Risk vs. public reaction in marine oil spills: a case study analysis of six Atlantic Canadian marine vessel-sourced oil related incidents.

By

Timothy W. Hayman

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Marine Affairs Program
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The undersigned hereby certify that they have read and recommend to Marine Affairs Program for acceptance a graduate research project titled "*Risk vs. public reaction in marine oil spills: a case study analysis of six Atlantic Canadian marine vessel-sourced oil related incidents*" by Timothy W. Hayman in partial fulfillment of the requirements for the degree of Master of Marine Management.

Supervisor: Dr. Ronald Pelot

Signature : _____ dated: _____

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ABSTRACT

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Abstract

Marine vessel-sourced oil related (MVSOR) incidents represent a potential threat to marine organisms and ecosystems in Atlantic Canada. The management of these incidents must involve management of the objective risks involved as well as the way the public reacts to the incident. Public risk perception may vary widely from the objective risks involved in an event, and can have a strong influence on the level of public reaction to an incident. This study tests the hypothesis that public reaction to an incident would correlate directly and positively with the level of risk involved in the incident. Six incident case studies are used from across a five-year period in Atlantic Canada, and examined through the analysis of incident case files held by the Canadian Coast Guard Environmental Response (Dartmouth, NS). Each case is analyzed to assess the level of risk of damages to the marine environment from oil and the level of public reaction to the incident, with disparities between the level of risk and level of reaction noted. As each incident is found to show such a disparity, a set of ten factors are identified that may have an influencing effect on public reaction. The potential influence of each factor is examined against all six case incidents, by identifying positive and negative correlations between the presence of the factor and the level of public reaction. Based on these influencing factors, a series of policy recommendations are proposed that suggest areas of focus for future improvements to environmental response and communications policies.

Keywords: Marine oil spills; Atlantic Canada; public reaction; public risk perception; risk assessment; risk management; environmental response; policy; management.

LIST OF ABBREVIATIONS USED

ATL	Atlantic Towing Limited
CBC	Canadian Broadcasting Corporation News Agency (*Radio-Canada is French-language equivalent)
CCG	Canadian Coast Guard
CH	CH News
CP	Canadian Press
CTV	CTV News Agency
DFO	Fisheries and Oceans Canada,
DFSR	Daily Field Supervisor's Reports
EAC	Ecology Action Centre
EC	Environment Canada
ECRC	East Coast Response Corporation
ER	Canadian Coast Guard Environmental Response
ITOPF	International Tanker Owners Pollution Federation Limited
Km	Kilometres
L	Litres
M	Metres
MART	Marine Aerial Reconnaissance Team
MPA	Marine Protected Area
MPIRS	Marine Pollution Incident Reporting System
MVSOR	Marine Vessel-Sourced Oil Related incidents
NB	New Brunswick
NGO	Non-Governmental Organization
NS	Nova Scotia
QC	Québec
REET	Regional Environmental Emergencies Team
SAR	Search and Rescue
SITREPS	Situation Reports
TC	Transport Canada

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CHAPTER 1 INTRODUCTION

1.1 Marine Vessel-Sourced Oil-Related (MVSOR) Incidents

Releases of oil into the marine environment, most often from marine vessels, have long been recognized as posing a significant threat to marine organisms and ecosystems (Bradley, 1974). There is an extensive body of literature on both the environmental impacts and the chemical and physical nature of oil spills, and the impacts of oil exposure on many marine organisms are well known (Jordan & Payne 1980; Reeda et al., 1999; Teal & Howarth, 1984). Oil spills can present undesirable environmental, political, and socio-economic impacts, and as such have managed to garner significant attention from members of the public, politicians, environmental NGOs, and governments around the world. Oil spill events are typically able to generate extensive public attention, despite the relative infrequency of major, catastrophic events (National Research Council of the National Academies, 2003). Although dramatic events may be rare, marine oil spills of various degrees are a concern in Atlantic Canada, particularly due to the potential impacts on migratory seabirds, fisheries, and ecologically significant shoreline ecosystems (Environment Canada, 2011; Office of the Auditor General of Canada, 2010).

For the purpose of this study, the term "Marine Vessel-Sourced Oil-Related Incidents" (MVSOR) will be used to refer to the incidents analyzed, as opposed to the term marine oil spills or otherwise. The purpose of this term is to more accurately classify the type of incidents involved in the study. Each of the incidents involves a marine vessel as the source of the event, and the cause for studying the incident is driven by the presence of oil products on board or spilled. "Oil spill", however, is not a suitable term as

not all of the incident cases involved oil products being spilled into the marine environment. Nonetheless, the reason that each incident was responded to by the Canadian Coast Guard (CCG) Environmental Response (ER) and the principal driver of public reaction was the presence of oil products on board the vessel. Each incident involved either a spill of some volume of product, or a potential spill that was averted.

1.2 Public Reaction to MVSOR Incidents

1.2.1 Risk: Perception vs. "Reality"

The study of risk can generally be subdivided into two principal categories; risk can be assessed as an objective quality through scientific or other quantitative means of examination, or the focus can instead be placed on the way risk is perceived by members of a specific group or the public at large (Renn, 2008a). The objective study of risk examines two primary elements of an incident: probability, and consequences. Some combination of the level of probability of an event combined with the extent of the consequences gives a basic measure of the level of risk (ISO, 2002; Renn, 2008a). Figure 1 displays a basic risk matrix, demonstrating the manner in which probability and consequences combine to give an indication of risk.

		Low Probability →				High Probability
Low Consequences ↓		1	2	3	4	5
	1	Low	Low	Low	Moderate	Moderate
	2	Low	Low	Moderate	Moderate	Moderate
	3	Low	Moderate	Moderate	Moderate	High
	4	Moderate	Moderate	Moderate	High	High
High Consequences	5	Moderate	Moderate	High	High	High

Figure 1.1 A typical risk matrix, where probability and consequences combine to produce a level of risk. Risk level is indicated as low, moderate, or high risk. Probability and consequences are displayed on an arbitrary 1 to 5 scale.

Both probability and consequences can be assessed from either a quantitative or qualitative approach (Covello & Merkhofer, 1993). A great deal of emphasis is typically put on the first of these methods, with risk often viewed and treated as a quantitative value that can be assigned to a situation (Pidgeon, 1998). Take for example the case of a hurricane approaching a coastal city. Weather experts may be able to determine the likelihood of the hurricane hitting the city by extrapolating the current trajectory, and incorporating other mitigating factors. They may be able to determine a probability as a set percentage, within a particular degree of calculated certainty. Alternatively, a more qualitative approach may assess a certain likelihood that the hurricane will strike based on historical records and past experience with such events. The consequences could likewise be calculated in two ways: one could determine the likely losses in exact dollar figures by using trajectory data and calculating the projected cost of property and infrastructure damage and loss of life, or take the more qualitative method of assessing

the likely degree of damages based on past experiences and trajectories, but without using a numeric or cost-based approach.

Although this probability-consequence method of risk assessment may validly identify the risk in some objective sense, whether in quantitative or qualitative terms, it is not the only important form of risk to consider (Apostolakis, 2004). Public perception of risk, that being the risk as assessed by members of the general public based on their own knowledge and other preconceptions, is also a critical aspect of risk in any situation (Sjoberg, 2000). Risk perception is often treated as a secondary aspect by those performing risk assessments, although its importance cannot be downplayed (Slovic, 2000). There is an increasing recognition among risk theorists that the traditional dichotomy between risk "perception" and "reality" is not necessarily reasonable (Renn, 2008a; Slovic, 2000; Joffe, 2003).

There is often a discrepancy between the objectively calculated risks and the risk as perceived by members of the public (Slovic, 2000). A common example is that of the difference in risks between driving in a car and traveling in an airplane (Sjoberg, 2000). For many in the general public, the risks of driving to work on a daily basis seem minimal, despite the relatively high frequency of fatalities and injuries due to automobile accidents. By contrast, a fear of flying is common and easily exacerbated by images of terrorist attacks and tragic plane crashes, despite the nearly statistically negligible probability of any such incident occurring on a given flight (Sjoberg, 2000). Although one could argue from an objective point of view that the public is wrong to have these particular perceptions of the risk, it does not alter the fact that such perceptions exist. It is

these perceptions, often more than any "facts" that are presented, that drive public reaction to incidents (Rogers, 1997).

1.2.2 Public Reaction vs. Perception

Although public perception of risk in an incident may vary widely from the objective risks involved, the perceptions will ultimately be the defining factor influencing the way in which members of the public will react to the incident (Rogers, 1997). The way in which this reaction takes place may vary depending on the circumstances. In some cases it may simply involve expressing certain opinions to family and friends, while in other cases it may escalate to the point of organized protest and civil unrest. In this manner, public reaction to an incident can have profound implications for those attempting to manage and execute the response to the event.

Accurately measuring public perception of a particular issue can be a challenging endeavour (Renn, 1998). Studies that aim to comprehensively understand public perception of an issue typically involve extensive opinion surveys of the affected population, coupled with other means of analysis (Berinsky, 1999). Public reaction, by contrast, can be measured by way of less extensive methods. This study aims to use a combination of incident case file reviews, media analysis, and interviews with relevant authorities to characterize the public reaction to a number of case studies.

1.2.3 Public Reactions to MVSOR Incidents

Although little work has been done to date on public reactions to Marine Vessel-Sourced Oil-Related (MVSOR) incidents in Atlantic Canada, the public reactions to many high profile MVSOR events around the world have been studied (Anderson, 2002; Molotch & Lester, 1975). Public reactions towards MVSOR events, particularly in

extreme cases, are often dramatic. It is typically assumed that the public reaction to MVSOR incidents is driven directly by the severity of the event, with extreme cases like the 1989 *Exxon Valdez* or the 2010 *Deepwater Horizon* incidents generating a dramatic reaction due to their massive scale. There is, however, much literature suggesting that factors beyond the scale of the event play a significant role in shaping public opinion (Anderson, 2002; Freudenberg & Gramling, 1994). There appears to have been little research done on public reactions to more minor MVSOR incidents, particularly in Atlantic Canada, an issue that this study aims to address.

1.2.4 The Management Problem: Managing Public Reaction

In the field of risk management, there are essentially two basic methods for mitigating risk. As illustrated in the risk matrix in Figure 1.1, risk is a combination of probability and consequences. In order to reduce the level of risk, one must either reduce the probability of an event occurring, or reduce the consequences that will stem from that event (McNeil et al., 2005). Although managing the objective risk may reduce the actual impact of MVSOR incidents, it may not influence the public reaction to these events. Given the known dichotomy that often exists between risks and public perception, the primary driver of reaction, it cannot be assumed that simply reducing the risk will necessarily reduce the level of public reaction (Slovic, 2000). It is therefore necessary to explore methods by which the public reaction to an incident can be reduced independently of altering the objective risk (Slovic, 1987). Strategies for public risk communication are important, but may be difficult to achieve and may not address the other factors influencing the public reaction (Gray & Ropeik, 2002; Slovic, 1986). In order to determine effective methods, one must first establish two basic facts: first, one

must identify whether there is in fact a difference between the level of risk and the level of public reaction to a given incident; second, one must identify factors that are responsible for a low level of direct correlation. If such factors can be successfully identified, additional strategies can be developed to mitigate their effect (Sjoberg, 2000).

1.3 Aims of the Current Study

The aim of this study is to produce recommendations to improve policies governing the response to MVSOR incidents, specifically focused on how these policies can better address the management of public reaction to these incidents. This is accomplished through the examination of six recent MVSOR case studies. By assessing the level of risk posed by each incident and the level of public reaction to the event, discrepancies between the objective threats and the public reaction to each case can be identified, and the reasons examined. This study does not aim to identify or describe the perceptions of risk held by the general public in any of these incidents; such information could be acquired only by means of extensive public opinion surveys, which were not a part of this research. It is also not critical to understand the specific perceptions in order to gain value from the study, as it is the public reactions that most directly affect the management of MVSOR incident responses. There are five principal aims to this study:

1) To assess the particular objective risks and threats that exist in each incident;
2) To identify and describe the degree of public reaction to each of these incidents;
3) To identify any discrepancies that exist between the objective risks and the public reaction to each case;
4) To identify the influencing factors in each case that are responsible for this discrepancy;

5) Finally, to apply the findings to the area of marine management, by assessing the current policies directing the response to these incidents, and making recommendations on how the findings of this study can improve the effectiveness of these policies.

1.4 Role of the Canadian Coast Guard in Environmental Response

The Canadian Coast Guard (CCG) is the primary federal agency responsible for supervising and carrying out environmental responses to marine oil-related incidents stemming from marine vessels or unknown sources (Canada Shipping Act, 2001 S.C. 2001, c. 26). The objectives of CCG Environmental Response (ER) are to "minimize the environmental, economic and public safety impacts of marine pollution incidents, and provide humanitarian aid to natural or manmade disasters" (Canadian Coast Guard, 2012). This project was carried out under the supervision of Joe LeClair (Canadian Coast Guard, Superintendant Environmental Response, Maritimes Region). CCG ER has expressed interest in the findings of this study, and hopes that they will be able to use the findings to influence future modifications and improvements to response policies. The study has also been of interest to members of Fisheries and Oceans Canada (DFO), particularly those in DFO Communications. The Canadian Coast Guard is a special operating agency of DFO and, as such, public communications in environmental responses are handled through DFO Communications with extensive input and involvement of CCG personnel.

CHAPTER 2 METHODOLOGY

In order to accomplish the goals of this study, I determined that the ideal methodology would be comprised of a case study format focused on a number of MVSOR incidents. The case study format offers the opportunity to obtain information from a variety of similar but non-identical cases, and by working from these past cases it may be possible to extract certain trends that can be applied to future incidents. Although certain information can be obtained from extensive study and analysis of a singular incident case, it may not be possible to identify what aspects of that case were unique to that occurrence, and what elements may represent greater trends that extend across similar incidents. A multiple-case study allows for the identification of trends in the nature of, and reaction to, the incidents, and should allow for the identification of general factors that have an influence in MVSOR incident characterization. It is, however, essential to ensure that the case study does not exceed the scope or resources of the project, and as such the number and type of cases must be carefully selected.

2.1 Case Selection

Once the case study format was selected, I began the process of narrowing down a set of cases on which to focus. The process started with a consultation between myself, Joe LeClair (Canadian Coast Guard Maritimes Region, Environmental Response), and Glen Herbert (Fisheries and Oceans Canada Maritimes Region, Ecosystem Management), where we discussed the desired goals of the project and potential suitable cases. A variety of MVSOR incidents that had occurred over the last few decades were identified and discussed. We made the initial decision to limit the case review to incidents in the last

five years, and then shifted to focus on selecting a limited number of significant incidents from that time period. Six cases were selected based on the criteria outlined in Table 2.1.

Table 2.1 Summary of criteria employed in the selection of the incidents to be examined in the study.

Element	Criteria
Date	All incidents were selected from the past five years (2008 to 2012). Of the six incidents, two were selected from each of three years: 2008, 2010, and 2011.
Type of Incident	Incidents must be marine vessel-sourced, oil-related (MVSOR) incidents. This includes ships of various types (large vessel, barge, small vessel), all of which must have had oil products on board.
Severity of Incident	Some volume of oil must either have been spilled, or there must have been a realistic possibility that oil could be spilled. Only incidents involving oil products fall within the purview of CCG ER. Each of the incidents selected must have solicited a response from CCG ER.
Location	Only incidents occurring within the Maritimes Region (NB, NS, and PEI) were considered.
Similar and Contrasting Incidents	A conscious attempt was made to select cases that had visible similarities in terms of scale, response, etc., without selecting incidents that were too similar. An attempt was also made to select incidents that had elicited varying levels of public reaction, so as to allow for comparison and contrast between cases.

2.2 Case Review

Incident files were obtained from the Coast Guard (CCG) for each of the relevant cases. These incident files included details of the incident, daily field supervisor reports (DFSR) detailing the day-to-day details of the response, salvage plans and risk assessments (where applicable), some media communications, and photographs of the incident. These files contain sufficient information to describe each case in detail, and provided insight into the potential factors that influenced the level of public reaction to

each incident. These incident files were supplemented through additional information where available, including that provided directly by members of CCG ER who were involved with the particular cases in question.

After examining each case in detail, I compiled a list of characteristics that would allow for categorization of the various elements of each case. These categories are listed in Tables 3.1, 3.2, and 3.3. After compiling the case details under these categories, I assessed the overall risk of damages from oil pollution based on a qualitative assessment of these factors, considering both the probability and consequences of the event. The risk level was assessed as Low, Moderate, or High, as a relative measurement against the other incident cases.

2.3 Gauging Public Reaction

With the details of each case established and the level of risk assessed, the second phase of the study involved assessing the level of public reaction to each incident. One of the ways to gauge the level of public reaction to an issue is through a review of the media attention paid to the event. Media reaction is not necessarily a direct indication of public opinion, or entirely what the public reaction entailed. It is, however, a useful metric that often corresponds to the level of public reaction to an event (S. Bornais, personal communication 2012)[1]. There are a variety of established methods for in depth quantitative and qualitative media analysis for any given event or subject (Altheide, 1996; Gunter, 2000). For the purposes of this study, a simplified method of media review

[1] The role of media in influencing public opinion and reaction is also well recognized (Anderson & Marhadour, 2007; McCombs, 2004). This study does not seek to examine this relationship, and instead presumes that media attention is at least reflective of the degree of public interest in the incident. The coupling of the media review with other methods of evaluating public reaction should avoid this potential problem.

was employed. This involved accessing publicly available media archives and databases, primarily online, and compiling qualitative assessments of the nature and availability of news reports on each incident.

One of the recognized shortcomings of this methodology is the exclusion of some forms of media, particularly non-print sources or those unavailable through various online databases or archives. To supplement the initial material and attempt to overcome these shortcomings, the media response was also characterized through interviews with Stephen Bornais (DFO Communications), who served in a principal communications role in each of the selected case study incidents. Interviews were restricted to obtaining factual information about the role of DFO Communications in each incident, and did not solicit from the participant any opinions or views that were beyond his professional capacity. The interviews with S. Bornais, coupled with conversations with J. LeClair, also offered an opportunity to determine public reaction through their direct experience as distinct from media reports. This information was combined with the information contained in the incident case files to develop a more comprehensive overview of the public reaction.

For each incident, the public reaction and media response were characterized based on a variety of categories, which I chose based on conversations with CCG/DFO personnel and preliminary review of the cases. These categories, along with the classification of each case, can be found in Table 3.4 in Chapter 3. Based on the details of each case and the rationale explained in Chapter 4, I ranked the degree of public reaction to each case as Low, Moderate, or High.

2.4 Risk vs. Reaction and Selection of Influencing Factors

Following the identification and analysis of the risks and public reactions involved in each incident, the analysis shifted towards comparing the levels of risk and reaction respectively and the identification and selection of factors that may connect these two aspects. For each incident, I noted whether the level of risk in each case corresponded to the level of public reaction, based on the hypothesis that there should be a direct, positive correlation between the level of risk and the level of public reaction. I then reexamined the case details to identify potential factors that may be responsible for any deviations from this hypothesis. I hypothesized the effect that each particular factor should have on deviating from the initial hypothesis, and evaluated each case to determine whether the observed patterns supported each hypothesized factor.

2.5 Policy Review

Following the review of specific cases, I focused my attention on the environmental response policies currently employed by CCG at both a national and regional level. I examined the *CCG Marine Spills Contingency Plan - National Chapter,* the *CCG Marine Spills Contingency Plan – Maritimes Regional Contingency Chapter,* the DFO *Internal Procedures for Management of Environmental Emergencies by Non-Coast Guard Personnel*, and the *Communications Policy of the Government of Canada*. I paid particular attention to the sections of each policy that pertained to relations with the public and communications during the incident and subsequent response. Upon completing this review, I used the results of the analysis (Chapter 4) to develop several

policy recommendations that may help improve these policies by addressing the specific issues raised by the analysis.

2.6 Ethical Considerations

The Dalhousie University Research Ethics Board requires, in accordance with the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* (Canada Panel on Research Ethics, 2011), that research involving human participants be subject to prior review and approval to ensure that it meets the ethical practices required of such research. The current study involved limited interviews with relevant professionals, but did not involve the solicitation of any opinions or information that was beyond the professional capacity of the individuals. No information was provided outside of that which would be available to any member of the general public, and the intent of the interviews was solely to collect pieces of information that were missing from or overlooked in the incident files held by the Coast Guard. As such, these interviews are equivalent to the collection of facts, and do not constitute "research involving humans", as defined by the Dalhousie University *Policy on the Ethical Conduct of Research Involving Humans* (Dalhousie University Research Ethics, 2012). Given that the current study did not constitute research involving humans, it was deemed that no ethics review or approval was required for completion of the study

CHAPTER 3 INCIDENT CASE STUDY DETAILS

This chapter describes the details of each of the six cases used in this study. For each case, the basic chronological and risk information is presented as reconstructed from the material contained in the incident case files held by CCG Dartmouth, discussions with CCG personnel, and supplemented as appropriate with external information. Although the specific materials contained in each case file vary, each one contained at least a collection of daily field supervisor reports (DFSR) documenting the environmental response, as well as various data tables, fact sheets, and copies of risk assessments or salvage plans where applicable. In addition to this information, details of the public reaction to each incident are reported, as constructed from information within the case files, interviews and discussions with S. Bornais and J. LeClair, and reviews of available media reports.

Tables 3.1, 3.2 and 3.3 at the end of this section contain a summary of detailed information for each case, emphasizing specific components of the temporal, location, and risk/threat related aspects of each incident. Additionally, Table 3.4 summarizes the details of the public reaction to each case.

3.1 King Darwin

Canadian Coast Guard (CCG) ER received notification on September 29th, 2008, that the tanker *King Darwin* had spilled a significant quantity of oil products while berthed alongside the New Brunswick Power wharf in the Port of Dalhousie, NB (approximate GPS location 48º04'22"N, 66º22'45"W). The *King Darwin*, a tanker delivering fuel to the NB Power generating station, was offloading its cargo of Bunker C heavy fuel oil in what should have been a routine procedure. During offloading, bolts on

the fuel discharge lines failed, resulting in the release of Bunker C oil onto the deck of the ship, onto the jetty, and into the water. CCG ER estimated that as much as 70,000 L of product was spilled before the source of the leak could be shutoff, all of which took place in the course of the first day.

Figure 3.1 Map of Dalhousie NB, showing the location of the *King Darwin* incident.

The location is highly industrial with restricted public access, with much of the adjacent shoreline comprised of the manmade concrete and wood pilings of the wharf. Some concern was raised due to the proximity of the site to the mouth of the Restigouche River, a productive tidal estuary with areas of undeveloped shoreline.

In accordance with provisions in the *Canada Shipping Act, 2001*, the responsible polluter (NB Power) contracted Dartmouth-based private response corporation ECRC to carry out the primary environmental response and cleanup, under the supervision and authority of CCG ER. Both ER and ECRC arrived onscene on the day of the incident, with additional resources brought to the scene as the response work continued. The Port of Dalhousie and NB Power were both involved in the response efforts, and actively communicated and coordinated with CCG and ECRC throughout the process. TC MART

overflights took place after a slight delay, and were able to confirm that no visible oil had extended into the estuary, suggesting that the spill was concentrated primarily on and under the wharf itself. The focus of the first several days of the response was on establishing appropriate booms to prevent further contamination, and beginning to plan clean-up efforts. ECRC stressed that the clean-up would be challenging, due to the presence of oil on and under the wharf, on the vessel sides, and on the shoreline, coupled with cold and rough weather. To prevent spreading contamination farther by moving the vessel, CCG arranged with the vessel owner to keep the *King Darwin* berthed until the clean-up could be completed.

Despite the high volume of product spill and these specific challenges, both containment and clean-up efforts were eventually effective. Booms had been deployed in the first days of the response, and were effective at containing the spilled product. Weather caused delays and made boom maintenance challenging, as anchors were required to keep booms from being moved or broken by high tides and waves. Some lightly oiled wildlife were discovered, prompting the initiation of bird hazing that effectively ended the problem. A variety of cleaning methods were employed, including the use of absorbent materials, dredging, the use of divers, and steam cleaning. Dredging operations faced several setbacks when dredges interfered with anchored booms, causing concerns of a potential release of product. Fortunately no release took place, and instructions were given to modify dredging tactics so as to avoid future problems. By October 3rd, as much as 50,000 L of oil had been recovered, and by the end of the clean-up nearly 100% of the product had volatized or been successfully recovered.

On November 18th, following an extensive period of cleaning the vessel, wharf, and shoreline, the *King Darwin* was cleared to depart the port. Upon confirming that the first movements of the vessel away from the port did not produce any traces of released oil, ER and ECRC teams completed the shut-down of operations, removed the last absorbents, and departed the site. A plan was set up for additional monitoring to take place in the spring, so as to ensure that no oil had appeared over the course of the winter.

3.1.1 Public Reaction

The degree of public reaction to the *King Darwin* incident was minimal, with very limited media coverage and little to no public outcry. The first media interviews with CBC and a local newspaper took place on September 30, and a statement with regard to the incident details was released. The nature of the interviews and reporting was highly factual, focused simply on the basic details of the incident. The only significant media item produced was an editorial that was published in *The Campbellton Tribune,* a local newspaper, by a resident of nearby Campbellton NB. The author claims to have visited a local beach between Eel River and Dalhousie, and have encountered a "thick black sludge that spread back into the water as far as [they] could see." The author presumed this to be related to the *King Darwin* spill, and also stated "are there any local environmentalists or concerned citizens taking note of this? How about showing some outrage over this very evident pollution…" (Letter to the Editor by a Campbellton resident, "What was on beach?", originally published in *The Campbellton Tribune* Oct. 22, 2008). The DFSR reports refer to this editorial, and CCG/ECRC personnel visited the site in an attempt to verify the account. No traces of oil were found, and ER was unable to confirm the veracity of the account.

A follow-up article was published in *The Campbellton Tribune* that informed readers that the clean-up was nearly at an end. The article highlighted the success of the clean-up, but gave few details. It also responded to the editorial published on Oct. 22nd, by acknowledging that CCG and Port of Dalhousie teams had followed-up at the site, and found no traces of oil. Aside from the minor attention that editorial may have garnered, few media inquiries or public complaints were forthcoming. A note in the Nov. 13th entry to the DFSR acknowledges that "there has been no media interest in the wharf operations lately." The DFSR also makes note of early fears that contamination of the public water supply may occur, but no contamination was ever confirmed, and public concern about the issue never materialized. S. Bornais noted that the media and public reaction to the incident was best described as "muted". Media requests for interviews or statements were minimal from both English and French sources, and the only media reports compiled reported the simple facts of the incident. No significant public concerns were noted in any of the reports or by S. Bornais, and no public consultations were requested or held.

3.2 Shovelmaster

In the afternoon of Nov. 19th, 2008, CCG ER received a call from the Regional Operations Centre (ROC) informing them that the barge *Shovelmaster* had capsized while being towed in rough seas. The 61 x 24 metre (m) dredge barge, owned by Irving Oil, was being towed off the south-west shore of Nova Scotia, near George's Bank, en route to Halifax NS when it encountered 45 knot winds and 2 to 3 m waves. After capsizing, the towline was cut, allowing the barge to drift. Rough seas prohibited any attempt to reattach the towline, and the barge was lost from sight. Plans were quickly discussed with

Transport Canada (TC) to arrange for overflight to locate the barge, and a second tug was dispatched to aid with the rescue operation. CCG ER was notified of the incident due to the presence of large volumes of multiple oil products on board the vessel, but though ER response planning began immediately (spill trajectories were constructed as early as Nov. 20), the initial phase of the incident was focused primarily on attempts to locate and rescue the barge and its three member crew.

On November 21, after having located the *Shovelmaster*, a tug (operated by Atlantic Towing Limited, ATL) was able to successfully reattach to the vessel and began to tow it offshore. The crew members on board the barge were successfully rescued by search and rescue (SAR). The REET (Regional Environmental Emergencies Team) had discussed a proposal from ATL to tow the barge to a place of refuge between Halifax and Digby, as per the Canadian *National Places of Refuge Contingency Plan* (Transport Canada, 2007), but ultimately decided against it, citing fears of proximity to lobster fishing grounds. Instead, it was determined that the barge should be towed to a designated disposal location offshore, approximately 80 nautical miles (nm) from the coast. On November 22, while being towed towards the disposal site, the *Shovelmaster* sank at 43º12'18"N, 66º49'03" W, approximately 45 nm south of Shelburne, NS.

By the time of its sinking, it was known that the *Shovelmaster* was carrying approximately 70,000 L of diesel fuel oil, 456 L of hydraulic oil, 114 L of lubricating oil for the equipment on board, and 750 L of various waste oils. CCG ER, which had been meeting and planning a response since the vessel was reported adrift, completed arrangements with TC for for an overflight as soon as weather would permit it, in an attempt to locate the barge and assess whether any product had been spilled.

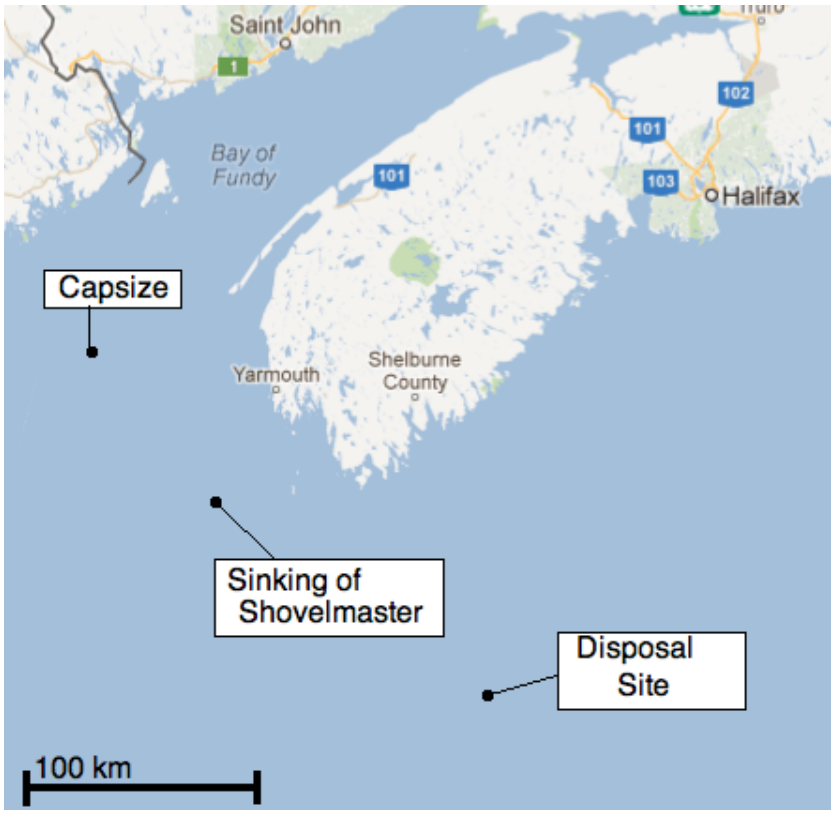

Figure 3.2 Map of south-west Nova Scotia, showing the capsizing and sinking locations of the *Shovelmaster*, as well as the designated disposal site to which it was being towed when it sank.

In similar fashion to the *King Darwin* incident, private response corporation ECRC was contracted by the responsible parties to carry out the response under CCG ER direction. Beginning on Nov. 23 a series of helicopter and airplane overflights, coupled with sea-level observations from a tug and CCG vessels on site, determined that there was some visible sheen at the surface on Nov. 24 (estimated at 3.5 L) and none thereafter, and no other evidence that more than a negligible spill of product had occurred. Sea conditions remained rough, presenting the possibility that small quantities of oil could be rapidly dispersed and out of sight.

With the barge not visible from the surface, ER began discussing the possibility of arranging for a video-equipped remotely operated vehicle (ROV) to dive to the site,

allowing for an assessment of the damages to the sunken barge. A dive was completed on November 30th, and successfully located the wreck. Review of the video taken by the ROV showed that the barge had settled upside down on the ocean floor, and was partially submerged in soft sediment. There was no evidence of fuel leaking, and the vessel appeared to be stable and intact with the fuel oil still contained in the onboard tanks. The video obtained in this dive provided much of the information upon which the two risk assessments, completed in response to concerns raised by stakeholders and the public, were based. The completion of the first ROV dive marked the end of the formal CCG ER response to the incident, although they continued to have involvement in subsequent monitoring efforts.

One of the major concerns posed by the *Shovelmaster* incident revolved around the location of the sinking being in the midst of an important lobster fishing area. The barge sank in lobster Area 33 (as assigned by the Provincial government), two days prior to the beginning of the lobster-fishing season. The lobster fishery in Nova Scotia is a profitable and highly valued industry, and features prominently in the communities in the area surrounding Shelburne (Nova Scotia Fisheries and Aquaculture, 2006). Other concerns surrounded the possibility that oil might wash up on the shore, some 45 nm away, resulting in pollution of the predominantly rural and undeveloped coastal environment.

In response to concerns of potential pollution, two separate risk assessments were carried out; one was completed by ITOPF (International Tanker Owners Pollution Federation), and the other by Dillon Consulting Limited. Each risk assessment took into account both the likelihood of a release of product from the sunken barge, as well as the

potential consequences of such a release. The risk assessments both determined that the most probably outcome was a very slow corrosion of the fuel tanks over many years, which would result in a slow and diluted release of fuel from the tanks. The light diesel oil should disperse quickly, and the projected damage to wildlife and the marine environment would be negligible. They also considered a variety of other scenarios, including the worst-case incident in which the entire 70,000 L of diesel fuel would be released at once. In addition to the likelihood of this scenario being extremely low, the consequences were deemed to be extreme only in the immediate surrounding area. No spill trajectories were able to project circumstances under which the oil could reach the shore, and each scenario projected rapid dispersion of the product.

The risk assessments also concluded that the risks of pollution involved with any attempts to raise the barge or to remove fuel oil from the onboard tanks were greater than the risks involved in leaving it in place on the seabed. In addition to the risk assessments, and in response to concerns about the decision that the vessel would be left in place, ATL prepared a monitoring plan based on consultations with REET, CCG ER, and the ITOPF/Dillon risk assessments. The plan outlines the method by which overflight and subsequent ROV monitoring would be used to ensure the predictions of the risk assessments occurred as expected.

3.2.1 Public Reaction

The public reaction to the *Shovelmaster* incident was extensive and dramatic. The first media reports began on the second day of the incident with an interview with the *Yarmouth Vanguard*, a local newspaper. Interviews continued on Nov. 23rd with CBC and CP (Canadian Press), and moved on to a full media briefing and on-air CBC

interview on the 24th. A DFSR entry on the 25th notes that "media interest [is] high", and that additional interviews were held. The ongoing nature of the incident generated sustained interest throughout the attempted rescue and subsequent sinking of the barge, and attempts were made by CCG ER to disseminate as much information as possible through the use of "media availabilities". According to S. Bornais, media were provided with photos, details, and the consistently updated potential spill trajectories. A media review found a wide range of available sources reporting on the incident at various stages, including both local and national sources.

Although much of the reporting is based on factual reports of the events, there is also evidence of a prominent role played by Halifax based environmental activist NGO the Ecology Action Centre (EAC). The EAC declared the decision to leave the barge in place "bizarre", and held public protests in downtown Halifax to raise awareness of their concerns that CCG ER was endangering the marine environment by leaving the barge in place (Canadian Press, 2009; CBC News, 2008). Protests involved members dressed as lobsters and other marine organisms pretending to drink diesel fuel, prior to dropping "dead" outside of Environment Canada (EC) offices in Halifax (Canadian Press, 2009). Pressure was also levied against all groups involved, including CCG ER, EC, TC, ATL and Irving. Spurred on by a comment from an EC spokesperson that compared the consistency of diesel fuel to that of maple syrup with respect to the way in which it disperses in water, the EAC launched a satirical press release claiming that "new evidence" had demonstrated that diesel fuel was "no more toxic than maple syrup" (Ecology Action Centre, 2009a; S. Bornais personal communication, 2012). In a final action aimed at further motivating public concern about the incident, the EAC declared

EC, TC, DFO and Irving as joint recipients of their 2009 "Tarred Duck Award", an award "presented to a group or individual who has acted in violation of environmental issues or advocated for economic development without consideration for the environment", for their involvement in the *Shovelmaster* incident (Ecology Action Centre, 2009b).

The *Shovelmaster* is unique among the six case studies due to this prominent involvement of an NGO in campaigning to influence public perception of the event. The extent of the present study does not allow for an assessment of whether the actions of the EAC played a significant role in shaping public perception and motivating reaction, but it should still be noted that the EAC is a prominent group in Halifax environmental issues, with a particular focus on raising public awareness and shaping public opinion on environmental issues (Ecology Action Centre, 2012).

Notes in the DFSR reports, as corroborated by information from S. Bornais and J. LeClair and multiple media sources, indicated that the general public reaction (i.e. outside of the media) was high, although no public consultation occurred outside of the media availabilities. Representatives from DFO and CCG held meetings with fisherman's groups as a response to concerns raised about the local lobster fishery that was to open only a few days after the initial incident. Fishermen were notified of the location of the barge and provided with information on the likelihood of any pollution, and although some mention of ongoing discussions with fishermen is reflected in the DFSR, few concerns from fishermen were expressed in the later part of the incident (S. Bornais, personal communication 2012).

3.3 Sault-au-Cochon

Coast Guard Operations notified CCG ER on the morning of November 10th, 2010, that the barge *Sault-au-Cochon,* a 100 m vessel carrying a cargo of logs, had broken loose from its tow and was drifting at approximately 45º45’87”N, 62º33’64”W, little more than 3 km from the south shore of Pictou Island, NS. The barge, which had been en route to Pictou, continued to drift west as tug crews attempted unsuccessfully to reattach the tow line. Approximately three and a half hours later, the barge ran hard aground on Pictou Island at a final GPS position of 45º43'75"N 62º38'16"W, less than 1 km from the mainland, and 5 km from Pictou NS.

Figure 3.3 Map of Pictou NS, showing the approximate location of the *Sault-au-Cochon* incident.

The location around Pictou Island where the barge ran aground is heavily rural, although the shore is easily accessible by land. The barge and its spilled cargo were easily viewed from publicly accessible property, which is only a short distance from the town of Pictou. The shoreline in the area is largely undeveloped and consists of mostly sandy beaches. The barge was known to be carrying a load of over 6,400 metric tonnes of logs, along with an excavator and two generators. In addition to this cargo, the vessel contained as

much as 7,000 L of diesel fuel, 400 L of hydraulic oil for the excavator, and 14 barrels of which two contained diesel, two contained waste oil, and the rest were empty. First responders on the scene reported no initial pollution, although it was noted that several barrels had dropped off the barge and some were coming ashore.

By early afternoon, rough sea conditions had caused the cargo to begin coming loose, and logs were reported floating away from the vessel. By this point some sheen was also seen near the vessel, and 12 of the barrels had been recovered by the local fire department. One was leaking, but it was quickly removed from the water and ended up spilling a negligible volume of product. CCG ER personnel began making preparations to travel to the site before the end of the first day, and arrived by 9am on November 11. Meetings were arranged and held with the vessel owner and the tug operators to discuss possibilities of removal. Rough seas in the first days made any attempts at removal impossible, although weather was not sufficiently severe to delay MART overflights, which took place on Nov. 12. By this point, a consistent sheen was detected, and the volume of spilled product was estimated to be approximately 47.3 L. Containment booms were deployed and monitoring efforts put in place, and by the end of the day no further sign of a leak was visible from the vessel.

In like fashion to the *King Darwin* and *R. Brazeau* incidents, the vessel owner-operator elected to contract ECRC to be on site during the salvage operation, under the supervision of CCG ER. On Nov. 13, the leaking tanks were successfully plugged after a release of an additional 6 L of diesel, and operations began to offload the oil from the barge's fuel tanks. All but the hydraulic oil was successfully removed by the end of the

day, and attention moved to clean-up activities. The remaining barrels were located on Nov. 15, when residents spotted them on a beach and began to complain.

Although the actual clean-up and containment were carried out effectively, there was a significant delay in producing and approving the salvage plan. The company eventually selected to undertake the salvage operation was not prepared until November 18th. Work commenced shortly thereafter, with ECRC arriving to perform cleaning and containment. Salvage operations involved removing the remainder of the fuel, refloating the barge, and removing logs. The *Sault-au-Cochon* incident is distinctive from the other incidents discussed herein, in that it involved a significant lost cargo that was not oil. The logs posed a separate challenge, as they did not fall under the purview of CCG ER, and posed a threat to navigation. They also presented a dramatic visual stimulus, despite not representing any significant pollution threat.

Following ongoing salvage and cleaning operations, coupled with regular overflight and monitoring, the barge *Sault-au-Cochon* was successfully refloated and departed the site on November 30th, 2010. No signs of leakage were detected in the wake of the departing vessel, and the last of the offloading of remaining product was performed while the barge was docked in Pictou. Satisfied with the condition of the barge and the site, CCG ER personnel and equipment departed on December 3rd. By the end of the response, nearly all of the product on board had been directly recovered, and the limited amount that was spilled was effectively contained and recovered.

3.3.1 Public Reaction

Media interest in the *Sault-au-Cochon* incident began immediately, with the first interviews taking place on Nov. 11th with CBC, CTV, CH, CP and local media. Pictou is a media centre for each of these organizations, and reporters had easy access to the site. Media attention remained high throughout the incident, with interviews held with local media and CBC/CTV on Nov. 13th, 15th, 17th, 20th, 23rd, 27th, 29th, and 30th. The DFSR entry for Nov. 12th specifically notes the high level of media interest, and a media review was able to retrieve a wide range of local and national stories on the issue, from multiple sources. In addition to media interest, general public outcry was noted in the DFSR, SITREPS (Situation Reports), and in discussions with S. Bornais and J. LeClair.

Much of the attention given to the incident focused on the large and very visible quantity of logs that had been spilled. Fishermen had initially complained about oil leaking from the barge on Nov. 11th, but subsequent complaints were focused primarily on the remaining barrels and the logs. In response to a high volume of complaints from residents, the Pictou County MLA's office made several public complaints and inquiries to CCG ER, specifically on Nov. 15th and 22nd. Again, these complaints focused mostly on the presence of the logs, and questioned the seemingly total lack of action taken by ER in removing the logs. A response from CCG, indicating that log cleanup was not the responsibility of CCG ER, diminished some but not all subsequent complaints.

Public complaints varied from private citizens to local politicians, the Pictou Island First Nation group, and local fishermen. In response to the high volume of concerns raised, CCG ER arranged to hold a public stakeholders consultation in nearby New Glasgow on December 3rd. This stakeholder meeting, attended by ER personnel and

stakeholders from across the local community, addressed and clarified many of the concerns raised by the public. Although follow-up interviews and reports were plentiful during the ongoing response, only limited media follow-up occurred after the conclusion of the incident, and no subsequent stakeholder complaints or issues were noted in the incident file.

3.4 René Brazeau

On February 12, 2011, the dredge *René Brazeau (R. Brazeau)* sank while mooring at pier 12 of the Port of Saint John, an industrial port facility in Saint John NB (GPS Location 45º15'56"N, 66º06'99"W). By the time CCG ER personnel arrived on site, the dredge was submerged and had spilled oil. The *R. Brazeau* was identified to have had 8,000 L of diesel fuel oil on board, along with an unknown volume of hydraulic oil.

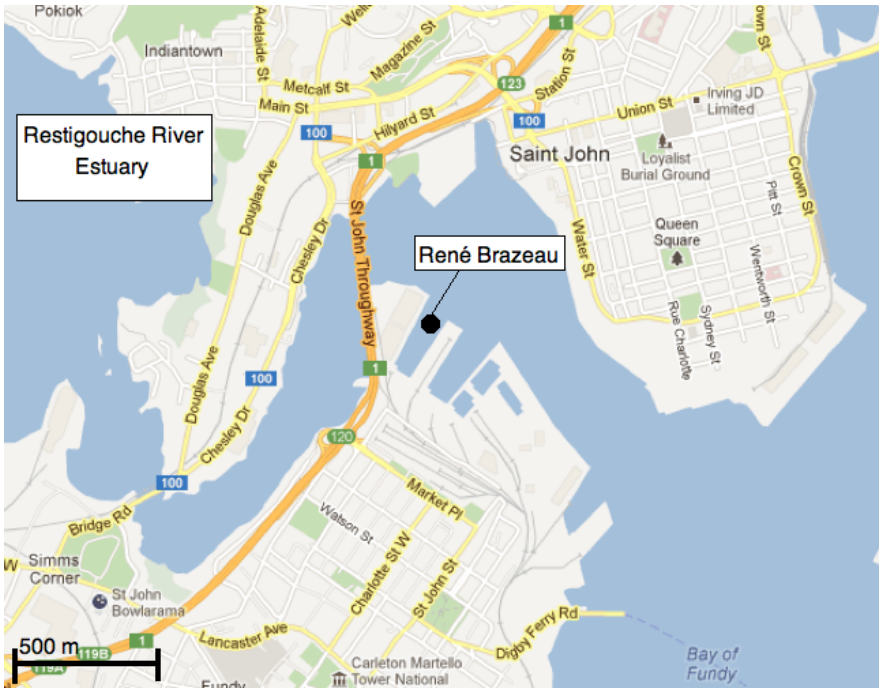

Figure 3.4 Map of Saint John NB, showing the location of the *René Brazeau* incident and the Restigouche River estuary.

The response began immediately with the deployment of containment booms, as it was identified that much of the diesel oil had been spilled into the water and on the face of the wharf. Divers were in the water on February 13th to begin examining the wreck and considering options for salvage. Preliminary examination revealed that fuel tanks on the dredge were continuing to leak, adding slowly but consistently to the volume of product spilled from the vessel. While divers focused on finding ways to plug the leaks, CCG ER efforts centred on containment of the spilled product for the first week, and proceeded with initial success. By Feb. 18th anchor buoys were added to improve the stability and effectiveness of the booms, and by Feb. 21 absorbent pads were being deployed to remove additional sheen.

The remaining leaks on the barge were plugged on Feb. 24, noticeably reducing the amount of visible sheen and speeding the rate of effective clean-up. Though containment and clean-up were ongoing and effective, the DFSR reports describe considerable delays in the production and approval of a salvage plan for removing the fuel from the wreck and refloating the vessel. The salvage plan was produced by Feb. 21, but it continued to be altered and delayed, with no action taken until the end of the month. By March 2, when the first media reports began to surface, the first fuel removal attempts were only about to begin. Once they did get underway progress moved along at a more rapid pace, with the tanks successfully emptied and capped by March 6th. Much of the equipment from the *R. Brazeau* had been successfully removed, and the response had shifted into ongoing monitoring and some limited cleaning of sheen with absorbent pads. On March 16, ER ended its official response, leaving some primary booms in place until all visible sheen

was gone. Final monitoring was left in the hands of other local authorities, as ER departed the scene.

The area in which the incident occurred is an industrial port area within the environs of an urban area. The port is located at the mouth of the Saint John River, where it empties into the Bay of Fundy. Although the spill was successfully contained, the high and strong tides in the area had the potential to transport the large quantity of diesel fuel over a significant area, with the potential to impact residential waterfront areas and less developed beach and marsh areas.

3.4.1 Public Reaction

The public reaction to the *René Brazeau* incident was limited, with the first media inquiries coming over two weeks after the actual event and little to no outcry was noted among the public. Interviews were first booked on March 2nd, and between that date and March 7th interviews were carried out with CBC, CH Saint John, local paper the *Telegraph Journal*, and local radio station News 88.9 FM. According to S. Bornais, the focus of these interviews revolved around a sense of poor communication between CCG and the media, with journalists indicating that they felt they should have been notified when the event took place, and showing less interest in the threats posed by the event. DFSR reports and other material surrounding the incident indicate that standard DFO communications procedures were followed, and notification of media (through press releases or otherwise) is not specifically required. A review of the media found extremely few reports from limited sources, indicating a general lack of immediate or ongoing media interest in the event.

Although the Port of Saint John is located within an urban and media centre, the

specific location of the incident was within an area with restricted public access and visibility. There was, however, concern that the incident could generate considerable backlash from the public and local politicians due to its proximity to the urban centre. The first SITREP prepared indicated that the incident was of special interest because "There are political sensitivities around the incident (e.g. location, resources at risk)." Despite the perceived sensitivities, no public consultations or other forums were held.

3.5 PC Scotia

On October 10, 2011, CCG Environmental Response (ER) received notification of a potential pollution incident stemming from a small vessel that was adrift and burning near Musquash, NB. The vessel, a 52' yacht registered out of Halifax as the Private Craft (PC) *Scotia*, had issued a distress call after the operator was forced to abandon the ailing vessel. An onboard smoke detector alerted the operator to the presence of a fire, and while preparing to examine the source of the problem, there was an explosion on board the vessel. Despite an initial attempt to use a fire extinguisher, the operator deemed the risk of staying aboard to be too great, and abandoned the vessel in a small Zodiac watercraft. The distress call issued indicated that the operator was in the Zodiac and in need of rescue, although he was not injured and there were no other passengers on board the vessel.

A Coast Guard search and rescue vessel was dispatched and proceeded to rescue the operator and locate and the burning vessel, which was still heavily engulfed in flames. The dispatched Coast Guard vessel was required to depart the scene to transfer *Scotia*'s operator to Saint John, leaving the *Scotia* to continue burning and floating adrift.

Coast Guard ER was notified that the fire could result in the release of a considerable volume of oil products on board the vessel into the marine environment. The vessel contained approximately 1,300 L of diesel fuel, 130 L of hydraulic oil, and some small propane tanks. Although it was initially unclear whether any product had been spilled, the ER team was dispatched to the site.

The first members of the ER team arrived at the site on October 10th, at which time *Scotia* was still afloat and burning. Preliminary observations began, but after no sheen or visible product spill were found, the ER team stood down for the day while awaiting additional resources. Land-based observation late in the day of October 10th confirmed that the vessel had ceased burning but was still afloat near its initial location. On October 11th, additional ER resources arrived, but the *Scotia* was no longer visible above the water. A TC MART overflight of the area found no trace of the vessel or any sheen, suggesting it had likely sunk without releasing any product.

After confirming that the vessel had not been towed to any nearby harbour, low-tide scans began to find the sunken vessel. The *Scotia* was located on October 12th, submerged at approximately 45º08.99'N, 66º14.36'W, less than 5 km from shore. Preparations began almost immediately to attempt to refloat the vessel, and precautionary measures were taken to ensure containment would be possible should a spill occur. Staging areas were set up, and various boom types were kept on stand-by for rapid deployment. By October 14th, divers had captured video of the wreck, confirming that no pollution was visible.

Figure 3.5 Map of a portion of the NB coast south-west of Saint-John, showing the location of the *PC Scotia* and the Musquash estuary. The Musquash Estuary MPA extends out of Musquash harbour, and encompasses the point marked as *PC Scotia*.

Although ER made preparations in the event of a significant potential release of product, no visible sheen was detected during the majority of the response period, indicating a negligible release of oil from the vessel. Some sheen was seen on October 29th during refloating operations, and sorbent booms were effectively used to contain the small quantity of fuel. The majority of detected pollution was limited to variously sized pieces of charred wood "with a strong diesel odour" (*PC Scotia* DFSR, Oct. 16, 2011), which were found on October 16th, 19th, 21st, 22nd, 23rd, and other miscellaneous debris found on an adjacent beach on November 7th. The primary focus of the response shifted to recovery and salvage after October 17th, with attempts to refloat the vessel using airbags commencing underway by October 24th. Recovery contractor All-Sea Atlantic was responsible for the project, which had initial success at raising the vessel above the

surface, but suffered difficulties when adverse weather conditions hampered attempts to tow the vessel to shore. Although the duration of the initial incident was less than a day, the ongoing response and recovery extended until November 9th, at which time the vessel had been raised, towed, and was successfully beached and awaiting final disposal.

The greatest concern raised by ER at the time was the fact that the location of the incident fell within the boundaries of the federally designated Musquash Estuary Marine Protected Area (MPA). The Musquash Estuary was first designated as an Area of Interest under the Canadian *Oceans Act* in 2000, and would become a full MPA by 2007 following extensive stakeholder consultation (Fisheries and Oceans Canada 2007). The estuary is recognized by DFO and local stakeholders as significant due to its large size and extensive undisturbed salt marsh ecosystems, an increasing rarity in Atlantic Canada (Fisheries and Oceans Canada 2007). A significant oil spill within the estuary, particularly one that corresponded with high tidal activity, could have devastating and long lasting effects on local marine life and the entire surrounding ecosystem. Particular concern was also raised about the timing of the incident, which occurred during high spring tides. Spring tides feature a tidal range that is considerably higher than a typical tide, and could have the capacity to transport any spilled product higher into the estuary than otherwise, potentially hindering any containment efforts. The nearest shore location was also noted as having an extensive intertidal zone, which could present challenges in the deployment of containment and recovery equipment. Unfavourable weather conditions also contributed to delays in the salvage of the vessel.

3.5.1 Public Reaction

According to S. Bornais and J. LeClair, the public reaction to the *Scotia* incident was essentially non-existent. Although media lines were prepared on October 13th, DFO Communications received no inquiries from media outlets or members of the public. Coast Guard, likewise, received no inquiries. The absence of any outcry or attention is reflected in the DFSR reports, which indicate that though there were extensive internal communications on the subject, no media contacts were made and no public interest was generated. Information about the occurrence of the incident and its location were available from the Joint Rescue Coordination Centre (JRCC) in Halifax at the time. Concern is expressed in the DFSR reports that the location, within the Musquash Estuary MPA, may generate significant fears or concerns. By contrast, the only concerns expressed stem from representatives working with the MPA within DFO. Media searches returned no results, further confirming the absence of any attention having been paid to the incident.

3.6 MV Miner

The 222 m bulk carrier *MV Miner* was originally built for service on the St. Lawrence Seaway/Great Lakes in 1966, and spent years actively transporting various bulk cargoes throughout the system. Three years after making its final revenue run, the vessel (formerly *Canadian Miner*) was sold for scrap and approved for transport from Montreal, QC, to a ship-breaking yard in Turkey in mid 2011. The vessel was prepared for transport, and departed Montreal under tow from two Greek-owned tugs. While passing through the end of the Gulf of St. Lawrence off the coast of Cape Breton the

towed vessel encountered a severe storm, during which the tow cables were severed and the vessel sent adrift. On September 20, 2011, after multiple failed attempts to reattach the tow cables, the *Miner* ran aground on Scaterie Island (approximate coordinates 46°01'13"N, 59°43'20"W). Scaterie Island is approximately 6 km from the coast of Cape Breton, in a rural area roughly 38 km from Sydney, NS.

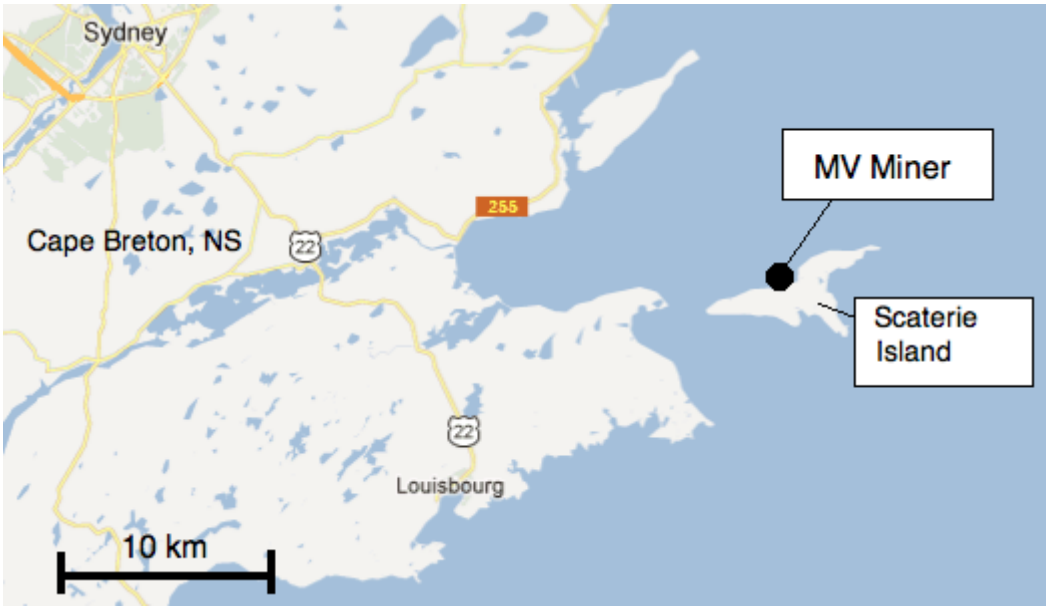

Figure 3.6 Map of east Cape Breton NS, showing the location of the *MV Miner* incident.

Although the area of water surrounding the location of the *MV Miner* incident is not protected, the land on Scaterie Island is designated as a Protected Area by the Government of Nova Scotia under the *Wildreness Protection Act* (Wilderness Areas Protection Act. *1998, c. 27, s. 1.*). This fact did not impede the progress of the initial environmental response, although subsequent wreck removal activities required the approval of the Nova Scotia Environment Minister to take place. Approval was granted on June 5, 2012.

Continuing storm activity hindered further attempts to reattach the tow lines, and the hull of the vessel was damaged severely in the impact. Coast Guard ER was advised of the incident on September 20th, although initial reports of the volume of fuel of oil products on board were unclear. Although the first reports suggested no fuel was on board, ER was also notified on the first day about the possibility that up to 6.5 Tonnes of diesel fuel may be on board the ship. Reports from the first days of the incident demonstrate a degree of confusion, as both details about the incident and the agencies responsible for dealing with it (federal, provincial and private) were unclear and at times conflicting. By day four of the response, it was discovered that the Regional Environmental Emergencies Team (REET) had still not been notified of the event.

Several attempts to remove the wreck were made, but by September 26th it was clear that the vessel could not be refloated and would have to be salvaged. Along with establishing the need for a salvage plan, meetings on the 26th also clarified the roles of the relevant organizations; EC was responsible for dealing with ballast water, TC for stability issues, and CCG ER for any oil pollution. Assessments of the vessel on the 27th and 28th confirmed its poor stability status, and ER began taking action to remove the bulk of the fuel that was on board. Removal of the on-board diesel fuel began in late September, and continued until near the end of October. Absorbent materials were also placed on board to remove fuel oils on and around the ship outside of the tanks. Subsequent storms and rough seas caused extensive delays to the operation, including a six day period of inactivity from October 22nd to October 27th. The formal initial response period drew to a close near the end of October, with the major fuel oil offloaded from the vessel and the principal risk of oil pollution removed. The vessel remained in place throughout the

winter of 2012, as the approval and commencement of salvage operations has been hampered by the inability to identify the owner of the vessel as well as ongoing unfavourable winter weather conditions.

At the time of writing this report, response to the *MV Miner* incident is still ongoing. A salvage plan has been devised, and there are plans to begin removing the wreck before the end of summer 2012. For the purpose of this analysis, the "incident" has been restricted to focus only on the initial phase of the environmental response (essentially until October 31, 2011). It should also be noted that although public and media attention to the issue has waned over the first part of the summer, it is expected that the resumption of salvage and removal operations in late summer will reignite attention in the incident (S. Bornais, personal communication, July 6, 2012).

3.6.1 Public Reaction

Reaction to the *MV Miner* incident from both the general public and the media came immediately, and was extensive throughout the duration of the incident and response. A media review for the *MV Miner* case revealed a wide range of sources and entries with regard to the incident, spanning from the initial event into 2012. Sources include CBC, CTV, CP, Halifax-based *The Chronicle Herald,* local paper *The Cape Breton Post*, and other local sources. The Canadian Press material was published extensively in news outlets nationally, and coverage of the initial wreck and ongoing removal efforts featured in the national portions of both CBC and CTV news broadcasts. S. Bornais recalled that DFO communications began receiving media inquiries by the fourth day of the incident, and were receiving such a large volume of requests that DFO

began attempts to reduce the requests for interviews by providing interested media with a printed daily update containing facts about the ongoing events.

Despite being located in a rather rural area, Scaterie Island is only 38 km from Sydney, from which the adjacent mainland is accessible by public roads. Sydney is a media centre, with regional offices for CBC and CTV, and a number of local media outlets. Access from outlets in Halifax and other media centres such as New Glasgow could easily be accomplished. The island itself is not directly accessible or visible from land, but the wreck was easily accessed by way of small private watercraft. After the initial storms subsided, photographers used local fishing vessels to access the *Miner* site, and extensive photographs of the damage were collected and disseminated to the media. The *Cape Breton Post* published a slideshow of dramatic images online on October 14th, many of which were widely used in other media outlets in the following weeks (Cape Breton Post, 2011). Video cameras were also sent out on fishing boats to acquire video for news reports, as weather allowed.

Coupled with the extensive media coverage was reaction from citizens throughout the region. Some local fishermen expressed concerns, which were addressed on an individual basis as no formal consultations have yet been held. More recent complaints from fishermen were focused on their lack of involvement in salvage operations, rather than any concern over the local lobster fishery (CBC News, 2012). At the behest of their constituents, local and provincial politicians also expressed concern over the incident. S. Bornais observed that much of the reaction from the general public was tied closely to updates on changes to the event from media and new developments in the situation, with more public complaints and inquiries arising after each new spike in activity. The

ongoing confusion over who would bear the blame for the incident and the responsibility to remove the wreck has provided increased opportunities for the incident to be revisited long after the initial event. Perhaps surprisingly, no NGOs or prominent environmental organizations have yet been actively involved in the incident. Even the EAC, which figured prominently in the public reaction to the *Shovelmaster* case, has been noticeably silent on the issue.

3.7 A Note on Oil Product Properties

The six incident cases examined involved primarily three types of oil products that were released into the marine environment: diesel fuel oil, Bunker C heavy fuel oil, and hydraulic and lubricating oils. It is important to note that while any volume of oil released may cause damage to marine life and ecosystems, there are significant differences in the properties of each of these products such that each present unique clean-up challenges and environmental hazards when spilled in a marine environment. This section offers a brief overview of the properties and hazards associated with each of the primary products involved in these incidents. These properties were considered when assessing the level of risk in Chapter 4.

3.7.1 Diesel Fuel Oil

Diesel fuel oil refers to the common variants of marine diesel oil (or marine gas oil), a ubiquitous and rather light fuel used in many marine applications. It is a moderately refined oil blended with distillates, being somewhat less refined than common gasoline but much more refined than heavy oils such as Bunker C. Like other refined fuels, marine diesel fuel oil is highly soluble in water and has a high acute toxicity for

many marine organisms (Environment Canada, 1999). Marine diesel will rapidly disperse in open water, by as much as 50% within five days, and a variety of methods for dispersal and mechanical containment are highly effective (Environment Canada, 1999). The greatest threat posed to marine organisms and ecosystems by marine diesel fuel oil stems from its high acute toxicity and its ability to permeate into coastal sediments, but long-term concerns are generally minimal due to the high rate of natural dispersion (Environment Canada, 1999).

3.7.2 Bunker C Heavy Fuel Oil

Bunker C is a class of fuel oil produced from straight-run heavy residual oil that has not been blended with any quantity of distillate (Environment Canada, 1999). Unlike marine diesel fuel oil, Bunker C has a low acute toxicity and does not disperse naturally in a marine environment (Environment Canada, 1999). Bunker C undergoes limited natural evaporation, and may takes years to disperse. Clean up is generally focused on mechanical methods or in situ burning, rather than the use of chemical dispersants. The primary threat to marine organisms posed by Bunker C is its ability to coat and smother marine organisms, as its toxicity is generally sub-lethal. This threat applies particularly to marine birds, for whom even limited oiling with heavy products can be lethal (Clark, 1984).

3.7.3 Hydraulic and Lubricating Oils

Hydraulic and lubricating oils may refer to a variety of specific combinations of fluids used in the operation of hydraulic systems or in the lubrication of machinery. These oils are light products that, when spilled in a marine environment, typically spread rapidly at the surface of the water to form a thin sheen. Toxicity is generally low, and

though these oils may disperse quickly, mechanical clean up of sheens is difficult (Environment Canada, 1999). Hydraulic oils are likely the least hazardous of the materials spilled in the incidents in the study, but they are worth considering due to their potential to further compound environmental threats posed by spills of the other materials.

Table 3.1 Summary of temporal characteristics for each of the six incidents analyzed in the case study. This information was used in conjunction with the information in Table 3.2 and 3.3 to inform the analysis in Ch. 4.

Temporal Characteristics	Incident					
	King Darwin	**Shovelmaster**	**Sault-au-Cochon**	**René Brazeau**	**PC Scotia**	**MV Miner**
Date of incident	Sept. 29, 2008	Nov. 19, 2008 adrift, Sank Nov. 22, 2008	Nov. 10, 2010 adrift	Feb. 12, 2011	Oct. 10, 2011	Sept. 20, 2011
Duration of incident	1 Day	4 Days	1 Day	1 Day	1 Day	1 Day
Season	Summer	Late Fall	Late Fall	Winter	Fall	Fall
Weather conditions	-	Storm	Storm	-	Calm seas turning unfavourable during ER	Storm
Start ER response	Sept. 29	Nov. 19 (Rescue first priority)	Nov. 11	Feb. 12	Oct. 10	Sept. 24
End ER response	Nov. 18	Nov. 30 - Final ROV inspections	Dec. 3, 2010	Mar. 16	Nov. 9	Ongoing
Significance of timing	None	Immediately prior to opening of lobster season	None	None	Spring tides	Followed by multiple storm events
Incident Classification: single event, multiple events, or ongoing events	Single Event	Multiple Event	Ongoing Event	Single Event	Ongoing Event	Single Event (Ongoing Response)

Table 3.2 Summary of location characteristics for each of the six incidents analyzed in the case study. This information was used in conjunction with the information in Table 3.1 and 3.3 to inform the analysis in Ch. 4.

	Incident					
Location Characteristics	**King Darwin**	**Shovelmaster**	**Sault-au-Cochon**	**René Brazeau**	**PC Scotia**	**MV Miner**
Approximate GPS coordinates	48º04'22"N, 66º22'45"W	43°12'18"N, 66°49'03" W	45º43'75"N, 62º38'16"W	45º15'56"N, 66º06'99"W	45º08'99"N, 66º14'36"W	46°01'13"N, 59°43'20"W
Description of location	NB Power Wharf, Dalhousie NB	At sea, due south from Shelburne NS near George's Bank	5 km NE of Pictou NS	Port of Saint John Pier 12, Saint John NB	Inside Musquash Harbour	Scaterie Island NS
Proximity to land	0m (Vessel alongside wharf)	45 Nautical Miles	0.8km	0m (Vessel alongside wharf)	<5 km	6 km
Visibility to public	Moderate	Low, but widely publicized	High	Low (Restricted Location)	Moderate	Moderate
Public access	Low to restricted	Restricted	Highly Accessible	Restricted	Moderate	Moderate
Accessibility for photographs	Low	Low	Highly Accessible	Restricted	Moderate	High
Closest population Centre	Dalhousie, NB	Shelburne, NS	Pictou, NS	Saint John, NB	Saint John, NB	Sydney, NS
Size of population[1]	3,676	1,879	3,813	68,043	68,043	76,801
Approximate distance to population centre (if not adjacent)	n/a	45 Nautical Miles	5 km	n/a	20 km	38 km
Proximity to significant fishing areas	n/a	Within Lobster Area 33	n/a	n/a	n/a (MPA)	Lobster Area 27
Dates of fishing season (if applicable)	n/a	Nov. 24 to May 31	n/a	n/a	n/a (MPA)	May 16 to July 15
Location within an MPA (Yes/No)	No	No	No	No	Yes	No, but adjacent to provincial protected area
Type of location at shore	Industrial	Rural	Rural	Urban/Industrial	Rural	Rural

[1]Population data from the 2006 Canadian census.

Table 3.3 Characteristics contributing directly to the level of risk from oil pollution in each of the six incidents involved in this case study. Information in this table was used to assess the overall risk level in the analysis in Ch. 4.

Risk/Threat Characteristics	Incident					
	King Darwin	**Shovelmaster**	**Sault-au-Cochon**	**René Brazeau**	**PC Scotia**	**MV Miner**
Cause of Incident	Bolt failure on discharge line during normal offloading caused release	Barge capsized due to heavy seas and broken tow	Barge ran aground due to heavy seas	Sunken barge	Fire on board vessel	Ran aground due to broken tow cable in storm
Type of coast	Manmade, concrete/wood wharf	Varied, low development	Sand beach, low development	Manmade wharf	Estuary/Salt Marsh and beach, low development	Various, low development
Significant ecological features	Restigouche River Estuary	Near important benthic habitat for several commercial species	None	None	DFO Protected Estuary	Provincial Protected Area
Potential threat to marine life (posed by initial incident)[1]	Moderate	Low	Low	Moderate	High	Low
Potential threat to ecosystem (posed by initial incident)[1]	High	Low	Low to Moderate	High	High	Low to Moderate
Potential threat to human health (posed by initial incident)[1]	Low	None	Low to Moderate (logs present hazard to navigation)	Low to Moderate	Low	Low
Type of vessel	Tanker	Barge	Barge	Dredge	Yacht (Private Craft)	Bulk Carrier
Type and quantity of product on board pre-incident	70,000 L Bunker C heavy fuel oil	70,000 L Diesel fuel oil, 456 L Hydraulic oil, 114 L Lubricating oil, 750 L Waste	7,000 L Diesel Fuel, 400 L Hydraulic oil	8,000 L Diesel fuel oil, unknown quantity of hydraulic oil	1,300 L Diesel fuel oil, 130 L Hydraulic oil	6.5 Tonnes Diesel fuel oil
Volume of product spilled	62,799 to 70,000 L	Small, limited and short-lived sheen	<50 L	Up to 8,000 L	Negligible	Minimal
Stability of vessel pre-incident	Stable, minor maintenance issues	Stable	Stable	Unstable	Stable	Unstable
Stability of vessel post-incident	Stable	Sunken, but stable	Aground, but stable	Unstable	Badly damaged, but refloated	Unstable (to be scrapped on site)
Success of containment	High (near 100%)	n/a	High	High	High	High
Success of product recovery	High	n/a	High	High, but slow	n/a	High
Success of clean-up	High	n/a	High	High despite being slow	n/a	High
Reported damages	Extensive oiling of wharf. Reports of oil on nearby beach not confirmed	Vessel on ocean-floor	Barrels and logs washed ashore	Some damage to wharf	Limited debris at shore	Limited sheen, unsightly wreck
Risk assessment performed (Yes/No)	No	Yes (Two)	No	No	No	No
Conclusions of risk assessment	n/a	Risk of release negligible, trajectory in case of release does not reach shore. Greater risk posed by recovery efforts	n/a	n/a	n/a	n/a

[1]Assuming that no environmental response activities, such as containment of product, were performed.

Table 3.4 Characteristics describing and contributing directly to the level of public reaction in each of the six incidents involved in this case study. The overall assessed level of public reaction in Chapter 4 is based upon a qualitative assessment of the information in this table.

Public Reaction Characteristics	Incident					
	King Darwin	**Shovelmaster**	**Sault-au-Cochon**	**René Brazeau**	**PC Scotia**	**MV Miner**
Speed of public reaction	Immediate (Day 1)	Immediate	Immediate	Delayed (First media inquiry 17 days after incident)	n/a	Rapid (Day 4)
Specific concerns raised by members of the public	None	Concerns about leaving barge sunk, not recovering oil.	Log cleanup and barrels on beach	Media frustrated at not being immediately contacted by CCG	n/a	Confusion over roles and responsibilities for wreck removal
Level of DFO Communications on behalf of CCG	Limited	Extensive	Extensive	Limited	Communication materials prepared, not used	Extensive
Public consultation held?	No	Limited to fishermen	Yes	No	No	No
Other parties involved in a principal role (non-DFO and non-CCG)	New Brunswick Power, ECRC, Port of Dalhousie	EC, TC, Irving Oil, ATL, ITOPF, ECRC, Ecology Action Centre (NGO), Dillon Consulting	Local Government (MLA's office), local fishermen, Pictou Landing First Nation	Port of St. John	None	Provincial Government Departments, Environment Canada, Transport Canada, Towing Company, Vessel Owner
Abundance of non-DFO/non-CCG parties involved	Few	Many	Many	Few	Few	Many
Availability of photos/video	Low to Moderate	High	High	Limited	Limited	High
Level of non-media public reaction	Low	High	High	Low	None	High
Sensational aspects of incident	None	Dramatic Rescue Attempt	Rescue, Cargo of Logs	None	In MPA	Dramatic wreck, easily visible. Storms in first weeks.
Ease of access to media reports	Limited	Readily available	Readily Available	Limited	n/a	Readily available
Abundance of media reports	Few	High	High	Few	None	High
Number of media sources	<5	>10	>10	<5	None	>10
Tone of media presentation	Factual	Factual and Sensational	Factual and sensational	Factual	n/a	Factual and sensational
Diversity of media reporting on issue	CBC, Radio-Canada (French) Canadian Press and Local Newspaper	CBC, Canadian Press, Chronicle Herald (Halifax), Radio-Canada, Ecology Action Centre publications, local newspapers	CBC, CTV, Canadian Press, Local Media	CBC, local media	n/a	CBC, CTV, Canadian Press, Radio-Canada, Local Sources
Level of coverage (local, regional, national	Local focus, but national availability	Local, regional, and national	Local, regional, and national	Local	n/a	Local, regional, and national
	Limited to first day, specific lack of media interest noted in DFSR	Ongoing	Ongoing	Limited	None	Ongoing
Follow-up after event	Only in local paper	Yes	Yes	No	No	Yes
Other	Single letter to editor Oct. 22	EAC campaign	MLA's office expresses concern	None	None	Currently Ongoing
Is location near media centre?	No	No	Yes	Yes	Yes	Yes

CHAPTER 4 ANALYSIS AND DISCUSSION

4.1 Risk vs. Reaction

The standard measurement of risk involves a combined assessment of the probability of an event occurring, and the consequences of the event should it occur (ISO, 2002). For each of the incident cases, I assessed the level of probability that damages to the marine environment due to oil would follow from the incident, ranking each as either low, moderate, or high probability. I then assessed the potential consequences of these damages in each case, again ranked as either low, moderate or high. Both probability and consequences were assessed as though no environmental response (i.e. containment, recovery, etc.) had taken place, in an attempt to characterize the inherent threats posed by the initial incident. These were then placed on the risk matrix shown in Figure 4.1 to determine the overall level of risk for the incident as low, moderate, or high. This was a qualitative assessment based on the details of each case and a variety of characteristics which are summarized in Tables 3.1, 3.2, and 3.3. The level of public reaction to each case was assessed using a similar process, the characteristics of which are detailed in Table 3.4.

4.1.1 Categorization of Level of Risk

The *King Darwin* incident was unique among the cases in that it involved a spill of Bunker C heavy fuel oil. Although Bunker C has a lower acute toxicity than diesel fuel, its heavier character gives it a long residence time in the marine environment and on marine organisms, causing particular damages to marine birds. Although the location of the incident was an industrial wharf, the spill occurred near the Restigouche River estuary. Strong tidal forces were noted as a cause of concern in the case, and had the

potential to transport oil into the more sensitive and productive estuarine ecosystem if containment was not performed or failed. The volume of fuel spilled was the largest of any of the incidents herein examined, and the threats posed to marine organisms and ecosystems were from moderate to high. The probability of damages was assessed to be high, and the consequences moderate. As such, the *King Darwin* is classified as a high risk incident.

In contrast to *King Darwin,* the *Shovelmaster* incident of a few months later represented a low level of risk. Despite having a large volume of diesel fuel oil on board, the conditions under which the *Shovelmaster* sank left the on board fuel tanks intact, with a low probability of sudden release. The two risk assessments performed for this incident both concluded that the probability of any release from the tanks, apart from a gradual release over many years with negligible impact, were exceedingly low. Even assuming a worst-case scenario in which the entire contents of the tanks were simultaneously released, all spill trajectories pointed towards the product being naturally dispersed long before reaching the shore. Likewise, the light diesel fuel would rise rapidly to the surface, allowing little chance for harmful effects on benthic organisms such as lobsters. In a somewhat surprising revelation, both risk assessments proposed that any attempts to raise the vessel from the ocean floor or to remove the oil from the tanks posed a greater probability of generating a spill than leaving the wreck in place. Overall, the risk of any damages to the marine environment from oil pollution in the *Shovelmaster* is assessed to be low.

The barge *Sault-au-Cochon* may have posed certain risks to the marine environment, but they stemmed from the abundance of logs spilled rather than any

release of oil products. The quantity of diesel fuel onboard the barge was significant, but the degree to which the integrity of the fuel tanks was compromised was minimal. Some minor leaks did occur, but these spilled a very small volume of product and could be easily plugged. The barrels that did arrive on shore were still sealed, and had not leaked their contents. Despite being grounded, the vessel was still stable during the incident and required minimal repair to be refloated and moved. Overall, the probability of a significant release was low. If such a release had occurred, the consequences are likely to have been moderate in severity, as the nearby shoreline is largely undeveloped but lacking in significant ecological areas. With the probability of damages low and the consequences moderate, the *Sault-au-Cochon* can still be classified as a low risk incident.

The *René Brazeau* incident involved a significant release of toxic diesel fuel oil from a sunken vessel, with much of the product being released immediately and ongoing releases continuing until the leaks were plugged. Although the immediate location of the incident was an industrial wharf, the Port of Saint John is located adjacent to the urban centre of Saint John and also at the mouth of the Saint John River. The proximity to the population posed a potential threat to human health, and high tidal ranges in the area had the potential to transport oil extensively through the area if successful containment was not accomplished. In similar fashion to the *King Darwin*, the probability of damages occurring as a result of the release of oil from the vessel was high, assuming no containment took place. The consequences were likely to be moderate to high due to the potential for widespread transport of oil and impacts on human health, but with few ecologically significant areas in the immediate vicinity. As such, the *René Brazeau* is also classified as a high risk event.

The *PC Scotia* is an excellent representation of an incident in which the potential for damages was extremely high. The vessel was carrying a relatively low volume of diesel fuel oil, and surprisingly little was actually released during the burning and sinking of the vessel. Still, the probability of some release remained high throughout the duration of the incident. The major potential for damages lay in the high consequences of a potential release. The vessel was located in a Marine Protected Area, designated as such to protect its pristine condition and ecologically significant areas. The incident also took place during a time of high spring tides in an area with an already high tidal range, increasing the likelihood that any spilled product may be transported high into the protected area. The proximity to land made it likely that even the volatile diesel fuel would have opportunity to reach the shore. As such, the consequences of this incident were assessed to be high. The combination of high potential consequences and a moderate probability of damages make the *PC Scotia* a high risk incident.

The final case, the 2011 *MV Miner* incident, presented a lower overall risk than that of the *Scotia* that had preceded it. Although estimated to be carrying a large volume of diesel fuel, extremely little was actually spilled and the fuel tanks were not compromised, even after multiple storm events. The probability of a release from the initial incident was low, although the consequences should it take place were somewhat higher. Although not located in a Marine Protected Area, the *Miner* wrecked adjacent to the Provincial protected area of Scaterie Island. With the wreck being located so close to the shore, there was a reasonable likelihood that any spilled product could have a direct impact on the shores of the protected area, potentially causing damage to coastal and intertidal organisms and ecosystems. Due to the potential damage that could be

experienced on the shores of Scaterie Island, the consequences of the *MV Miner* incident were assessed as moderate. With an overall low probability and moderate consequences, the *Miner* can be classified as a low risk incident in the same fashion as the *Sault-au-Cochon* incident.

		Probability		
		Low	Moderate	High
Consequences	Low	Low Risk *-Shovelmaster*	Low Risk	Moderate Risk
	Moderate	Low Risk *-Sault-au-Cochon* *-MV Miner*	Moderate Risk	High Risk *-René Brazeau* *-King Darwin*
	High	Moderate Risk	High Risk	High Risk *-PC Scotia*

Figure 4.1 Risk matrix for damages to the marine environment stemming from the release of oil. Each of the incident cases from this study are displayed in the relevant part of the matrix corresponding to the assessed level of risk for the incident.

4.1.2 Categorization of Level of Public Reaction

The overall level of public reaction to the 2008 *King Darwin* incident was low, with some immediate media interest giving way to a near absence of any attention. Requests for DFO communications were limited, and public reaction outside of the media was essentially non-existent. The DFSR reports for the incident specifically acknowledge the near total lack of any media or public attention being paid to the incident. The only slight variation from this trend was the single letter to the editor of the *Campbellton Tribune*, with the author claiming to have found oil on a beach nearby that was never confirmed by CCG ER. The letter to the editor specifically notes the absence of any attention being paid to the incident, lamenting the lack of outrage over the event.

In stark contrast to the *King Darwin*, the *Shovelmaster* incident drew extensive reaction from both media and the public, with national and local media giving extensive coverage to the events and members of the public actively protesting the actions of CCG ER in dealing with the event. Coverage was ongoing throughout the event, with both factual and more sensational presentations of the incident appearing throughout the response period. Most notable of the response was the activism of the EAC, whose public protests and awareness campaigns seem likely to have been responsible for raising and sustaining public outcry. Among the elements focused on by the EAC was the involvement of Irving Oil, a company whose ubiquitous presence in the Maritime Provinces brings with it the likelihood of negative perceptions and connotations surrounding its operations and motives.

The 2010 *Sault-au-Cochon* grounding also drew extensive reactions from both media and the public. The ease of access to the incident allowed for dramatic photographs and videos, while the abundance of visible logs in the water added to the dramatic appearance of the event. Extensive local and national media coverage, with an apparent trend towards both factual and sensational representations of the incident and coupled with abundant visuals, was reflective of the overall non-media public reaction to the event. The reaction from local stakeholders, including fishermen and First Nations groups, was sufficient to justify holding a public consultation with stakeholders, the only one of its kind among the six incident cases in this study. The overall level of public reaction to the *Sault-au-Cochon* is classified as high.

The *René Brazeau* incident drew almost no public or media attention. With the first media response coming 17 days after the initial event, communications materials that

had been prepared by DFO in anticipation went almost unused. Media coverage was limited to local media, with the focus of media inquiries being on their sense of not having been informed rather than concerns over the actual incident. The overall public reaction to the incident was low. Even the limited attention given to the *R. Brazeau* was more dramatic than the reaction to the *PC Scotia* in 2011, which received no media or public inquiries at all. The fact that the incident took place in an MPA generated interest and concern within DFO, but no reaction took place externally. The overall public reaction to the *Scotia* was low, even non-existent.

The final and most recent incident, the *MV Miner*, is still ongoing as of the completion of this project. It has generated extensive media and public attention, with local, regional and national news coverage aided by dramatic and easily available photographs of the wreck. The involvement of numerous government departments has led to confusion over roles and responsibilities, and the incident has escalated well beyond the scale of a simple environmental response. The overall level of public reaction to the *MV Miner* is classified as high, and although the current study is focused only on the initial environmental response phase, it is worth acknowledging that public reaction to the *MV Miner* remains high and ongoing into the summer of 2012, and seems likely to continue until the wreck is removed.

4.1.3 Risk vs. Reaction

The results of the risk assessment and public reaction assessment are displayed in Table 4.1. Note that both aspects of the case were rated on the same relative low, moderate, high scale, and that the initial hypothesis held that the level of public reaction should correspond directly and show a positive correlation with the level of risk. Table

4.1 clearly demonstrates that the level of public reaction does not correspond to the level of risk in any of the incident cases, thereby failing to support the initial hypothesis.

Table 4.1 Summary of assessed level of risk of damages from of oil pollution from incident and assessed level of public reaction for each of the six incidents analyzed in this study. Assessed levels were determined by an analysis of the case characteristics presented in Tables 3.1, 3.2, 3.3, and 3.4. This comparison tests the hypothesis that the level of public reaction to an incident should correspond directly to the level of risk.

	Incident					
	King Darwin	**Shovelmaster**	**Sault-au-Cochon**	**René Brazeau**	**PC Scotia**	**MV Miner**
Assessed level of risk of damages from oil pollution caused by incident	High	Low	Low	High	High	Low
Assessed level of public reaction to incident	Low	High	High	Low	Low	High
Does level of reaction correspond to level of risk?	No	No	No	No	No	No

4.2 Factors Influencing Public Reaction

The results of the first phase of the analysis, as summarized in Table 4.1, do not support the initial hypothesis that the level of public reaction should directly and positively correlate with the level of risk involved in the incident. Given that this is the case for all six of the incident case studies, it suggests that there are influencing factors other than the level of risk that modify or mitigate the level of public reaction in each case. After examining the case details (as summarized in Tables 3.1, 3.2, 3.3 and 3.4), I proposed that the following 10 factors may be responsible for influencing public reaction:

1) The incident comprises multiple or ongoing events, rather than a single occurrence
2) The incident is highly visible/accessible to the public
3) There is a high availability of photographs/videos of the incident
4) Significant fishing areas are present in the vicinity of the incident
5) The incident occurs during or within one month of the fishing season (if applicable)
6) The incident occurs within a Marine Protected Area (MPA)
7) Presence of ecologically significant areas near the event location
8) The abundance of non-DFO/CCG parties prominently involved in the incident is high
9) The incident involves a human rescue or safety-of-life-at-sea (SOLAS) event
10) The event occurs near a regional media centre

For each factor, I have hypothesized that its presence in an incident should cause the level of public reaction to increase (i.e. move from low to moderate or high) from the anticipated result, and its absence should cause the level of public reaction to decrease (or remain low). In Table 4.2, I have summarized the factors and indicated whether each one is present in any given case. Factor numbers used in the table correspond to those used in the text (see above). I have then indicated whether the presence of the factor corresponds to the presence of its anticipated effect. If the factor exists and public reaction is high or if the factor is absent and public reaction is low, a positive correlation is noted (marked by a "√" in Table 4.2). If the factor is absent and public reaction is high, or if the factor is

present and public reaction is low, a negative correlation is noted (marked by "X" in Table 4.2).

If a factor had zero positive correlations, the hypothesis that the factor had a role in influencing public reaction was rejected. If the factor had one or two positive correlations, there was limited evidence to support the hypothesis. A factor with three positive correlations (50% of the incidents) was deemed to have some evidence to support the hypothesis. A factor with four or five correlations was considered to have strong evidence to support the hypothesis that it had a role in influencing public reaction, while it was deemed that a factor with positive correlations in all six cases was almost certain to have had an effect on public reaction to the incident.

It should be noted that it is not possible within the confines of this particular study to make any conclusive statements as to the effect of any particular factor in influencing the level of public reaction to each incident, as the number of variant characteristics between cases is too high to definitively isolate the role of particular factors. There are also potential socio-economic, historical, and political variances in local populations that are not addressed within this study but which may play a significant role in modifying reaction. Although not definitive, the results of this study present a series of factors whose influence is likely, and while it would be unwise to limit one's view to the specific factors at hand to the exclusion of all others, it would also be equally unwise to ignore the likely possibility that addressing these factors may prove valuable in managing public reaction to such cases.

Table 4.2 Potential factors influencing public reaction. Factor numbers reference those in the text (section 4.2) The presence of the factor in each incident case is identified as Y for present, N for not present. An apparent positive correlation between the factor and the level of public reaction is marked with "√", while an apparent negative correlation is marked with "X". Positive correlations are highlighted.

Factor #		Incident					
		King Darwin	**Shovelmaster**	**Sault-au-Cochon**	**René Brazeau**	**PC Scotia**	**MV Miner**
1	Present	N	Y	Y	N	Y	Y[2]
	Correlation	√	√	√	√	X	√
2	Present	N	N	Y	N	N	N
	Correlation	√	X	√	√	√	X
3	Present	N	N	Y	N	N	Y
	Correlation	√	X	√	√	√	√
4	Present	N	Y	N	N	N	Y
	Correlation	√	√	X	√	√	√
5	Present	N	Y	N	N	N	N
	Correlation	√	√	X	√	√	X
6	Present	N	N	N	N	Y	N
	Correlation	√	X	X	√	X	X
7	Present	Y	Y	N	N	Y	Y
	Correlation	X	√	X	√	X	√
8	Present	N	Y	Y	N	N	Y
	Correlation	√	√	√	√	√	√
9	Present	N	Y	Y	N	N	N
	Correlation	√	√	√	√	√	X
10	Present	N	N	Y	Y	Y	Y
	Correlation	√	X	√	X	X	√

4.3 Summary of Key Findings

The six incidents analyzed in this study varied in both the level of risk involved and the level of public reaction to the incident. The *King Darwin, René Brazeau* and *PC Scotia* were all classified as high risk incidents, but generated only a low level of public reaction. By contrast, the *Shovelmaster, Sault-au-Cochon* and *MV Miner* were classified as low risk incidents, but each managed to generate a high level of public reaction. As

[2] Although the *MV Miner* involved a single physical event, it is classified as "ongoing" due to the continued confusion over roles in responding to the event, and the additional details that have kept the case ongoing.

such, the initial hypothesis that the level of public reaction should correspond directly and correlate positively with the level of risk involved is not supported.

The findings for each of the ten factors are summarized as follows, based on the analysis summarized in Table 4.2:

1) There is strong evidence that public reaction was influenced by the incident being comprised of multiple or ongoing events, rather than a single occurrence.
2) There is strong evidence that public reaction was influenced by the accessibility/visibility of the incident to the public.
3) There is strong evidence that public reaction was influenced by the availability of photographs/videos of the incident.
4) There is strong evidence that public reaction was influenced by the presence or absence of significant fishing areas in the vicinity of the incident.
5) There is strong evidence that public reaction was influenced by whether the incident occurred during or within one month of the fishing season.
6) There is limited evidence that public reaction was influenced by whether the incident occurred within a Marine Protected Area (MPA).
7) There is some evidence that public reaction was influenced by the presence of ecologically significant areas near the event location.
8) It is almost certain that public reaction was influenced by the abundance of non-DFO/CCG parties prominently involved in the incident.
9) There is strong evidence that public reaction was influenced by the involvement of a human rescue or safety-of-life-at-sea (SOLAS) event.

10) There is some evidence that public reaction was influenced by whether the event occurred near a regional media centre.

CHAPTER 5 POLICY REVIEW AND RECOMMENDATIONS

5.1 Review of Relevant Policies

The Canadian Coast Guard Environmental Response (CCG ER) is the chief agency responsible for coordinating and performing responses to marine vessel-sourced oil spills and incidents (Canada Shipping Act, 2001). Environmental responses performed by CCG ER are governed by several policies. The principal policy is the *CCG Marine Spills Contingency Plan - National Chapter* (Canadian Coast Guard, 2011), from which a subsequent regional plan has been developed, titled the *CCG Marine Spills Contingency Plan – Maritimes Regional Contingency Chapter.* The regional plan draws on the national plan, and includes detailed information on how responses are to be carried out within the Maritimes Region. High-level environmental responses that constitute emergencies (as defined by Public Safety Canada) are governed by the Canada *Federal Emergency Response Plan* (Public Safety Canada, 2011), which acts in such cases as a higher over-arching level beyond the more specific marine spill plans. Given that the events discussed in this study were not recognized as federal emergencies, the relevant policies are the marine spill contingency plans.

The primary focus of this study is on the management of public reaction in MVSOR events. The *National* plan says very little about communications, simply referring to DFO Communications as the agency responsible for organizing communications to the public on behalf of CCG ER. The *Regional* plan is also mum on the issue of communications, focusing instead on detailed instructions for responding appropriately to MVSOR incidents. As CCG ER is an operating agency of DFO, the

public communications aspect of the response is performed by DFO Communications with input and involvement from CCG ER personnel. DFO Maritimes region has a set of *Internal Procedures for Management of Environmental Emergencies by Non-Coast Guard Personnel,* although the primary policy governing the communications aspect of the response is the *Communications Policy of the Government of Canada* (Government of Canada, 2006). The DFO internal policy makes only a brief mention of communications procedures, noting that media inquiries are to be directed to the communications branch. The *Communications* policy is of particular interest to this study, as it is the primary document detailing the method by which DFO communications are to be performed in a general sense. The *Communications* policy is detailed, and gives ample attention to the need to inform the public in a timely, accurate fashion during incidents (including MVSOR ones), as well as how to deal with particular public concerns. This includes instructions on how to deal with risk communication, crisis and emergency communication, and how public opinion may be solicited through research and consultations. This policy provides an excellent high-level framework, although its application in specific scenarios may require the use of more targeted, lower-level strategies.

5.2 Policy Recommendations

The aim of this study is, ultimately, to provide recommendations on ways in which the current policies governing the management of responses to MVSOR incidents can be improved based on the findings of this research. Although the relevant policies provide thorough guidelines for public communication, even specifically addressing risk perceptions, the disparity between risk and reaction displayed consistently across the six

incident cases in this study suggests that additional focus may be required. Based on the policy review and the findings outlined in Chapter 4, I have devised the following six policy recommendations.

- Recommendation 1: Inter-departmental cooperation in environmental responses is critical to ensuring public concerns are adequately addressed, and for avoiding confusion over responsibilities that may lead to public speculation with regard to the effectiveness of organization. It is almost certain that the level of involvement from non-DFO/CCG parties is positively correlated with the level of public reaction to the incidents outlined in each case, suggesting that the confusion created by having many groups involved may alter public perception of the risks. Response and communications policies should continue to stress the need for clear, concise, and timely coordination between federal departments, as well as expanding attempts at coordination to include provincial authorities and other involved stakeholders.
- Recommendation 2: There is strong evidence that incidents involving multiple or ongoing events generate a greater degree of public response than those that involve only a single incident. Response and communications policies should emphasize the need to prepare for greater public reaction and outcry in cases involving multiple related events, or in such cases where the response is lengthy and ongoing.
- Recommendation 3: There is strong evidence that public reaction is influenced by both public accessibility to the incident and the availability of photographs. Response and communications policies should account for the fact that incidents

occurring near land or in highly visible areas with easy public access are likely to generate increased public reaction. In cases where photographs are readily available, CCG ER should be upfront with information and provide photographs early to avoid accusations of withholding information.

- Recommendation 4: Incidents that take place within fishing areas, particularly during or within a month of the fishing season, appear to generate increased public outcry and reaction. Response and communications policies should involve a proactive approach to consulting with local fishermen, including immediate and upfront communication of the risks to the fishery and ongoing meaningful consultations to address fishermen's concerns.
- Recommendation 5: There is strong evidence to suggest that incidents involving a safety of life at sea (SOLAS) event as part of the incident are likely to generate a higher level of public reaction. Response and communication policies must recognize the extra attention garnered by SOLAS incidents, and take measures to ensure that the risks associated with the MVSOR incident are communicated distinctly from the other events.
- Recommendation 6: There is strong evidence that events located near regional media centers are capable of generating higher levels of media attention, as well as higher overall public attention to an incident. Communications policies should recognize the high potential for increased and wider spread media attention for events occurring near media centres, and prepare plans to quickly and effectively disseminate factual information to various media sources.

CHAPTER 6 CONCLUSIONS

6.1 General Conclusions

The findings of this study are consistent with the notion that public reaction to MSVOR incidents is determined by multiple factors, and may not correlate directly with the level of risk involved in the incident (Slovic, 2000). The assessed level of public reaction does not directly correspond to the level of risk for any of the six incidents examined. Rather, each high-risk incident generated a low public reaction, and each low risk incident generated a relatively high level of public reaction. These findings suggest that some other factors besides the severity of the event must be responsible for influencing public reaction to each of the incidents.

Although there may be other influencing factors besides those identified in this study, there is at least some evidence to support the role of each of these factors in influencing public reaction to the six incidents. There is great certainty that the involvement of a high number of non-DFO/CCG parties in the environmental response (Factor 8) will correspond to a higher level of public reaction, and there is strong evidence that several of the other identified factors (Factors 1, 2, 3, 4, 5, and 9) do correlate to the level of public reaction in these incidents. It should be recognized that the role of each of these factors is determined by correlation, and a causal relationship has not been definitively identified. Nonetheless, it is worth acknowledging the potential that each of these factors may have an influencing effect on public reaction to MVSOR incidents, and making use of this knowledge to inform environmental response management.

Managing public reaction to MSVOR incidents is an important part of the environmental response, as unfavourable public reaction can be detrimental to public cooperation in response events, may damage public opinion of response organizations such as CCG ER, and may have detrimental consequences for the perception of those in positions of environmental response management. Greater risk communication is often proposed as a means to mitigate public reaction by allowing better informed public perceptions (Slovic, 1986). The results of this study suggest that other factors beyond the level of risk play a significant role in influencing public reaction, and that rather than simply focusing on better risk communication, it may be necessary to address these factors directly in order to better manage public reaction to MVSOR incidents. The findings of this study may be able to help influence and shape further modifications to response and communications policies, by identifying specific ways in which public reaction can be better anticipated and managed. The specific policy recommendations presented here offer a limited number of direct, targeted suggestions for policy improvement, but should be seen as representing only the beginning of research into this field in Atlantic Canada, rather than as an exhaustive or definitive assessment of the many aspects involved in public reaction to MVSOR incidents.

6.2 Limitations of the Study

It should be noted that the time available for this study was limited to the period from May 14th to July 23rd, 2012. The brevity of the study period restricted the extent to which each of the cases could be examined, as well as imposing certain limitations on the ability to conduct extensive interviews or surveys of public opinion. I have made all

attempts to scope the project reasonably within the time available, but it should be noted that the available period and resources influenced certain decisions. Most notable was the decision to refrain from conducting public opinion surveys as a method of data collection, and to focus on public reaction rather than public perceptions of risk. Note also that performing a formal media content analysis (Krippendorff, 2003) was beyond the scope of this project.

6.3 Directions for Further Research

The scope of this study was able to address only the public reaction to six MVSOR incidents, and to identify some of the factors that may influence that reaction. It would be ideal for future studies to further expand on the scope of this research, by extending the same case study methodology to address a greater number of case studies throughout the Maritimes, and perhaps over a greater geographic and temporal scale. An examination of additional cases would allow for each of the proposed factors to be tested more extensively, and may be able to definitively identify consistent trends in factors influencing public reaction.

It would also be of interest to move beyond the scope of public reaction, and move to assessing public risk perception by surveying public opinion. This would present other challenges and would require a more extensive study involving public opinion surveys. It would, however, have the potential to address not only the issue of how members of the public reacted to these incidents, but what their greater motivations were to do so. By better understanding risk perceptions among members of the public, it may

also be possible to more thoroughly improve policies for the communication of risk to the general public.

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