; and
- Protect worker and public health and safety.

In addition, we completed a review of literature about spill response planning (e.g., Baker 1999, Kuchin and Hereth 1999, Ornitz and Champ 2002, Ott 2005, Pond et al. 2000, USCG 2005). We then created statements describing these objectives, by sampling from the quotes we extracted from the interviews and literature. Ultimately, we ended up with 42 statements. These are listed in Table 1. It was essential that these statements capture the full range of objectives that might be important in any spill response. In other words, we were seeking a set of statements that could be used to study perspectives about spill response objectives in any region. [2]

A sorting instruction specified the context under which the participant was 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 <u>you</u> would be *most unlikely to emphasize (-4)* to *most likely to emphasize (+4)* in a future response.

[2] 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.

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 also told them that many of the statements refer to "considerations" rather than to clearly articulated "objectives." 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. The Q sort was further constrained by forcing participants to sort the cards into a normal distribution. This pattern is shown in Figure 1.[3] Three cards could be placed in the two left-most columns, five in the third column, and so on. The scale was ordinal and relative, not absolute. 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.

Participants reported the Q sort was innovative, fun, and that it stimulated their thinking. During the Q sort the researcher asked the participant to talk about the sorting and how he or she interpreted the statements. These comments were recorded and used to help interpret the results.

[3] A question has arisen among researchers using Q method about whether the pattern into which people are required to sort the Q statements, such as the normal distribution shown in Figure 1, matters to the results that are obtained. The conclusion among researchers of Q is that the use of a normal distribution makes little or no difference to the results of a study. We elected to use the normal distribution because we find it helps people sort the cards and because it enables us to use software that we prefer.

Figure 1. Layout for Q sort cards.

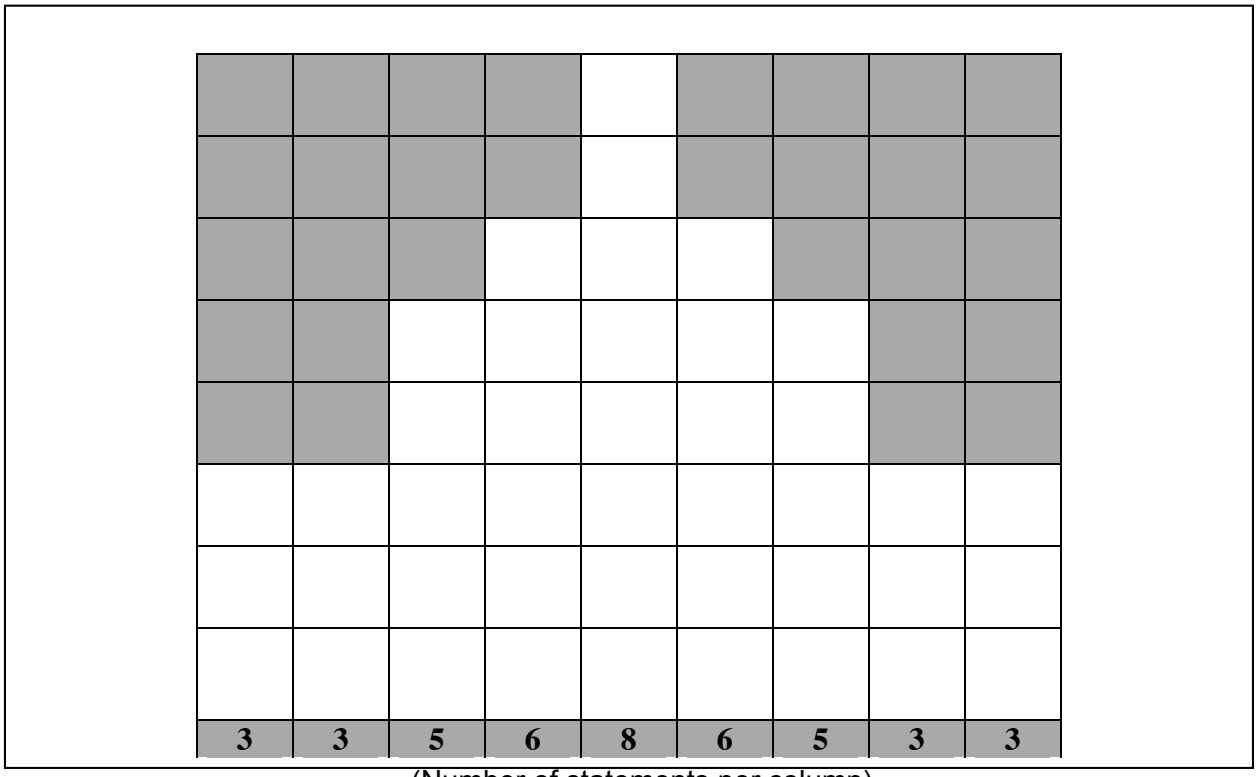

Table 1. List of 42 statements used in the Q sorts.

1) Economic impacts to towns from costs of clean-up should be mitigated.
2) Consumption of contaminated seafood should be prevented.
3) Get on with response efforts early for areas that have been pre-identified as sensitive areas.
4) Even if a species is not native to this area, mitigate impacts to the local population.
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.
6) Give priority to protecting those areas that have multiple resource values, like those that are undeveloped, pristine, and that provide for recreation.
7) Attention should be focused on protecting species that are especially critical for the functioning of an impacted ecosystem.
8) Health and ecological impacts from clean-up activities should be mitigated.
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.
10) Damage to cultural artifacts (e.g., shipwrecks) from oil and its clean-up should be prevented.
11) Economic impacts from lost recreation should be mitigated.
12) Inconveniences to local residents and tourists should be mitigated.
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).
14) There should be no situations that threaten human health whatsoever during the response.
15) Costs to the responsible party resulting from the response should be minimized.
16) Getting clean-up contractors on-scene should ramp up quickly, even if there is uncertainty about how many gallons have been spilled.
17) The clean-up should address aesthetic concerns – like oil stains on rocks.
18) Get a good estimate of the amount of oil spilled.
19) Local responders/leaders should be integrated quickly into response planning because of their knowledge of local conditions, resources, etc.
20) Coordination among participating government agencies, contractors, etc. should be established rapidly.
21) Establish meaningful ways of involving volunteers in the response.
22) A well-organized unified command with a clear chain of command should be established.
23) A well-coordinated expert scientific effort should drive the gathering of decision-relevant information, not public concerns and perceptions.
24) Implement the contingency plan.
25) There should be no residual oil or buried oil that is going to show up later.
26) Restoration planning should be tightly integrated with the response effort so that decisions are based on future restoration needs.
27) As much on-water recovery and removal of oil as possible should be achieved.
28) Conduct monitoring of response activities, such as booming, to actually see whether things are working.
29) Clear definitions of what counts as "clean" should be used so that there is a clear end-point.
30) Tell members of the public about the things they want to know about.
31) Responders should listen to the publics' concerns, even if they cannot be addressed to their complete satisfaction.
32) Unified Command should gain public support for the response effort.
33) Unified Command should develop and maintain trust with members of the public.
34) Efforts to communicate with and engage with the community should be proactive and timely.
35) Consistent and accurate information should be provided to the public.
36) Response efforts should direct oil to a "sacrificial area" – such as a sandy cove that will be easier to clean-up than other, more rocky areas.
37) Unified Command should reconcile the preferences and points of views of all parties about what impacts are important to avoid.
38) Unified Command should manage expectations about the clean-up so that they are reasonable.
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?"
40) Response efforts need to avoid disrupting the integrity and culture of local communities.
41) Subsistence fishing and shellfishing areas should be protected.
42) Make determinations of "clean" with relevant stakeholders, including local residents.

2.4 Q Method Data Analysis

Q method data are analyzed 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 discourses. 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 articulate a small number of social perspectives on a topic.

We arrive at the meaning of each of the social perspectives by following three basic steps. First we enter Q sort data into a computer program called MQMethod.[4] This program computes a correlational matrix among all the Q statements across sorts and also factor analyzes the results. Factor solutions are expressed as idealized Q sorts, or social perspectives. The researchers represent each perspective as a short narrative. Second, we recorded the conversation we had with the participant during the sort. 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. Third, we mailed a narrative description of each social perspective to participants whose individual sorts were most strongly correlated with that perspective. We asked each of them to verify clarity, content, and emphasis of the perspective. In some cases we made minor revisions based on their feedback.

Factor analysis lies at the heart of Q method. MQMethod is basically a factor analysis program. 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 our cases, the factor analysis reduced the complexity to two or three perspectives. As stated above, the analysis produces perspectives that are represented as a specific Q sort. 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 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 a score derived as part of the factor analysis. These scores are called "factor loading scores" and a +1.00 would indicate that a participant's sort exactly matched the factor, a 0 would mean there were no similarities at all, and a –1.00 would indicate that a participant's sort was the exact opposite of the factor sort.

In the following sections we describe the results for each case separately. Then, we will discuss general findings and observations that emerge from the four cases.

3. Spill response objectives in Buzzards Bay, Massachusetts

In Buzzards Bay, we had 16 people do Q sorts. Twelve we had interviewed earlier as part of our initial case study effort. From the analysis, three distinct and coherent factors emerged. Each factor represents a social perspective: Perspectives A, B, and C. Each represents a perspective on what are the most appropriate objectives for guiding responses to future oil spills in the Buzzards Bay region.

Table 2 presents the factor loading scores of each participant and gives the total variance explained by each of the three factors. In all our results we have removed people's actual

[4] This freeware program is available through http://www.qmethod.org. Readers interested in learning more about Q method will find this website informative.

names in order to respect their privacy. In the Table we listed subjects according to the factor on which they load most highly. Table 3 presents the inter-factor correlations among the three factors, which shows that they are largely independent of each other. Table 4 presents the rankings of each statement in each of the three factors.

What is particularly important is that every person loaded significantly on at least one factor. This confirms that all the participants had relevant and coherent perspectives on the topic. In addition, Subject 7 loaded significantly on two factors and Subject 12 loaded on all three factors These individuals expressed points of view that are complex combinations of the fundamental perspectives we identified. To see if their viewpoints would inform better factor solutions, we investigated other solutions using additional judgmental hand rotation and extraction of additional factors, but we discovered all the new solutions had more participants confounded on more than one factor, higher inter-factor correlations, and/or less variance explained. Thus, these alternative solutions were not as informative about the differences in preferences among the participants in our study.

Table 2. Factor loadings for Buzzards Bay Q sort participants.
Loadings significant at 95% confidence level when >= .3981. **Bold** font indicates significant loading on a factor.

Subject	**Factor A**	**Factor B**	**Factor C**
Subject 1	**0.8988**	0.1282	0.0873
Subject 2	**0.7926**	0.3017	0.1520
Subject 3	**0.7634**	0.0898	0.0093
Subject 4	**0.7293**	0.1523	0.3260
Subject 5	**0.6869**	0.3799	0.2366
Subject 6	**0.6597**	0.3775	0.2166
Subject 7	**0.5907**	**0.4919**	-0.2437
Subject 8	**0.5550**	0.1970	0.3314
Subject 9	0.0006	**0.8796**	-0.0448
Subject 10	0.2775	**0.7265**	0.0054
Subject 11	0.2308	**0.6181**	0.3890
Subject 12	**0.4269**	**0.5946**	**0.4915**
Subject 13	0.3614	**0.5307**	0.1892
Subject 14	0.3572	**0.5103**	0.3491
Subject 15	0.0276	0.0480	**0.8166**
Subject 16	0.3807	-0.1076	**0.7543**
% variance explained	30%	21%	14%

Table 3. Inter-factor correlations for Buzzards Bay Q study.

	Factor A	**Factor B**	**Factor C**
Factor A	1.0000	0.4602	0.3373
Factor B		1.0000	0.1365
Factor C			1.0000

Table 4. Factor array for Buzzards Bay Q study.

Statement	Factor A	Factor B	Factor C
1. Economic impacts to towns from costs of clean-up should be mitigated.	-3	0	-3
2. Consumption of contaminated seafood should be prevented.	0	2	-1
3. Get on with response efforts early for areas that have been pre-identified as sensitive areas.	2	3	-1
4. Even if a species is not native to this area, mitigate impacts to the local population.	-2	-2	0
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.	-1	0	0
6. Give priority to protecting those areas that have multiple resource values, like those that are undeveloped, pristine, and that provide for recreation.	3	0	3
7. Attention should be focused on protecting species that are especially critical for the functioning of an impacted ecosystem.	1	2	4
8. Health and ecological impacts from clean-up activities should be mitigated.	1	2	0
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	1	1
10. Damage to cultural artifacts (e.g., shipwrecks) from oil and its clean-up should be prevented.	-2	-1	-2
11. Economic impacts from lost recreation should be mitigated.	-3	-1	-1
12. Inconveniences to local residents and tourists should be mitigated.	-2	-1	-3
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).	-1	0	-2
14. There should be no situations that threaten human health whatsoever during the response.	2	4	-4
15. Costs to the responsible party resulting from the response should be minimized.	-4	-4	-4
16. Getting clean-up contractors on-scene should ramp up quickly, even if there is uncertainty about how many gallons have been spilled.	3	3	0
17. The clean-up should address aesthetic concerns – like oil stains on rocks.	-4	-3	-4
18. Get a good estimate of the amount of oil spilled.	-1	0	2
19. Local responders/leaders should be integrated quickly into response planning because of their knowledge of local conditions, resources, etc.	4	1	4
20. Coordination among participating government agencies, contractors, etc. should be established rapidly.	4	2	-1
21. Establish meaningful ways of involving volunteers in the response.	-2	1	0
22. A well-organized unified command with a clear chain of command should be established.	4	4	0

23. A well-coordinated expert scientific effort should drive the gathering of decision-relevant information, not public concerns and perceptions.	2	-2	2
24. Implement the contingency plan.	0	3	-1
25. There should be no residual oil or buried oil that is going to show up later.	-4	1	1
26. Restoration planning should be tightly integrated with the response effort so that decisions are based on future restoration needs.	-1	-1	3
27. As much on-water recovery and removal of oil as possible should be achieved.	2	4	2
28. Conduct monitoring of response activities, such as booming, to actually see whether things are working.	1	1	4
29. Clear definitions of what counts as “clean” should be used so that there is a clear end-point.	-1	1	2
30. Tell members of the public about the things they want to know about.	-1	-3	-2
31. Responders should listen to the publics’ concerns, even if they cannot be addressed to their complete satisfaction.	0	-2	1
32. Unified Command should gain public support for the response effort.	0	-1	-2
33. Unified Command should develop and maintain trust with members of the public.	1	-4	2
34. Efforts to communicate with and engage with the community should be proactive and timely.	1	0	0
35. Consistent and accurate information should be provided to the public.	1	-2	3
36. Response efforts should direct oil to a “sacrificial area” – such as a sandy cove that will be easier to clean-up than other, more rocky areas.	2	-4	1
37. Unified Command should reconcile the preferences and points of views of all parties about what impacts are important to avoid.	0	-2	-1
38. Unified Command should manage expectations about the clean-up so that they are reasonable.	0	0	-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?”	3	-1	-3
40. Response efforts need to avoid disrupting the integrity and culture of local communities.	-3	-3	0
41. Subsistence fishing and shellfishing areas should be protected.	0	2	1
42. Make determinations of “clean” with relevant stakeholders, including local residents.	-2	0	1

In the following sections we present the three perspectives that are represented by Factors A, B, and C using narratives that describe the kinds of objectives that should guide spill response in the Buzzards Bay region. Since the narratives are constructed from the Q statements references to important Q statements are included in the descriptions.

Buzzards Bay Perspective A

The perspective emphasizes the need for establishing a coordinated and effective response structure that focuses on protection of ecological resources.

The four most highly ranked statements relate to establishing clear roles and coordination among responders. Coordination among response organizations is critical (20) and local responders should be integrated quickly into the response effort (19). There should be a well-organized unified command with a clear chain of command (22) that is lead by individuals with experience and flexibility (19). In this perspective it is not as important to implement the contingency plan (24) as it is to be responsive to the situation. This responsiveness can be improved by using a well-coordinated expert scientific effort to drive the gathering of decision-relevant information, not public concerns and perceptions (23).

Another theme that receives emphasis in this perspective is that response should proceed quickly. Clean-up contractors should be directed to the scene quickly, even if there is uncertainty about how many gallons have been spilled (16) and responders should get on with response efforts early for areas that have been pre-identified as sensitive areas (3). Furthermore, as much on-water recovery and removal of oil as possible should be achieved (27).

While the response should be rapid, it should also be strategic. It is important to focus on sensitive ecological resources (3, 6, 7, 36, not 4). In particular, the response should give priority to protecting those areas that have multiple resource values, such as undeveloped, pristine places, and others that provide recreation (6). Where possible the response efforts should direct oil to a "sacrificial area" – such as a sandy cove that will be easier to clean-up than other, more rocky areas (36). Moreover, it is important that there should be no situations that threaten human health whatsoever during the response (14) and efforts should also be attentive to protecting public health (2, 8).

This perspective does not place a lot of emphasis on how the spill or response might affect local communities. In our validation of a draft narrative for this perspective, one respondent noted that this is particularly true for the initial *emergency* phase of spill response. For example, during the early stages of a spill response minimizing inconveniences to local communities and residents (11, 40) would be a low priority. LIkewise involving untrained residents in emergency clean-up activities is ranked low, mainly because those activities may pose health risks. Similarly, it would be a low priority at such moments in a spill response to minimize economic impacts to towns from costs of clean-up (1, 11, 13), mitigate aesthetic impacts and concerns about residual oil (17, 25); and mitigate socio-cultural impacts, such as to subsistence fishing (41) and the integrity and culture of local communities (40). There is scant support for making determinations of "clean" with relevant stakeholders, including local residents (42) or establishing meaningful ways of involving volunteers in the response (21). On the other hand, many of these could become very important in latter phases of spill response, including damage assessment and restoration.

Buzzards Bay Perspective B

The perspective emphasizes two themes. These are that there should be a well-coordinated response that is driven by the contingency plan and the response should emphasize protection of public health and ecological resources. The former improves the likelihood that the second will be achieved.

Establishing a well-organized unified command with a clear chain of command (22) is the highest ranked objective. The Unified Command should implement the contingency plan (24). 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?" (39). Having a well-coordinated expert scientific effort drive the gathering of decision-relevant information (23) and setting up mechanisms for Unified Command to reconcile the preferences of all parties about what impacts are important to avoid (37) are de-emphasized in the midst of a response. There is some ambivalence about the role of local responders (19) and volunteers (21), which was a source of tension in the *Bouchard-120* spill response in this region.

A second, very important theme that is emphasized in this perspective is that the response should not put people or resources at further risk. There should be no situations that threaten human health whatsoever during the response (14). Furthermore, health and ecological impacts from clean-up activities should be mitigated (8). This perspective emphasizes *preventing* risks as much as possible:

- as much on-water recovery and removal of oil as possible should be achieved (27);
- getting clean-up contractors on-scene should ramp up quickly, even if there is uncertainty about how many gallons have been spilled (16);
- consumption of contaminated seafood should be prevented (2); and
- subsistence fishing and shell-fishing areas should be protected (41).

On the other hand, there is little belief that the spilled oil can be 'managed' by responders. For example, people whose perspectives were similar to this perspective are unlikely to emphasize that response efforts should direct oil to a "sacrificial area" – such as a sandy cove that will be easier to clean-up than more rocky areas (36).

This perspective also did not emphasize objectives related to public communication. While the same is true for Perspective A, several related statements scored lower here. For example, Perspective B emphasized more weakly that:

- Unified Command should develop and maintain trust with members of the public (33);
- tell members of the public about the things they want to know about (30);
- responders should listen to the publics' concerns, even if they cannot be addressed to their complete satisfaction (31);
- consistent and accurate information should be provided to the public (35); and
- efforts to communicate with and engage with the community should be proactive and timely (34).

Buzzards Bay Perspective C

This perspective emphasizes the ways that Unified Command's response effort is coordinated and integrated with a larger context of activities, such as local responders, and monitoring and restoration. By being part of the 'big picture' in which response is embedded, response activities can be improved.

This perspective emphasizes a set of objectives related to the performance of the response system. Decisions should be driven by good information, and not necessarily by the area contingency plan (24) or public perceptions (23). Local responders/leaders should be integrated quickly into response planning because of their knowledge of local conditions, resources, etc. (19). A concern with gathering and using relevant information is complemented by the emphasis given to the objective that a well-coordinated expert scientific effort should drive the gathering of decision-relevant information (23) and the need to get a good estimate of the amount of oil spilled (18). Furthermore, it is important that monitoring of response activities be

conducted, such as booming, to actually see whether things are working (28) and that response be informed by the needs of restoration (26).

There is an underlying sense, among those whose Q sorts were similar to this perspective, that damage from oil is inevitable, even although recovery of oil on the water is desired (27). Thus, it is important that there be clear definitions of what counts as "clean" should be used so that there is a clear end-point (29) and responders consider directing oil to a "sacrificial area" – such as a sandy cove that will be easier to clean-up than other, more rocky areas (36).

The aim of the response effort should focus on protecting species that are especially critical for the functioning of an impacted ecosystem (7) and on protecting those areas that have multiple resource values, like those that are undeveloped, pristine, and that provide for recreation (6). They want to do this even if this means having people experience some kinds of harm (8, 14). While it may be responsible during emergency response to allow people to experience temporary loss of areas for recreation or commerce, it would never by acceptable to put lives at risk. Mitigation of economic impacts, inconveniences to local people and tourists, cultural resources, and aesthetics (1, 11, 12, 13, 15, 17). are relatively unimportant objectives

This perspective also emphasizes objectives related to public communication. Provision of consistent and accurate information to the public is very important (35). On the other hand, the objective to tell members of the public about the things they want to know about (30) is not emphasized. Moreover, this perspective does not emphasize objectives for managing public expectations (38) or gaining public support for the response effort (32) – even while they want to gain their trust (33).[5]

Discussion of Buzzards Bay results

Each of the three perspectives represents a distinct view about the relative importance of objectives that should guide oil spill response in Buzzards Bay. Of course, they share some features, while still having some important differences.

Perspective A highlights the need for a well-organized response system. It should ensure good coordination (20), integrate local responders (19), have a clear chain of command (22), get clean-up crews on-site rapidly (16), and initiate efforts rapidly (3). On the other hand, objectives related to economic costs (1, 11), aesthetic concerns (17), and inconveniencing local residents (12, 40) were ranked low. Objectives related to public health and ecological impacts were important (2, 8, 7, 6, 36, 14) but not as important as objectives related to response organization. Nor did they receive the same relative emphasis as they did in Perspectives B or C.

Objectives that are articulated in policy (e.g., National Response Plan) rated high in Perspective B (statements 14, 2, 7, 8, 41); these are the statements regarding protection of public and worker health and protecting species that are especially critical for the impacted ecosystem. This perspective placed a high priority on implementing the contingency plan (24). In contrast, Perspective A emphasizes more strongly the need for responsible authorities to assign people

[5] When we validated a draft of this narrative with an individual who loaded highly on Factor C we were told that "Managing public expectations is one of the more critical elements of an effective spill response. In general, the public has inflated expectations of the efficacy of current spill response technologies. No response, no matter how well conducted, will pick up every oiled bird or return every oiled marsh and beach to it's pre-spill condition (at least not in the near term). It is important that the public hear that message early and often." Nevertheless, in this Factor statement #38 was ranked very low (z-score equal to -1.161).

who can be flexible (39), to achieve coordination (20), and to integrate local responders (19). Perspective B also shares with perspective A the concern that there be a clear chain of command (22), as much oil as possible be recovered off-shore (27), and to ramp up response quickly (16). Perspective B does not place a high premium on science to guide the response effort (23) (relative to Perspectives A or C).

Perspective C emphasizes monitoring of activities (28), providing accurate and consistent information to the public (35), and integrating restoration planning with clean-up activities (26) more strongly than the other perspectives. Perspective C shares with Perspective A the objective to have good local responder integration into the effort (19); this may be a result of conflicts that arose among federal, state, and local responders about the notification and integration of local first responders immediately after the spill occurred (see Tuler et al. 2006a). Concerns about impacts are mostly focused on ecological impacts (7, 6), but less so about threats to public health (14), as well as aesthetic concerns (17), costs to the responsible party (15), inconveniences to local residents (12), and costs to local towns (1). Science as a guide to decisions is most important in this perspective (23).

4. Spill response objectives in San Francisco Bay, California

In San Francisco, 13 people completed Q sorts. Three distinct and coherent factors emerged. Each factor represents a social perspective: Perspectives D, E, and F. Each represents a perspective on what are the most appropriate objectives for guiding responses to future oil spills in the San Francisco Bay region. In this case we elected to "rotate" the factors to more clearly distinguish them.

Table 5 presents the factor loading scores of each participant and gives the total variance explained by each of the three factors. In all our results we have removed people's actual names in order to respect their privacy. In the Table we listed subjects according to the factor on which they load most highly. Table 6 presents the inter-factor correlations. It shows that they are largely independent of each other. Table 7 presents the rankings of each statement in each of the three factors.

What is particularly important is that every person loaded significantly on at least one factor. Subject 8 loaded significantly on two factors (names are not provided to maintain confidentiality). One person's loading was *negative*, however, suggesting substantial disagreement with the second factor (E). In addition, Factors E and F are each defined by a single individual.

Table 5. Factor loadings for San Francisco Bay Q sort participants.
Loadings significant at 95% confidence level when >= .3981. **Bold** font indicates significant loading on a factor.

Subject	Factor D	Factor E	Factor F
Subject 1	**0.8536**	0.0405	0.1308
Subject 2	**0.8388**	-0.1359	0.2181
Subject 3	**0.8338**	0.2543	-0.2806
Subject 4	**0.8075**	-0.1688	-0.1034
Subject 5	**0.7938**	0.0952	0.0954
Subject 6	**0.7936**	0.1327	0.2093
Subject 7	**0.7796**	-0.1721	-0.1147
Subject 8	**0.7086**	**-0.4414**	-0.0961
Subject 9	**0.6714**	0.0106	0.3167
Subject 10	**0.6657**	0.0074	0.0405
Subject 11	**0.6625**	0.3489	0.2179
Subject 12	0.2439	**0.8594**	0.0767
Subject 13	0.3547	-0.2139	**0.8535**
% variance explained	51%	10%	9%

Table 6. Inter-factor correlations for San Francisco Bay Q study.

	Factor D	Factor E	Factor F
Factor D	1.0000	0.2431	0.3996
Factor E		1.0000	0.0099
Factor F			1.0000

Table 7. Factor array for San Francisco Bay Q study.

	Factor D	Factor E	Factor F
1. Economic impacts to towns from costs of clean-up should be mitigated.	-2	0	0
2. Consumption of contaminated seafood should be prevented.	1	2	2
3. Get on with response efforts early for areas that have been pre-identified as sensitive areas.	3	0	1
4. Even if a species is not native to this area, mitigate impacts to the local population.	-4	-1	-4
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.	-1	2	-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	0	0
7. Attention should be focused on protecting species that are especially critical for the functioning of an impacted ecosystem.	2	4	4
8. Health and ecological impacts from clean-up activities should be mitigated.	0	-1	2
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.	2	3	4
10. Damage to cultural artifacts (e.g., shipwrecks) from oil and its clean-up should be prevented.	-1	-1	2
11. Economic impacts from lost recreation should be mitigated.	-3	-1	3
12. Inconveniences to local residents and tourists should be mitigated.	-3	-2	0
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).	-2	4	2
14. There should be no situations that threaten human health whatsoever during the response.	4	-3	1
15. Costs to the responsible party resulting from the response should be minimized.	-4	-3	-3
16. Getting clean-up contractors on-scene should ramp up quickly, even if there is uncertainty about how many gallons have been spilled.	4	1	0
17. The clean-up should address aesthetic concerns – like oil stains on rocks.	-4	-3	-2
18. Get a good estimate of the amount of oil spilled.	0	2	-1
19. Local responders/leaders should be integrated quickly into response planning because of their knowledge of local conditions, resources, etc.	2	2	1
20. Coordination among participating government agencies, contractors, etc. should be established rapidly.	3	1	1
21. Establish meaningful ways of involving volunteers in the response.	-3	0	-4
22. A well-organized unified command with a clear chain of command should be established.	4	3	1
23. A well-coordinated expert scientific effort should drive the gathering of decision-relevant information, not public concerns	1	4	-1

and perceptions.			
24. Implement the contingency plan.	3	-4	1
25. There should be no residual oil or buried oil that is going to show up later.	-2	-4	4
26. Restoration planning should be tightly integrated with the response effort so that decisions are based on future restoration needs.	-1	0	-3
27. As much on-water recovery and removal of oil as possible should be achieved.	2	-4	3
28. Conduct monitoring of response activities, such as booming, to actually see whether things are working.	1	1	3
29. Clear definitions of what counts as "clean" should be used so that there is a clear end-point.	0	3	0
30. Tell members of the public about the things they want to know about.	-2	-2	0
31. Responders should listen to the publics' concerns, even if they cannot be addressed to their complete satisfaction.	-1	-1	-1
32. Unified Command should gain public support for the response effort.	-1	-1	-1
33. Unified Command should develop and maintain trust with members of the public.	0	-2	-1
34. Efforts to communicate with and engage with the community should be proactive and timely.	1	0	-1
35. Consistent and accurate information should be provided to the public.	0	-2	0
36. Response efforts should direct oil to a "sacrificial area" – such as a sandy cove that will be easier to clean-up than other, more rocky areas.	0	1	-2
37. Unified Command should reconcile the preferences and points of views of all parties about what impacts are important to avoid.	0	1	-2
38. Unified Command should manage expectations about the clean-up so that they are reasonable.	1	2	-4
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	0	0
40. Response efforts need to avoid disrupting the integrity and culture of local communities.	-1	0	-3
41. Subsistence fishing and shellfishing areas should be protected.	0	-2	2
42. Make determinations of "clean" with relevant stakeholders, including local residents.	-2	1	-2

In the following sections we present the three perspectives that are represented by Factors D, E, and F via narratives that describe the kinds of objectives that should guide spill response in the San Francisco Bay region. As above, references to important Q statements are included in the descriptions.

San Francisco Bay Perspective D

This perspective emphasizes the need to rapidly establish an effective organization to implement response actions. Response actions should be guided, initially, by the contingency plan. A quick response, however, should in no way put people at risk (14).

This overall goal is facilitated through the achievement of several objectives. Establishing a well-organized unified command with a clear chain of command (22) was among the most strongly emphasizes statements. Clarity about roles and responsibilities is critical. In addition, objectives for getting clean-up contractors on-scene quickly (16), implementing the contingency plan (24), ensuring coordination among multiple responsible government agencies and organizations (20), and integrating local responders and leaders into response efforts (19) were all strongly emphasized. Of course, contingency plans should not be followed blindly. 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?" (39).

In addition to the paramount objective of not putting people at risk during the response (14), a well-organized response system should be oriented toward protecting critical ecological systems. There should be rapid efforts to protect areas that have been pre-identified as sensitive (3, 24) and attention should be focused on protecting species that are especially critical for the functioning of an impacted ecosystem (7). The ability to protect ecological systems is enhanced by on-water recovery and removal of oil (27). In any case, 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 (9). This concern is not extended to non-native species (4).

This perspective does not emphasize objectives related to the concerns or needs of impacted human communities.[6] For example, objectives related to mitigating aesthetic, social, or economic impacts to local communities (17, 12, 11, 1, 13, 40, 25) were ranked low. Furthermore, it is not a high priority to involve local communities in response efforts (21, 42) or to inform them about the response efforts (30). Minimizing costs to the responsible party resulting from the response (15) was not important.

San Francisco Bay Perspective E

This perspective emphasizes mitigation of long-term impacts to coupled human and environment systems. The emphasis should be on mitigating impacts to "foundational" components of the human-environment system, including fisheries and markets.

Protection of ecological systems is very important to this perspective. The most highly ranked statement is that attention should be focused on protecting species that are especially critical for the functioning of an impacted ecosystem (7). In this context, that can mean, for example, plankton which are important because they are the base of the food chain. It may also mean that a response effort should protect the adults of a species at risk because the adults can come back next year and reproduce (5).

It is very important that critical components of regional human systems be protected. This means that economic impacts to local commercial fishermen should be reduced (13), enough oil be removed so that communities and can recover (9), and consumption of contaminated

[6] When validating a draft narrative for this perspective one person commented that "the relegation of local community involvement to "low priority" is 1) an artifact of the exercise (i.e., only a certain number of cards could be allocated to each rank), 2) local community involvement had been already been included via area contingency planning, and 3) some of us DID put at least one card involving public/media/community outreach by the unified command (and there were several cards that touched on this) in the first five ranks." While all of these reasons may have some validity for specific individuals loading on Factor B, as an "ideal" Q sort representing the largest group of respondents the relative emphasis given to these statements is low.

seafood is prevented (2). At the same time, it is not very important that the response be driven by a concern for subsistence or recreational fishing and shell-fishing (41, 11) or inconveniences to tourists (12), because these are not significant elements of the regional economy or culture.

Efforts to protect coupled human and environment systems are enhanced when objectives related to the organization of the response effort and basis for decisions are attended to. It is critically important for there to be a well-coordinated response (23, 22, 19) that utilizes good information (23, 18, 19) has clear decision criteria (29), and is flexible (24). In other words, response managers should not just do what is specified in the contingency plan.

This means that the response effort should not be driven by public concerns or perceptions (17, 23, 33), and that Unified Command has the responsibility to manage expectations about the clean-up so that they are reasonable (38). Consequently, a priority of managers should *not* be to achieve as much on-water recovery and removal of oil as possible (27) because that could require the use of dispersants which might harm plankton and diatoms that are important to the health of fisheries – it would be better to see oil on rocks and lose a few birds than use dispersants that could affect entire fisheries. Similarly, the elimination of residual or buried oil (25) may cause more problems than are solved: the focus should be on higher order objectives of ecosystem functioning and not have the response be driven by, for example, aesthetics (17). In addition, avoiding *all* situations that threaten human health whatsoever during the response (14) is not emphasized. Oil spill response is inherently risky and this objective would be a "show stopper."

San Francisco Bay Perspective F

This factor is very focused on mitigating impacts to ecological resources. The entire response should be guided by this overall goal, including organizational and management objectives.

Protection of ecological systems is paramount. The response should focus on protecting species that are especially critical for the functioning of an impacted ecosystem (7), but not on species not native to the area (4). The aim should be for the response to 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 (9). Mitigation of impacts to important regional economic activities, such as recreation (11, 10) and sale of seafood (2, 13, 41), are also important objectives – but secondary to protection of the ecological resources.

Mitigation of impacts and promotion of long-term recovery are enhanced when no residual oil or buried oil is going to show up later (which may exacerbate impacts; 25) and oil is recovered and removed while off-shore (27). However, there is little credence given to the idea that oil can be *purposefully* directed to "sacrificial" areas as an impact mitigation strategy (36). Usually the people that must make such a decision in the field lack ecological expertise. In other words, response actions can cause more harm than good.

It is also important to ensure that response efforts are actually working, so that new strategies can be developed if necessary. This means response activities should be monitored (28) and responders should be guided by, but not get locked into, contingency plans (24). Moreover, it is important to allow response managers to focus on critical tasks. They should not be side-tracked by managing volunteers (21) or public opinion (38), resolving conflicts about preferences and points of views of all parties (37, 42), or addressing aesthetic concerns (17). Similarly, because it is difficult to coordinate response activities with restoration planning (26), it is not emphasized as an important objective.

Finally, oil spills and their responses involve risks. It is not possible to respond in a way that puts *no* responders at risk (14). Nor is it reasonable to avoid disrupting the integrity and culture of local communities (40). Responses are by their very nature disruptive. It is also not an important objective to minimize costs to the responsible party (15).

Discussion of San Francisco Bay results

Each of the three perspectives represents a distinct view about the relative importance of objectives that should guide oil spill response in San Francisco Bay. Of course, they share some features, while still having some important differences.

Perspective D emphasizes very strongly (relative to the other two perspectives) the need for a well-organized response system. It should ensure good coordination (20), integrate local responders (19), have a clear chain of command (22), get clean-up crews on-site rapidly (16), and initiate efforts rapidly (3). On the other hand, objectives related to mitigating impacts to human systems were ranked low (1, 11, 12, 13, 17, 40). Objectives related to ensuring public and worker health and safety and to mitigating ecological impacts were ranked as important in this perspective. Most emphasis is given to protecting key species and sensitive areas that have been identified during pre-spill planning (3, 24, 7).

The concern for mitigating impacts to ecological systems is shared by Perspectives E and F. But this general statement can mask some important differences in the perspectives that Factors D and E represent. In particular, Perspective E represents a view that mitigation of impacts is not only a function of the amount of oil that is removed or remains. It is also a function of *how* the oil is removed. Thus, for example, it might be better to avoid using dispersants or *in situ* burning. Furthermore, there is additional emphasis on the need to protect adults of a species that can continue to reproduce in the following years (5). Interestingly, this also appears to have an influence on the relative importance of worker and public safety in the overall response effort. Perspective E believes that oil spill response is inherently risky so that avoiding *all* situations that threaten human health whatsoever during the response (14) is not a sensible objective.

In addition, Perspectives E and F emphasize protecting the human components of the impacted region (e.g., statement 13). This issue does not emerge as a strong concern in Perspective D. Perspective E expresses concern with long-term impacts that may result from “hidden” changes such as impacts to lower levels in the food chain. That is why Perspective E does not emphasize that there should be as much on-water recovery and removal, as this may mean the use of dispersants that harm plankton (27), or that there should be no residual oil or buried oil (25). This is also suggested by Perspective E’s emphasis on reducing economic impacts to local fishermen (13).

Perspectives E and F give more emphasis to the objective that 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 (9). Again, this reflects their concern with the impacts to human components of the impacted region (i.e., local economies, culture). Perspective F appears to place somewhat more emphasis on avoiding potential impacts to recreation (11, 12) – which can be important to the local economy – and to subsistence fishing (41), relative to Perspective E. This may be because Perspective E has a different sense of the importance of these than does Perspective F.

Finally, the way that decisions about response actions are made is another area of significant disagreement between Perspectives D and E. Perspective D believes that the response should

closely follow the contingency plan (24), and at the same time leadership should be flexible and experienced (39). Perspective E suggests that the contingency plan should not be implemented blindly. Case specific contingencies need to be accounted for, and the best way to do this is with a well-coordinated expert scientific effort (23) and clear definitions of what end-points are desired (29). Such end-points may not be clearly spelled out in the contingency plan. It is better to have responders who ask: "What do we need here, now?"

These differences cannot be simply attributed to the affiliations of the individuals who load highly on the various factors. Eleven out of thirteen of the individuals completing the Q sorts about San Francisco Bay loaded on Factor D. Only one person defined Factor E (a local fisherman) and only one person defined factor F (a state NRDA specialist).

5. Delaware Bay spill response objectives

Twelve people completed Q sorts in the Delaware Bay region. Three distinct and coherent factors emerged from the analysis. Each factor represents a social perspective. We call these Factors J, K, and L. Each represents a perspective on what are the most appropriate objectives for guiding responses to future oil spills in the Delaware Bay region. In this case we elected to "rotate" the factors to more clearly distinguish them.

Table 8 presents the factor loading scores of each participant and gives the total variance explained by each of the three factors. In the Table we listed subjects according to the factor on which they load most highly. Table 9 presents the inter-factor correlations among the three factors, which shows that they are largely independent of each other. Table 10 presents the rankings of each statement in each of the three factors.

What is particularly important is that every person loaded significantly on at least one factor. Subjects 6 and 11 loaded significantly on two factors (names are not provided to maintain confidentiality), suggesting substantial agreement with aspects of two factors. In addition, Factor K is defined by a single individual (Subject 12). We investigated other factor solutions, through additional judgmental hand rotation of factors and inclusion of additional factors, but we discovered all the new solutions had more participants confounded on more than one factor, higher inter-factor correlations, and/or less variance explained. Thus, these alternative solutions were not as informative about the differences in preferences among the participants in our study.

Table 8. Factor loadings for Delaware Bay objectives Q sort participants.
Loadings significant at 95% confidence level when >= .3981. **Bold** font indicates significant loading on a factor.

Subject	Factor J	Factor K	Factor L
Subject 1	**0.8520**	-0.0775	0.0249
Subject 2	**0.8126**	0.1534	0.2131
Subject 3	**0.7055**	-0.2298	0.3727
Subject 4	**0.6813**	0.2809	0.2537
Subject 5	**0.5949**	0.3294	0.3855
Subject 6	**0.5761**	-0.1830	**0.5219**
Subject 7	0.2320	-0.1161	**0.7965**
Subject 8	0.3530	-0.0149	**0.7897**
Subject 9	0.2951	-0.1184	**0.7602**
Subject 10	0.3120	0.3110	**0.7358**
Subject 11	**0.4606**	0.3515	**0.5639**
Subject 12	0.1717	**0.8641**	0.3073
% variance explained	30%	11%	29%

Table 9. Inter-factor correlations for Delaware Bay objectives Q study.

	Factor J	Factor K	Factor L
Factor J	1.0000	0.2903	0.6084
Factor K		1.0000	0.3345
Factor L			1.0000

Table 10. Factor array for Delaware Bay objectives Q study.

Statement	Factor J	Factor K	Factor L
1. Economic impacts to towns from costs of clean-up should be mitigated.	-2	0	-2
2. Consumption of contaminated seafood should be prevented.	0	0	2
3. Get on with response efforts early for areas that have been pre-identified as sensitive areas.	4	4	1
4. Even if a species is not native to this area, mitigate impacts to the local population.	-2	-2	-4
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.	-2	0	-1
6. Give priority to protecting those areas that have multiple resource values, like those that are undeveloped, pristine, and that provide for recreation.	0	3	0
7. Attention should be focused on protecting species that are especially critical for the functioning of an impacted ecosystem.	1	4	2
8. Health and ecological impacts from clean-up activities should be mitigated.	0	1	2
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.	1	4	3
10. Damage to cultural artifacts (e.g., shipwrecks) from oil and its clean-up should be prevented.	0	-3	-1
11. Economic impacts from lost recreation should be mitigated.	-1	0	-3
12. Inconveniences to local residents and tourists should be mitigated.	-3	-2	-3
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	0	-1
14. There should be no situations that threaten human health whatsoever during the response.	2	-2	4
15. Costs to the responsible party resulting from the response should be minimized.	-4	-4	-3
16. Getting clean-up contractors on-scene should ramp up quickly, even if there is uncertainty about how many gallons have been spilled.	2	3	0
17. The clean-up should address aesthetic concerns – like oil stains on rocks.	-4	-1	-4
18. Get a good estimate of the amount of oil spilled.	-2	0	1
19. Local responders/leaders should be integrated quickly into response planning because of their knowledge of local conditions, resources, etc.	3	-1	1
20. Coordination among participating government agencies, contractors, etc. should be established rapidly.	3	1	1
21. Establish meaningful ways of involving volunteers in the response.	-1	1	-4

22. A well-organized unified command with a clear chain of command should be established.	4	3	4
23. A well-coordinated expert scientific effort should drive the gathering of decision-relevant information, not public concerns and perceptions.	1	2	3
24. Implement the contingency plan.	4	-3	2
25. There should be no residual oil or buried oil that is going to show up later.	-4	1	-2
26. Restoration planning should be tightly integrated with the response effort so that decisions are based on future restoration needs.	-3	2	0
27. As much on-water recovery and removal of oil as possible should be achieved.	0	1	2
28. Conduct monitoring of response activities, such as booming, to actually see whether things are working.	2	1	1
29. Clear definitions of what counts as “clean” should be used so that there is a clear end-point.	-1	-1	4
30. Tell members of the public about the things they want to know about.	-1	-4	-2
31. Responders should listen to the publics’ concerns, even if they cannot be addressed to their complete satisfaction.	-1	0	-1
32. Unified Command should gain public support for the response effort.	0	-1	-1
33. Unified Command should develop and maintain trust with members of the public.	1	2	0
34. Efforts to communicate with and engage with the community should be proactive and timely.	3	2	0
35. Consistent and accurate information should be provided to the public.	2	2	0
36. Response efforts should direct oil to a “sacrificial area” – such as a sandy cove that will be easier to clean-up than other, more rocky areas.	1	-3	-1
37. Unified Command should reconcile the preferences and points of views of all parties about what impacts are important to avoid.	-3	-1	1
38. Unified Command should manage expectations about the clean-up so that they are reasonable.	1	-4	0
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	-2	3
40. Response efforts need to avoid disrupting the integrity and culture of local communities.	-2	-2	-2
41. Subsistence fishing and shellfishing areas should be protected.	0	-1	-2
42. Make determinations of “clean” with relevant stakeholders, including local residents.	-1	0	0

Delaware Bay Perspective J

The perspective takes the view that the spill response needs to be directed by the contingency plan (24). This does not mean that it should be followed to the letter. As one person loading highly on this perspective noted “there must be some flexibility to allow for adaptive management on an as needed basis. That is, a response is never "black and white" and will not follow a ‘script’ perfectly.”

Toward this over-arching goal, the most important thing to do is to establish a clear chain of command (22) that realizes effective coordination among the important parties such as governmental agencies and contractors (22). Local responders also need to be quickly integrated into the response effort (19)

Once established, the response team should move quickly to protect areas that had been pre-identified as sensitive (3). Another key first step is to establish proactive communication with the local communities (34). Although the response should be quickly organized, leadership needs to protect the health of responders above all else (14). While it is important to get clean-up contractors on-scene quickly (16), their numbers should reflect the needs of the moment and not driven by a desire to be overly cautious. Thus, it is important to monitor the effects of response activities (28) and provide good feedback to the unified command who can adapt as needed (39).

The integration of new scientific information (23) is not as important during the initial phases as experience and pragmatism in unified command decision-making; moreover, the best available science relevant to the initial assessment of a spill should already have been incorporated into the contingency plan. On the other hand, there is room for the gathering and integration of more detailed scientific information as the spill response progresses, such as about specific species or habitats at risk.

An important part of the response, according to this perspective, is proactive and timely communication with the public (34). Unified command should provide accurate and consistent information to the public (35) while also managing expectations about the clean-up so that they are reasonable (38) and gaining public support for the response effort (33).

Delaware Bay Perspective K

This perspective emphasizes the need for protecting the area’s ecology by a quickly implemented response.

The four highest ranked statements in this perspective all involve the protection of the area’s ecology (3, 7, 6, 9). The emphasis is on protecting sensitive resources, critical species, and getting the ecological systems back to normal functioning as quickly as possible. Furthermore, the statement about directing oil to a sacrifice area (36) was strongly rejected in this perspective. To ensure that the ecology is protected response should ramp-up quickly even if there is uncertainty about the magnitude of the spill (16). Long-term mitigation of ecological impacts is further enhanced when there is tight integration between the response effort and restoration planning (26); no other factor ranked this statement as high as in this factor. Decisions should be based on good science rather than public concerns and perceptions (23). Interestingly, this perspective does not show the faith in the contingency plan (24) that Perspective J does, nor did it support the statement about flexible and experienced decision makers implementing the contingency plan (39). This suggests that the contingency plan is seen as inadequate in this perspective.

In spite of the privileging of science over public perceptions, it is important to this perspective that the community be informed and engaged during the response. Trust should be developed with the community (33), efforts to communicate should be proactive and timely (34), information provided should be accurate and consistent (35), and meaningful ways should be found to involve volunteers in the clean-up effort (21). The focus on community relations, however, does *not* mean that people should only be told what they want to know (30), that expectations should be managed so that they are reasonable (38), or that public support is needed about the response (32).

Delaware Bay Perspective L

This perspective 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.

While there is a recognition that zero risk is impossible, the most highly ranked statement is that there should be no situations that pose significant threats to human health during the response (14). In addition, consumption of contaminated seafood should be prevented (2), health and ecological impacts from clean-up activities should be mitigated (8), and 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 (9). Avoiding ecological impacts should focus on species particularly critical to the functioning of the ecosystem (7). The best way to do this is by a concerted effort to achieve as much on-water recovery and removal of oil as possible (27).

With regard to the implementation of the response, this perspective emphasizes many of the same considerations as the perspective represented by Perspective J. There should be a well-coordinated unified command with a clear chain of command (22) and flexible and experienced decision-makers who implement the contingency plan (39, 24).

One place that these perspectives diverge is that this perspective strongly emphasizes the need for a clear definition of what level of cleanliness the clean-up is working toward (29). Much more than Perspective J, this perspective wants Unified Command to reconcile disagreements about which impacts to avoid (37).

Another difference with Perspective J is that this perspective does not give as much attention to the public relations tasks of Unified Command (35, 34, 33). Instead, the importance is placed on having the response being informed with information that is gathered scientifically.

Discussion of Delaware Bay results

Each of the three perspectives represents a distinct view about the relative importance of objectives that should guide oil spill response in the Delaware Bay. Of course, they share some features, while still having some important differences.

There was consensus among the perspectives on:

- mitigation of economic impacts, nuisance, and aesthetic impacts is not emphasized (1, 11, 12, 15, 17, 40),
- not worrying about non-native species (4), and
- establishing a well-organized unified command with a clear chain of command (22)

Perspective J strongly emphasizes the need to set-up a well-coordinated response, that is directed by the contingency plan in the early stages of a spill response (19, 20, 22, 24). Those

areas that have been pre-identified as sensitive should be the focus of initial response (3). The focus is not about thinking ahead, to future needs such as those during restoration actions (26). During the response it is important to adapt to changing conditions (28). Unified command should attend to public communications during the response (34), but building trust, addressing concerns, and the like are not emphasized.

Perspective K places a very strong emphasis on protecting the ecological systems that may be impacted (3, 6, 7, 9, 36). Like Perspective J there is a strong emphasis on getting on with response efforts early for areas that have been pre-identified as sensitive areas (3). Recovery of ecological systems (9) is foremost in the minds of those who are associated with this perspective. For example, to ensure that the ecology is protected response should ramp-up quickly even if there is uncertainty about the magnitude of the spill (16). Unlike Perspective J there is little emphasis on implementing the contingency plan (24).

Although Factors J and L are highly correlated (61%) we have chosen to make a distinction between the perspectives they represent. This is primarily because of their different ways of emphasizing the use of the contingency plan vs. use of science and pre-defined end-points defining "clean" (23, 24, and 29) and the way that perspective J emphasizes public communications (particularly statement 34). A strong theme of Perspective L is the protection of public health and safety, which includes efforts to prevent consumption of contaminated seafood (2, 14, 27); there is little subsistence fishing in the area (41) so that is not a major health-related concern. While both Perspectives K and L emphasize statement 9, Perspective L emphasizes recovery in terms of impacts to human communities; the importance of species and habitat recovery is more in terms of their role in local economies.

6. Washington state spill response objectives

Thirteen people completed Q sorts in Washington State. Two distinct and coherent factors emerged from the analysis. Each factor represents a social perspective. We call these Perspectives M and N. Each represents a perspective on what are the most appropriate objectives for guiding responses to future oil spills in the Washington state region.

Table 11 presents the factor loading scores of each participant and gives the total variance explained by each of the factors. In the Table we listed subjects according to the factor on which they load most highly. Table 12 presents the inter-factor correlations between the factors, which shows that they are largely independent of each other. Table 13 presents the rankings of each statement in each of the factors.

What is particularly important is that every person loaded significantly on at least one factor. Subject 9 loaded significantly on both factors (names are not provided to maintain confidentiality), suggesting substantial agreement with aspects of both. We investigated other factor solutions, through additional judgmental hand rotation of factors and inclusion of additional factors, but we discovered all the new solutions had more participants confounded on more than one factor, higher inter-factor correlations, and/or less variance explained. Thus, these alternative solutions were not as informative about the differences in preferences among the participants in our study.

Table 11. Factor loadings for Washington state objectives Q sort participants.
Loadings significant at 95% confidence level when >= .3981. **Bold** font indicates significant loading on a factor.

Subject	Factor M	Factor N
Subject 1	**0.8852**	0.1722
Subject 2	**0.8809**	-0.0173
Subject 3	**0.8663**	-0.0383
Subject 4	**0.8383**	0.2500
Subject 5	**0.8121**	0.2606
Subject 6	**0.7487**	0.2548
Subject 7	**0.7278**	0.2291
Subject 8	**0.6957**	0.3056
Subject 9	**0.6314**	**0.5178**
Subject 10	**0.6275**	0.2659
Subject 11	0.2685	**0.8200**
Subject 12	-0.0533	**0.8147**
Subject 13	0.2697	**0.7112**
% variance explained	48%	20%

Table 12. Inter-factor correlations for Washington state objectives Q study.

	Factor M	Factor N
Factor M	1.0000	0.3752
Factor N		1.0000

Table 13. Factor array for Washington state objectives Q study.

Statement	Factor M	Factor N
1. Economic impacts to towns from costs of clean-up should be mitigated.	-2	0
2. Consumption of contaminated seafood should be prevented.	1	0
3. Get on with response efforts early for areas that have been pre-identified as sensitive areas.	3	2
4. Even if a species is not native to this area, mitigate impacts to the local population.	-3	-3
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.	0	-3
6. Give priority to protecting those areas that have multiple resource values, like those that are undeveloped, pristine, and that provide for recreation.	1	0
7. Attention should be focused on protecting species that are especially critical for the functioning of an impacted ecosystem.	2	0
8. Health and ecological impacts from clean-up activities should be mitigated.	1	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.	1	0
10. Damage to cultural artifacts (e.g., shipwrecks) from oil and its clean-up should be prevented.	0	-3
11. Economic impacts from lost recreation should be mitigated.	-3	-1
12. Inconveniences to local residents and tourists should be mitigated.	-4	-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).	-1	1
14. There should be no situations that threaten human health whatsoever during the response.	4	-4
15. Costs to the responsible party resulting from the response should be minimized.	-4	-4
16. Getting clean-up contractors on-scene should ramp up quickly, even if there is uncertainty about how many gallons have been spilled.	3	3
17. The clean-up should address aesthetic concerns – like oil stains on rocks.	-4	-2
18. Get a good estimate of the amount of oil spilled.	2	0
19. Local responders/leaders should be integrated quickly into response planning because of their knowledge of local conditions, resources, etc.	2	4
20. Coordination among participating government agencies, contractors, etc. should be established rapidly.	2	3
21. Establish meaningful ways of involving volunteers in the response.	-3	1

22. A well-organized unified command with a clear chain of command should be established.	4	2
23. A well-coordinated expert scientific effort should drive the gathering of decision-relevant information, not public concerns and perceptions.	1	-1
24. Implement the contingency plan.	3	3
25. There should be no residual oil or buried oil that is going to show up later.	-1	-4
26. Restoration planning should be tightly integrated with the response effort so that decisions are based on future restoration needs.	-1	-2
27. As much on-water recovery and removal of oil as possible should be achieved.	4	-1
28. Conduct monitoring of response activities, such as booming, to actually see whether things are working.	2	2
29. Clear definitions of what counts as “clean” should be used so that there is a clear end-point.	-1	-2
30. Tell members of the public about the things they want to know about.	-2	1
31. Responders should listen to the publics’ concerns, even if they cannot be addressed to their complete satisfaction.	-2	2
32. Unified Command should gain public support for the response effort.	-2	0
33. Unified Command should develop and maintain trust with members of the public.	0	4
34. Efforts to communicate with and engage with the community should be proactive and timely.	0	4
35. Consistent and accurate information should be provided to the public.	0	2
36. Response efforts should direct oil to a “sacrificial area” – such as a sandy cove that will be easier to clean-up than other, more rocky areas.	-1	-2
37. Unified Command should reconcile the preferences and points of views of all parties about what impacts are important to avoid.	0	-1
38. Unified Command should manage expectations about the clean-up so that they are reasonable.	0	1
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?”	1	0
40. Response efforts need to avoid disrupting the integrity and culture of local communities.	-2	-1
41. Subsistence fishing and shellfishing areas should be protected.	0	-1
42. Make determinations of “clean” with relevant stakeholders, including local residents.	-1	1

Washington State Perspective M

Perspective M gives the highest importance to protecting human health (14) no matter what it takes. Protecting sensitive ecological areas (3, 7) is the next most important goal. Both of these ends are served by recovering as much oil as quickly as possible (27), which is the main objective of the response.

This objective is achieved by setting up a unified command (22) which implements the contingency plan (24) with flexible and experienced decision makers (39). Attention is placed on getting contractors on site (16), getting a good estimate of the amount of oil spilled (18), and monitoring effectiveness of mitigative actions (28).

Decisions during the response need to be informed with scientifically-gathered information, instead of public concerns and perceptions (23).

Involving volunteers is not emphasized (21). Two reasons were expressed for this. First, there is a fear among some that volunteers may be injured during the clean up (14). As one person loading highly on Factor M told us: "there are considerable safety and human health issues involved in oil spills, and without the proper training and equipment, these are compromised." A second reason is that involving volunteers may divert critical people and attention away from protecting natural resources; as another person loading highly on Factor M stated "in a time critical situation, training, informing, and being a sounding board to uniformed and/or untrained personnel can cause undesirable resource damage."

Furthermore, due to the urgency involved, it is not possible to spend time listening to public concerns (31), gaining public support for the response (32), or involving stakeholders in determinations of how clean to make the site (42). This perspective is not opposed to communicating with the community -- that must happen -- but it is not the first or even second priorities; responders need to make salvage, recovery of oil and minimization of impacts the highest priority. Communicating with the public (34), establishing trust (33), and providing accurate information (35) are all ranked in the exact middle of the distribution, much lower than in Perspective B, suggesting that they are secondary objectives.

Washington State Perspective N

Perspective N places the most importance on establishing positive relations with the community during the response. This entails good communication (34, 31), trust (33), bringing in local expertise quickly (19), and information sharing (35). Establishing and maintaining the trust of the community (33) requires that responders distribute information about the spill and response (35) and take time to listen to publics' concerns (31). Although it was not strongly emphasized, this perspective did give much more weight to the importance of establishing meaningful ways for volunteers to become involved in the response (21) and gaining public support for the response (32).

It agrees with Perspective M on the importance of a strong unified command (22) that implements the contingency plan (24) and establishes coordination among agencies and contractors quickly (20).

While people who hold this perspective would argue that safety is important, they are sensitive to statements that imply zero risk can be achieved. This is why they soundly rejected the statement that there should be no risk whatsoever to people involved in the response (14); this just is not achievable. There will always be some risk, however small. Likewise, this

perspective rejected the statement about there being no residual oil that will show up anywhere (25). Again, this is infeasible.

Discussion of Washington state results

Each of the perspectives represents a distinct view about the relative importance of objectives that should guide oil spill response in the Washington state region. Of course, they share some features, while still having some important differences.

These two perspectives share many beliefs about the response. They both emphasize a speedy response -- getting the contractors on-scene quickly (16), rapidly establishing coordination among all parties (20), and getting on with the response efforts early in sensitive areas (3). The response should be guided by the contingency plan (24). Another critical element is monitoring the effectiveness of response activities (28). It is also agreed that considering the costs to the responsible party are of lowest priority (15). Protecting non-native species (4) was also ranked low.

Perspective N differs significantly from Perspective M in regard to the way that Unified Command interacts with the public. Perspective N places a high degree of importance on establishing positive relations with the community and local officials during the response (19, 21, 31, 33, 34, 35). There is weak emphasis on mitigating ecological (e.g., 5, 7, 8, 9) compared to Perspective M. This appears to be a reflection with the idea that implementing a well-coordinated, rapid response guided by the contingency plan (16, 19, 20, 24) will ensure that these are also achieved.

Perspective M places more emphasis on achieving as much on-water recovery as possible (27), while being guided by the contingency plan (24) in a response effort that is well-coordinated and rapid (similar to Perspective N).

Although statements 14 and 25 ended up at opposite ends of the two perspectives, they really do not speak to a significantly different belief. Everyone wants to protect public health and clean up the oil to the best extent possible. However, there is a stronger concern in Perspective M for protecting public health by taking actions to recover as much oil as possible and a stronger concern in Perspective N for communicating and working with the community during the response.

7. Discussion

We asked people in four regions to tell us which were the most important objectives during the emergency phase oil spill response to meet these overarching goals (and not during other phases, such as restoration, damage assessment, compensation). In most cases we heard that all of the objectives, as defined by the 42 statements in the Q sample, were important to someone. Some exceptions included the minimizing costs to the responsible party resulting from the response (15) and that the clean-up should address aesthetic concerns – like oil stains on rocks (17); these were not ranked highly by any individuals or in any of the perspectives in all four cases.

However, Q method pushes people to express relative priorities. In doing this, the participants in the research reveal that they attempt to realize the over-arching goals of spill response by emphasizing different objectives. Lack of emphasis does *not* necessarily mean that an objective was rejected. In some Q sorts, we met with individuals who expressed opposition to a

stated objective (e.g., statement #4) but in most cases a low ranked statement was an expression that is was weak in relative importance.

7.1 Overview of case-specific findings

Three perspectives about the objectives or considerations that should drive oil spill response were found in three of the case studies: Buzzards Bay region, San Francisco Bay region, and Delaware Bay region. Two distinct perspectives were found in the case study of Washington state. Each of the perspectives 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.

These results indicate that people with experience with oil spills and responses agree about the relative importance of some objectives and disagree about the relative importance of others – even while they may agree with higher order goals as expressed in policy and statute. In the San Francisco Bay region we found a high degree of agreement among those that participated in our research. In the San Francisco Bay case 11 of 13 research participants loaded on a single perspective (San Francisco Bay D). In the Delaware Bay, Washington State, and Buzzards Bay case studies there was a broader range of perspectives among those who participated in our research. However, In Delaware perspectives J and L are fairly strongly correlated and only one person loaded significantly on perspective K.

7.2 Comparison of the perspectives from the four cases

In this section we compare the results across the four case studies, investigating similarities and differences among the perspectives. In each case study, our analysis yielded two or three factors/perspectives. We treated each of these as a single Q sort and analyzed them as a group. In the jargon of Q method, this is called a second order composite analysis. It is second order, because it takes as input the factors from the first order analysis. It is composite because it uses all the project data. This type of analysis allows us to investigate the commonalities and differences among the case-specific factors. For example, statements that are ranked highly in case-specific factors – such as the need to implement the contingency plan – will likely emerge as highly ranked statements in a cluster of factors that define a second-order factor. Those case-specific factors that do not rank statement 24 highly may then cluster into a second group.

We entered eleven factors from the four case studies into the Q analysis program. Four second order composite factors emerged from our analysis. These are listed in Table 14. The results shows that Factors W and Y were found in each one of the cases. Factor X, however, was only found in Buzzards Bay and Delaware Bay. Factor Z was only found in San Francisco and Delaware Bay.

Table 14. Second order composite factor loading scores for the cross-case analysis. Loadings significant at 95% confidence level when >= .3981. **Bold** font indicates significant loading on a factor.

	Second Order Factors			
Case-specific perspective	**Factor W**	**Factor X**	**Factor Y**	**Factor Z**
Buzzards Bay A	**0.76**	0.12	0.36	0.34
Buzzards Bay B	0.23	0.10	**0.83**	0.03
Buzzards Bay C	0.14	**0.80**	0.06	0.24
San Francisco D	**0.65**	0.03	**0.64**	0.33
San Francisco E	0.09	0.33	-0.06	**0.83**
San Francisco F	-0.03	0.32	**0.79**	-0.19
Delaware Bay J	**0.85**	0.06	0.38	0.13
Delaware Bay K	0.17	**0.80**	0.31	0.10
Delaware Bay L	0.37	0.03	**0.63**	**0.56**
Washington M	**0.53**	0.10	**0.73**	0.28
Washington N	**0.85**	0.36	-0.09	-0.10
% variance explained	27%	15%	27%	13%

Table 15 shows how each Q statement is ranked in each of the four second order factors. In the previous sections of this report, we interpreted the factor ranking matrices in the form of narratives, or perspectives. Here we take a different approach.

We compare the four factors on several themes, which are related to categories of objectives we identified as part of our earlier research and literature review:

- Mitigate economic impacts;
- Protect environment and mitigate environmental impacts;
- Protect worker and public health and safety;
- Implement a coordinated and timely response;
- Address needs and concerns of the affected public/communities;
- Gain public support for the response;
- Protect cultural resources; and
- Mitigate social nuisance impacts.

These categories were used to develop the set of Q statements (see section 2.3). For each category we created an index, which is an aggregate of multiple statements. For each category we summed z-scores of the statements included in the index an divided by the number of statements comprising the index. Z-scores are a relative measure of the importance of a statement in a factor (these data are in Appendix A). The indices reveal the relative importance of a particular category of objectives – or theme – across the four factors.

Table 15. Factor array for second order composite factors.

Statement	Factor W	Factor X	Factor Y	Factor Z
1. Economic impacts to towns from costs of clean-up 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 clean-up 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 artifacts (e.g., shipwrecks) from oil and its clean-up 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
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 clean-up 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 clean-up 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 clean-up 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 clean-up 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

Mitigate economic impacts

This index comprises three statements that address costs of clean-up, losses for recreation sub-sector, and losses to commercial fishing, as shown in Table 16. 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 factors, and is not included in this index.

Table 16. Economic Impacts Index Scores.

Statement	Factor W	Factor X	Factor Y	Factor Z
1. Economic impacts to towns from costs of clean-up should be mitigated.	-0.74	-0.77	-0.27	0.00
11. Economic impacts from lost recreation should be mitigated.	-0.74	-0.26	-0.09	-0.45
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).	0.08	-0.51	0.22	1.80
Economic Impacts Index Score	**-1.4**	**-1.54**	**-0.14**	**1.35**

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

Factor 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 coupled human and environment systems. Specifically, for Perspective E, the emphasis is on mitigating impacts to "foundational" components of the human-environment system, including fisheries and markets. There is a remarkable parallel to the relevant perspective in Delaware Bay. There Factor Z is associated with 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.

Protect health and safety

As shown in Table 17, the index related to health and safety is based statements 2, 8, 14, and 41. These include direct threats to people during the clean-up and indirect threats via consumption of contaminated seafood (e.g., subsistence fishing). Factor Y placed the strongest emphasis on this theme. It ranked every one of these statements stronger than did the other factors.

Table 17. Health and Safety Index Scores.

	Factor W	Factor X	Factor Y	Factor Z
2. Consumption of contaminated seafood should be prevented.	0	-0.26	0.92	0.90
8. Health and ecological impacts from clean-up activities should be mitigated.	0.31	0.26	0.92	-0.45
14. There should be no situations that threaten human health whatsoever during the response.	-0.17	-1.54	1.58	-1.35
41. Subsistence fishing and shellfishing areas should be protected.	-0.20	0.00	0.79	-0.90
Health and Safety Risks Index Score	**-0.06**	**-1.54**	**4.21**	**-1.8**

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 previous sections, we discussed how this statement sometimes was ranked low, not because people think safety is unimportant, but because they felt that zero risk is unobtainable.

Mitigate ecological impacts

The index for ecological impacts is based on six statements (Table 18). These comprise several different ideas: setting priorities (5, 6, 7), mitigation (8), initiation of action (3), and removing oil (9). Three of the four factors gave this index strong emphasis. It is not strongly emphasized in Factor W, which is defined by San Francisco D and Washington State M case-specific factors. This is in keeping with the fact that ecological risk assessments drive oil spill contingency response planning efforts. All three factors that ranked this significant pointed to protecting critical species (7) and removing oil so that ecosystem functions are restored (9).

Table 18. Ecological Impacts Index Scores.

	Factor W	Factor X	Factor Y	Factor Z
3. Get on with response efforts early for areas that have been pre-identified as sensitive areas.	1.41	0.77	1.23	0.00
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.	-1.10	0.00	-0.35	0.90
6. Give priority to protecting those areas that have multiple resource values, like those that are undeveloped, pristine, and that provide for recreation.	0.35	1.54	0.13	0.00
7. Attention should be focused on protecting species that are especially critical for the functioning of an impacted ecosystem.	0.31	2.05	1.41	1.80
8. Health and ecological impacts from clean-up activities should be mitigated.	0.31	0.26	0.92	-0.45
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.	0.20	1.28	1.06	1.35
Ecological Impacts Index Score	**1.48**	**5.90**	**4.40**	**3.60**

Addressing ecological impacts is especially important to Factor 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 this by Factor X reflects a disagreement about the ecological justification for doing this.

Implement a coordinated and timely response

Objectives related to establishing and implementing a coordinated and timely response were emphasized in many of the case-specific factors. For example, there was often strong emphasis given to establishing a well-organized unified command with a clear chain of command (22) and integrating local responders quickly (19). On the other hand, there were important differences among the factors within and across the cases on other objectives related to how responses were organized; for example, implementing the contingency plan (24) was a hotly contested objective.

We created two indices related to this theme. The first index, shown in Table 19, consists of statements related to establishing a coordinated response. Although the index scores are moderate, there is wide-spread agreement about the importance of establishing a coordinated response. The scores, however, mask two very important differences among the four factors. First, Factors W and Y strongly emphasize implementing the contingency plan (24) while Factors X and Z de-emphasize this objective. Second, Factors X and Z strongly emphasize

establishing a well-coordinated expert scientific effort that drives the gathering of decision-relevant information (23), but Factors W and Y do not give as much emphasis to this objective.

Table 19. Coordinated Response Index Scores.

	Factor W	Factor X	Factor Y	Factor Z
22. A well-organized unified command with a clear chain of command should be established.	1.64	0.77	1.58	1.35
23. A well-coordinated expert scientific effort should drive the gathering of decision-relevant information, not public concerns and perceptions.	0.23	1.03	-0.48	1.80
24. Implement the contingency plan.	1.37	-1.03	1.23	-1.80
26. Restoration planning should be tightly integrated with the response effort so that decisions are based on future restoration needs.	-1.10	1.29	-0.88	0
28. Conduct monitoring of response activities, such as booming, to actually see whether things are working.	0.90	1.29	1.01	0.45
29. Clear definitions of what counts as “clean” should be used so that there is a clear end-point.	-0.71	0.26	0.09	1.35
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?”	0.74	-1.28	-0.09	0
Establish Coordinated Response Index Score	**3.07**	**2.33**	**2.46**	**3.15**

The second index consists of statements related to implementing a timely response (Table 20). On this index, Factor W scores substantially higher than the others. Factor 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 factors, which is consistent with its lack of support for implementing the contingency plan (24).

Table 20. Implement timely response index scores.

	Factor W	Factor X	Factor Y	Factor Z
3. Get on with response efforts early for areas that have been pre-identified as sensitive areas.	1.41	0.77	1.23	0
16. Getting clean-up contractors on-scene should ramp up quickly, even if there is uncertainty about how many gallons have been spilled.	1.33	0.77	1.06	0.45
19. Local responders/leaders should be integrated quickly into response planning because of their knowledge of local conditions, resources, etc.	1.84	0.77	0.66	0.90
20. Coordination among participating government agencies, contractors, etc. should be established rapidly.	1.64	0.00	0.88	0.45
Implement Timely Response Index Score	**6.22**	**2.31**	**3.83**	**1.8**

The factors can be further distinguished by the way they rank three statements in particular. There is an inverse relationship between the emphasis given to implementing the contingency plan (24) and the two statements:

18. Get a good estimate of the amount of oil spilled.
23. A well-coordinated expert scientific effort should drive the gathering of decision-relevant information, not public concerns and perceptions.

Table 21 presents the z-scores for these statements (see Appendix A for entire list of Q statements and z-scores). The two darkly shaded cells point out that Factors W and Y emphasized implementing the contingency plan (24). The lightly shaded cells point out that Factors X and Z emphasized getting a good estimate of the amount of oil spilled (18) and establishing a well-coordinated expert scientific effort that should drive the gathering of decision-relevant information (23).

Table 21. Comparison of factors in relation to implementing the contingency plan vs. gathering information to inform response actions.

	Factor W	Factor X	Factor Y	Factor 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.	-0.51	0.51	0.09	0.90
23. A well-coordinated expert scientific effort should drive the gathering of decision-relevant information, not public concerns and perceptions.	0.23	1.03	-0.48	1.80

Address needs and concerns of the affected public/communities

Addressing public concerns were almost always ranked by respondents as objectives they would be unlikely to emphasize. There were, however, some exceptions. In Buzzards Bay Factor C it was very important to ensure that consistent and accurate information be provided to the public (32) and in San Francisco Bay Factor E it was important that Unified Command manage expectations about the clean-up so that they are reasonable (38). Factor N from Washington state strongly emphasizes a number of objectives related to public communications; in fact, it can be labeled with the title "Focus on community relations." 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 our case study interviews (Tuler et al. 2006a) and in the literature (e.g., Lindstedt-Siva 1999).

As shown in Table 22, Factor W most strongly emphasizes this theme, although weakly; this theme is not emphasized strongly in any of the factors that emerged from the cross-case analysis. In factor 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. Factor X rejects the idea that Unified Command should manage expectations about the clean-up so that they are reasonable (38), while Factor Z supports it.

Table 22. Addressing community needs index scores.

	Factor W	Factor X	Factor Y	Factor Z
30. Tell members of the public about the things they want to know about.	-0.11	-1.54	-0.92	-0.90
31. Responders should listen to the publics' concerns, even if they cannot be addressed to their complete satisfaction.	0.20	0.26	-0.88	-0.45
34. Efforts to communicate with and engage with the community should be proactive and timely.	1.49	0.51	-0.18	0
35. Consistent and accurate information should be provided to the public.	0.90	1.28	-0.44	-0.90
37. Unified Command should reconcile the preferences and points of views of all parties about what impacts are important to avoid.	-0.78	-0.51	-0.79	0.45
38. Unified Command should manage expectations about the clean-up so that they are reasonable.	0.39	-1.54	-0.70	0.90
42. Make determinations of "clean" with relevant stakeholders, including local residents.	-0.23	0.26	-0.48	0.45
Address Community Needs Index Score	**1.86**	**-1.28**	**-4.39**	**-0.45**

Gaining public support for the response

Factor W also scores highest on the theme that Unified Command should strive to gain public support for the response effort (Table 23). Factor X does not support gaining public support for the response effort but stronger support for developing and maintaining trust with the public. Both Factors Y and Z strongly disagree with this objective.

Table 23. Gain public support index scores.

	Factor W	Factor X	Factor Y	Factor Z
32. Unified Command should gain public support for the response effort.	0	-0.77	-0.66	-0.45
33. Unified Command should develop and maintain trust with members of the public.	1.10	1.03	-1.05	-0.90
Public Support Index Score	**1.10**	**0.26**	**-1.71**	**-1.35**

In summary, Factor W is most strongly associated with objectives that are related to public relations/communications. It can be argued that gaining public support is related to how well the publics needs and concerns are addressed – which helps to explain why both themes are emphasized by the same perspective/factor. While others factors rank some objectives related to this theme highly, they do not give them the same overall emphasis.

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 factors associated with the cross-case analysis, as shown in Table 24. Statement 41 received moderate support in Factor Y, and it is related to protecting *both* health and cultural activities.

Table 24. Cultural impacts index scores.

	Factor W	Factor X	Factor Y	Factor Z
10. Damage to cultural artifacts (e.g., shipwrecks) from oil and its clean-up should be prevented.	-0.82	-1.28	0.13	-0.45
40. Response efforts need to avoid disrupting the integrity and culture of local communities.	-0.93	-0.51	-1.4	0
41. Subsistence fishing and shellfishing areas should be protected.	-0.20	0.00	0.79	-0.90
Cultural Impacts Index Score	**-1.95**	**-1.79**	**-0.48**	**-1.35**

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.
17. The clean-up should address aesthetic concerns – like oil stains on rocks.

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

7.3 Limitations of Q method

There are several limitations to Q studies in general and to our studies in particular. Q method cannot tell us:

- that there are not other perspectives that exist within the populations of interested and affected parties in the four regions; nor
- how widely held these perspectives are within a population.

These limitations arise in part, from the use of a small number of individuals to define social perspectives. There is no guarantee that individuals with certain perspectives will be included in the group of people participating in the research effort. In other words, participants may not represent the fill range of viewpoints within the population of interest. And, Q studies are not designed to gather data from a large enough set of people to make claims about frequencies.

The results from the San Francisco Bay region case study raise these issues. We found a high degree of agreement among those who participated in our research – is this a pattern that would be maintained if more people were asked about their perspectives? The high degree of agreement may be an artifact of the individuals who completed the Q sorts. We may not have chosen a very good sample to represent the diversity of perspectives about relative importance of objectives that should inform response in this region – we may have missed one or more important perspectives. On the other hand, the degree of consensus may in fact be real. A high level of consensus about objectives in San Francisco Bay may have been a result of recent planning efforts in this region, such as the 2000 ecological risk assessment (Pond et al. 2000). However, this claim must be balanced against the information that only *two* of the participants in our research attended workshops for the ecological risk assessment (see Pond et al., 2000 Appendix A). Both of these were high loaders on Factor D. In addition, at the time of our study there had been no recent large scale oil spill in this region that would raise questions about the contingency plan and general agreement about objectives; our data were gathered prior to the spill in 2007.

In the Delaware Bay region we also found a high degree of agreement. Two of the perspectives are strongly correlated (J and L) and only one person loaded on perspective K. The strong agreement about many of the objectives is apparent after a recent spill in 2004, the Athos 1, as well as after an ecological risk assessment consensus workshop. Moreover, all of the participants in our study of Delaware Bay were participants in that ERA workshop. One could ask whether people who did not participate in the ERA would show as much agreement.

At the same time, we cannot discount the perspectives on which only one or two people load significantly as unimportant or marginal. Because we used Q method we do not know anything about the relative frequencies of the perspectives represented by the factors in the population.

In addition, the results obtained via 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 interested and affected parties might believe are important for the emergency phases of oil spill response. To ensure the adequacy of our Q statements, we asked individuals if there were any important objectives missing from the set of statements that they thought should have been included. In the San Francisco Bay case none were suggested. In the Buzzards Bay case three gaps in the statements were suggested: 1) the importance of meeting policy and regulatory requirements, 2) addressing 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.

8. Conclusion

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 eleven 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.

For example, all four composite perspectives gave weight to objectives associated with implementing a timely response. The most agreement across all cases was for getting contractors on-scene quickly and integrating local responders quickly. Objectives associated with protecting ecological systems were also widely emphasized, although not as strongly as implementing a speedy response. This may be an artifact of the way that people think about how a response is conducted – first implement the response activities, so that ecological systems will be protected. In the realm of ecological objectives, the most consensus was for paying attention to critical species. The next most consensual objective was for removing oil from the water.

However, this research also documents that there are important differences about spill response objectives. Multiple perspectives about objectives were identified in each case, and they reveal important differences in the ways that people emphasize or define the goals associated with oil spill response. For example, there was varying degrees of emphasis on implementing the contingency plan, protecting ecological resources, protecting public health and safety, and interacting with the public. One perspective in particular (Factor X) emphasized implementing a rapid response effort that closely follows existing contingency plans. This perspective was the

most important of the cross-case analysis perspectives and it was defined by at least one case-specific perspective in each of the four regions we studied. It is interesting to note that this same perspective focused on addressing public concerns and building trust with the public. This suggests that those involved in spill response planning believe that a trustworthy relationship with the public may be necessary prerequisite to being able to implement a timely response plan. A closerlook reveals that in every case we studied there are differences among key people involved in spill response planning and implementation. Abordaif et al. (1995) and Lindstedt-Siva (1999) also found this to be the case.

We draw three conclusions from these findings that are important for guiding future oil spill response planning. First, while there are differences among oil spill response planners about which objectives to emphasis, these differences are not of a fundamental nature rooted in deeply held differences about what should be done in the initial stages of a response – the differences appear to be ones in emphasis.

Second, our works provides additional empirical support for the claim made by others that "that the elements of a contingency plan are of very unequal importance" (Abordaif et al. 1995).

Third, the findings indicate that establishing a systematic approach to assessing the effectiveness of a spill response is extremely challenging. Comparing responses to different spills can be even more daunting. While there may be 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. A reasonable conclusion to draw is that before stakeholders can fruitfully discuss performance metrics to guide planning for future responses or assess past or future spill responses there needs to be some agreement about which objectives are important to measure.

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Appendix A: Z-scores for statements in each factor in the cross-case analysis.

Statement	Factor W	Factor X	Factor Y	Factor Z
1. Economic impacts to towns from costs of clean-up should be mitigated.	-0.74	-0.77	-0.27	0
2. Consumption of contaminated seafood should be prevented.	0	-0.26	0.92	0.90
3. Get on with response efforts early for areas that have been pre-identified as sensitive areas.	1.41	0.77	1.23	0
4. Even if a species is not native to this area, mitigate impacts to the local population.	-1.21	-0.51	-1.54	-0.45
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.	-1.10	0	-0.35	0.90
6. Give priority to protecting those areas that have multiple resource values, like those that are undeveloped, pristine, and that provide for recreation.	0.35	1.54	0.13	0
7. Attention should be focused on protecting species that are especially critical for the functioning of an impacted ecosystem.	0.31	2.05	1.41	1.80
8. Health and ecological impacts from clean-up activities should be mitigated.	0.31	0.26	0.92	-0.45
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.	0.20	1.28	1.06	1.35
10. Damage to cultural artifacts (e.g., shipwrecks) from oil and its clean-up should be prevented.	-0.82	-1.28	0.13	-0.45
11. Economic impacts from lost recreation should be mitigated.	-0.74	-0.26	-0.09	-0.45
12. Inconveniences to local residents and tourists should be mitigated.	-1.21	-1.28	-0.75	-0.90
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).	0.08	-0.51	0.22	1.80
14. There should be no situations that threaten human health whatsoever during the response.	-0.17	-1.54	1.58	-1.35
15. Costs to the responsible party resulting from the response should be minimized.	-2.03	-2.05	-1.93	-1.35
16. Getting clean-up contractors on-scene should ramp up quickly, even if there is uncertainty about how many gallons have been spilled.	1.33	0.77	1.06	0.45
17. The clean-up should address aesthetic concerns – like oil stains on rocks.	-1.64	-1.29	-1.54	-1.35
18. Get a good estimate of the amount of oil spilled.	-0.51	0.51	0.09	0.90
19. Local responders/leaders should be integrated quickly into response planning because of their knowledge of local conditions, resources, etc.	1.84	0.77	0.66	0.90
20. Coordination among participating government agencies, contractors, etc. should be established rapidly.	1.64	0	0.88	0.45
21. Establish meaningful ways of involving	-0.23	0.26	-0.88	0

volunteers in the response.				
22. A well-organized unified command with a clear chain of command should be established.	1.64	0.77	1.58	1.35
23. A well-coordinated expert scientific effort should drive the gathering of decision-relevant information, not public concerns and perceptions.	0.23	1.03	-0.48	1.80
24. Implement the contingency plan.	1.37	-1.03	1.23	-1.80
25. There should be no residual oil or buried oil that is going to show up later.	-2.03	0.51	0.79	-1.80
26. Restoration planning should be tightly integrated with the response effort so that decisions are based on future restoration needs.	-1.10	1.28	-0.88	0
27. As much on-water recovery and removal of oil as possible should be achieved.	0.04	0.77	1.93	-1.80
28. Conduct monitoring of response activities, such as booming, to actually see whether things are working.	0.90	1.29	1.01	0.45
29. Clear definitions of what counts as “clean” should be used so that there is a clear end-point.	-0.71	0.26	0.09	1.35
30. Tell members of the public about the things they want to know about.	-0.11	-1.54	-0.92	-0.90
31. Responders should listen to the publics’ concerns, even if they cannot be addressed to their complete satisfaction.	0.20	0.26	-0.88	-0.45
32. Unified Command should gain public support for the response effort.	0	-0.77	-0.66	-0.45
33. Unified Command should develop and maintain trust with members of the public.	1.10	1.03	-1.05	-0.90
34. Efforts to communicate with and engage with the community should be proactive and timely.	1.49	0.51	-0.18	0
35. Consistent and accurate information should be provided to the public.	0.90	1.28	-0.44	-0.90
36. Response efforts should direct oil to a “sacrificial area” – such as a sandy cove that will be easier to clean-up than other, more rocky areas.	0.03	-0.51	-1.36	0.45
37. Unified Command should reconcile the preferences and points of views of all parties about what impacts are important to avoid.	-0.78	-0.51	-0.79	0.45
38. Unified Command should manage expectations about the clean-up so that they are reasonable.	0.39	-1.54	-0.70	0.90
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?”	0.74	-1.28	-0.09	0
40. Response efforts need to avoid disrupting the integrity and culture of local communities.	-0.93	-0.51	-1.45	0
41. Subsistence fishing and shellfishing areas should be protected.	-0.20	0	0.79	-0.90
42. Make determinations of “clean” with relevant stakeholders, including local residents.	-0.23	0.26	-0.48	0.45