

COASTAL COMMUNITY OUTREACH

Major Marine Vessel Casualty Prevention, Preparedness and Response along British Columbia's Coastal Waters

The Issues and Solutions

Marine Planning Partnership for the North Pacific Coast



Prepared for
Marine Planning Partnership for the North Pacific Coast

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PREFACE

The report - *Major Marine Vessel Casualty Prevention, Preparedness and Response along British Columbia's Coastal Waters: The Issues and Solutions* - was initially prepared in collaboration by Gitga'at First Nation and Coastal First Nations - Great Bear Initiative in June 2013, as a draft, living document.¹ It was a statement of the issues that requires consideration by the shipping industry, its federal regulatory agencies, contracted services, and the province. It identified 174 solutions. The statement report was provided to Transport Canada, shipping industry, as well as to the Expert Panel on Tanker Safety.²

The intent of the June 2013 report remains in this revised document undertaken by the *Marine Planning Partnership for the North Pacific Coast* (MaPP) for the purpose of coastal community outreach. Revision is updated with new information. The focus has also been expanded to apply to all communities residing and depending on healthy and secure coastal waters as safe shipping continues along BC's coast.

Undertaking community outreach on major vessel casualty risk, prevention and response preparedness has been identified as an important output for MaPP. Such outreach is primarily directed towards coastal planners as they play an important to guide communities in protecting natural, socio-economic and cultural values and resources. The community and their planners maybe called on during response to a marine vessel casualty incident - and any resulting pollution - within their region. MaPP views this outreach initiative as a natural extension of coastal planning and protection and its organizations' mission.

The community outreach is supported by this document, and presentations delivered in a workshop format by Stafford Reid of EnviroEmerg Consulting – the primary author of the original and revised document.

ABOUT MaPP

The *Marine Planning Partnership for the North Pacific Coast* (MaPP) is a collaborative planning process for coastal areas in four sub-regions of British Columbia. It is a partnership between the Province of British Columbia, the Coastal First Nations-Great Bear Initiative, the North Coast-Skeena First Nations Stewardship Society and the Nanwakolas Council, which includes 20 member First Nations. MaPP is notable for the diversity of stakeholders it brings together and the number of marine uses, activities and values it addresses.

The MaPP marine planning work is founded on an ecosystem-based management framework that focuses on human well-being, ecological integrity and governance. It is informed by local and traditional knowledge and by input and advice from scientists and stakeholder advisory committees.



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PREAMBLE

Shipping along the West Coast of British Columbia is well managed. Major vessel casualties have been few.³ The low number of vessel accidents also attests to the general effectiveness of *International Maritime Organization's* convention regime and Canada's shipping laws, and the *diligence* of the vessel owners, their agents and charterers. International oversight is not the issue being addressed in this document and community outreach.

The issues are national and regional related in major vessel casualty risk assessment, prevention and preparedness. Improvements are needed in Canada's emergency response planning and management regime, as well as greater need for oversight, management and monitoring of shipping in British Columbia by government, First Nations and industry.⁴

The timing is right for such community outreach as there is a potential order of magnitude increase in large vessel traffic associated with future Liquefied Natural Gas, container, bulk ore, petroleum, chemicals and other exported goods. This change highlights the need to achieve enhancements in all areas that reduce vessel traffic impacts (acute and chronic), casualty risk and casualty event consequences. Greater and different public, agency, industry oversight related to regional shipping is required than what exists now. Oversight is required to guide in investing response capacity where, when and how it is needed regionally along the West Coast.

The purpose of this document is to promote dialogue geared toward improving major marine vessel casualty prevention, preparedness and response capacity within British Columbia's coastal waters. To that end, this document identifies key regulatory, capacity and management issues and describes solutions to correct known deficiencies. The goal is to collaborate and engage with federal and provincial regulatory agencies and the shipping industry to develop effective and on-going solutions that address institutional and technical deficiencies.⁵

The waters of the West Coast of British Columbia provide a wealth and diversity of goods, services and cultural well-being to coastal communities, particularly First Nations. They deserve a higher level of investment in, and resources dedicated toward, environmental stewardship and marine emergency response than currently exists.

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SUMMARY

Canada does not have response capability to monitor and address the full range of impacts and consequences that a major marine vessel casualty would have on the ecological, aboriginal, cultural, social, and economic values bestowed by the West Coast of British Columbia. The current management regime does not provide adequate collaboration and transparency on marine vessel operations and impacts, safety, emergency preparedness and emergency response. There is a lack of coordinated oversight for shipping management and monitoring, as well as emergency planning and preparedness for major vessel casualties.

This situation exists because the regulations and standards written in the mid-1990's that established Canada's current marine emergency response regime focused almost exclusively on the oil spill consequence of the 1988 *Nestucca* barge and 1989 *Exxon Valdez* tanker incidents - not the vessel casualties themselves.^{6 7} There are deficiencies within this regime in regards to: addressing local and regional cultural, social and economic impacts; rescuing contaminated or injured wildlife; handling wastes and pollution; managing a large response workforce; and more. The regulations and standards governing coastal and marine emergency response are outdated. The current situation is a long way from being able to provide effective incident management in the event of a major vessel casualty. This deficiency is partly because of the lack of capacity of First Nations and local governments to be effectively engaged in emergency response. As well, the Canadian Coast Guard just adopted the Incident Command System in mid-2013 and needs substantial growth and time to foster relationships and build competencies.

There are shortcomings related to how marine emergencies including major vessel casualties are funded and damages compensated. There is a likelihood that a shipowner will reach its limits of financial responsibility for emergency management and response well before the incident's closure.⁸ This legal threshold can happen much sooner than publicly expected, resulting in a transfer-of-command to the federal government, such as the Canadian Coast Guard. There is a financial risk and vulnerability to those coastal communities – particularly First Nations - that have invested services and resources towards providing or augmenting the response efforts of not getting complete cost recovery and/or not being fully compensated for natural resource damages and business losses.⁹

Risk management in the coastal environment can be complex. Vessel transport of raw and manufactured goods around the world is a challenging industrial activity. The factors leading to a major marine vessel casualty and poor emergency response can have a long incubation period - often measured in decades - leading to accumulated deficiencies. Precipitating factors may lie dormant for a long time, until catalyzed by the right combination of triggering events.¹⁰ Climate change, market demands, increased vessel traffic, complacency, information overload and other changes can accumulate and compound to create high-risk situations. A catastrophic incident can result without the *due diligence* provided by good regional oversight and management that is inclusive of coastal regional planners, as well as stakeholders from local, provincial and federal agencies, communities (fishers, tourism), as well as First Nations.

The twenty preparedness and response issues presented in this document may not have arisen if there was effective oversight, stewardship, investments, and leadership by regulatory agencies and the shipping industry over the past two decades. There are 174 solutions for enhanced marine coastal protections related to these issues. These vessel risk and issues conveyed in this document are supported by the *Nuka Research and Planning Group's* extensive 3-volume reports commissioned by the BC Ministry of Environment. This independent group from the United States identified similar requirements for achieving a world-class system for coastal protection.

Efforts and investments need to be made to reduce vulnerability to low-probability, high consequent events - such as major vessel wreckage - rather than debating and predicting such events.¹¹ It is more effective to focus on the possible impacts of vessel casualties and seek means to prevent such situations from escalating - such as preventing a drifting vessel from grounding through rescue tug intervention. Choosing the best place of refuge to tow the disabled vessel that maximizes coastal protection must then be applied. If the vessel grounds, then the focus needs to be on how to mitigate the consequences by initiating timely and effective salvage operations. If harm is happening such as an oil spill or other cargo losses, it is important to respond effectively to address all cultural, social, ecological and economic adverse effects based on regionally-based

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(geographic) response plans that have been founded on consultation and collaboration. All these prevention and response activities need to be integrated and coordinated during a major vessel casualty.

Companies and government need to view risk-management activities as part of profit generating activities - not as an after thought. Risk and incident management needs to be an integral part of the overall marine vessel transportation system design and operations.

The following issues and solutions pertaining to major marine vessel casualty prevention, preparedness and response along British Columbia's coastal waters provide a framework achieving this change and establishing a new way of doing business with coastal communities, First Nations, the province, as well as non-government organizations (environmental and industry).

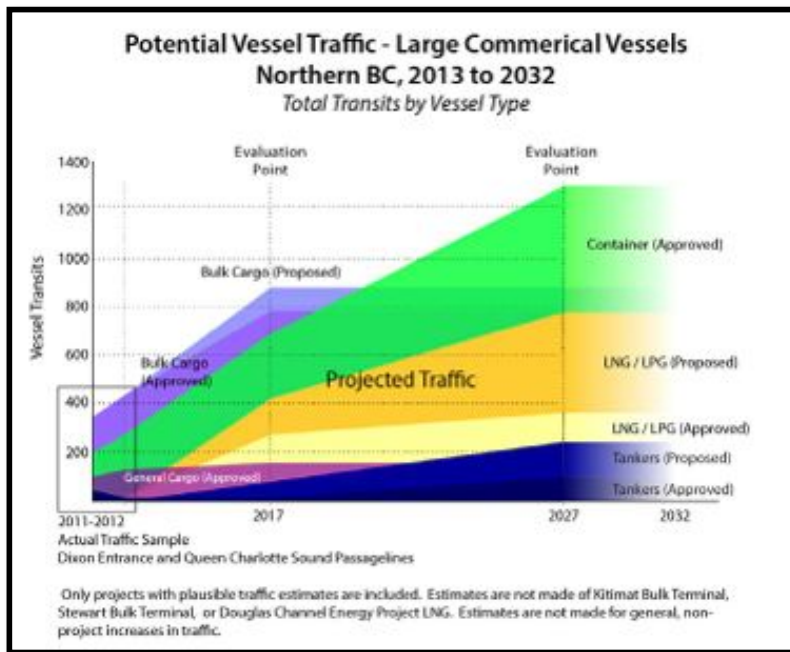
INTRODUCTION

The waters of the West Coast of British Columbia provide a wealth and diversity of goods, services and cultural well-being to coastal communities, particularly First Nations. They deserve a higher level of investment in, and resources dedicated toward, environmental stewardship and marine emergency response than currently exists. The potential order of magnitude increase in vessel traffic associated with resource exports and consumer goods transport highlights the need to achieve enhancements in all areas that reduce vessel accident risk and consequences. See vessel traffic volume growth charts on next page. Achieving such changes will involve improving management, governance and oversight, and investment in coastal stewardship and response capacity.

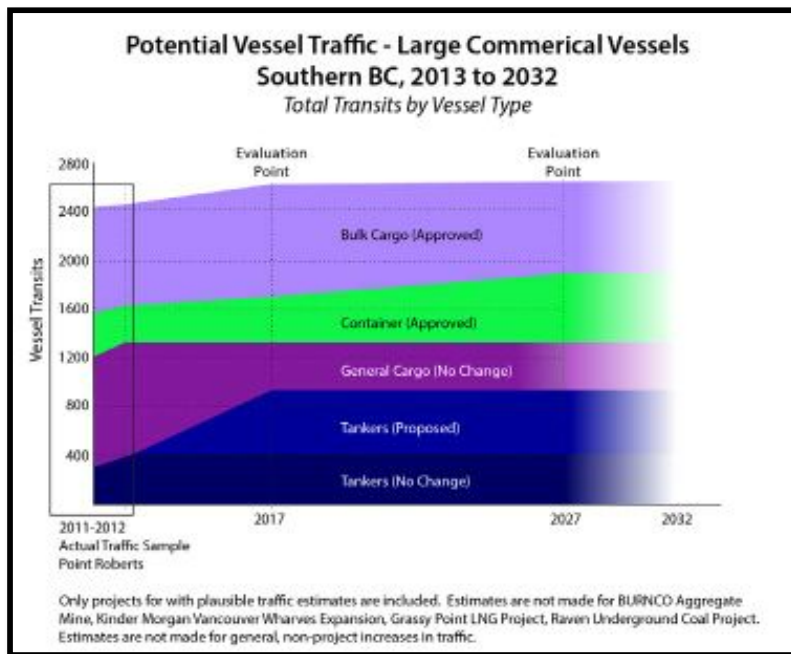
The purpose of this document is to promote dialogue towards improving major marine vessel casualty prevention, preparedness and response capacity within British Columbia's coastal waters. To that end, this document identifies key regulatory, capacity and management issues and describes solutions to correct known deficiencies. The goal is to collaborate and engage with federal and provincial regulatory agencies and the shipping industry to develop effective and on-going solutions that address institutional and technical deficiencies.¹²

Shipping in the coastal waters of British Columbia is well managed. Major vessel casualties have been few. The low number of vessel accidents also attests to the general effectiveness of *International Maritime Organization's* convention regime and Canada's shipping laws, and the *diligence* of the vessel owners, their agents and charterers. However, International oversight is not the issue being addressed in this document. The issues are regional related to investments in major vessel casualty risk assessment, prevention and preparedness. Time is right for improvements in the management regime. This includes improved engagement and monitoring of shipping by the public, governments, First Nations and industry.

The vessel risks and issues conveyed in this document are supported by the Nuka Research and Planning Group's extensive 3-volume reports commissioned by the BC Ministry of Environment in October 2013 (See Appendix 1).¹³ This independent group from the United States identified similar requirements for achieving a world-class system for coastal protection. The issues and solutions in this document go well beyond the findings and recommendations of the Tanker Safety Expert Panel's review in November 2013.¹⁴ Their assessment only focused on Canada's marine oil spill preparedness and response regime as it applies to oil handling facility and ship-source oil spill preparedness and response, and not on matters pertaining to the management of a vessel casualty *per se* – ocean rescue, salvage, places of refuge.



Nuka Research & Planning Group, 2013. Volume 2: A vessel traffic study assessing the current and potential levels of shipping on the west coast of Canada, and current volume of hydrocarbons being shipped or used as fuel.



1.0 OVERSIGHT AND CAPACITY

OVERSIGHT AND STEWARDSHIP



The issues identified in this document may not have arisen if there had been effective oversight, stewardship, and leadership by regulatory agencies and the shipping industry over the past two decades. What is more important, there is little trust and confidence being cultivated among the shipping industry, First Nations and environmental protection interest associations. This polarization does not have to be the case and is a social cost to British Columbians.¹⁵ There is a need to get beyond rhetoric that is no longer constrained by facts or science.¹⁶ Collaboration and consultation brings reality-to-the-table where technical, social, and environmental sciences can have both meaning and function. This includes the recognition and application of coastal values during the management of a major vessel incident (See Appendix 1).

The current shipping management regime is not providing effective collaboration and transparency on marine vessel operations, safety and emergency preparedness. The approach does not address the values, issues and needed solutions in BC's coast. An effective oversight model provides a means to examine the "bigger picture" and to ensure all the smaller, individual safety and risk mitigation pieces will fit and work.¹⁷ A new way-of-doing-business doesn't infer replacing the committees and organizations in place, but working in harmony.¹⁸ This requires frank dialogue with a high measure of respect.

The challenges to build coastal emergency planning and response capacity can be summarized as: overcoming complacency, avoiding faith-based preparedness, thinking someone else will do the job, applying authority properly, and building working and effective relationships for governance, management and responses. Cooperative oversight is a means to address these challenges.

A major marine casualty and any pollution (cargo loss, oil spill, wreckage) have immediate and long-term impacts on the social welfare of coastal communities that can often last longer than the ecological impacts. There are opportunities before, during and after major vessel casualty to reduce and to mend the torn social and cultural fabric of affected coastal communities.¹⁹ Collective and cooperative oversight - based on transparency and trust - can provide a solid foundation to begin mending and healing after an incident.

The success of the oversight process relies first, on the inclusion of all governments and stakeholders, and second, on an environment where an open exchange of ideas is encouraged. It is essential that group results represent and address the interests of all participants, and not a small group of technical experts.²⁰ While technical expert input is required, many issues discussed herein will center on value judgments and, in those cases, acceptance by all parties is important.

For marine protection, there requires:

- Regionally-based oversight and stewardship groups be established with federal, provincial and First Nation government and industry participation. The purpose is to address regional topics such as: marine vessel casualty risk factors, implementation of risk mitigation and response preparedness, remedies for institutional, financial, and technical gaps in emergency response, and breaking down barriers between First Nation, industry and environmental NGO sectors.

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- That mission, terms-of-reference, and lesson-learned from other oversight groups in North America be evaluated to formulate the best means to jointly achieve “best-practices” for shipping oversight, incident management and operational response measures for vessel casualty prevention and response.²¹
- A mechanism of secure private and public funding, or combinations thereof, be established that ensures member participation, as well as to enable joint monitoring studies and research projects to be undertaken.

BUILDING EMERGENCY RESPONSE CAPACITY



There is broad coastal community interest – particularly from First Nations - in building their own emergency response capacity, as well as for British Columbia. For the last decade, there has been a marked decline in emergency planning that addresses marine vessel casualty risk, prevention and response preparedness. The focus of government and industry soon after the 1988 *Nestucca* barge and 1989 *Exxon Valdez* tanker was on oil spills. The effort declined quickly with government cutbacks beginning in the mid-1990s.²² Cutbacks continue today.²³ There is insufficient capacity in vessel casualty and related planning and preparedness within industry and government - as well as within coastal communities. This also includes both the public and private sectors not having qualified providers to offer training courses on a wide range of important subject areas.

Over \$13 billion of federal and provincial government, shipping industry, port and railway money has been directed to the *Canada's Pacific Gateway Project* to make intermodal container and bulk cargo management larger and more efficient.²⁴ This initiative, combined with planned development such as for new LNG and expanded crude oil exports, significantly increases vessel casualty and marine accident risk. There has been little investment and effort under this initiative to ensure vessel traffic will be “regionally” safe, or to ensure government, industry and coastal communities are better prepared to respond to a vessel incident or casualty.²⁵ There is significant “catching-up” to be made.

For marine protection, there requires:

- Designated coastal community representatives with jurisdictional representation, such as local government and First Nations, are trained to participate effectively in command, operations and planning positions of emergency response. The goal is to fully enable coastal communities: to assess; to guide; and to contribute to the incident management of a major vessel casualty and any resulting pollution.²⁶
- There is training and capability to provide:
 - Field observations suitable to guide incident management and response according to regionally specific social, cultural, ecological and economic values.²⁷
 - Logistical support to field operations such as moving equipment and personnel by small vessels and vehicles to the marine casualty site or where pollution has occurred.²⁸
 - Shoreline cleanup of pollution stemming from a major vessel casualty - that may be fuel, oil or debris-based. This requires the establishment of a shoreline workforce of coastal people that has

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been trained in basic safety and shoreline cleanup for a range of cargo losses such as: oil, containers and bulk goods.²⁹

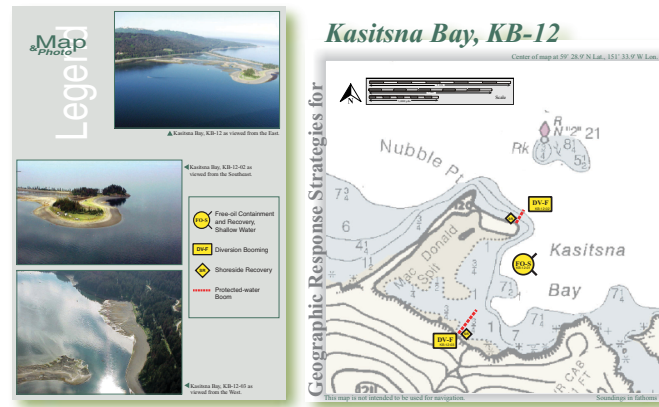
- That the following training that is identified as needing enhancements - or not available - should be delivered by the public and public sectors to improve major vessel casualty preparedness:
 - Basics of Salvage Operations
 - Places of Refuge Decision Making
 - Management of a Debris Field from a Vessel's Cargo
 - Emergency Rescue Tug Towing of a Major Marine Vessel³⁰

And in the event of a major vessel casualty:

- Oily Waste Minimization and Monitoring
 - Division Supervisor and Team Leader
 - Basic Marine Spill Safety and Shoreline Cleanup
 - In-situ Oil Burning
 - Dispersant Use
 - Field Observation of Marine Spill Trajectory
 - Geographic Information Systems application in Vessel Casualty Response
 - Use of Geographic Response Plans
 - Provision of Logistics Field Services
- That emergency management training and equipment for vessel casualty/pollution response are also applicable for other regional threats such as severe storm, seismic, search and rescue, structural and forest fires so as to maximize coastal community's emergency preparedness.³¹

2.0 EMERGENCY PLANNING AND RESPONSE STANDARDS

GEOGRAPHIC RESPONSE PLANS



Preparing Geographic Response Plans (GRPs) for major vessel casualties and resulting impacts (oil spills, cargo loss, wreckage) has not been done in British Columbia in collaboration with coastal community planners nor the province. GRPs are used as a guide to protect natural and cultural values and resources during response to a marine casualty - or any resulting pollution - within a defined geographical area.³² They can also serve to expedite a place of refuge decision for a major vessel requiring a safe haven for repairs, to reduce the risk of environmental damage, or both. GRPs are also a means to mitigate the impact of a large workforce arriving into an area to conduct incident management and tactical operations. They can also be a resource for emergency planning, preparedness and response for seismic events such as tsunamis and earthquakes.

BC's *Coastal Resource Information System* managed by GeoBC is an exceptional resource to establish a foundation for GRPs.³³ However, the coastal mapping program needs significant funding and leadership to keep it current and functional. It must also be more available to users such as scientists, emergency planners, teachers, agencies, and First Nations.³⁴

An essential benefit of GRPs is not just the document, but also the process of preparing it. GRPs need to be developed in partnership with all levels of government, First Nations, and industry. They can include contact numbers of local emergency coordinators, First Nations, and others that need rapid notification of a spill or a place of refuge decision. If these people are party to the GRPs development for their local area, responders will have a much better understanding of expectations and have a resource-base to work from.

The GRP process garners local stakeholder acceptance of difficult decisions that may have to be made – whether under an escalating emergency situation such as where to deploy on-water booms, to protracted operations such as shoreline cleanup or salvage operations. A good GRP reflects the social and economic values of a region – including that of First Nations (See appendix 1).

GRPs are well developed in the United States in design, development and delivery. This is particularly the case for the States of Alaska and Washington that share many of the ecological and cultural attributes of BC's coast. This provides an opportunity to expedite GRP develop for British Columbia.

GRP development and maintenance needs to also be inclusive of mapping and resource experts of such programs as the *Marine Planning Partnership for the North Pacific Coast* (MaPP). There should only be one GRP design and implementation program for BC that that can seamless expand and be enhanced by industry, government and coastal communities. This calls for broad and extensive harmonization consultations that address not only GRP design, but on a governance model.³⁵

The GRP development can begin once a common vision, commitment, and design have been established by all jurisdictions, as well as, First Nations. The actual develop of the GRP for 29,000 kilometers of BC's coast will

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take many years, and would be based on a priority-need basis – places of refuge, high traffic volume/risk areas, etc. Long-term funding will be needed, as well as an oversight/administrative capability to ensure continued integration and applicability to potential users and contributors.

For marine protection, there requires:

- A template for Geographic Response Plans that is satisfactory to First Nations, Local, Provincial, and Federal Governments, and BC's Response Organization.³⁶ This includes fostering common understanding a vision regarding GRP design and implementation based on experiences garnered from the GRP programs in the States of Alaska and Washington.
- Policies and processes established on the dissemination, updating, access, and application of Geographic Response Plans that are also satisfactory to the above noted parties.
- BC's *Coastal Resource Information System* by GeoBC be funded to up-date marine resource information, particularly in shore zone data such as grasses, kelp and other natural resources important to Coastal First Nations and other community needs.
- BC's *Coastal Resource Information System* application move from its current Internet Map infrastructure to an ArcGIS on-line cloud base infrastructure, a KML/HTML5 platform for use in Google Earth. An example approach is that of *Alaska Ocean Observation System* that is being designed for safe marine operations, improved storm and other hazard response, and integrated data products for ecosystem assessments and climate trends.³⁷
- That a program of Geographic Response Plans development begins with jurisdictional and industry collaboration and that utilizes provincial and aboriginal coastal resource mapping resources.³⁸ This is supported by long-term funding, as well as an oversight/administration capability to ensure adequate integration and application by potential users and contributors.

PLACES OF REFUGE



A vessel requiring assistance due to loss of propulsion or steerage, actual or imminent structural failure or fire damage may require a place of refuge.³⁹ There has been no provincial and local government, First Nations or other stakeholder consultation since 1995 when Transport Canada drafted a *National Places of Refuge Contingency Plan*.^{40 41 42}

There has been no Geographic Response Plans, Risk Assessment Models, Vessel Transit Plans, or other tools to guide the decision-making process. Yet, potential place of refuge sites to meet vessel anchoring and shelter needs have been identified and mapped by Transport Canada.⁴³ These sites have been selected mainly to protect a shipowner's asset, but not necessarily to protect the environment and other coastal community interests.

The decision to allow a place of refuge and the determination of the location is a critical strategic response action as the outcome – whether denied or approved – can markedly affect a coastal community's welfare, the environment, and the response cost. This decision needs to be expeditiously made while ensuring that the

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choice is both pragmatic to the shipowner and equitable to those coastal people that benefit from the decision or may incur an impact. These goals can be best achieved by advanced consultations, collaboration, and consensus on places of refuge planning - compared to an emergency call in the middle-of-the-night.

For marine protection, there requires:

- Transport Canada engages the province, local governments, and First Nations as stakeholders in place of refuge (POR) planning, preparedness, and processes that includes the identification of potential PORs along the West coast. The consultation and collaboration process can be modeled after the *Alaska Department of Environmental Conservation's* POR working group and planning initiatives, and that POR planning and delivery be integrated into the design and application of Geographic Response Plans.
- Transport Canada develops a POR Risk Assessment Model and a Vessel Transit Plan template that are acceptable to above stakeholders. These tools are to be made available to coastal planners and emergency personnel in concert with other federal and provincial POR decision-makers during an event.⁴⁴ The POR Risk Assessment Model can be formulated according to one developed by the US Coast Guard and Washington's Department of Ecology. All processes and tools are supported by training courses delivered to coastal community planners.

RESPONSE GAP ANALYSIS



In the event of a major oil spill, coastal communities may ask why the oil recovery was so low, as well as why currents, waves and adverse weather conditions weren't considered in the response preparedness for the area.

Anywhere within the inner and outer coastal waters of British Columbia, there are periods and places where mechanical (booms and skimmers) and non-mechanical (in-situ oil burning and dispersants) technologies would not effectively contain or clean up oil. An important analysis that is missing in Canada's Response Organization planning and preparedness is a response gap analysis.

A response gap refers to the period whereby an area's sea conditions would preclude safe or effective deployment of oil spill response systems.⁴⁵ Historical data about an area's wind, sea state, temperature, currents and visibility are used to analyze and compare to the operating limits of the spill response equipment being considered - mainly the booms, skimmers, and vessels. A response gap analysis is a reality check on what could actually be achieved to recover oil at sea. The information can be incorporated into Geographic Response Plans and can be used to assist in field operations.

For marine protection, there requires:

- Response Organization's preparedness standard undertakes Response Gap Analyzes that are area-specific to determine the seasons and periods whereby sea conditions would preclude safe or effective deployment of spill response systems.
- Transport Canada establishes the criteria for Response Gap Analyzes and establishing agreed on equipment/vessel specific performance measures related to sea conditions (waves, fog, wind, currents,

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temperature, water densities, sediment loadings, etc.). This requires consultations with First Nations and the province.

- Response Gap Analyzes be an integral part of determining an effective three-level tiered preparedness and response to a major vessel casualty that may require local, provincial, national and/or international resources (equipment, people, technical expertise, etc.).⁴⁶

OIL SPILL PREPAREDNESS STANDARDS



Canada has a marine response regime to address only one consequence of a vessel casualty - an oil spill or its threat. However, even within this regime there are deficiencies related to narrowly defined response preparedness standards for a Response Organization to be certified by Transport Canada.⁴⁷ These regulations and standards were written in 1995 after the *Nestucca* barge and *Exxon Valdez* tanker incidents. There are operational gaps in: rescuing oiled wildlife; handling oily wastes; deciding to use dispersants or to burn oil on water; managing a large shore workforce; and responding to oil types not defined under the *Canada Shipping Act*, as well as handling hazardous and noxious substances.

Furthermore, these regulations and standards have been amalgamated into one *Environmental Response Regulation* and one *Environmental Response Standard*, but largely for administrative reasons only.⁴⁸ There has been no effort: to improve on them; to reflect any lessons learned; to remedy deficiencies; or to be inclusive of other marine vessel casualty response needs such as salvage.⁴⁹ There has been no consulting with First Nations or the province on this matter. The regulation was gazetted under the *Canada Shipping Act* in September 2008, but has not been promulgated.

The current and newly revised regulation/standard(s) will not meet expectations of the public, provincial and local governments, or First Nations. These deficiencies - perpetrated by poor law and standards - impede development of British Columbia's preparedness for an oil spill, as well as reflects poorly on the shipping industry and Transport Canada. Canada's vessel casualty and pollution preparedness must achieve the highest level of environmental, social, and economic protection that can be met through the use of best achievable technologies and incident management practices.

For marine protection, there requires:

- Extensive consultation and collaboration are undertaken with the province and First Nations on revisions to the regulations and standards that define the level of a Response Organization's planning, preparedness, and response to oil spills, as well as other vessel casualty impacts.
- Member and subscriber agreements, as well as the standard itself should explicitly state that the Response Organization planning and preparedness standards do not constitute cleanup standards that must be met by a shipowner (Responsible Party). Resource and environmental agencies, as well as affected jurisdictions and First Nations determine the levels of impact mitigation and environmental restoration. Protection priorities, intensity, and levels are a function of the incident's management.

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- That any new Environmental Response Standard explores the following improvements:
 - Expand the definition of “oil” which requires Response Organization’s preparedness and response to be inclusive of oil of any kind including, but not limited to: crude oil, petroleum; gasoline; fuel oil; diesel oil; oil sludge; oil refuse; diluent blended oils; oil mixed with wastes other than dredged spoil; biological oils that includes fats and greases of animals and vegetable oils, including oils from: seeds; nuts; fruits; and kernels.
 - That measurable performance criteria are referenced in both regulations and standards – such as noted below for oil containment, recovery, pumping, and storage equipment and their systems. That these performance criteria are tested by industry standards by a third-party, not the equipment manufacturer or the Response Organization. There are also tested under the environmental parameters they will be used such as: water temperatures; sea states; salinities; and sediment loading.
 - Apply ASTM international - formally called the *American Society for Testing and Materials* (ASTM) – standards for oil containment, recovery, pumping and storage equipment and their operating environments as follows:
 - F1780 --- 97(2010) *Standard Guide for Estimating Oil Spill Recovery System Effectiveness*.
 - F-631: *Standard Guide for Collecting Skimmer Performance Data in Controlled Environments*
 - F-2008: *Standard Guide for Qualitative Observations of Skimmer Performance* F2709-08: *Standard Test Method for Determining Nameplate Recovery Rate of Stationary Oil Skimmer Systems*
 - F 1523-94 (2001) and F 625-94 (Reapproved 2000) for boom classification.
 - *ASTM Standard Practice for Classifying Water Bodies for Spill Control Systems* Operating environments that are the conditions in which response equipment is designed to function.
 - Calculate response capacity based on the capability of spill containment, skimming, pumping, and storage to manage a client’s specific product, whereby those resources (booms, skimmers, deluge systems, etc.) that would be ineffective are not part of this calculation.⁵⁰
 - Establish open-ocean (offshore) oil spill response capability that is a combination of specialized domestic response vessels and international ones sourced under mutual aid.⁵¹
 - Quantify and qualify response measures based on "Effective Daily Recovery Capacity" that is the calculated capacity of fuel and oil recovery devices that accounts for limiting factors such as daylight, weather, sea state, and character of the recovered oil (emulsified, weathered, fresh). This information would be incorporated into geographic response plans and response gap analyzes.
 - Undertake a systems approach preparedness and response that includes the infrastructure and support resources necessary to mobilize, transport, deploy, sustain, and support the equipment to meet the standards, including mobilization time, trained personnel, personnel call out mechanisms, vehicles, trailers, response vessels, cranes, boom, pumps, storage devices, etc.
 - Design the escalation of response to a major vessel casualty and any resulting oil spill based on a three tiered approach that takes into account coastal remoteness, regional operational conditions, and environmental sensitivities as to effectively and timely source local, provincial, national, and international response resources. These resources include salvage as well as pollution response equipment and expertise. The *IPEICA Report Series Volume 14 Guide to Tiered Preparedness and Response* provides the framework and approach to be considered.⁵²
 - Define more clearly that the RO’s clients are a “Responsible Party” that are accountable for the incident command functions, supporting management, and paying for response and damage compensation.⁵³
 - Stipulate in membership (Full, Subscriber, and Third Party) agreements as a condition of the arrangement with a RO that:
 - The use of the Incident Command System (ICS) and the Unified Command (UC) protocol therein will be required for the management of the incident. (See: Incident Management)

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- As a Responsible Party (RP) the member is commitment to providing a qualified Incident Commander knowledgeable and experienced in ICS/UC. The Incident Commander's name(s) and his/her certified training and experiences, and contact numbers are provided as part of the agreement.
 - All Incident Action Plans signed off by Unified Command includes ownership by the plan by its signatories and that this information may be made public during an incident.
 - Shipowner members provide their Limits of Financial Liability calculated for each vessel and their insurance provider, and what amount will actually be applied to vessel casualty response – including specifying amounts for oil, cargos, and salvage operations.
 - Shipowners provide information on the volume of oil on each vessel either as cargo, bunker, and/or packaged, as well as any hazardous or noxious substances that pose a risk to responders.
 - Registration information also includes all Port State inspections and status that includes listing of vessel documentations (type, provider, date issued & reviewed).⁵⁴ General vessel informational web links to third-party providers can also be included to facilitate vessel information and analysis such as World Ship Register, Q88, and SIRE.⁵⁵
- Extensive database is made available to the public on the internet that provides the above RO membership agreement and vessel information that can be accessed for research and during and emergency.
 - Ensure the RO is directly responsible for response performance outcomes of its third party contractors.
 - Address mutual aid from other national or international sources, whereby the RO ultimately responsible for performance from such services.
 - Recognize that an oil spill may be only one aspect of a vessel casualty and, therefore should show how additional operational elements can be integrated with the RO's incident management's organization.
 - Prepare operational guidelines, job aids, and technologies that address the technical and organizational delivery of its response, and ensure there is a training delivery and certification for each aspect.
 - Use alternative, non-mechanical technologies such as in-situ oil burning and dispersant use, where and when appropriate. (See: In-situ Burning of Oil and Dispersant Use)
 - Prepare for rapid deployment of trained personnel for aerial observation - with in specified time-frames on notification of an incident - that can monitor, record and report on the incident situation. This includes oil and other pollution trajectories, as well as the vulnerabilities and threats fisheries and wildlife habitats/populations and economic facilities.
 - The standard include deployment of trained aerial spill/pollution spotters to:
 - Direct vessels to the heaviest concentrations of oil or pollution;
 - Direct dispersant and in situ oil burn resources;
 - Report on the effectiveness of response operations.
 - Define the number of shoreline workforce personnel that need to be hired, as well as the time-frame for deployed after shoreline assessments have been done (See: Shoreline Workforce).
 - Make it explicit that unpaid convergent volunteers for shore cleanup and wildlife response are not allowed to be used by a RO for spill response. Public interested or canvassed to work on spill response must be managed as a registered, trained, equipped, supervised and paid "workforce".
 - Include wildlife response planning, preparedness and response with specific numbers of wildlife species that are required to be managed and their timeframes. (See: Wildlife)

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- Specify holding capacities for collected wastes that are in the range of 4 to 5 times the tier level oil spill preparedness (e.g. tier 4 would be 40,000 to 50,000 metric tons of oily wastes) to reflect the potential for some oils to emulsify (i.e. gain water). (See: Debris and Waste Management)
- Ensure oily wastes are segregated for disposal in accordance to provincial standards or expectations.
- Include fuel and oily waste minimization methods in training and responding.
- Prepare Geographic Response Plans in consultation with coastal communities and all jurisdictions under an agreed on governance model . (See Geographic Response Plans)
- Undertake Response Gap Analyses that are area-specific to determine the time periods, whereby an area's sea conditions would preclude safe or effective deployment of spill response systems.
- Provide estimates of when a Responsible Party will reach its limits of financial responsibility- based on scenarios as well as during an incident - to assess when there will be a transfer-of-command to government, and what level of impact mitigation remains to be managed.
- Ensure that exercises test all phases of an oil spill from notification, on-water to shoreline response.
- Establish means and methods for recovery of mobile oil trapped nearshore with the same level of attention as currently done for shores with stranded oil under the Shoreline Cleanup Assessment Techniques process.
- Field-test, and prove all means to effectively track, contain, recover, pump, store, and off-load heavy oil types for all coastal temperatures, sea conditions, and weathering states (evaporation, emulsification, oxidation etc.). This includes shoreline treatment systems such as water-deluge/flushing. Establish a publically-available database to track field tested recovery systems.
- Specify those oil types carried as cargo or as a vessel fuel that with weathering can submerge (i.e., wave overwash), or become sunken; that requires shoreline chemical agents or heated water to facilitate water-deluge treatments, and/or any shore treatments whereby a net environmental benefit cannot be assured.^{56 57}
- Establish a capability to establish multiple and linked meteorological stations for wind measurements that is supported by operational guidelines, training and exercises.
- Establish a capability to establish multiple air quality monitoring stations for both responder and public safety that is supported by operational guidelines, training and exercises.
- Provide services for internet-based situation reporting and social-media management that is designed under the Incident Command System and the Unified Command protocol there in. This includes a website to post Incident Action Plans, special reports, and media releases.

INCIDENT MANAGEMENT



Historically since the 1973 Irish Stardust grounding in Alert Bay and the 1981 Nestucca oil spill off the West coast of Vancouver Island, there has been a significant divergence in organization and policies between federal and provincial lead government agencies on how incident management should unfold. This is a salient factor that can undermine effective response to a vessel casualty and any resulting pollution. Public, political and First Nations expectations will not be met unless remedied.

Since the inception of RO regime in 1995, the CCG in British Columbia have not exercised as an Incident Commander, integrated their response personnel with a Response Organization (RO) nor with any other jurisdiction. The Canadian Coast Guard (CCG) adopted in March 2013 the internationally-proven Incident Command System (ICS) to manage an emergency.⁵⁸ This is although the ICS has been required by provincial agencies and is widely used by the shipping industry for the past 20 years.⁵⁹ In December of 2013, the CCG formally applied the ICS during the *USTV General Zalinski* oil removal project.⁶⁰

The Ministry of Environment has participated in ICS and Unified Command along with industry and BC's RO.⁶¹ First Nations have also participated from time-to-time.⁶² Exercises need to be designed and initiated to build the relationships and competencies in ICS and team integration between the provincial and federal agencies, as well as with local governments and First Nations. The BC Ministry of Environment has made it a strategic priority to achieve harmonization in emergency management with the federal government since 1991 - with no success. There is now an opportunity to revisit this agreement.

The references to CCG's roles in its plans, policies, publications need to be eliminated to reflect its adoption of ICS and the Unified Command protocol therein. Taking a Unified Command position ensures the CCG is strategically ready to augment (support) an RP lead response, and if need, to accept a transfer-of-command. This arrangement encourages the Responsible Party (shipowner) and affected jurisdictions - including First Nations - to share in Command and to integrate into a single Incident Management Team.^{63 64 65 66} Unified Command enables participants to balance economic, social, cultural and ecological values (See Appendix 1). Its application recognizes that no one company, agency or jurisdiction holds all these "value cards" when making decisions on what to protect, when, and how.⁶⁷

A transfer-of-command has never been tested in British Columbia, nor has the CCG used or employed a RO services under a third-party agreement other than for the *USTV General Zalinski* oil removal project in December 2013 – a planned project.⁶⁸ For any major vessel casualty there can be expected a transfer-of-command from the Responsible Party (shipowner) to the CCG - often in a matter of days or weeks - and likely before closure of the incident.⁶⁹ The CCG is then required to assume the primary command role (spokesperson function) and maintain the integrity of the Unified Command with the remaining jurisdictions and First Nations.⁷⁰ Any disruption of Unified Command could result in an acrimonious political reaction and jeopardize response efforts.

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For marine protection, there requires:

- The CCG, as well as other participating federal agencies, must use the Incident Command System and the Unified Command Protocol therein. This applies regardless of the nature of pollution: fuel or oil spill, cargo lost, wreck removal. There is only one federal agency represented in Unified Command along with other jurisdictions and First Nations. Other participating agencies (federal, provincial, local) are strategically positioned within the Incident Management Team to fulfill their respective mandates as directed by Unified Command.
- Other jurisdictions and First Nations represented in Unified Command need to provide a qualified Incident Commander to represent their interests, as well as technical specialists within the Environmental Unit to guide the development of response priorities.
- At the on-set of any major vessel casualty, the lead federal agency must assume an Incident Commander role under Unified Command arrangement with the Responsible Party, other jurisdictions and First Nations, and must retain this role should there be a transfer-of-command from the Responsible Party.
- The lead federal agency must ensure that the Incident Commander representing the Responsible Party (shipowner) is qualified to undertake emergency management under the ICS, and all operational functions thereunder (Salvage, Wildlife Response, On-water Oil Recovery, Shoreline Cleanup etc.).
- The 1981 agreement titled: *An Understanding between Canada and British Columbia Concerning Federal and Provincial Responsibilities in Oil and Hazardous Material Spills (1981 Spill Agreement)* be rescinded by the signatories, as it does not provide an integrated response in dealing with marine vessel casualties. The process of achieving a federal and provincial agreement on the *Memorandum of Understanding between Canada/British Columbia on Environmental Emergency Interaction* must be initiated again, but with First Nations involved and engaged in a new arrangement.
- Guides for a Joint Information Centre, as well as for a Liaison Office be written.⁷¹ Their application during a major incident needs to be agreed on by all jurisdictions - as well as First Nations. These facilities and their mission require training and exercising. In addition, policy and delivery mechanisms for web-based situation reporting and other social media tools need to be developed and agreed on.⁷²

3.0 OFF-SHORE RESPONSE OPERATIONS

OCEAN RESCUE



British Columbia's northern coastal regions have marginal tug capability to rescue a seagoing vessel needing assistance in circumstances arising from loss of power, hull failure, or on-board fire. Current capability is contingent on the availability of a few large commercial tugs that might be in the area and available for emergency services on short notice.^{73 74} There has been no investment by the shipping industry or the federal and provincial governments in assessing, training, equipping, or exercising an open-ocean (offshore) vessel rescue.⁷⁵

Under a worse case scenario, a stricken vessel would have to be over 200 nautical miles off Haida Gwaii to have some confidence that a tug-of-opportunity could arrive on time to secure a tow and keep it "at station" to prevent a drift grounding. This assumes if safe to do so, if a suitable tug was available, and if the crew was willing and adequately trained.⁷⁶

For marine protection, there require:

- A rescue (assist) tug capability is established for the northern coast with seagoing specifications to handle all sizes and types of vessels that transit within Canada's Economic Exclusion Zone. Capabilities can also include the equipping and training for: fire-fighting, salvage operations, and oil spills. This capability to be supported by regular field exercises with live-vessels.
- That drift analysis and tug response times be done within the Hecate Strait and Dixon Entrances that includes drift-cards and other methodologies to achieve a high level of tug/vessel rescue confidence.
- That rescue tug capability be part of an integrated major marine vessel casualty response regime for British Columbia and funded under a similar model as for Canada's privately-funded regime for oil spill response.
- Transport Canada undertakes an oil tanker drift and rescue tug analysis to re-evaluate the efficacy of the Tanker Exclusion Zone, and adjusts the demarcation-line accordingly.
- That the Tanker Exclusion Zone be considered for other vessels carrying hazardous materials as cargo such as chemical tankers and LNG carriers to comply with.
- Transport Canada ensures the recommendations of the Pacific States/BC Oil Spill Task Force are fully considered to mitigate groundings of a major vessel.⁷⁷
- Transport Canada determines if major vessels that visit BC's ports have:
 - incorporated emergency towing as part of their ISM-approved Safety Management System,
 - dedicated "emergency towing" equipment for a high-seas rescue such as a towing bridle, Smit-Bracket system, and extra chain.
- Transport Canada undertakes a study of tugs-of-opportunity that could provide rescue (assist) under both severe and average conditions that include whether:
 - crew and captain are willing to undertake rescue services under adverse conditions;

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- specialized training has been provided and reflected in their company's safety plans, and
- tugs have been equipped with specialized towing resources, such as floating buoys, bridle lines, Orville hooks, etc.⁷⁸
- That air-liftable emergency towing packages be strategically stationed in the northern coast to facilitate emergency towing that is modeled after Alaska's *Emergency Towing System* for major vessels.⁷⁹
- Federal and provincial governments (lead agencies) develop guidelines and protocols on invoking contingency measures if a vessel in distress needs rescue tug services. This includes putting resources on standby such as Incident Management Teams, risk assessment specialists, and other supporting personnel in case rescue fails and grounding appears certain.
- A template for a Vessel Transit Plan be established that guides and considers all the factors needed to safely tow a major vessel to a place of refuge, and that maximizes environmental protection.

SALVAGE



Though there are large ocean-going tugs in British Columbia, there is essentially no major vessel salvage operations capability.^{80 81} Recognized and reputable salvage companies have no ongoing presence or capacity representation in BC.^{82 83} A key consideration of a world-class marine spill prevention and response system identified in 2013 *West Coast Spill Response Study* (Vol 3: World-class Oil Spill Prevention, Preparedness, Response & Recovery System) by Nuka Research and Planning Group was that: *Rescue and salvage resources can be on-scene quickly enough to be effective after an incident or spill* and further stated that: *Once an accident has occurred, lightering remaining cargo or fuel from the damaged vessel and other types of salvage operations can be critical to mitigating the pollution impact.* Salvage was identified as a feature “not present or is minimally present (Table 6.1 – 66) largely because neither Canada’s Response Organizations nor shippers are required to have salvage capacity or services in place.

Salvage is often the most critical measure to proactively prevent environmental damages from a vessel sinking, releasing its cargo - either as cargo or as bunker fuel - as well as other non-oil cargoes such as containers, LNG, bulk goods, etc. The motivation for maintaining a salvage capability has shifted from a private concern - protecting the vessel and its cargo - to a more public or societal interest in protecting the environment and economy from impacts of a vessel casualty. This capability can be achieved *domestically* by promoting a salvor industry in British Columbia, and *internationally* by ensuring there is an arrangement with a global provider of these services, or combination thereof.

The management of vessel salvage response is often a joint effort between the Responsible Party (shipowner) and responding government agencies. Therefore, salvage operations must be incorporated into the incident management system and supported by operational guidelines and technical specialists. It also must be part of the vessel’s operations through master and crew training on what-to-do if its vessel is stricken. Wrong decisions can quickly exasperate the situation.⁸⁴

For marine protection, there requires:

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- Transport Canada establish a salvage/salvor capability for the northern coast by defining performance measures regarding such matters as: salvage equipment and salvor notification availability, on-scene response timeframe to specified coastal locations, product lightering and transfer capacity that includes oil, containers, LNG, bulk cargo. Salvage capability also to include subsurface product removal, and stability and structural integrity assessment services, and rescue towing and firefighting capabilities.⁸⁵
- Transport Canada clarifies which department is the lead federal agency - themselves or Fisheries and Oceans Canada's Canadian Coast Guard - for overall incident management for a vessel casualty, even if there is no cargo or fuel spillage or other impact or threat.⁸⁶
- That the lead federal agency undertakes with First Nations and other jurisdiction regular exercises that pertain mainly to vessel salvage and pollution that includes other cargos than oil.
- Transport Canada prepares an operational guideline on salvage operations that defines the mission and structure of a "Salvage Branch" under the Incident Command System to guide response.
- That federal and provincial Incident Commanders have been fully trained in what salvage operations entails.
- That federal and provincial lead agencies established "technical specialists" in salvage to support salvage operational planning within the Incident Command System's Planning Section.^{87 88}
- That critical salvage equipment is pre-staged in the north coast that would be immediately used to prevent a vessel sinking and to mitigate pollution.
- That a qualified salvor be stationed in British Columbia to provide salvage training, exercise participation, and emergency services.
- That a rescue tug capability addressed above includes equipment and crew training to assisted and/or direct salvage services.
- That proof of training and certification of a vessel's master and officers pertaining to on-board management of a compromised vessel – as provided by an international salvage company - be considered as a "vetting" factor for vessels carrying oil or hazardous materials into Canadian waters.
- That salvage capability be part of an integrated major marine vessel casualty response regime for British Columbia and funded under a similar model as for Canada's privately-funded regime for oil spill response.

IN-SITU BURNING



There is no capability to burn contained oil on-water in British Columbia - referred to as "*in-situ*" oil burning. This alternative method of oil spill response is widely used elsewhere in the world.⁸⁹ The subject of burning oil on water has languished in the policy stage since 1995.⁹⁰ A second area not explored or developed in the *in-situ* burning of oil on shores by use of forced air-curtain burners for large oiled wood debris, and for mobile oil collected during shore treatment. It is in the interest of First Nations and other coastal communities to have *in-situ* oil burning as part of the response.

The in-situ burning is a viable means to mitigate the impact of a spill on people and the environment. This action will be under special circumstances, such as a major offshore spill of petroleum from an oil tanker or a bunker release for any large vessel. *In-situ* oil burning is undertaken in conjunction with other spill recovery efforts such as booming and skimming.

A draft *British Columbia/Canada In-situ Oil Burning Policy and Decision Guidelines* written in 1995 provides *de-facto* regional direction and procedures to expedite *in-situ* burn decisions. It is written to ensure public safety and maximize environmental protection.⁹¹ It is the only guideline of this nature in Canada.⁹²

The interest in burning oil as a response technique is largely driven by the environmental and ecology agencies along the Pacific West coast as there is a high likelihood of a net environmental benefit from its application - if correctly timed and appropriately implemented.⁹³ There are other benefits from burning oil on water. Burned oil does not have to be clean from shores, thereby exposing responders to toxic vapours. As well, the oil doesn't have to be collected, stored and disposed as waste.

There has been little or no research or even consideration of burning contaminated or oiled wastes on shore. This can be accomplished by putting oiled wood debris (*e.g.* logs) into a temporary forced-air curtain burner.⁹⁴ It can also include putting mobile oil - whether fresh or emulsified - collected on or near shore into a portable incinerator that also utilizes forced air.⁹⁵ Both methods minimize the need to transport and dispose collected oil, at a high cost and with the potential for further land contamination. There has been no innovation in this subject area.

There is a need to move from the research phase to the policy and procedural stages for *in-situ* oil burning on water - it is proven technology that can be done with public welfare protected. *In-situ* burning of oily wastes on shore needs to be researched with innovative and pragmatic approaches.

In-situ oil burning capitalization and application by the shipping industry and its response organizations will only occur if government environmental agencies take a lead in the decision-making.

For marine protection, there requires:

- That Response Organization's preparedness standard establish *in-situ* oil burning on water capability supported by: multiple fire-booms, an operational guideline to protect both responder and public health, and air monitoring equipment.
- That both federal and provincial governments foster public confidence on *in-situ* oil burning to achieve a net environmental benefit, as well as to protect both responder and public health. This includes provincial and local governments, and First Nations consultation, as well as specifically directed to regional coastal health authorities.
- That the federal and provincial government establish technical specialists in both the areas of decision-making and tactical operations for *in-situ* oil burning.
- The draft *BC/Canada In-situ Oil Burning Decision Guideline* be finalized and endorsed by Ministry of Environment, Environment Canada, Fisheries and Oceans Canada, and Transport Canada. This includes First Nations prior review and endorsement.
- That research and development begins with both industry and government on the *in-situ* burning of oily wastes on shore.
- *In-situ* oil burning is considered in geographic response plans.

DISPERSANT USE



There is no oil dispersant capability in British Columbia. It is an alternative method of oil spill response widely used elsewhere in the world.⁹⁷ It is in the interest of First Nations and other coastal communities to have dispersant capability as part of the response options for a major oil spill. Canada's industry and governments have been debating the issue for nearly 40 years.

The efficacy of using dispersants with minimal disruption to the environment has been enhanced with new environmentally-safer dispersant formulations, improved application devices and methods, and better monitoring protocols.⁹⁸ Opponents to dispersants view that its use is an industry-based scheme because it is inexpensive. Furthermore, the prevailing view is that the methods are just a means of transferring the environmental impact to the water column. Yes, these methods are less expensive than on-water booming and skimming, and there are impacts to organisms in the water column. Nevertheless a net environmental benefit can be achieved if used on the right product, at the right time, and in the right areas.

The decision to use dispersants rests with Fisheries and Oceans Canada and Environment Canada. Fisheries and Oceans Canada view dispersants as just another deleterious substance added to the environment. Conversely, Environment Canada views them as a potentially effective response tool to achieve a net environmental benefit.⁹⁹ There is also a conundrum in which no dispersant planning by industry without approval; no approval by government without planning. In essence, there is a dead-lock in moving dispersants use forward in Canada for these reasons.

For marine protection, there requires:

- Response Organization's preparedness standard establish a dispersant use capability supported by: dispersal equipment (both by vessel and aircraft), an operational guidelines to protect both responder and public health, and water monitoring capability to determine the efficacy of any application.
- Environment Canada up-dates its 1984 dispersant-use policy and protocols to reflect current levels of technology and environmental impact understandings, as well have Fisheries and Oceans endorses it.
- The federal and provincial government establish technical specialists in both the areas of decision-making and tactical operations for dispersant use.
- Canadian Coast Guard determines the process and requirements to seek dispersant services from the United States and elsewhere in the world. This can include the pre-positioning of dispersant stocks.
- Both federal and provincial governments foster public confidence on dispersant use to achieve a net environmental benefit, as well as to protect both responder and public health. This includes First Nations consultations.

OPEN OCEAN (OFFSHORE) SPILL RESPONSE



British Columbia does not have meaningful open-ocean (offshore) response capability that is provided by oil containment/skimming vessels that are specialized and seaworthy for this challenging environment. This requirement is not specified under Canada's *Marine Oil Spill Preparedness and Response Regime* as defined under regulations and preparedness standards for Response Organization (RO) certification. Western Canada's RO's area-of-responsibility is defined by its Geographic Area of Response (GAR) that does include offshore areas. However, there has been no exercising or evaluating of open ocean (offshore) response to test assumptions. Sea conditions can quickly exceed the design capabilities of few larger skimmer vessels currently owned by *Western Canada Marine Response Corporation*.¹⁰⁰

There is an industry expectation that open ocean will be delivered by the Canadian Coast Guard by deployment of its few buoy-tending vessels rigged with side-booms and skimmer. This deployment has never been tested in offshore conditions, such as off the West Coast of Vancouver Island, Haida Gwaii Islands, or within Hecate Strait, and Dixon Entrance. CCG's vessels would have low capability/ capacity for a major spill of heavy oil such as a bunker or crude oil release. They may not even work at all for emulsified heavy oil.¹⁰¹

Open ocean response, such as provided by large, seagoing vessels available in the United States, Asia, and Europe, would have to be sourced under mutual aid agreement from these locales. As a result, there could be significant delay to the recovery of spilled oil within Canada's territorial seas. Even with timely vessel deployments, they would not be expected to recover more than 15 per cent of the released oil - even under ideal, calm, summer sea conditions. There would need to be multiple open ocean skimming vessels to make a meaningful contribution to response efforts.

For marine protection, there requires:

- A response gap analysis as when, where, and how frequent open-water (offshore) response will be unsafe or not practicable, and what is required to improve offshore oil spill response capability and capacity in the north coast.
- An analysis to be undertaken to assess international response resources that may be used.

4.0 ON-SHORE RESPONSE OPERATIONS

SHORELINE WORKFORCE



Coastal communities have an opportunity to be engaged in a paid and supervised workforce to assist in field logistics, debris and oily waste management, wildlife rescue and rehabilitation, and shoreline treatment.¹⁰² However, British Columbia does not have a capability to establish and to manage a large workforce in the event of a major vessel casualty. There has been no consideration to establish a workforce for shoreline debris cleanup from a major container vessel casualty.

Canada's Response Organization standards for the rate or intensity of shore treatment require "A minimum of 500 m of shoreline is to be treated each day".¹⁰³ This rate of shoreline cleanup would not necessarily require a large cleanup workforce of a thousand or more responders.^{104 105} The treatment rate could be much higher if adequate resources - people, equipment, logistics, supervision, and administration - are available.^{106 107}

The gathering, registering, screening, training, supervising, and deploying a workforce can be challenging. The lack of good management of a workforce for cleaning oiled shores can have adverse political ramifications. Negative public and media attention will prevail if people who arrived to volunteer for shoreline cleanup - as well as wildlife response - are managed poorly. Poor management would not serve First Nation's interests.

For marine protection, there requires:

- The Response Organization's preparedness standard establishes a workforce capacity should be at least 1,000 workforce members for the first 48 hours, that are readily expandable to 6,000 members within another 72 hours. These timelines begin after shores are no longer subject to "re-oiling" and the shoreline assessment process has begun.¹⁰⁸
- A pre-registry of 12,000 be established to determine public willingness, availability and capability for the services required, pay-scales, and working conditions and hazards - this takes into account that about two thirds of a hired workforce will either quit or be terminated.
- The Response Organization's preparedness standard should make it explicit that unpaid, converging volunteers for shore cleanup and wildlife response are not allowed for spill response. Public interested in - or canvassed to work on spill response - must be managed as a registered, trained, equipped, supervised and paid as a "workforce member".
- A program on the basics of: oil spill safety, of shoreline cleanup, of oily waste management, and of Division supervisor/Team Leadership is established. This program should be supported by training materials (manuals, presentations, props), a cadre of instructors, a workforce code-of-conduct, database registration, and a workforce website with social media functions.¹⁰⁹
- The Response Organization's preparedness standard entails regular exercises of workforce involvements in shoreline cleanup, as well as the collection, transport and temporary storage of oily wastes.¹¹⁰

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- First Nations be consulted on where and how they may best be used as workforce personnel.
- There be a systematic survey of the availability and willingness of coastal community people to participate as an oil shoreline workforce, and what their concerns and expectation would be. This survey could be conducted every three years, to also assess workforce member demographics, associations, locations, and performance capabilities through out British Columbia.”

FIELD OPERATIONAL LOGISTICS



Field logistics for a major vessel casualty can make-or-break response operations. The logistics to safely and effectively move equipment and personnel is very challenging almost anywhere along British Columbia’s coast. Exceptional skill, local knowledge and innovation are required. Besides poor weather and navigation hazards, other factors need to be considered in moving equipment and people such as during an oil spill or salvage operations. For example, an operation’s window-of-opportunity is dictated by tides and daylight. Sometimes only a few hours of work can be done a day. Effective and fast logistics are critical. Intimate knowledge of safe access and egress to exposed shores is important for workforce safety.

Coastal First Nations and other communities have these attributes, but require the resources and training to provide logistical services to field operations that include on-water and on-shore response, salvage support, equipment staging, and moving shore assessment personnel.

For marine protection, there requires:

- An evaluation of field logistics be part of the geographic response planning for the northern coast. The evaluation includes determining what specialized vessels may be required to be bought or designed from the ground-up.
- First Nations be provided priority employment for providing field logistics to support a marine vessel casualty and any resulting pollution. This includes the management of equipment depots, as well as providing resource transportation and staging. First Nations be consulted.

DEBRIS AND OILY WASTE MANAGEMENT



Under Canada's standards for its *Marine Oil Spill Preparedness and Response Regime's*, just "temporary" oily waste storage is in the purview of a Response Organization (RO). The province under its environmental management legislation guides "final" waste disposal solutions. The province is expected work directly with the Responsible Party, and not necessarily through the RO.¹¹² This approach can impede achieving an integrated approach to oily waste management. Consultations with First Nations and local governments are required as oily waste management solutions can affect them – such as use of their lands for disposal. To-date, there has been no consultations by either the province or BC's Response Organization.

Waste disposal is expected to be paid for by the Responsible Party (RP). Hence, the RP will expect pragmatic and reasonable measures. These objectives are hard to achieve without advanced preparedness. The province has guidelines for oily waste management, but no current strategy or plans for final disposal.¹¹³ ¹¹⁴ There has been no consideration for temporary and final disposal of other marine vessel pollutions, such as a debris-field from a container vessel casualty.

On-water oil recovery can go on for weeks, and shoreline cleanup for months. Once temporary capacity has been reached, it is up to the RP and Province to solve additional storage capacity, off-site transport, and final disposal solutions.¹¹⁵ A lack of an integrated system from oil collection to final disposal can be a major impediment to both on-water and on-shore cleanup: essentially can stop field operations. A lack of preparedness will also significantly elevate the cost of both the response and of the final oily waste disposal solutions. The cost of final disposal could readily end-up resting with government, not the polluter. Both response delays and cost consequences have political ramifications.

Solutions for final oily waste disposal cannot be readily "pulled-out-of-a-hat." There are institutional and technical challenges that one faces in determining final disposal solutions for oil wastes.¹¹⁶ There will be trade offs between what is most "environmentally preferred" and what is "practicable". There needs to be creative and proactive solutions examined by both government and industry that go well beyond normal business practices for oily waste disposal during an emergency.

The application of waste minimizing response strategies such as *in-situ* oil burning and dispersant use become very important when not having an oily waste disposal plan and meaningful capacity. There are many other oily waste minimizing opportunities throughout the course of spill response.¹¹⁷ These oily waste minimization opportunities are not addressed in either the current or revised standards for Canada's Response Organizations. As such, there is little focus on training in these significant cost-saving approaches.

For marine protection, there requires:

- The preparedness standards for Response Organizations be based on specify waste holding capacities that are in the range of 4 to 5 times an RO's tier level oil spill preparedness - e.g., tier 4 is for a 10,000 tonne spill which would be 40,000 to 50,000 metric tons of oily wastes to be prepared to manage.¹¹⁸
- The Response Organization's preparedness standard include strategies and training on practical steps to minimize oily waste generations such as outlined in the *International Petroleum Industry Environmental Conservation Association (IPIECA), Rpt. Series , Vol. 12 Guidelines for Oil Spill Waste Minimization and Management*. In addition, the standards could stipulate that a RO should have:
 - Arrangements for the timely disposal of all oily wastes that are readily recyclable.
 - An approved strategy with Ministry of Environment on final oily waste disposal.
 - An on-site monitoring system such as pre-scripted signage and trained supervisors that ensures that all oily wastes are being segregated into proper waste streams, measured in quantity, logged, and tracked.
 - Equipment for *in-situ* (at or near site) burning by forced-air of oiled woody-debris, as well as the combustion of shore-based mobile oil collected that is done by portable incinerators designed specifically for these applications.
 - Suitable oil impermeable liners that can fit commercial totes, garbage bins, and trucks to minimize storage and transport spillage.
 - Specialize equipment and systems to move oil from shore to temporary storage that fits the working environments (remote beaches, steep banks, rough trails). Examples are Muck-Trucks and improvised tram ways that can move oiled-filled buckets through difficult terrain to receiving areas.
 - Arrangements with seagoing barge companies to use their barges as waste work-platform, or waste storage/transport system.
 - Identify and use "technical specialists" in waste management and provide them appropriate incident management training.
- The province undertakes waste management planning and preparedness. This includes engineered and environmentally approved siting criteria/design for a waste disposal facility with a minimum design level of 50,000 metric tons of oily wastes. The facility siting criteria could be for land-farming (bioremediation), incineration, land-filling, industrial processing, and combinations thereof.
- The province develops a debris management and disposal plan to handle flotsam created by a major container vessel casualty.
- The province establishes land-reserves for strategically located Crown Land that could be set-aside for oily waste facilities to be located - with appropriate local government and First Nations consultations and pre-acceptance. Locations should be based on logistical requirements to transport oily waste both by sea and land methods. Permit conditions should be pre-established.

HARMED WILDLIFE RESCUE



To date, British Columbia has no meaningful contaminated wildlife response capability or capacity. Additional government and industry funding needs to be dedicated towards contaminated wildlife response training, planning and equipment to foster partnership commitment, as well as to build response capacity.

Contaminated wildlife response is partially ensconced into the spill preparedness for Canada's Response Organization's standards. However, the level is marginal. The standards only call for the hazing (scaring away) of birds to prevent them from descending on oiled waters or shores. There are no requirements to plan, train or equip for the actual capture, assessment and rehabilitation of harmed birds and mammals.^{119 120}

The fundamental problem is that wildlife response is not treated with the same urgency and intensity as other response actions, such as shoreline cleanup. Shoreline response has established procedures for determining which shores require treatment, how, and to what level. These basic types of decisions are not well established for wildlife and the diversity of species on the West coast. Furthermore, wildlife response planning, direction and operations have largely been outside the incident management system.¹²¹ Preparedness and delivery have been done on a volunteer basis by British Columbia's non-governmental wildlife rescue and rehabilitation's organizations (NGOs). These NGOs would provide most of the technical specialists personnel to guide a wildlife rescue and rehabilitation workforce. However, certain conditions must be met such as: being paid, supervised, incorporated into the incident management structure, and managed by a professional contractor knowledgeable in wildlife response during a major vessel casualty.¹²²

Recognizing this need to provide guidance and structure to wildlife response, the Ministry of Environment drafted an *Operational Guideline on Oiled Wildlife Response*. This guideline is in keeping with the provincial policy direction on oiled wildlife rescue and rehabilitation, as well as supports delivery of its *BC Marine Oil Spill Response Plan*.¹²³ This operational guideline has not been finalized or endorsed by the federal government.^{124 125} The draft guideline identified which types of response measures as being "reasonable" as defined as: having ecological merits, pragmatic, and cost-effective. However the contentious issue that blocks moving forward on wildlife response preparedness is determining if all rescued wildlife species that are assessed as candidates for rehabilitation should be cared for - or alternatively - only those species (or populations) felt to be at risk or endangered.^{126 127 128} There is a clash between what industry and government considers as "reasonable cost" based on ecological criteria and the "moral requirement" of the wildlife rescue NGO members. The latter expects all oiled wildlife that are candidates for treatment should be cared for. Several wildlife rescue NGOs have established a collective called the *Oiled Wildlife Trust* to address the issues as one voice.¹²⁹

Much more dialogue between all parties is needed to foster mutual trust. There needs to be a balance between "reasonable measures" and "reasonable expectations".

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For marine protection, there requires:

- The federal and provincial agencies with mandates for coastal marine wildlife protection finalize the operational guidelines for harmed wildlife response to fully reflect reasonable actions and costs, best wildlife care practices, and wildlife response under the Incident Command System.¹³⁰
- The process of building British Columbia's capability engages local NGO wildlife rescue and rehabilitation groups - such as the *Oiled Wildlife Trust* members - to address the core values they hold regarding the care of all harmed wildlife, compared to "species-specific" decisions founded on ecological and economic values held by government and industry.
- The Response Organization's preparedness standard expands its wildlife response capability and capacity to include: hazing, capture, assessment, rehabilitation and release of contaminated birds and mammals.
- The Response Organization's preparedness standard requires that - within 24 hours of a spill - to have capability to mobilize personnel and equipment to haze, capture and transport contaminated wildlife. This would require at least two mobile (vehicle or trailer) facilities to provide initial wildlife rescue, assessment and stabilization.
- The Response Organization's preparedness standard within 72 hours of evidence of harmed wildlife, to have capability to establish a temporary Wildlife Care (Rehabilitation) Centre for the continued assessment, stabilization, and treatment of wildlife. The capacity of the centre should be able to handle a minimum of 200 birds, 10 sea otters, and 10 seals, and have the capability to expand to meet additional demands.
- That the mobile and fixed wildlife rescue and rehabilitation facilities are deployed, constructed and operated under established wildlife care protocols, as well as a federal/provincial agreed-on operational guidelines. A professional (fee-for-service) contractor provides the management of wildlife response.
- The participants in wildlife response are managed as paid, trained, supervised as qualified workforce members.
- The technical-level workforce members in wildlife response are obtained from the British Columbia's wildlife rehabilitation NGOs who have been provided advanced orientation on how to provide their services under the Incident Command System and the working environment.

HAZARDOUS CHEMICALS PREPAREDNESS AND RESPONSE



British Columbia has essentially no hazardous material response capability for a vessel-based incident. Canada's marine spill preparedness and response regime does not apply to responding to a hazardous material incident on - or from - a major vessel. This activity is not part of Canada's Response Organization mandate.

Hazardous materials are generally "dangerous goods" that have commercial uses. They may be carried in bulk or in packages, and may be liquid, solid, or gas. They may be very hazardous or just noxious to people or the environment. In the marine world, these products are referred to as "hazardous and noxious substances" (HNS).¹³¹

Transport Canada is the lead federal agency to address HNS response on - or from - vessels. The Ministry of Environment is the lead provincial agency for hazardous materials spills that can potentially impact provincial lands and/or provincial financial, social and environmental interests.¹³²

A HNS incident can result from accidents from and within: a chemical tanker (bulk chemicals), a container vessel (packaged), a cargo vessel (break-bulk), a ferry (vehicle contents). LNG carriers and condensate tankers are also in this category.¹³³ Between the years 2001 and 2010, there have been 98 chemical spills from vessels in Canadian waters.¹³⁴ Most of these were small spills.¹³⁵ The high volume of HNS carried by sea-going vessels as international trade highlights the potential for a major chemical spill occurring in British Columbia's waters.

There has been no progress in this response area. Over twenty-two years have passed when first recommended by the 1990 Brander-Smith's report on tanker safety and marine spill response capability. Twelve years have passed after a Pacific Work Group submitted its report to Transport Canada outlining a framework for a *Canadian Marine Chemical Emergency Response Regime* (MCER).^{136 137 138 139}

The financial limit of liability for a HNS incident is very low, as the risks are defined by the Bunker fuel of major carriers and tankers, not its cargo. For example, a 80,000 DWT tonne condensate tanker only has approximately \$26 million for response and damage compensation as provided by the tanker owner's *Protection and Indemnity Club* insurer. Once spent or allocated, the next source of funds is from Canada's *Ship-source Oil Pollution Fund* (SSOPF) that has \$159.9 million.¹⁴⁰ The SSOPF is the only avenue to expand response and damage compensation levels for Canada for all impacts related to a vessel casualty – oil, containers, HNS, wreckage (See Financial Risk and Vulnerability)

For marine protection, there requires:

- The Pacific Region Working Group on *Marine Chemical Emergency Response* report prepared in 2001 be *de facto* the working direction for ship-source hazardous and noxious substances (HNS) incidents, given the lack of timely progress by Transport Canada.¹⁴¹ This entails establishing an operational capability by:
 - Using Incident Command System and the Unified Command protocol therein to co-ordinate response to marine HNS incidents.

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- Training of contractors and government response personnel to effectively and safely response to HNS marine incidents both on-board a vessel, as well as on water.
- Acquiring specialised equipment that may be required for an on-board ship-sourced HNS incident.
- Designing HNS safety features into emergency response vessel(s).¹⁴²
- Building an expert system of technical specialists and chemical data properties.
- Establishing a database that captures Vessel entry information on what HNS chemicals they are transporting, as well as the type and volumes of bunker fuels being used.¹⁴³
- Undertaking table-top and field exercises with industry, agencies, and First Nations.
- Preparing Geographic Response Plans and Vessel Transit Plans that specifically address HNS concerns towards public safety and environmental protection.
- Establishing risk-based assessments for potential places of refuge involving vessels carrying HNS products. Particular focus would be condensate, chemical, and LNG tankers, and vessels carrying uranium.

5.0 FINANCIAL CONSIDERATIONS

FINANCIAL RISK AND VULNERABILITY



Coastal communities and First Nations are entitled to have a clear understanding provided by government and shipping industry of their financial risks and vulnerabilities. Opportunities and mechanisms to reduce financial risk and vulnerability need to be fully explored.

Financial risk pertains to a Responsible Party (shipowner) defaulting on response commitments or exceeding its limit of financial responsibility for the management of a major vessel casualty. Both outcomes result in the Responsible Party passing the remaining incident management and response operations on to government. Financial vulnerability pertains to the likelihood of not fully recovering all costs incurred, as well as any subsequent adverse economic and political consequences.

Transfer-of-command can happen sooner than expected, as the limits of financial responsibilities defined under the federal *Marine Liability Act* are low.¹⁴⁴ In the case of a tanker spilling persistent oil as its cargo, the limit is \$137.9 million. The limit ranges from about \$10 to \$20 million for a tanker carrying non-persistent oil (e.g. condensate, jet fuel), a general cargo vessel, container vessel, ferry or LNG carrier. The amount is calculated on the size of the vessel. On reaching this limit, command is transferred to the Canadian Coast Guard. The Responsible Party can legally cease in its response efforts.

After a transfer-of-command, all subsequent expenditures from all government parties engaged - including First Nations - are then from their own budgets or General Revenue. These costs have to be accounted, compiled, and then submitted to the international compensation funds as a claim. If a spill is from a tanker carrying persistent oil as its cargo, there is about \$1.0 billion available for both response expenditures and damage compensation.¹⁴⁵ For other types of vessels, there is only Canada's *Ship-source Oil Pollution Fund* with \$159.8 million available per incident. Unaccounted costs, or those felt as "unreasonable" by claims managers, will not be reimbursed. Costs that exceed the fund limits will also not be considered. As such, there are financial risks to those that participate in the response and expend their own money.

For marine protection, there requires:

- A shipowner's limit of financial liability and its payment source are disclosed as part of its application to make an arrangement with a Response Organization.
- There be a legislative requirement for a shipowner - or its representative - to disclose the allocation of *Protection and Indemnity Club* insurance funds during the incident to make transparent any amounts being held back as a contingency for future liabilities and therefore not being used for response efforts.

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- The *Ship-source Oil Pollution Fund* levy be reinstated to increase the financial safety margin should international funds become insufficient to pay for response and compensation, including natural resource damages (see below).
- There is a determination on whether the *Ship-source Oil Pollution Fund* is the best value for Canadians, compared to industry establishing its own fund, investing its own contributions, administering the fund itself, and paying its own annual contribution to the international compensation funds.¹⁴⁶
- Opportunities and mechanisms to reduce financial risks and vulnerabilities need to be fully explored.¹⁴⁷
- Training and tools be provided to provincial and local governments, and First Nations to assist in expenditures tracking during a major marine casualty.

NATURAL RESOURCE DAMAGE ASSESSMENT AND COMPENSATION



Canada does not have a natural resource damages assessment and compensation processes that harmonizes with First Nation's interests, as well as that of BC's Provincial Government. For ship-source cargo, fuel or oil or other pollution spills, the *International Maritime Organization* (IMO) conventions that Canada has acceded to do not endorse compensating for natural resource damages.¹⁴⁸ Canada's *Ship-source Oil Pollution Fund* also does not endorse natural resource damage claims for unmitigated pollution from a vessel casualty.

Fund claim managers will only accept costs they deemed reasonable and accounted for from expenditures made responding on-water and on-shore, as well as made while managing oiled wildlife. Claims for damages to economic activities, such as businesses and private property damages, will also be admissible. Claims for damage to an ecosystem's natural resources themselves (shores, birds, fish, habitats, etc.) are not admissible.

The concept of natural resource damage assessment is to determine "residual" damages after cleanup (impact mitigation) is completed. This remaining damage is essentially an "unmitigated" loss of use and enjoyment of the resources by coastal communities. The Natural Resource Damage Assessment (NRDA) process and monetary compensation are attempts to make the coastal community "whole" for the loss of those ecological services stemming from exposure to oil, hazardous substances, debris, or wreckages - even after extensive cleanup efforts. Compensation for residual damages is an equity matter. It reflects the understanding that - though efficient response activities (mitigation) were undertaken, there may still be a net loss in ecological values and services for several years after. These are foregone services that are over-and-above economic ones such as business losses and private damages. The loss - whether permanent or temporary - is a cost and therefore a monetary award should be applied (compensation).

In the United States, it is a matter-of-course that compensation - a monetary transfer payment - is sought from the Responsible Party (RP) that equals to an assessed amount that reflects the social, cultural, and ecological value of unmitigated impacts.¹⁴⁹ This is not the case in Canada. Both the federal and the provincial governments have their own "bank-accounts" to receive compensatory awards based on court settlements under "creative sentencing" clauses found within their respective laws. Environment Canada has the *Environmental Damage Fund*, whereas the Province has the *Habitat Conservation Trust*.^{150 151} There is no bilateral

agreement between these governments on who invokes a NRDA, what it entails, who receives the compensation award, and how it is allocated.¹⁵² Furthermore, the province and First Nations have not been party to the compensation discussions on how or where the money is allocated.

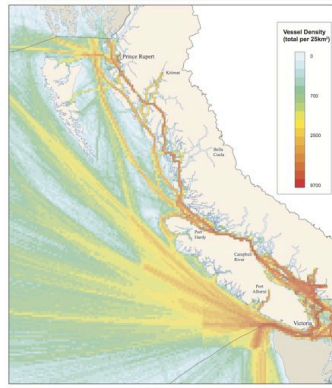
It may be a moot point regarding which one of the two competing funds a compensatory payment from a ship-source spill or marine casualty is used - federal or provincial. There is a high likelihood that there will not be enough money remaining for natural resource damage compensation after the Responsible Party pays for response and private damages. If there is a transfer-of-command to government, a natural resource damage claim made to either international or Canada's compensation regimes will not be accepted by the claims managers.¹⁵³ Compensation for environmental damage is restricted to costs for reasonable measures to reinstate the contaminated environment - such as shoreline cleanup activities. Consequently, both the Canadian Coast Guard and Transport Canada will not support or accept submissions from First Nations, local governments or the province seeking natural resource damage compensation for ecological services forgone.

For marine protection, there requires:

- Environment Canada and the BC Ministry of Environment should prepare a Natural Resource Damage Assessment harmonization agreement that is inclusive of each other, as well as First Nations and local coastal governments such as the establishment of a "NRDA Trustee Committee" modeled after those in the United States.
- Environment Canada and BC Ministry of Environment should undertake a project to determine economic values of coastal resources that could be subject to natural resource damage compensation.¹⁵⁴
- Environment Canada and the BC Ministry of Environment should hold a multi-stakeholder workshop on natural resource damage assessment and compensation.
- Canada's *Ship-source Oil Pollution Fund* is used for natural resource damages compensation based on sound NRDA principles and processes.

6.0 RESEARCH AND DEVELOPMENT

MAJOR VESSEL MONITORING AND TRACKING



With the advent of *Automatic Identification Systems* (AIS) required on all major sea-going (convention) vessels to electronically track them, there are significant opportunities to comprehensively assess the nature of vessel traffic along British Columbia's coast.^{155 156} A high level of tracking and data analysis is required to fully understand major vessel risk along British Columbia's coast, as well as how it changes over time and with future vessel traffic patterns and types, such as LNG carriers, oil tankers, expanded container vessel movements, etc. To realize these opportunities takes agency and industry leadership and innovation.

AIS records a vessel type, its destination, route, duration with a region and more.¹⁵⁷ Knowing this information ensures regulatory compliance, assesses any deviation from a vessel's normal operations - such as having to find alternative anchorages due to severe weather or port congestion. During an emergency situation, AIS would be beneficial to determine drift rates and direction of a vessel that has lost its steerage or engine power.

AIS data can be provided by a vessel in three ways: from transmission from vessel-to-shore-based stations using radio towers, or from ship-to-ship, and to satellite. From this radio data, any ship with an active AIS transponder can be found on web-based "ship-finder" programs and its progress seen in moving on the screen.¹⁵⁸ There are several AIS radio towers in British Columbia to support vessel-to-shore AIS transmission, but there are gaps in coverage, such as when off-shore vessels pass north of Brooks peninsula, and gaps along the inside passage. As such, vessel-to-shore identification of vessels is incomplete and makes real-time tracking of a vessel difficult – as well as data capture.

AIS data can be captured in real time and stored for future reference, mapping and analysis. Canadian Coast Guard's *Marine Communications and Traffic Services* (MCTS) uses vessel transit data through AIS for daily operational requirements. The *National Information System on Marine Navigation* (INNAV) provides access to vessel transit data for all MCTS-covered areas.¹⁵⁹ It is not used for vessel data compilations or analysis, the data is archived. The INNAV is limited to subscribers only – generally industry, and not for public use. For someone doing research on vessel traffic and risk, it is not readily available. Instead, the AIS data has to be purchased from other sources such as the Puget Sound Marine Exchange, the Alaska Marine Exchange, and a Satellite AIS vendor.

For marine protection, there requires:

- Complete AIS vessel-shore based coverage for both the outer coast and inside passage;
- All AIS data is archived and readily made available to agencies, industry, academics, non-government organizations, and others that want to use it for vessel traffic analysis and risk assessment such as by Oceans Network Canada.¹⁶⁰ The information should be available and provided in formats for both GIS mapping, as well as tabular analyzes.

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- An industry/agency based vessel traffic analyzes platform be established to provides annual up-dates of vessel traffic, as well as has the capability to do future projections on vessel growth. This information should support regional-based vessel risk analysis, as well as geographic response plans.

TECHNOLOGY AND SOCIOLOGY



There is a need for substantial increases in research and development (R&D) to improve marine casualty response capability, as well as to more fully understand and address cultural, social and economic effects and consequences of increased vessel traffic and vessel casualties. Industry and government investment towards R&D also pertains to managing all types of pollution from a vessel casualty, such as a handling a debris field from a container vessel accident to undertaking salvage and rescue tug operations.

The technology available for responding to major marine casualties has improved only incrementally since 1990. Canada has lost much of its world-respected lead in applied R&D for emergency science and technology through staff attrition of Environment Canada's Environmental Technology Center located in Ottawa. In contrast, the United States has identified numerous R&D projects such as listed by the *Coastal Response Research Center* located at the University of New Hampshire.¹⁶¹ The *Pacific State/BC Oil Spill Task Force* - which the Ministry of Environment is a member - has also identified many R&D needs.¹⁶²

A key area of research pertains to what is referred to a "human dimensions impacts" of major vessel casualties, as well as the intrusive nature of response efforts on a coastal community.¹⁶³ It is well understood that released oil can have significant acute impacts to ecological systems. However, attention is often focused mainly on the ecological impacts. The *Exxon Valdez*, *Prestige*, *Cosco Busan*, *Deepwater Horizon* and other major spills have made it apparent that there is a wide variety of human dimensions impacts that are also important for planners and spill responders to address. These impacts include those on human physical and mental health, social relationships and activities, economic industries and sectors, cultural systems, infrastructure, public and private organizations, governance and political systems. Response plans, guidelines, training, and impact monitoring all need to be substantially improved regarding how they characterize, anticipate, or prepare for short or long term human dimensions impacts from a large spill. This includes the ramifications of thousands of responders arriving within a coastal community during a major incident.

For marine protection, there requires:

- Federal and provincial governments, and First Nations industry collaborate to develop and implement a comprehensive framework for monitoring the ecological, cultural, social and economic effects of increased large vessel traffic along BC's coast. Consideration needs to be given to:
 - Collection and development of comprehensive environmental and socioeconomic baseline data.
 - Investment in environmental monitoring.

Coastal Community Outreach on Major Marine Shipping in British Columbia

- Identification of the culturally and socially disruptive effects of major vessel casualties.
- Development of a framework for integrating new information into regional shipping management and emergency response plans and standards.
- Spill technology and marine vessel casualty research listed by the United States needs to be evaluated to determine if any suggestions are relevant to Canada's West coast situation.

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APPENDICES

APPENDIX 1: Nuka Research and Planning: Listing of Opportunities And Status to Achieve a World-Class System of Coastal Marine Protection from Vessel Casualties Resulting in Pollution

Extracted from: WEST COAST SPILL RESPONSE STUDY, VOLUME 3: World-Class Spill Prevention, Preparedness, Response & Recovery System. Volume 3 describes a vision of the key features of a world-class system, provides examples where these features are implemented, and suggests opportunities to enhance the system on the west coast of Canada to achieve a high level of marine protection stemming from a major vessel casualty.

WEST COAST SPILL RESPONSE STUDY, VOLUME 3: World-Class Spill Prevention, Preparedness, Response & Recovery System

6. SUMMARY OF RECOMMENDATIONS

This section summarizes the opportunities to enhance the marine spill prevention, preparedness, response, and recovery system that were identified in Sections 3-5.

While these recommendations are fairly high level, each will require actionable plans, timelines, and parties responsible for its oversight. Some of the following recommendations can be implemented immediately, while others require changes in regulation or policy. Some necessitate additional analysis to ensure that the intended purpose is achieved without creating unintended consequences. For example, a rescue tug that is not able to arrest a drifting containership of the size expected would not achieve the intended purpose of having a rescue tug. (It is outside the scope of this study to conduct this level of analysis.)

The tables below list the characteristics of a world-class response and summarize the recommendations related to each described in Sections 3-5. A color-coding system is used to present our assessment of the extent to which each characteristic is currently achieved on Canada's west coast.




	Feature is not present or is minimally present
	Feature is partially present, or is present but likely to require enhancement
	Feature is mostly or fully present

Table 6.1. Summary of recommendations related to PREVENTION elements

FEATURE	ASSESSMENT	OPPORTUNITY
Vessel operations surpass international safety and spill prevention standards		
Vessels meet or surpass international requirements		Foreign vessels visiting BC's ports are likely to be flagged to countries that are ranked fairly well by the Paris Memorandum of Understanding Port State Control program may need to be scaled up as vessel traffic increases Continue to track and report the number of vessel inspections and the results of those inspections
Vessels operate in a corporate safety culture that goes beyond compliance		Harmonize with existing incentive/recognition programs in neighboring jurisdictions Adopt Green Award or other incentives in ports beyond Vancouver
Vessel traffic is monitored and, in higher risk areas, actively managed to prevent accidents		

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FEATURE	ASSESSMENT	OPPORTUNITY
Vessel movement data is compiled and archived for analysis		<p>Improve accuracy and quality of AIS data and integrate with other databases if possible</p> <p>Make MCTS readily available for analysis</p> <p>Periodically analyze vessel traffic data for trends and to evaluate prevention measures</p>
Vessel traffic is actively managed in high-risk areas		Consider which measures used in the Vancouver area will be warranted farther north as traffic changes; based on risk analysis and understanding how they have worked in Vancouver/Georgia Strait
Marine pilots are required for large vessels transiting certain waterways		With the Pacific Pilotage Authority, determine the number of pilots needed for future traffic and implement a plan to ensure there are enough qualified pilots available
Escort vessels accompany certain vessels in high-risk operating areas		Analyze whether changes in vessel traffic in the north warrant escorts in some areas, and whether escorts should be used for large vessels in addition to laden oil tankers
Rescue and salvage resources can be on-scene quickly enough to be effective after an incident or spill		
Emergency towing resources are available for rapid deployment		Determine how rescue towing will work along the coast, whether with an escort or dedicated rescue tugs or tugs of opportunity
Marine firefighting resources are available for rapid deployment	Not determined	Determine how marine firefighting needs will be met throughout the area, including with what resources, by whom, and in what timeframe
Salvage resources are available for deployment as needed to be effective		Determine how salvage needs will be met throughout the area, including with what resources, by whom, and in what timeframe
Potential places of refuge are identified in advance		<p>Identify potential places of refuge <i>in advance</i> to streamline decision-making when a vessel is in distress</p> <p>Incorporate input from key stakeholders and integrate with spill response planning and resource placement</p>

Table 6.2. Summary of recommendations related to PREPAREDNESS elements

FEATURE	ASSESSMENT	OPPORTUNITY OR COMMENTS
Geographic areas are prioritized for protection from oil spills		
Marine and coastal resources are inventoried		Inventory coastal resources by updating and validating existing databases and by creating geospatial data management tools to overlay sensitivity data with response planning and management tools
A process is in place to prioritize areas for spill protection		Establish an inter-agency, or, better yet, multi-stakeholder process to develop a shared prioritization of areas for protection
Areas to be avoided are established as appropriate		Consider establishing additional areas to be avoided and/or vessel routing Consider applying existing tanker exclusion area to other vessels (beyond just those laden tankers traveling south from Alaska) based on a risk analysis and prioritization of sensitive areas
Geographic response plans are developed as appropriate		Make existing WCMRC area plans available and increase, enhance, and test them, as appropriate, with input from diverse stakeholders Develop GRP for areas of the coast not currently covered by WCMRC area plans GRP should be incorporated into planning documents and made publicly available
Contingency planning is comprehensive, integrated, and understood by all relevant parties		
Planning is integrated across jurisdictions and sectors		Establish a standing committee or other structure to engage all government agencies in a cohesive planning process with transparency and opportunity for input from other groups
Contingency plans address all major spill response functions	Not determined; plans not available	WCMRC's contingency plan houses the critical operational details upon which a successful response depends, but it is not available for public review. It should be made available and assessed. A short series of unannounced drills could be conducted to test shippers familiarity with the notification procedures and plan (shippers are not otherwise responsible for any aspect of responding to spills from their vessels in BC).
Response planning standards ensure sufficient response capacity to respond to a worst-case spill		Increase the response planning standard of 10,000t and establish more aggressive response timeframes for the entire coast Review the method for determining compliance with the standard to ensure that it considers storage capacity, type of product, and the spread of spilled oil, among other factors

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FEATURE	ASSESSMENT	OPPORTUNITY OR COMMENTS
Response operating limitations are identified and mitigation measures established		Conduct a response gap analysis for key shipping routes along the coast to understand how often ships are moving through areas where an effective response could not be occur Acknowledge response limitations in planning and identify mitigation measures or alternatives that will be employed when those limits are exceeded
Operational tactics are defined	Not known; guide not complete or not available for review	WCMRC tactics guide should be public and analyzed to ensure that response resources are cached appropriately to implement the tactics
Sufficient equipment can be deployed quickly to respond to a worst-case spill		
Response inventories are up-to-date, accessible, and accurate; resources are tracked during a response		WCMRC has gone above and beyond the required amount of response equipment, and provides its inventory in the WRRIL and on its website. Clarity is needed about the CCG resources that would be available for a response in BC. A process should be put in place for tracking resources during a response, if one is not already included in contingency plans.
Response caches are strategically located, stocked, and maintained		WCMRC has located some equipment on the north coast, despite the fact that they are not required to do so. However, as presented in Volume 1, the response resources remain inadequate and additional analysis should be conducted to determine the level of resources needed and the best place to locate them.
Equipment is the best available for the operating environments, environmental conditions, and potential spilled substances		Increase resources suitable to open water and offshore conditions Demonstrate the ability to respond to a spill of heavy oil
Logistical support is in place to support the response		Develop publicly available scenario or plan to ensure that adequate logistical support is available for a significant spill response even in remote areas. (If this is already included in WCMRC plan, it should be vetted by a multi-stakeholder group.)
Spills can be detected, tracked, and modeled as needed to perform the response		Can be considered to be mostly in place Existing surveillance programs should be included in spill response planning, if they are not already Consider whether additional aircraft are needed to provide coverage to entire west coast in case of increased shipping
Sufficient personnel are available to respond to a worst-case spill		
Trained responders are available to staff a significant, prolonged response		WCMRC should identify additional spill response personnel, including where they will come from Test availability of sufficient personnel periodically through unannounced call-out drills

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FEATURE	ASSESSMENT	OPPORTUNITY OR COMMENTS
All responders and response managers use the same incident management system		Federal government should transition to using the ICS structure with a Unified Command, including a plan to train personnel as needed
Responders are well-trained and regularly exercised	Not clear	Establish process to ensure the qualifications of outside responders, and share information about the qualifications and training of response organization personnel
Volunteers are managed to maximize their effectiveness		Establish plan to manage large numbers of volunteers or to convert them to a workforce
A process is in place to restore damaged resources and to promote ecosystem recovery after a spill		
A process is in place to restore damaged resources and promote ecosystem recovery after a spill		Create a process to identify, prioritize, develop, and monitor restoration projects and ensure that there is funding available for their full implementation

Table 6.3. Summary of recommendations related to elements of the SYSTEM

FEATURE	ASSESSMENT	OPPORTUNITY OR COMMENTS
Government ensures compliance and transparency		
Government authorities review and audit industry contingency plans		Rigorous evaluation of the ability to achieve a 10,000t (or, ideally, larger) response planning standard is needed WCMRC contingency plan should be available for public review and input
Other stakeholders are actively engaged		Consider establishing regional advisory councils based on the Alaska model to complement existing groups
Effective enforcement mechanisms are in place		Enforcement mechanisms should be reviewed with a focus on Port State Control inspections
All parties actively pursue continuous improvement through research and development and the testing of planning assumptions		
A research and development program is in place		A goal-oriented research and development program should be created and funded. Results from the recently announced Department of Fisheries and Oceans contract to develop spill countermeasures should be widely shared.

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FEATURE	ASSESSMENT	OPPORTUNITY OR COMMENTS
Planning assumptions are verified through drills and exercises, and plans are updated to reflect lessons learned		Specific planning assumptions should be identified that need to be tested or demonstrated through a combination of planned exercises and unannounced drills
Incident reviews support continuous improvement		Transport Canada and the CCG should commit to conducting an incident review if a major spill ever occurs Incident review(s) should be made public and should be conducted by experts who did not participate directly in the response
Data on spill causality and "near misses" are compiled, analyzed, and used to inform system changes		Data should be compiled according to the format recommended by the Pacific States/BC Oil Spill Task Force
Financial mechanisms and resources meet needs from initiating the response through recovery		
Sufficient funds are available from industry and/or government to fully implement planning, response, and recovery		Liability limits should be significantly increased to reflect potential spill costs, or should be eliminated completely
Fair compensation is given for environmental, fiscal, and/or social impacts		A mechanism should be created to assess losses and to award compensation

APPENDIX 2: An Ideal Model for Environmental Incident Management and Response



PREAMBLE

The following provides an ideal model for environmental incident management and response for a major vessel casualty that results in pollution. The model provides a “framework” from which to view the issues and solutions provided in this statement document.

An important perspective for the management of an environmental incident is recognizing, respecting and resolving the many values involved. These include regional economic, social, cultural, and ecological values. This perspective also includes balancing the financial aspects of a company’s vessel being destroyed or put-out-of-service. Those responsible for incident management and response delivery needs to recognize that no one jurisdiction or group owns nor has claim for all the goods and services provided by an affected environment – whether coastal shores or offshore marine. This applies regardless of the source of a spill and who is the regulatory agency – federal or provincial. Furthermore, safeguarding private assets of the company responsible for impact prevention, mitigation, restoration and compensation - the *Responsible Party* - does not necessarily supersede interests of the regional communities that rely on the threatened or affected environment. All stakeholder interests are to be addressed and balanced fairly.

Addressing these values is a collaborative and consultative process among affected jurisdictions – including First Nations and the Responsible Party. The arrangement is not one of a single command-and-control. The latter is “old school” thinking. A single command and control approach is applicable when there is the protection of life-and-limb, such as rescuing passengers from a sinking vessel. It is not necessary, nor suitable, for the management of an environmental incident.

Even the “emergency” phase of an escalating environmental incident must reflect the economic, social, cultural, and ecological values of the vulnerable area. This includes providing provision for a disabled vessel needing a place of refuge to undertake repairs, for salvage operations to patch a hull breach, or recovery of mobile oil on water. The tools to expedite decision on where to tow a vessel to a place of refuge, or what shores to protect first need to have regional values embedded as part of emergency planning and preparedness. These tools include geographic response plans, oiled shore sensitivity mapping, and places of refuge guidelines. Even with these references-at-hand, it doesn’t negate notification and dialogue with regional interests such as local government and First Nations should an event arise.

Generally, the “emergency” phase of an incident is short-lived – often measured in a few hours to maybe a few weeks. Whereas, the protracted cleanup of oiled shore or shipwreck removal can go on for months or years after. Most environmental incidents are just “work projects whereby the values of affected jurisdictions and the company can be established under incident management through cooperation and collaboration. The objective is to strive for consensus on balancing values. These activities have to be applied at all levels of the incident’s management, from the command, planning to field operations. It is of paramount importance that the right people are in the right place to identify and apply the values they have been provided the license to address by their elected officials. This engagement also must be done with respect and patience. A measure of response performance is not just how quickly the incident was resolved – vessel finding a place of refuge, contaminated shores treated – but whether relationships among responding agencies, jurisdictions and individuals remained positive after incident closure. Lingering resentfulness and acrimony are as much a cost of an environmental incident, as any residual oil or wreckage on shores.

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An ideal model for the management of - and response to - an environmental incident cannot be achieved without a fundamental understanding of the need to recognize, respect and resolve the economic, social, cultural, and ecological values. As well, the process of doing so is through cooperation, collaboration, and consultation. The process is done prior to an incident as a facet of emergency preparedness, as well as during an incident as part of its management.

Lastly, there must be transparency and openness in information used for emergency preparedness, as well as created during an incident. This information should be readily available to the public, such as on web sites, this can include the original situational reports, field assessments, and incident action plans. As for interpretation of response performance, there should only be one evaluation and one message. This communication is developed collaboratively and released together by incident management.

Ideal Model for Environmental Incident Management

Values: Must be addressed and respected are economic, social, cultural, ecological, and financial

Process: Must be through consultation and collaboration to seek consensus among the value holders

Transparency: The work and analysis required for emergency preparedness must be transparent and readily available to the public, as well as the incident situational reports and action plans created during an emergency event

Activity	Description
<i>Initial Incident Management</i>	Initial responses to an environmental incident are generally from an emergency dispatch centre. This necessitates gathering the best situational information being communicated regarding the casualty. It also includes having rapid full specifications about the vessel before hand that includes its ownership, amount of petroleum on-board as bunker and cargo, and more. Ideally, this information is also publically and readily accessible to assist supporting agencies/contractors.
<i>Notifications</i>	If multiple emergency dispatch centres are involved, then good exchange of situational and response information is important. Notifications need to extend to regional/local jurisdictions threatened that includes First Nations and local governments. Ideally, these notified recipients are trained, resourced and empowered to make response decisions on behalf of their jurisdiction and stakeholders. Ideally, values and operational elements are fully articulated through notifications and situational information/analysis.
<i>Rescue & Refuge</i>	Providing tug rescue to assist a vessel must be based on proven ocean-going tug capabilities (size, power, seaworthiness) and supported by crew training and exercising for all sizes and types of vessels, and sea conditions. Captains and crew require guidelines on emergency towing and are trained and exercised in the procedure. A Place of Refuge (POR) selection is based on prior consultations that captures the technical needs for harbouring a vessel (anchorage and shelter) as well as the social, economic, and cultural values of any potential PORs that could be adversely affected. POR need to be vessel-type specific: condensate tanker, persistent oil tanker, LNG carriers, container vessel etc. for the risks they present. POR also includes a Risk Assessment Tool and Vessel Transit Plan that needs to be completed, disseminated, and agreed to. Drivers for selecting a POR includes both the protection of shipowner's assets as well as environmental protection.

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<i>Integrated Incident Management</i>	Ideally incident management transitions from the singular, jurisdiction-specific emergency dispatch centres, to an Incident Management Team comprised of integrated responders from industry, agencies, and First Nations working together. Integration also includes the Responsible Party and its contracted services (salvage, spill response, wildlife rescue, etc.). Ideally, the incident management system is universally understood to foster both capability and capacity so as to not to educate on-the-fly, and to source responders from anywhere in the world. There needs to be one set of response objectives, strategies and incident action plan that addresses the social, cultural, ecological, and financial values affected by all parties.
<i>Response Escalation</i>	Pre-established tiered preparedness and response that can be applied to vessel casualties and accidental pollution from small operational events to worst case ones. The tiered approach represents the best opportunity to structure and build these preparedness and response arrangements in a consistent and effective manner that facilitates the integration of local, provincial, national, and international response resources. Tiered preparedness and response involves response gap analysis, geographic response plans, oiled shore/coastal sensitivity mapping, and risk/incident scenario developments. It is followed by mutual aid agreements and exercises with identified resource providers (salvage companies, oil spill cooperatives/organizations, technical specialists, etc.)
<i>Information Management & Dissemination</i>	Incident information should be based on “one evaluation” and “one message”. There should be a single web-base incident situation site that provides all situational information as provided in near real-time and without interpretation. Ideally, this is the same situational information that the Incident Management Team is working with, and includes posted Incident Action Plans. The performance and agency/industry contribution to response efforts are provided by command-approved media releases. There should be a Joint Information Centre that accompanies the Incident Command Post to provide this public service. Social media should be part of the information dissemination.
<i>Salvage & Pollution Control</i>	Salvage operations is about preventing and mitigating the environmental threat of polluting products and of the vessel itself. Salvage includes the training and protocols undertaken by the vessel’s captain and officer so as to not exacerbate the situation by undertaking poor handling of the compromised vessel before salvage operations begins. Ideally, salvage is done by expert salvor and pre-positioned specialized equipment that can be augmented with national and international resources. Salvage operations are integrated within the incident management system.
<i>Resource Information Scope & Access</i>	Resource information such as coastal uses, ecologies, habitats, etc should be readily available for both emergency planning and response. Ideally, the information should be publically available on the internet and based on the best technologies that combine Google Earth imagery and Geographic Information systems (GIS). This web-based resource information can include fly-along shore videos and imagery. The capability to download “pdf” hard copy documents and files would facilitate information dissemination such as geographic response plans and plans/guides for places of refuge, oiled shore sensitivity and shoreline type maps etc. Full GIS capability is required at the Incident Command Post that is not reliant on internet services. Ideally, highly trained specialists that are also trained in incident management provide GIS services.
<i>Field Observation</i>	Field observation is important to provide situational information to incident management. Field assessments include pollution trajectory, shoreline

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& Assessments	contaminations, cleanup performance. Ideally, this is done by qualified technical specialists using technologies that gather data (GPS, images, measurements) and that can be interpreted to guide response operations. Assessments need to reflect local/regional values and be scientific in nature. Field observation records should be included in the situational reporting and made public without interpretations.
Product Control	Product control is the actual recovery and/or containment of a released pollutant that may be oil, as well as other cargos such as containers. Control equipment should be rated for the product they are to recover - especially oil. The equipment – both individual apparatus and as a system needs to be tested under an industry-approved standards, as well as by an independent third party. The equipment must then be rated for the environmental conditions it is expected to perform under (water temperatures, salinities, waves, currents etc.). Response gap analysis should be done to determine where pollution recovery is not practicable both seasonally and by working environments. Such information should be mapped and ideally be part of Geographic Response Plans. Response equipment's rating, testing, and analysis are a measurement of reality.
Establishing a Workforce	Large environmental incidents – such as an oil spill – are often reliant on converging, public volunteers to provide operational response capability and capacity. Ideally, such support should be managed by establishing a workforce from these volunteers that are registered, assessed, assigned, trained, supervised and paid. These steps are important management and safety measures. Workforce establishment and management need to be exercised. Ideally, surveys need to be done to determine the availability and composition of potential workforce participants, rather than assuming people will be forthcoming in their services – particularly for oil spills.
Treatment & Remediation	What shores or areas affected get treatments and to what degree embeds all values: social, cultural, financial and ecological. The treatment of polluted shores and structures should ideally be viewed as a “work project” not an emergency endeavor. This provides time for thorough assessment of impacts to guide operations, ensures no more damage is not done (net environmental benefit), and that determinations of when to treatment is complete (end-points) are acceptable to agencies and stakeholders. Data collected should have utility for post impact monitoring and for damage compensation determinations.
Protection and Care of Harmed Wildlife	The protection and care of harmed wildlife is a moral as well as ecological matter than needs to be addressed at the same level of organization and resourcing as cleaning contaminated shores. Ideally, wildlife care delivery is by a paid, trained workforce managed by a professional wildlife care provider. As the workforce would be largely derived from non-government wildlife care/rehab groups, particular attention is needed on balancing what are reasonable measures held by the Responsible Party and government agencies, with what values of the workforce members hold. These financial versus ethical values need to be understood and appreciated so as not to not create conflict.
Pollution Minimization	Whether recovering a pollutant on water or on land, opportunities to minimize wastes should be explored and applied fully. Ideally, the objective is not to create more wastes than absolutely necessary. This requires guidelines supported by training and response monitoring. Ideally, wastes should be managed as close to the collection source as possible, which can include in-situ burning and treatments.
Post Impact	Post-impact monitoring is a continuum of the incident from the first field observations

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<i>Monitoring</i>	to final treatments of harmed shores and structures. Ideally, positive relations fostered during the incident's management fosters a cooperative and engaging post impact monitoring. The data collected during the incident is scientifically sound, and the credentials of specialist gathering the data has been accepted by all parties.
<i>Damage Compensation</i>	A common goal of emergency response is that actions are reasonable measures and expenditures. This suits the interest of the Responsible Party, or whoever is paying for response. "Reasonableness" is an economic efficiency position, not one of equity. Efficient measures can often led to residual environmental impacts. Ideally, compensation as a monetary award is provided for any unmitigated losses to those that realized them. This includes the loss of the goods and services that a healthy environment provides to local communities, not just compensation of economic (private) damages.

APPENDIX 3: End Notes

These end notes provide insights, history, and information that augments the issues and solutions examined in this document.

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- ¹ “Coastal First Nations” for the original issues and solutions statement of June 2013 is an alliance of First Nations on British Columbia’s North and Central Coast and Haida Gwaii that include Wuikinuxv Nation, Heiltsuk, Kitasoo/Xaixais, Nuxalk Nation, Gitga’at, Haisla, Metlakatla, Old Massett, Skidegate, and Council of the Haida Nation.
- ² The Tanker Safety Expert Panel’s mandate was to conduct a pan-Canadian review and assessment of Canada’s marine oil spill preparedness and response regime as it applies to oil handling facility and ship-source oil spill preparedness and response. In November 2013, the Panel released its first report titled: *A Review of Canada’s Ship-source Oil Spill Preparedness and Response Regime - Setting the Course for the Future*. Information the Tanker Safety Expert Panel and access to their report can be found at: <http://www.tc.gc.ca/eng/tankersafetyexpertpanel/menu.htm>
- ³ “Major marine vessels” include oil tankers and barges of 150 gross tons (GT) and above, and all other vessels of over 400 GT which are generally sea-going (convention/international) vessels.
- ⁴ In March 2000, the bulk carrier *M/V Bovec* dragged anchor in high winds and grounded in Tuck Inlet within Prince Rupert Harbour. No oil was released. On 25 September 2009, the bulk carrier *M/V Petersfield* experienced a malfunction of its gyro heading feed and struck the west shore of Douglas Channel, B.C. The vessel sustained extensive damage to its bulbous bow, forepeak and collision bulkhead. These are just two of six reported incidents between 1998 and 2008. Refer to Transportation Safety Board of Canada Marine Statistics (2009): <http://www.tsb.gc.ca/eng/stats/marine/index.asp>
- ⁵ “Regulatory agencies” include, but not limited to Transport Canada, Fisheries and Oceans Canada, Environment Canada, and BC Ministry of Environment.
- ⁶ The regime is called: *Canada Marine Oil Spill Preparedness and Response Regime*. It is delivered by five Transport Canada-certified Response Organizations located across Canada. There is only one Response Organization in British Columbia (Western Canada Marine Response Corporation). The organizations are privately funded from fees received by major vessel owners/operators and coastal oil handling terminals (<http://www.tc.gc.ca/eng/marinesafety/oep-ers-regime-menu-1780.htm>)
- ⁷ The “regulations and standards” referred to the *Response Organizations & Oil Handling Facilities Regulations* and the *Environmental Response Arrangements Regulations*, as well as the *TP 12401, Response Organizations Standard*; and *TP 12402, Oil Handling Facilities Standards*. These mid-1990s regulations are expected to be repealed and replaced by a new environmental response regulation and a new standard. The changes are more administrative than substantive whereby will be consolidated into one Environmental Response Standard.
- ⁸ The legal limits that a shipowner (Responsible Party) is required to finance incident management and response is defined under the federal *Marine Liability Act*. Once they have reached this threshold, they can be released from further obligations, and the response is transferred to the Canadian Coast Guard. From the point on all costs have to be accounted for, compiled, and submitted as a claim to other international compensation funds (for persistent oil spills from tankers) and/or Canada’s *Ship-source Oil Pollution Fund*.
- ⁹ If expenditure and/or compensation claims are not accounted for or felt to be unreasonable by claims managers, they will not be reimbursed. Also, claims that exceed compensation fund thresholds will not be available.
- ¹⁰ In the case of the *Exxon Valdez* 1989 incident, the factors included ice in a channel, a tired crew, a nighttime passage, an impaired captain, mistakes in helm orders, locked-on autopilots, missed warning from fixed navigation aides.
- ¹¹ Low probability, catastrophic events are difficult to forecast. Often these are events that are without precedents such as the September 11, 2001 Trade-Tower incident in New York (911 Incident), October 19th, 1987 Stock-Market crash (Black Tuesday), April 20, 2010 Deepwater Horizon oil spill in the Gulf of Mexico, November 2012 Sandy Hurricane on Eastern Seaboard. What caused the event is generally assessed on hindsight by examining a chain-of-errors that led to the mishap. Very low probability, but high consequence events are often referred to as “Black Swan” events. It is a metaphor that describes an event that is a surprise (to the observer), has a major effect, and after the fact is often inappropriately rationalized with the benefit of hindsight. The Black Swan theory was developed by Nassim Nicholas Taleb to explain:

- The disproportionate role of high-profile, hard-to-predict, and rare events that are beyond the realm of normal expectations in history, science, finance, and technology
- The non-computability of the probability of the consequential rare events using scientific methods (owing to the very nature of small probabilities)

The psychological biases that make people individually and collectively blind to uncertainty and unaware of the massive role of the rare event in historical affairs.

¹² “Regulatory agencies” include, but not limited to Transport Canada, Fisheries and Oceans Canada, Environment Canada, and BC Ministry of Environment.

¹³ Nuka Planning and Research studies commissioned by BC Ministry of Environment (October 2013) provides key elements for a world-class system for coastal protection that includes spill prevention, preparedness, response and recovery enhancements. It also addressed the range of needs to effectively manage a major vessel casualty, not just oil spills. The study consists of three volumes (<http://www.newsroom.gov.bc.ca/2013/10/study-sets-foundation-for-world-class-marine-spill-plan.html>):

- Volume 1 - An assessment of the existing marine-spill prevention and response regime in place for B.C.
- Volume 2 - A vessel traffic study assessing the current and potential levels of shipping on the west coast of Canada and the current volume of hydrocarbons being shipped or used as fuel.
- Volume 3 - An analysis to identify international best practices and the elements required for establishing a world-class marine spill preparedness and response system.

¹⁴ In November 2013, the Panel released its first report titled: *A Review of Canada’s Ship-source Oil Spill Preparedness and Response Regime - Setting the Course for the Future*. Information the Tanker Safety Expert Panel and access to their report can be found at: <http://www.tc.gc.ca/eng/tankersafetyexpertpanel/menu.htm>

¹⁵ The gulf between industry and environmental sectors is widening particular in the oil transportation sectors -- both marine vessel and inland pipeline. This situation does not have to be the case. There is more common ground between industry, agencies, communities, NGOs than appreciated. This situation was recognized in the United States after the 1989 *Exxon Valdez* tanker oil spill. The solution was to establish long-- term funding for public (citizen) oversight committees with a--range of community and industry representation. There was also support from US regulatory agencies and oil corporations to participate and work with these committees and councils. See: *Cook Inlet Regional Advisory Council* (<http://www.circac.org>) and *Prince William Sound Regional Advisory Council* (<http://www.pwsrac.org>)

¹⁶ Rhetoric the art of persuasion where public speakers try to persuade audiences to accept a certain point of view. Rhetoricians are not constrained by facts or truth. Their goal is to get their audience to believe in a "preferred reality" -- that is, the reality they want people to believe. Because the goal of rhetoricians is to sway opinion. The line between science and rhetoric is becoming increasingly blurred.

¹⁷ “Oversight” is when environmental and industrial NGOs - as well as agencies, First Nations and general public - have access to information on industry and conservation practices. Readily available information can then be used to evaluate existing environmental protection measures and practices, as well as identify safety or preparedness gaps. By working with the same and complete information provides an opportunity to develop common solutions towards industrial safety and risk mitigation. It is goes beyond just passive monitoring and information exchange. Oversight involves engagement by all stakeholders. Experts in marine vessel matters: prevention, response, etc. – report their findings and understandings to the oversight group based on their regionally-based questions and requests.

¹⁸ Committees and groups established by government and or industry to guide in marine vessel casualty prevention and oil spill preparedness such as Transport Canada’s Regional Advisory Committees, and the Canada Marine Advisory Committee do not provide adequate First Nations and coastal community representation, transparency, and collaboration.

¹⁹ The common approach to making a community whole again is just expect a quick respond, pay for response services and damages, the hope the bad situation just fades away over time. This is a too simplistic a strategy to mitigate the long term impacts on the well being of coastal people.

²⁰ The studies commission by the BC Ministry of Environment undertaken by Nuka Research and Planning Group (<http://www.nukaresearch.com>) endorsed need and approach for a public oversight group. BC Chamber of Shipping’s submission to the Expert Panel on Tanker Safety (<https://www.tc.gc.ca/eng/tankersafetyexpertpanel/menu.htm>) also suggested consideration of the public oversight modeled after successful regional advisory committees in Alaska (https://www.tc.gc.ca/media/documents/mosprr/Chamber_of_Shipping_of_British_Columbia.pdf). In contrast, the Expert Panel on Tanker Safety recommendation #37 called for disbanding Canada’s six Regional Advisory Committees that reports to the Minister of Transportation – which are essentially a public oversight group. Instead, the Panel recommends

establishing a single senior-level Interdepartmental committee within government of experts to provide enhanced stewardship and oversight.

²¹ Alaska established regional citizens advisory councils (RACs) after the *Exxon Valdez* tanker incident in 1989: the *Cook Inlet Regional Citizens Advisory Council* (<http://www.circac.org>) and the *Prince William Sound Regional Citizens Advisory Council* (<http://www.pwsrac.org>). Interest groups represented in these councils include: tribal organizations, chamber of commerce, environmental groups, recreational groups, commercial fishing groups, and aquaculture associations. These regional councils have dedicated funding to monitor and undertake special oil spill and vessel casualty risk mitigation studies that are often undertaken together with industry. Within the State of Washington, there is the *Puget Sound Harbor and Security Committee* (<http://pshsc.org>) which is a collaborative organization of public and private maritime organizations. It has voting members, as well as representatives from aquaculture, commercial fishing, environmental groups, labour, tribal (First Nations), and more. Government agencies also participate. The committee's mission is to:

"to provide a proactive forum for identifying, assessing, planning, communicating, and implementing those operational and environmental measures, beyond that which is in laws or regulations, that promote safe, secure, and efficient use of Puget Sound and adjacent waters."

²² The typical reaction is for governments after a major environmental incident is to call for a public enquiry or panel. This was the case for the post 1989 *Nestucca* oil barge and 1989 *Exxon Valdez* oil tanker incidents. This brings oversight to the forefront for a short period for fact finding and analysis. The solutions provided can then linger for years with little effort to assess delivery performance and success -- that is because oversight is no longer occurring. In British Columbia, the *Citizens Advisory Committee on Oil Spills* was established soon after the David Anderson (1989) *Report to the Premier on Oil Transportation and Oil Spills* was released by the Provincial government to provide post-enquiries "oversight". The committee was tasked with monitoring the implementation of recommended measures directed to oil spill prevention and response preparedness. Representation included environmental non-government organizations, First Nations and government. This committee that was disbanded in 1993. There has been no oversight group with this mandate since.

²³ An example of capacity reduction is the recent elimination of Regional Environmental Emergency Team (REET) managed by Environmental Canada's, as well as their emergency planning personnel located in Vancouver. The REET function was moved to Eastern Canada.

²⁴ Canada's *Pacific Gateway* (<http://www.pacificgateway.gov.bc.ca>) is a national strategy responding to the rise of Asian economies that provides a framework for policies, investments, and initiatives that to make Canada a more competitive exit and entry point in North America for Canadian goods (oil, ore, containers, bulk goods, etc). It has federal, provincial, and regional levels of engagement.

²⁵ The emphasis is on "regionally" measures to reduce vessel casualty risk related to navigational aids, pilotage practices to handle larger vessels and protocol to avoid traffic congestion, etc. This is additional oversight and efforts currently done by industry and regulator agencies under IMO convention/*Canada Shipping Act* compliance.

²⁶ A strategic position for First Nations, as well as any other jurisdiction - during the management of a major vessel casualty and any resulting pollution can be accomplished through the use of the Incident Command System (ICS) and being situated in Unified Command (UC). Once in UC, all parties can then jointly develop response objectives and strategies, to approve Incident Action Plans, and to augment the response efforts with their personnel and equipment. These activities are done in the Incident Command Post. This requires training and exercising in ICS, as well as building relationships within the industry/government response community.

²⁷ Establishing a field observation capability requires have the training and resources to undertake aerial observations of oil or pollution on water, as well as shoreline assessments. There are standardized procedures and processes to do build this specialization, such as *Shoreline Cleanup Assessment Techniques* (SCAT).

²⁸ Logistical support is one of the most significant challenges in coastal response to a major pollution event. Logistical support is the most advantageous for First Nations as it utilizes locally knowledge and expertise, minimizes exposures to pollutants, and has the highest economic returns. Logistics support for on-shore and on-water operations is accomplished through the use of existing small vessels (vessels-of-opportunity), specially designed emergency vessels, or both.

²⁹ Shoreline cleanup has is probably the lowest benefit to First Nations and other coastal community people. The focus of shoreline cleanup training can be on establishing trained and motivated area (Division) supervisors and cleanup workforce crew team leaders, rather than a cadre of general workforce personnel. The training can include the maintenance and exercising of equipment depots and how to manage "staging" areas, which are generally outside the contamination zones.

³⁰ Emergency rescue refers to the use of a large ocean going tug (also referred to as an Emergency Towing Vessel – ETV) that made itself available (i.e. a tug-of-opportunity) to secure a disabled vessel to hold it in place or tow it to a place of refuge. Salvage is a specialized service that can include the off loading its cargo and fuels, and to remove a wreckage so as to prevent or minimize environmental damage. Places of refuge refers to making a decision regarding the disposition of a vessel needing assistance.

³¹ Community-based emergency training has the potential to benefit coastal people if it improves emergency management that facilitates integration with the industry and other agencies during a vessel casualty, reflects the logistical challenges of response in remote areas, as well as provides additional emergency capability within the community for other threats, such as fire, search and rescue, severe storms, seismic, etc.

³² Geographic Response Plans (GRPs) provide recommended spill response strategies that responders can use. The strategies can be very specific about locating booms, staging areas for equipment, finding temporary storage areas for oily wastes, locating a command post, accessing places for response equipment for sea deployment, finding a facility for a temporary Wildlife Care (Rehabilitation) Centre, and more. A GRP can incorporate spill risk ranking trajectory modeling that predicts where and how long it will take for the oil or other cargo to affect sensitive resources. Also modeling can be used to determine the likelihood of a vessel requiring a place of refuge using vessel traffic patterns and drift analysis. Places of refuge for major vessels can include consideration of anchorage suitability, as well as associated environmental risk.

³³ BC Coastal Resource Information System by GeoBC (<http://geobc.gov.bc.ca/base-mapping/coastal/index.html>) is a product of extensive video-taping, mapping, and coastal resource documentation since the early 1990's for marine oil spill preparedness, and later for planning coastal land use and marine protected areas. Over 29,000 km of BC coast has been video-taped and mapped on a Geographic Information System. The system also includes information coastal shore oil sensitivity.

³⁴ BC's coastal resource mapping and data system is fragmented and in accessible to only a few GIS personnel within the provincial government. There is no ongoing training in the use of the system. There is no commitment to making the information physically and intellectually accessible and does not inspire community confidence that it would be kept both current and available when needed during an emergency.

³⁵ There are Geographic Response Plan initiatives being advanced or considered in BC, such as those by *Western Canada Marine Response Corporation* (<http://wcmrc.com>) with technical support from the *Strategic Natural Resource Consultants Inc.* Environment Canada's *Environmental Emergencies Management System* (E2MS) also undertaking coastal mapping with the support of the National Wildlife Research Centre's Geomatics Lab's (<http://dev.nwrc.carleton.ca/Default.aspx>) These are being done in isolation of each other, and without broad harmonization consultation with the province, local governments, or First Nations.

³⁶ Considerations for Geographic Response Plans and their management, content, structure and dissemination include: •Internet-based to allow access and up-dating for planning purposes •structured content to serve as a database of information, rather than just text (pdf) documents. •Searchable information that is down-loadable (e.g. maps, contacts) to be both operational and to support internet-based situation reporting. •Includes guidance documents (e.g. Operational Guidelines, Response Plans).

³⁷ *Alaska Ocean Observation System* (AOOS) focus areas are:

- Safe marine operations
- Coastal hazard mitigation
- Tracking ecosystem and climate trends
- Monitoring water quality

What is unique about AOOS is promotes increased access to existing coastal and ocean data in useful ways to meet the needs of stakeholders such as public, agencies, NGOs, industry, fishers, teachers, search and rescue, and more. It is based on Google Earth as its foundation, but includes interactive nearshore video and photo graphs taken from aircraft. It has the capability to download pdf files and images linked to shore areas, and more. (See: <http://www.aos.org>). Within the AOOS is *Cook Inlet Response Tool* (CIRT), developed by the *Cook Inlet Regional citizens Advisory Council* represents a state-of-the-art response tool. It was recently used in the Kulluk drilling rig incident on Kodiak Island of Alaska, where responders were searching for the best possible place of refuge.

³⁸ Provincial resources for Geographic Response Plans include coastal resource and oil spill sensitivity mapping prepared and managed by *GeoBC*, whereas for First Nations can include use of their *Marine Planning Partnership for the North Pacific coast* (MAPP) program (<http://mappocean.org>).

³⁹ A place of refuge is a place where a ship in need of assistance can take action to enable it to stabilize its condition and reduce the hazards to navigation, and to protect human life and the environment.” A place of refuge decision also include having the vessel repaired in place, continue its voyage, allow to ground, or be scuttled.

⁴⁰ There are other guidelines written at international to provincial levels to facilitate decision-making on a place of refuge for a major vessel under distress: International Maritime Organization’s *Guideline on Places of Refuge for Ships in Need of Assistance* – international; Pacific States/BC Oil Spill Task Force’s *Places of Refuge Annex* – Pacific West coast (from Alaska to California, including Hawaii), and Ministry of Environment’s *Operational Guideline on Places of Refuge Decision-making* – provincial.

⁴¹ The *National Places of Refuge Contingency Plan* (PORCP) (<https://www.tc.gc.ca/eng/marinesafety/tp-tp14707-menu-1683.htm>) states that Transport Canada’s regional:

Procedures and arrangements should take into account and, where appropriate, build upon existing procedures and plans. Consideration should be given to identifying any specific needs, issues and concerns of stakeholders that would need to be taken into account in decisions related to a place of refuge. Each TC Marine Safety region should bring the PORCP to the attention of the various port, local, regional authorities so that existing contingency plans and emergency procedures can be reviewed and updated as needed. Contingency plans should take into account foreseeable accident scenarios that might result from the granting of a place of refuge and what measures might be taken to reduce the consequences.

⁴² The *National Places of Refuge Contingency Plan* defines stakeholder as: “... any individual, group, or organization to affect, be affected by, or believe it might be affected by a decision or activity.”

⁴³ Identifying “Potential” places of refuge recognizes that there is no perfect mooring or anchoring site for all vessels and all situations. Larger vessels, such as oil tankers and freighters, cannot be taken to certain locations. Some ports may have shallow approaches or small-sized bays, and large ships cannot enter these locations. Decision-makers must address both environmental and operational issues when deciding where to take stricken vessels.

⁴⁴ A risk assessment model identifies a potential place of refuge’s (POR) anchoring and services suitability for a particular vessel size and type, natural resources threatened, health and safety of near communities, and economic disruptions. It then provides comparative weightings each of the factors and to several POR alternatives to assist in a final decision to direct a vessel the POR, if at all. A Vessel Transit plan ensures the safest routes are chosen and all contingencies are examined.

⁴⁵ An example of a response gap analysis was in Prince William Sound, Alaska for Trans-Alaska oil tankers by the *Prince William Sound Regional Citizens’ Advisory Council* (<http://www.pwsrcc.org/programs/oil-spill-response/oil-spill-response-gap/>)

⁴⁶ The principle of tiered preparedness and response is to ensure appropriate resources can be mobilized rapidly and escalated to provide an effective response to any oil spill - including a vessel casualty (e.g. salvage operations). These resources are sourced locally to internationally depending on assessed needs. A tiered approach is a long-standing, internationally recognized system employed for categorizing and structuring levels of oil spill preparedness and response. The *International Maritime Organization* (IMO) sets out this principle for establishing national oil spill preparedness and response capabilities as per the *Convention on Oil Pollution Preparedness, Response and Co-operation* (OPRC). A tiered approach is not well developed in Canada, and is not a regulatory requirement for industry preparedness to a vessel casualty and accidental pollution. Tiered preparedness requires the application of response gap analysis, coastal resource oil sensitivity mapping/analysis, species at risk considerations, and incident risk and scenario development.

⁴⁷ As a result of the 1988 *Nestucca* tug and barge collision and the 1989 *Exxon Valdez* oil tanker grounding, marine emergency preparedness and response mechanism became enshrined into the *Canada Shipping Act* and its regulations - at least for the oil spill consequence. The regulation that followed these events was the: 1993 *Response Organizations and Oil Handling Facilities Regulation* (<http://laws-lois.justice.gc.ca/eng/regulations/SOR-95-405/>) This regulation establishes an entity called a “Response Organization.” Owners of ships and coastal oil handling facilities identified by the regulation are required to have an arrangement with a Response Organization to handle an oil spill that they are responsible for. A Response Organization has to meet specific spill response planning and preparedness standards to be federally certified by Transport Canada. These are the “*Response Organizations Standards*” set out in Transport Canada’s 1995 TP 12401 E document (<https://www.tc.gc.ca/eng/marinesafety/tp-tp12401-menu-2162.htm>). Once certified, a Response Organization can collect retainer fees from vessel and oil handling facility owners to buy response equipment (vessels, booms, skimmers), to hire staff, and to undertake spill preparedness planning. These fees do not pay for response.

⁴⁸ The relevant existing *Canada Shipping Act* regulations are expected to be repealed and replaced in 2011 by new environmental response regulation and standard to bring the requirements under CSA 2001. The changes are more administrative than substantive whereby:

- The *Response Organizations & Oil Handling Facilities Regulations* and the *Environmental Response Arrangements Regulations* will be consolidated into one Environmental Response Regulation;
- The *TP 12401, Response Organizations Standard*; and *TP 12402, Oil Handling Facilities Standards* will be consolidated into one Environmental Response Standard.

⁴⁹ Lesson learned that can be applied to improved standards for Canada's Response Organization planning, preparedness and response can include managing convergent volunteers as a workforce (2007 *M/V Coco Busan*: San Francisco, USA), minimizing oily wastes (2007 *M/T Hebei Spirit*: South Korea), dealing with oiled wildlife (2006 *M/V Westwood Anette* and 2007 *M/V Andre*: British Columbia), or in-situ burning technologies (Deepwater Horizon drill rig incident: Gulf of Mexico).

⁵⁰ The current and revised standard for Response Organizations calculated their tiered levels (10,000 tonne) response capacity based on cumulative ratings of booms, skimmers, and pumps designed for different types of oil from light diesels to heavy bunkers. Many small skimmers suitable for light oils will not work on heavy oils, and *vice versa*. As such, a 10,000 tonne rated capability needs include only the equipment that will be effective for each oil product being exported. That is there needs to be 10,000 tonne rated capacity for light fuels, and another 10,000 tonne rated capacity for heavy fuels – not combined resources.

⁵¹ Canada's Response Organization does not stipulate preparedness for ocean-ocean (exposed) sea conditions that are typically undertaken by large, specially designed skimming and booming vessels. *Western Canada Marine Response Corporations* "Enhanced Area of Response" ends at the entrance to the Juan de Fuca Strait. Such large sea-going vessel's located in Canada are generally buoy-tending vessels that are equipped with side-sweep booms and skimmer when need. Specifically designed –single purpose - response vessels would need to be sourced internationally from the United States, Europe, and/or Asia. It is expected that the Canadian Coast Guard would source and manage such resources.

⁵² The *Guide to Tiered Preparedness and Response* is one of a series produced by the *International Petroleum Industry Environmental Conservation Association* (IPIECA) (<http://www.ipieca.org/publication/guide-tiered-preparedness-and-response>). The full series of reports represents the IPIECA member's collective contribution to the global discussion on oil spill preparedness and response.

⁵³ The term "Responsible Party" doesn't infer fault for the incident or spill. A RP can also be a government agency who as taken over or assumed an incident management/command role.

⁵⁴ An example of vessel documentation is the US Coast Guard's *Maritime Information Exchange* (Port State Information Exchange) to provides a database of major seagoing (convention) vessel information and their inspection status (<http://cgmix.uscg.mil>).

⁵⁵ There are several third-party web-site that provide comprehensive information on major marine vessels. Some require registration/subscription. An example is Q88 that is used by Charterers, Brokers, Agents, Suppliers, Terminals, Port Authorities, Spill Response (<https://www.q88.com>), World Shipping Register (<http://www.world-ships.com>), and Oil Companies International Marine Forum's Ship Inspection Report Programme (SIRE) (<http://www.ocimf.com/SIRE/Introduction>)

⁵⁶ SUBMERGED OIL is defined as oil that is below the water surface and is in the water column and may re-appear, whereas SUNKEN OIL is defined as oil that has been deposited on the floor of the sea, lake, or river. Oils with a specific density near 1.0 (close to receiving water density) may rise and sink as water temperature or water density (salinity) change – exhibiting either a submerging or sinking behaviour. Once they weather (evaporate, oxidize, emulsify) some heavy fuels such as Intermediate Fuel Oil 360 – and even more viscous types - used as a vessel's bunker fuel can potentially submerge or sink, as well as several bitumen-based unconventional oil transported as a tanker's cargo.

⁵⁷ *2012 Shorelines and Oil Spill Response in British Columbia, Training Course Notebook*. Prepared for BC Environment by Polaris Applied Sciences, Inc. states regarding current response capabilities for either submerged or sunken oil as:

"There are no proven techniques for locating oil that is neutrally buoyant and suspended in the water column"
"Containment and removal efforts for neutrally buoyant oil will likely be ineffective. No proven techniques exist for containing oil in the water column, or for removing oil from large volumes of water"

⁵⁸ The Incident Command System (ICS) is a common, proven organizational structure employed by many companies and government agencies throughout Canada, United States, and world-wide to manage emergencies of all types and scales: such as a spill, vehicle accident, flood, severe storm. The use of the ICS and preparation of response plans

addresses the “timeless tactical truth”: Effective emergency response needs effective organization. An Incident Management Team employs the ICS, principally at an Incident Command Post.

⁵⁹ Both the US federal and state governments are required by law to use ICS for emergency management, which provide international consistency with the Province of British Columbia for a cross-border marine incident, but not with the federal government.

⁶⁰ The United States Transport Vessel *Brigadier General M.G. Zalinski* ran aground during a storm and sank in Grenville Channel while enroute to Alaska from Seattle. It lies upside down in about 90 feet of water, roughly 100 kilometres south of Prince Rupert. The vessel has been the source of numerous small oil leaks over the last decade as the ship slowly deteriorates, releasing oil from the fuel tanks. The CCG, as the lead federal agency, announced plans in July 2013 to address the ongoing threat of pollution by removing the fuel on board, as well as potentially addressing other hazardous materials and munitions in the ship's cargo. It conducted its operations beginning in December 2013 and the salvage company successfully removed most of the oil over three months of operations. Info: <http://www.dfo-mpo.gc.ca/media/infocus-alaune/2013/zalinski/zalinski-eng.htm> and http://www.env.gov.bc.ca/eemp/incidents/2013/brigadier_zalinski.htm

⁶¹ British Columbia has only one Transport Canada-certified Response Organization to services its coast: *Western Canada Response Corporation (formally Burrard Clean Operations)*. Their headquarters are in Burnaby.

⁶² *Western Canada Response Corporation* regularly invites First Nations to participate in its exercises required for re-certification by Transport Canada.

⁶³ The BC Ministry of Environment has historically and consistently taken the initiative to resolve the divergent response approaches and policies. After the 1989 *Nestucca* oil barge incident, the Province recognized that the 1981 agreement titled: *An Understanding between Canada and British Columbia Concerning Federal and Provincial Responsibilities in Oil and Hazardous Material Spills (1981 Spill Agreement)* did not serve the interests of the province, First Nations, Local Government or industry who sought an integrated response to a marine vessel casualty - whether the incident results in a spill or not. The 1981 agreement promotes a “one lead agency” approach, rather than a unified (shared) command and integrated response team with other jurisdictions. Since 1995 a draft *Memorandum of Understanding between Canada/British Columbia on Environmental Emergency Interaction* has been on the table with little or no federal interest in addressing.

⁶⁴ For 20 years, the federal government model for marine oil spill response, other stakeholders - regardless of standing (senior jurisdiction's representative, First Nations elder, or a junior biologist) - are not part of the CCG's Incident Management Team. Instead they are accommodated by another separate team - the federal *Regional Environmental Emergency Team (REET)*. The REET is essentially an “arms-length” committee. It has only an advisory role to the CCG, when asked. The REET members are kept separate from CCG's Incident Management personnel. The REET members are primarily tasked with establishing environmental response priorities and to provide expert advice to the CCG's Federal Monitoring Officer or On-scene Commander. Essentially, the federal government brings two teams to one incident - the CCG's Incident Management (or Monitoring) Team and the REET. Since the Incident Command System became the main means for emergency management, most of the REET functions are now done and delivered by an Environment Unit (EU) within the ICS's Planning Section. Often the EU and REET are the same people trying to be in two places at the same time, but with different masters, processes and agendas. Now that the CCG has adopted the ICS in March 2013, such the REET might be replaced by just the EU.

⁶⁵ The Ministry of Environment - as the lead provincial agency for spills - response plans use ICS and the Unified Command protocol therein which reflects its emergency management program's mission statement: *Exemplary Environmental Emergency Management through Leadership, Organization, Team Work, and Shared Responsibility* (<http://www.env.gov.bc.ca/eemp/overview/principles.htm>).

⁶⁶ Transport Canada is responsible for the plans and policies for ship-source oil spill, but the Canadian Coast Guard of Fisheries and Oceans is responsible for the operational (tactical) delivery that includes incident management or monitoring.

⁶⁷ There is a misconception that responding to a major vessel casualty or resulting pollution is always an emergency situation that necessitates only one person in command to expedite decisions. This is maybe the case for a short period where decisions pertaining to lifesaving and imminent ecological threats are paramount. For the most part, responding to a casualty or pollution is a long protracted work project that requires a team effort that must balance a range of social, cultural, economic, and ecological values. This is accomplished under the Unified Command protocol within the Incident Command System, which in turn, creates a single agency/industry integrated response team.

⁶⁸ To use the services of *Western Canada Response Corporation* (BC's only certified Response Organization), there requires either a *Full Membership* (required for major ship owners and oil handling terminals), a *Subscriber Membership* (optional for other companies or an government agency/corporation) or a *Third Party Agreement* (Offered at the time of a spill). Full and Subscriber Memberships get a significant discount on services and equipment use, whereas a Third Party does not. A federal Treasury Board directive states that the CCG cannot have membership with an RO or sign a Third Party agreement with an RO – requires a bidding process. During the planned project of the *General Zalinski* oil removal in Grenville Channel (December 2013), it took several weeks for CCG to make contractual arrangements for *Western Canada Marine Response Corporation* to provide standby response services.

⁶⁹ Under the federal *Marine Liability Act (Part 6: Liability and Compensation for Pollution)*, a shipowner can legally release itself from incident management and response obligations once it reaches its level of financial responsibility. This can happen well before closure of an incident and much sooner than expected. As which time the shipowner is unwilling and unable to respond and the incident's management and operations is transferred to the lead federal agency - the CCG.

⁷⁰ The Canadian federal government adopted the 1990 Brander-Smith approach to ensure the Canadian Coast Guard will at all times have overall responsibility for oil spill. This policy is entrenched in the CCG's *Environmental Response National Plan*, Response Management System (RMS), their exercises, and the very core of their culture. Should the CCG assume control of a spill as an On-Scene (Incident) Commander, there is no strategic place for the Provincial and Local Government, or First Nations. This is because the CCG's *Environmental Response National Plan's* guiding principle pertaining to a lead agency role, states: f) *there can be only one lead agency with the authority and mandate to ensure overall management and responsibility for the monitoring of and management of a response to a pollution incident*. With the adoption of the Incident Command System in March 1993, the CCG will need to amend their response plans to employ Unified Command (shared responsibility) and team integration with other jurisdictions: provincial and local governments, First Nations, as well as the shipowner action as a Responsible Party
<http://www.tc.gc.ca/eng/mediaroom/releases-2013-h031e-7089.htm>)

⁷¹ Under the ICS, the management of public media is done by an Information Officer within the Command Staff at the Command Post. The intent is to ensure there is only "one evaluation and one message" being communicated. For a large marine vessel casualty/oil spill, information management needs to be done by a Joint Information Centre (JIC) by the Information Officers and supporting staff. The JIC is a separate room or building, with extensive organizational components. This approach ensures that the media and information dissemination does not interfere with actual management of the incident by the Incident Management Team located at nearby the Incident Command Post. The JIC is not well understood in Canada, particularly from the federal government agencies. The BC Ministry of Environment does have an operational guideline on this topic. There is a similar situation arises with Liaison Officer role as above. This another Command Staff position located at a Command Post. The Liaison Officer is the "meeter- and greeter" for people arriving at an Incident Command Post. The Liaison Officer needs to ensure that the right people are present to ensure full accommodation, collaboration and consultation. When the incident gets big, it requires that a separate Liaison Office be established near the Incident Command Post. The Liaison Officer role and that of its larger "office" organization are not well understood in Canada. The BC Ministry of Environment does have an operational guideline on this topic.

⁷² An area for potentially poor performance is the management of social media on the internet. To-date, there has been no planning and preparedness in the management of social media on the internet such as having a unified web-based situation report along with Facebook, Twitter, Google+, Tumblr, MySpace *etc.*, with technical support. This factor is of critical importance to communicate situation information, as well as response performance. Government, industry, and First Nations reputations are on-line here.

⁷³ "Assist" or "rescue" refers to "a tug or other vessel capable of attaching to and stabilizing a drifting disabled vessel, to arrest the drift until a suitable salvage/towing vessel can arrive on scene to provide necessary assistance, or that it can safely tow the vessel to a place of refuge.

⁷⁴ Referred to as a "tug-of-opportunity" that requires the tug to have a place to harbour its tow (logs, barge) and that the environmental conditions for rescue do not put the crew in danger. Successful actions also requires the captain and crew to have the training, skills, and equipment to "snag" a vessel and to keep it "at station" until additional assistance arrives or a place of refuge decision can be made on where to tow the vessel.

⁷⁵ The following reports addressed the issue of ocean rescue by tugs: the 1978 report on *Potential Pacific Coast Oil Ports: A Comparative Environmental Risk Analysis*, (Vol. 1): Fisheries and Environment Canada; the 1990 federal Brander-Smith Report titled *Public Review Panel on Tanker Safety and Marine Spills Response Capability* (rec. 6-8), and the provincial 1995 report titled: *A Review of Escort, Rescue and Salvage Towing Capability in Canadian Waters*, Prepared for the Canadian Council of Ministers of the Environment, by Robert Allan Ltd, and D.F. Dickens Associates Ltd.

⁷⁶ Study refers to the 2002 *West Coast Offshore Vessel Traffic Risk Management* project initiated by the *Pacific States/British Columbia Oil Spill Task Force* to evaluate rescue tug capability from Alaska to California. The study

determined the distances offshore where a dispatched rescue tug make it on time to secure a tow on a drifting vessel and hold it at station. An intersection line ("point of no return") were established for a "worst case" and "average" case situation, as defined by a vessel drift rates of 3.6 and 1.1 knots, respectively. Vessels that had the highest drift were container ships and LNG tankers.

⁷⁷ Transport Canada needs to review the 2008 five year status of the recommendations provided by the Pacific States/BC Oil Spill Task Force's *West Coast Offshore Vessel Traffic Risk Management* to ensure Canada is meeting the expectations of this report to mitigate major vessel grounding on the Pacific West Coast.

⁷⁸ For more information on towing requirement and equipment refer to the report *Peril at Sea and Salvage – A Guide for Masters* by the *International Chamber of Shipping*.

⁷⁹ Alaska's *Emergency Towing System* is a pre-staged package of equipment that may be deployed in the event a disabled vessel requires assistance in accessing a place of refuge (<https://dec.alaska.gov/spar/perp/ets/>). It is designed to use vessels of opportunity to assist disabled vessels that consists of lightweight high performance towline, a messenger line used in deploying the towline, a lighted buoy, and chafing gear. These components may be configured to deploy to a disabled ship from the stern of a tugboat or airdropped to the ship's deck by helicopter.

⁸⁰ Salvage operations is a specialized field that includes stability analysis of a damaged vessel, use of specialized hull patches, operation of large water and fuel removing pumps, underwater remotely operated vehicles (ROVs) and more. A salvage vessel is generally very large with both rescue towing and fire fighting capabilities.

⁸¹ In Canada, there is no legal requirement that major vessels entering its waters to have an arrangement with a salvage company, nor are there any specifies the performance requirements of a salvage company. In the United States there are legal requirements and specifications (http://www.donjon-smit.com/wp-content/themes/djs/documents/2008-12%20SMFF%20FINAL%20RULE_3.pdf)

⁸² There are companies that have salvage services or affiliations working in BC providing port tug services, but not salvage. There is no stationed salvor or salvage equipment. Svitzer Salvage had made recent inquires to provide such a presence if there is a business opportunity to do so. Smit Canada has some basic salvage equipment stationed in Port of Prince Rupert.

⁸³ Large international salvage companies include: *Svitzer, SMIT, TITAN, Donjon, Gililinus, Mammoet, and T&T Bisso*.

⁸⁴ Some international salvage companies provide vessel captain and crew specialized training on what to do if their vessel is grounded or otherwise compromised so as to reduce the threat of wreckage and/or cargo loss. An example is Svitzer Salvage's PreparAct™ program (<http://www.salvage-academy.com/salvageacademy/courses.html>)

⁸⁵ A local rescue tug may hold a major vessel at station such as a large oil tanker, but does not have the power and sea capability to tow it to a place of refuge. This is where a large salvage tug provides this capability.

⁸⁶ For ship-source oil spill, the lead federal agency is the Canadian Coast Guard of Fisheries and Oceans Canada - as stated in their policies and response plans. However, if there no oil spilled or little or no oil spill threat, it is not clear who is the lead federal agency: Transport Canada or Fisheries and Oceans Canada? Transport Canada has no incident management capabilities.

⁸⁷ Training provincial and federal Incident Commanders is important because the representative of the Responsible Party (shipowner) who takes a command role may not have any experience in incident management, spill response, salvage, etc. They may just be a ship agent or its Protection and Indemnity Club insurer (<http://www.igpandi.org>). In Canada there is no legal requirement or standards for this individual be qualified as an Incident Commander. In the United States there is: referred to as a "Qualified Individual" (<http://www.gpo.gov/fdsys/pkg/CFR-2002-title33-vol2/xml/CFR-2002-title33-vol2-sec154-1026.xml>)

⁸⁸ For each "Branch" established in the Incident Command System's Operations Branch - such as Wildlife Branch, Salvage Branch, Oil On-water Recovery Branch, Shoreline Cleanup Branch - requires a specific plan to be written by the Planning Section's Environmental Unit. These plans are written by technical specialists.

⁸⁹ In-situ oil burning with towed fire-boom was a major tool used in the Deepwater Horizon oil spill in the Gulf of Mexico. More than 400 burns were undertaken that eliminated between 220,000 to 310,000 barrels of surface oil. As a result, this

burned oil did not have to be clean from shores and expose responders to toxic vapours from fresh oil, and the oil didn't have to be collected, stored and disposed off as oily waste. For some days, there were many multiple burns in the Gulf.

⁹⁰ In the early 1990's, Environment Canada was a world-leader in researching on of how to burn spilled oil on water that is controlled with fire booms (referred to as "in-situ oil burning"). In the mid-1990s, the Ministry of Environment pursued the matter of how to make the decision for in-situ oil burning to ensure that air quality impacts from the soot plume does not become a public health concern.

⁹¹ The Ministry of Environment began drafting in 1995 the: *British Columbia/Canada In-situ Oil Burning Policy and Decision Guidelines* in keeping with the Pacific States/BC Oil Spill Task Force call for decision-guidelines for non-mechanical response methods.

⁹² The intent of the Ministry of Environment's guideline on in-situ oil burning was to have Fisheries and Oceans, Environment Canada and the Ministry of Environment sign-off on how and when to make a decision to undertake an in-situ oil burn. This has yet to happen; the report is still a draft 17 years later. The primary obstacle is that the MoE's Air Quality program is not convinced that public health is fully protected, despite millions of dollars of research stating that there are ample marine conditions and locales for in-situ oil burning to occur and health safety measures (monitoring, fire control, etc.) that can ensure public health is protected. The entire focus of the draft guideline is on ensuring that public health is protected.

⁹³ Net environmental benefits are the gains in environmental services or other ecological properties attained by actions, minus the environmental injuries caused by those actions. A net environmental benefit analysis (NEBA) is a methodology for comparing and ranking the net environmental benefit associated with multiple management alternatives. (<http://www.esd.ornl.gov/programs/ecorisk/documents/NEBA-petrol-s-report-RE.pdf>)

⁹⁴ Large oiled logs were burned during the 1989 *Nestucca* barge incident, but without any forced air to accelerate the burn. This caused a lot of smoke, and a tendency for oil to seep into the sediments.

⁹⁵ An air curtain incinerator is a simple set-up of having some side containment from cement blocks, or natural land indentation, and using gas powered air blows that force air into the fire by way of metal manifolds. This results in a very hot fire and minimizes smoke.

⁹⁶ There has been no design consideration for building portable incinerators for mobile oil on shore. However, the technology is there. They could potentially be built with off-the-shelf parts, and in expensively. They do not have to be long-lasting. The scale can be small; handling a buck of oil at a time, but continuously for 24 hours.

⁹⁷ For the past two decades, dispersants have been the tool of choice in many countries such as England, Norway, New Zealand, and Africa. In the United States, a large dispersant stockpile and delivery capability exists. It is the primary tool for some States, such as Hawaii. It was used in the Deepwater Horizon spill in the Gulf of Mexico, but with some controversy when injected directly into releasing oil from the damaged well-head. This was never an intended purpose for the use of dispersants.

⁹⁸ The following have stated their strategic position or level of interest in use of dispersants:

- *US National Research Council*: "The Overall Ecological Impact of Oil Will Likely be Reduced by Dispersion"
- *International Petroleum Industry Environmental Conservation Association (IPIECA)*: "In Most Regions it is Likely That the Dispersant Option Will Offer a Net Environmental Benefit for Some Oil Spill Scenarios"
- *American Society for Testing and Materials (ASTM)*: "The Trade-Off That Must be Evaluated is Between the Impact of the Relatively Long Residence Time of Spilled Oil Which Strands on Shorelines Versus the Short-term Impact of Dispersed Oil in the Water Column"
- *IMO/ITOPF/Commission of the European Communities*: "On Occasions, the Potential Benefit Gained by Using Dispersants to Protect Coastal Amenities, Sea Birds and Intertidal Marine Life May Far Outweigh Any Potential Disadvantages, As the Temporary Tainting of Commercial Shellfish"
- *IMO/United Nations Environment Program*: "The Possible Detrimental Effects of the Use of Dispersants Might be Offset by the Gains That Result From Keeping Other Parts of the Environment Clear of Oil".

⁹⁹ Environment Canada has a pre-approved list of dispersants suitable use for Canadian waters and maintains a toxicity database on treatment agents (SpillTox). Canada was also the first country to write a guide on this topic: Environment Canada's 1973 *Guidelines on the Use and Acceptability of Oil Spill Dispersants* (Rpt. EPS 1_EE-73-1) and wrote a 2nd addition in 1984.

¹⁰⁰ *Western Canada Marine Response Corporation* has three skimmers that could handle open ocean (offshore) environments if the conditions were suitable: Burrard Clean No. 9 (105 tonnes), Eagle Bay (30.6 tonnes) and MJ Green (30.6 tonne) (<http://www.wcmrc.com>)

- 101 Main component of the Canadian Coast Guard offshore oil recovery inventory is the Pharos Marine GT185 Skimmer. It would need modifications to process heavy oils. The July 2006, *Floating Heavy Oil Recovery: Current State Analysis*, report presented to: US Coast Guard Research and Development Center 1082 Shennecossett Road Groton, CT 06340 stated: *Initial testing with a Pharos Marine GT185 skimmer, a main component of the Canadian Coast Guard's recovery inventory, demonstrated that the equipment was unable to effectively collect the reffloated bitumen. When manually fed a quantity of bitumen, the GT185 was unable to pump product at a throughput that would be considered to be "operational". This initial test started a program to investigate and improve heavy viscous oil recovery operations in Canada.*
- 102 It has been generally understood by industry, *Western Canada Marine Response Corporation* and government that "volunteers" will not be used to rescue and treat oil birds, to clean oiled shores, or to remove oily wastes. Instead, a paid "workforce" will be used instead. Public can volunteer to register to be part of a workforce, but after that they are essentially employees. This condition would also apply to debris cleanup from a container vessel incident.
- 103 This rate of shoreline treatment is a minimum planning and preparedness level for a Response Organization to achieve to be certified by Transport Canada.
- 104 When the *Prestige* oil tanker sank near Galicia (Spain) in November 2002, there were over 10,000 people cleaning oiled shores. About 76,000 metric tons of heavy fuel oil was released. The 2007 *Hebei Spirit* oil tanker incident in South Korea resulted in over a million people cleaning oiled shores. It spilling about 10,800 metric tons of crude oil. When the container vessel *Cosco Busan* collided into a pier of the San Francisco-Oakland Bay Bridge and punctured its fuel (bunker) tanks, there were about 1,000 converging volunteers. It lost about a 1,000 tonnes of heavy fuel oil (IFO 380).
- 105 Other than a low Response Organization standard, there are also other reasons establishing a large a shoreline workforce in BC has not been given much attention. Oil spill exercises have - since the early 1990's - focused only on initial on-water response of an oil spill. Exercises typically end before oil has reached the shore. There has only been one oiled shoreline exercise. It was sponsored by Ministry of Environment (MoE) in 2010 for their Incident Management Team training. Another reason is that a perspective of the Canadian Coast Guard (CCG) is that MoE will be the primary government agency to assume the long, arduous task of managing shoreline cleanup along with the Responsible Party its response organization. This assumption has been fostered as a result of MoE's longstanding interest in *Shoreline Cleanup Assessment Techniques* (SCAT), its Coastal Resource Inventory and Coastal Oil Spill Sensitivity mapping, and that MoE had established a Workforce for shoreline cleanup in the early 1990's. Although MoE will have a strong interest and role in the assessment and treatment of oiled shores as Provincial Crown lands, it does not mean federal agencies can reduce or relinquish their involvement as a result.
- 106 The actual intensity of shoreline cleanup is determined by the spill itself, the decisions of Unified Command, and the availability of workers.
- 107 The combined resources of both CCG and WCRMC to equip and supervise an oiled shoreline cleanup workforce cannot match the potential of Ministry of Forest's Fire Protection. Fire Protection's people, tactical training and equipment used for forest fighting can be readily applied to shoreline cleanup with only some basic training and exercising. This has never been done or planned for.
- 108 The shoreline assessment process refers to *Shoreline Cleanup Assessment Techniques* (SCAT) that is an international and standardized way of measuring oil contamination, determining treatments, defining end-points, and signing of a shoreline as clean. The SCAT process must be done before a shoreline cleanup workforce is deployed to a shore area.
- 109 Between 1991 and 1995, the BC Ministry of Environment, with support and participation from CCG, Environment Canada, and Response Organization (then Burrard Clean Operations) established and delivered a shoreline workforce training program. Over 1,600 coastal community personnel received workforce certifications. When the program ceased, the resource materials have essentially been stored away and have become out-dated.
- 110 There has never been a Response Organization exercise in BC that has specifically addressed the registering, assignment, training, equipping and deploying of a shoreline workforce. There have been a few minor incidents such as the *Westwood Anette* bunker spill in Squamish on August 4, 2006 to garner some experiences, but only involved approximately 200 responders. (http://www.env.gov.bc.ca/eemp/incidents/2006/westwood_06.htm)
- 111 There as been no study or survey to test the assumption that coastal residents and other from British Columbia are both available and willing to participate in a workforce of oil spill cleanup - and that - there are enough people that are suitable for to establish a large workforce of several thousand participants.

112 Oily waste storage not only includes the recovered oil, but also other oiled debris and equipment such as booms, buckets, shovels, bags, and from the decontamination of oiled equipment such as vessels. Some consequences of not having adequate capability includes further contamination of the land-base and infrastructures (backshores, sidewalks, roads, piers) and the mixing of waste-streams (fresh oil, plastics, pails, sorbents, ropes).

113 A major oil spill produces large amounts and variety of oily wastes. The volume of oily waste can greatly exceed the initial volume of fresh oil spilled.

114 In Canada, British Columbia has probably made the most inroads to addressing oily waste management stemming from studies initiated over 20 years ago. In 1993, MoE wrote an oily waste management manual to guide the process of managing waste streams – fresh oil, oiled shoreline debris, contaminated equipment, *etc.* In the same year, there was an effort to inventory potential sites for final disposal/storage of oily waste. A strategic plan for the collection and disposal of oily wastes from a marine oil spill was also written. There has been little work in this area since. Refer to: 1993 *Inventory of Potential Sites for Disposal/Storage of Oily Waste*, and 1993 *A Strategic Plan for the Collection and Disposal of Oily Wastes from a Marine Oil Spill*, prepared for the BC Ministry of Environment, and Burrard Clean Operations (now called Western Canada Marine Response Corporation).

115 Canada's Response Organization standards - both current and revised – require and RO to have custody of oily waste continuously for a 24 hour period, and then have a capacity to temporary store at least twice that amount for two days.

116 The 1993 studies noted in footnote above to determine practical solutions for final oily waste disposal identified the constraints and capabilities in British Columbia regarding storage and disposal of oily wastes in landfills, land farms, incinerators, pulp mills, dry-land log sorts, cement plants, and asphalt plants. The findings revealed two types of impediments: either *technical* or *institutional*. Technical impediments are when a facility could not take the oily wastes for final disposal because it would disrupt or jeopardize its operations or cause environmental risk. Institutional impediments are those when facilities could technically handle the oily wastes, but provincial regulations or local bylaws would not allow them to receive them. For example, most landfills are not permitted to take large amounts of liquid oily waste (an institutional impediment), whereas pulp mills can burn waste oil, but do not want to risk contaminating its boilers with salt or plastics (a technical impediment). The conclusion of the study was that there are very few options for handling large amounts of oily waste in an emergency. This is the situation today.

117 Oily waste minimizing opportunities through out the course of spill response that includes:

- The use of Shoreline Cleanup Assessment Techniques (SCAT) in a manner that ensures only shores that need to be cleaned are worked on (e.g. many coastal high wave energy shores have a natural cleaning capability that is gentler on the environment than aggressive cleaning to remove oil).
- To adopt shore treatment completion standards (end-points) that relate to the oily waste disposal challenges (e.g. the cleaner a beach, the more oily waste generated).
- To undertake in-situ beach burns for disposal of large oily debris (e.g. oiled logs).
- To carefully manage and monitor shoreline workforce activities (e.g. ensure that responders are removing only the oiled sediment, and not the beach itself).
- To undertake shoreline treatment methods that utilize natural cleaning of oiled sediments (e.g. surf relocation of oiled beach sediments).

To minimize the use of sorbents for shoreline protection and cleanup that becomes an additional oily waste (e.g. fibre booms and cloths, peat-moss).

118 Expanding the oily waste management volumes is particularly important for heavy oils (Crudes and Bunker fuels) that can emulsify which increases the oil's volume with embedded water up to 80 percent.

119 The revised Environmental Response standard for Response Organizations doesn't add improvement to the existing one for oiled wildlife response. The new standard just requires a list of potential NGO wildlife rehabilitation groups and hired professional services that could be used by the Responsible Party.

120 Basic oil spill safety training is required before anyone can work within contaminated areas. This includes operations, workforce personnel, incident management team members, specialists undertaking shoreline assessments. Generally, this training takes about a half day of instructions.

121 Historically, the cost of wildlife response in British Columbia has been borne by non-government "volunteer" animal welfare organizations such as the *Society for the Prevention of Cruelty to Animals* and the *Wildlife Rehabilitators of British Columbia*. This is essentially a free service to the Responsible Party (spiller) and to the government trustees of the

wildlife resources affected (MoE, DFO, EC, CWS). As a result, there has been little work on defining reasonable measures and hence cost for oiled wildlife response.

122 There is only one professional wildlife response services with a presence in British Columbia: *FocusWildlife*. This contractor is familiar with the response dynamics related to incident management for wildlife response. There are several similar services in the United States, but have not exercised in B.C.

123 The provincial policy direction on oiled wildlife rescue and rehabilitation is: *To clarify the Provincial position regarding wildlife treatment, the Ministry will adopt guidelines for the rehabilitation of birds and animals, including endangered species*. Refer to: [BC Marine Oil Spill Prevention and Preparedness Strategy](#)

124 The Government of Canada's wildlife response is guided by its January 2000 *National Policy on Oiled Birds and Oiled Species at Risk* (http://www.ec.gc.ca/ee-ue/6C9C412C-07EB-4AAD-AB99-A7C5CF9E5B63/oiled_birds_sar_2000_01_e.pdf). The Canadian Wildlife Service (CWS) of Environment Canada is the agency for implementation of this policy. CWS is charged with the administration of the *Migratory Birds Convention Act*. There will be an additional responsibility under federal endangered species legislation for all listed species at risk under its jurisdiction. The Marine Mammal Regulations of the *Fisheries Act* specifies prohibitions and legal authorities respecting marine mammals in Canada. The *Fisheries Act* prohibits any person from disturbing marine mammals, except when the individual or organization is authorized to do so by a license or aboriginal authority. This Act and regulation are administered by Fisheries and Oceans Canada.

125 Federal endorsement of the provincially written *Operational Guideline on Oiled Wildlife Response* is required because the guide addresses response to both federal and provincial wildlife species under a common framework.

126 The draft guideline on oiled wildlife response identified measures as being "reasonable" that include:

- To assess initial and projected wildlife impacts.
- To ramp up and prepare for wildlife response.
- To capture all oiled wildlife.
- To assess, stabilize and document all oiled wildlife.
- To establish a temporary oiled wildlife care facility.
- To rehabilitate oiled wildlife for those species directed by government.
- To release wildlife back to the environment.
- To clean, re-inventory and re-supply equipment used.

127 Rehabilitation (stabilization, cleaning, feeding, de-oiling, and release) is often the most costly component of the overall wildlife response process - especially if there are only a few animals assessed as candidates for continued care. The treatment cost *per animal* can be high, and hence often viewed by the Responsible Party (RP) as "unreasonable." If the RP refuses to rehabilitate a particular species of oiled wildlife, it is up to the government to advise them to do so based on ecological criteria, or to rehabilitate the animals themselves at their cost. Alternatively, they can instruct the RP to euthanize a particular species of wildlife.

128 The debate on reasonable actions (costs) rests on whether the criteria for rehabilitation should be on "philosophical" grounds where the polluter has injured the animal and is morally obligated to save them all OR on "ecological" grounds where only selected wildlife species that are designated as either: *Endangered, Threatened or of Special Concern* under the *Species at Risk Act* (SARA) are required to be rehabilitated. Neither grounds preclude a Responsible Party from treating all oiled wildlife for corporate image or other reasons. The issue of whether to treat an oiled bird or mammal mainly arises when there is:

- Only limited funds for spill response and choices have to be made - clean beaches or treat birds;
- A bottleneck in wildlife response that causes undue stress to captured animals that then need to be euthanized.

The issue will also arise if government assumes responsibility for the spill (e.g. mystery spill) and has to abide by the criteria they had established for reasonableness for the private-sector.

129 The *Oil Wildlife Trust* (OWT) is a group of six NGOs from BC's wildlife and rehabilitation NGOs (<http://www.eowconference09.org/wp-content/uploads/focues-wildlife.pdf>). The OWT mission is to establish uniform professional response to oiled wildlife incidents, with a vision to engage all stakeholders in actively supporting best achievable practices for all oiled wildlife. OWT Values are:

- Inherent/intrinsic worth of all wildlife (individual or otherwise)
- Humane treatment of wildlife
- Professional standards of operation in oiled wildlife response
- Strength of cooperation and respect of expertise (strength in diversity)

OWT Objectives are:

- To support professional response and polluter pay principle
- To participate in government decision-making process

- To endorse best achievable care standards
- To ensure humane treatment of all species and individuals
- To assist in resource development
- To facilitate education and outreach

130 Agencies with primary roles in wildlife protection and response include: Fisheries and Oceans Canada, Environment Canada (Canadian Wildlife Service), BC Ministry of Environment.

131 The *International Maritime Organization* adopted the HNS Protocol as an extension of the *Oil Pollution Preparedness Response and Cooperation 1990 Convention*. In 1997 Canada signed onto the 2010 *Hazardous and Noxious Substances Convention* (which addresses liability and compensation issues),

132 The Ministry of Environment's *BC Hazardous Material Response Plan* has the essential organizational elements for guiding a hazardous material response on a vessel and to engage provincial resources (http://www.env.gov.bc.ca/eemp/resources/response/pdf/hazardous_material_response_plan.pdf)

133 Condensate is a non-recoverable and unsafe. Condensate is a raw (crude) gas that turns to liquid when extracted from crude oil wells. Condensates are imported by tanker by *EnCana* to a terminal in Kitimat, as well as will be a major imported product for *Enbridge's Northern Gateway Project*. If there is a rupture and spill of this product, *Western Canada Marine Response Corporation* is neither equipped nor required to respond. Condensates are a significant danger to responders due to its high volatility that poses a fire/explosion threat.

134 Transport Canada (TP15093E), 2010 Discussion Paper: Maritime Transport of Hazardous and Noxious Substances: Liability and Compensation (<http://www.tc.gc.ca/media/documents/policy/hns-discussion-paper.pdf>)

135 The most notable hazardous material vessel incident in British Columbia was on April 8th, 1994 when styrene monomer was spilled while a chemical tanker was off-loading at the Pacific Terminals in Port Moody. It is an oily, floating, flammable and noxious liquid for humans and the environment. The response was poorly orchestrated, though it occurred at the terminal and in an urban area. The Minister of Environment, Lands and Parks (Honourable Moe Sihota) undertook a concerted effort to have a full evaluation of this incident. A more recent incident was when on December 23rd 2011 the cargo vessel *MCP Altona* carrying 350 tonnes powdered uranium concentrate (yellow cake) in drums from a Saskatchewan mining company discovered several drums ruptured during rough seas conditions. Though the vessel was already near Hawaii, it was order to returned to British Columbia to a place of refuge in Ladysmith harbour: arriving on January 3rd.

136 Brander-Smith Report, 1990 *Public Review Panel on Tanker Safety and Marine Spill Response Capability*. The Canadian initiative to prepared for hazardous material response is based on a recommendation in this report, that stated: *....to involve relevant government agencies and industry in the process of developing a system for response to marine incidents of chemical materials.*

137 Workshops in Ottawa (1995) and Toronto (1997) were held to begin the process of establishing a Canadian capability to manage a ship-source hazardous material incident. In 1998, British Columbia established a Pacific Working Group to begin setting the foundations for a *Canadian Marine Chemical Emergency Response* (MCER) regime. This group included marine carriers, shippers, terminal operators, chemical producers, distributors and marine consultants as well as federal, provincial and municipal agencies. It submitted its report in 2001 to Transport Canada, Ottawa with no reply.

138 Transport Canada refers to the initiative as: *Canada Ship-source Hazardous and Noxious Substances (HNS) Incident Preparedness and Response Regime*.

139 The lack of progress in hazardous material preparedness from vessel accidents was noted in by the Auditor General of Canada its 2010 *Fall Report of the Commissioner of the Environment and Sustainable Development: Chapter 1 - Oil Spills from Ships* in its section on preparing for ship-source chemical spills (http://www.oag-bvg.gc.ca/internet/english/parl_cesd_201012_e_34435.html). Transport Canada wrote background paper on the topic, with essentially no meaningful operational readiness. Refer to: Transport Canada (TP15093E), 2010 Discussion Paper: Maritime Transport of Hazardous and Noxious Substances: Liability and Compensation. Transport Canada's commissioned *Expert Panel on Tanker Safety* is addressing this issue as Phase 2 of its review which focuses on Ship-source spill preparedness and response requirements in the Arctic, as well as requirements for a hazardous and noxious substances system (<https://www.tc.gc.ca/eng/tankersafetyexpertpanel/menu.htm>)

140 Sources in the 2011-12 *Annual Administrator's Report of the Ship-source Oil Pollution Fund* (<http://ssopfund.gc.ca/en/about-us/publications/annual-reports>) During the fiscal year commencing April 1, 2012, the maximum liability of the SOPF is \$159,854,965 for all claims from one oil spill. As of April 1, 2012, the Minister of Transport has the statutory power to impose a levy of 47.94 cents per metric ton of oil, as defined in the Act, imported by

ship into or shipped from a place in Canada in bulk as cargo of a ship. The levy is indexed to the consumer price index annually. No levy has been imposed since 1976.

¹⁴¹ The Pacific Region MCER Working Group on *Marine Chemical Emergency Response* report submitted to Transport Canada can be augmented by the more recent 2007 *European Maritime Safety Agency (EMSA) HNS Action Plan*.

¹⁴² The *European Maritime Safety Agency (EMSA)* as prepared a technical report on the development of a vessel design requirements to enter and operate in dangerous atmospheres (Safety Platform Study, January, 2012)

¹⁴³ Vessel planning to enter Canadian waters have to provide 24 hours notice to Canadian Coast Guard's *Marine Communications and Traffic Services (MCTS)* and provide pertinent information concerning their status and compliance with applicable Canadian acts and regulations. In addition, major vessels have to have an arrangement with a certified Response Organization. In doing so, they have to provide shipowner contact and basic vessel registration information as part of their membership agreement. Despite these requirements, none of this information is available to agencies outside CCG or and RO. In addition, there is critical information missing such as the type of fuel a vessel uses or HNS chemicals a vessel is carrying. In contrast, the United States Coast Guard maintain a Vessel Response Plan (VRP) search on the internet that provide consolidated and more substantive information about vessel entering US waters that is useful and important for assessing an incident's risk and coastal vulnerabilities if a particular vessel has an accident.

¹⁴⁴ The limits of liability of a shipowner, as defined by the federal *Marine Liability Act (Part 6)* are based on levels of compensation established by various conventions of the *International Maritime Organization*. The shipowner is legally liable for the payment of compensation under the first level that are funds from is *Protection and Indemnity (P&I) Clubs* insurers. This money is immediately available for response by the shipowner. The amount available is in accordance with IMO's *Civil Liability Convention* for tankers/barges carrying a persistent oil as cargo. The maximum amount is \$136.7 million, which is the ceiling defining the shipowner's limit of financial responsibility and hence its legal obligations to continue incident management and response operations. It is important to realize that neither the charterer of the tanker nor the owner of the oil cargo involved in an incident has any liability to pay compensation under the terms of these international fund conventions, just the registered shipowner. As such, don't expect a large international corporation to be engaged in the response efforts.

Once the shipowner's applicable limit of liability has been exceeded, Canada has access to make a claim for response costs and damages from a second (International Oil Pollution Convention - IOPC) and third (Supplementary Fund) levels of funding. These funds only pertain to barges and tankers carrying a persistent oil as cargo.

For all other major vessels - including barges and tankers carrying non-persistent oil as cargo - there is essentially only one tier of funding that is provided by the *Protection and Indemnity (P&I) Clubs* insurers. The amount available for response and compensation is calculated differently than above. It is based on the *Convention on Limitation of Liability for Maritime Claims* (1976 and 1992) as referred in the 2001 *International Convention on Civil Liability for Bunker Oil Pollution Damage* (Bunkers Convention). Depending on the vessel's size, the financial limits are the range of \$60 million for an 80,000 DWT vessel, to a maximum of \$100,000. The funds are intended only to address the costs of managing and responding to a release of a vessel's bunker fuel.

Canada has fund-of-last resort called the *Ship-source Oil Pollution Fund*. Claims to this fund can be made if all other international funds have been exceeded first. There is about \$ \$161,293,660 available *per* incident. (<http://ssopfund.gc.ca/CMFiles/reports-en/AnnualReport2012-2013-en.pdf>)

¹⁴⁵ Costs must be considered reasonable as defined in the international fund's claims manual. Compensation is for private damages such as loss of business revenues, damage to property. It does not include natural resource damages based on social and cultural amenities foregone.

¹⁴⁶ *Ship-source Oil Pollution Fund's* levy was only imposed between 1972-76 resulting in \$34.86 million of industry contributions. Since 1976, the federal government has been paying interest from General Revenue on this initial amount, whereby as of 2013:

- \$439,592,144 interest paid from general revenue since 1976 (more than 12 times the original amount)
- \$15,412,054 the total claims made on the fund since its inception in 1972 (Claims are the only direct compensation benefit to Canadians) (11 dollars accrued for every dollar claimed).
- \$14,107,925 administration costs (about the same amount as the total claims)
- \$52,869,730 amount paid out of the fund for oil shipping industry's contribution to international funds (a direct benefit to industry).

Canadian taxpayer have paid out nearly a half a billion dollars for an insurance policy that provides only \$161.2 million for a single incident. Furthermore, about \$5 million to \$14 million continues to be added each year (based on 2002 to 2013 accounts) to the fund from General Revenue, with basically few claims, with on-going administration costs, and yearly contributions to international compensation funds.

147 There are many factors that make mitigating financial risk and vulnerability difficult, such as:

The type of vessel (bulk oil carrier *versus* general vessel) as well as the type of oil spilled (persistent *versus* non-persistent) determines what compensation regime is invoked.

- The size of vessel determines the amount of funds available for response and compensation.
- International conventions determines the Responsible Party (RP) that authorizes expenditures and assumes incident command.
- The corporate nature of the Responsible Party (national company *versus* foreign company) influences how funds will be allocated.
- The spill location (open ocean *versus* inside passage) determines anticipated and actual cost of response and pollution damages.
- The rate of response expenditures determines when the limit of financial responsibility is reached and what amount of impact mitigation has been achieved.
- The role of the *Protection & Indemnity Club* (P&I Club) representative, the International Oil Pollution Convention Fund (IOPC) or International Tanker Owners Pollution Federation (ITOPF) technical advisors, and lawyers of the RP influence operational expenditures.

148 International Maritime Organization conventions that do not endorse claims for natural resource damages include: *Convention on Limitation of Liability for Maritime Claims* (1976 and 1992), *International Convention on Civil Liability for Bunker Oil Pollution Damage*, 2001, *International Fund for Compensation for Oil Pollution Damage*, 1992.

149 The *Natural Resource Damage Assessment* (NRDA) provisions in the United States are legislated under the *Comprehensive Environmental Response, Compensation, and Liability Act* and the *Oil Pollution Act of 1990*. These acts provide a mechanism for restoring natural resources that have been adversely affected, or “injured,” by releases of oil or hazardous substances. In enacting this legislation, the US Congress believed that these resources provide valuable services to society. The NRDA process is an attempt to make the public “whole” for the loss of those ecological services stemming from exposure to oil or hazardous substances, before, during and after cleanup efforts.

150 *Environmental Damages Fund* (the Fund) established in 1995 by Canada’s Treasury Board is intended to assist in the rehabilitation of injured or damaged environmental or natural resources and to ensure that proposed projects to help rehabilitate the environment are cost effective and technically feasible (<http://www.ec.gc.ca/edf-fde/>). If the Crown successfully prosecutes a polluter and a fine is imposed, or where the federal government commences civil litigation and either negotiates a judgment from a court in relation to restoration of environmental damages, the court, the Crown and the defense can recommend that the monies obtained be placed into the Fund. Cleanup costs, actual response costs and legal costs are specifically excluded from the Fund. Environment Canada administers the fund, and accounts for each award separately, so that the money can then be used to fund projects in the same community in which the pollution has occurred.

151 The *Habitat Conservation Trust Foundation* (Fund) or HCTF came into existence in 1981 because its major contributors (hunters, anglers, trappers, and guide-outfitters) were willing to pay for conservation work above and beyond that required by government for basic management of wildlife and fish resources (<http://www.hctf.ca>). Unlike license fees that cover basic management costs, conservation investments funded by HCTF surcharges benefit contributors by enhancing their opportunities to use and enjoy wildlife and fish resources. HCTF funds have been used to receive compensation awards from major projects - that though approved - resulted in unmitigated resource losses such as a wildlife habitat. It is also available for any compensatory award for pollution obtained from “creative sentencing” under provincial pollution laws.

152 To date, the compensation awards for spills have been pursuant to federal laws and assigned to the Environmental Damages Fund. The awards have been too few and too small for the province to take notice. This could change if the damage fund was large. It could also change if First Nations and Local Coastal Community governments were directly affected by a spill or vessel casualty and not party to the compensation negotiation and how or where the money is allocated.

153 For oil spills that are funded from the IMO’s International Oil Pollution Compensation Funds, the fund administrator explicitly states:

Compensation for environmental damage (other than economic loss resulting from impairment of the environment) is restricted to costs for reasonable measures to reinstate the contaminated environment. Claims for damage to the ecosystem are not admissible. Canada’s Ship-source Oil Pollution Fund also subscribes to this criteria on assessing claims.

154 Environment Canada began to scope out coastal values in the mid-1990s by drafting a public questionnaire to model tangible and intangible economic losses from a major vessel casualty that results in wide-spread pollution. It was never used.

155 *Automatic Identification System* (AIS) is a shipboard broadcast transponder system, operating in the VHF maritime band, that is capable of sending such ship information as identification, position, heading, ship length, beam, type, and draught, hazardous cargo information, to other ships as well as to AIS Shore-based stations. It is capable of handling over 2,000 reports each minute and updates as often as every two seconds.

156 The implementation of International ship requirements for AIS-equipment on SOLAS-ships has been addressed under the SOLAS Convention Chapter V. Canadian requirements have been addressed in Part 4 (Additional Equipment Requirements) whereby:

- 1) Every ship of 150 tons or more that is carrying more than 12 passengers and engaged on an international voyage shall be fitted with an automatic identification system (AIS).
- (2) Every ship, other than a fishing vessel, of 300 tons or more that is engaged on an international voyage shall be fitted with a AIS.
- (3) Every ship, other than a fishing vessel, of 500 tons or more that is not engaged on an international voyage shall be fitted with a AIS, but if it was constructed before July 1, 2002 it need not be so fitted until July 1, 2008.

157 Automated Information System (AIS) on vessel broadcast's:

- Vessel's name and ID reference identifications (IMO, MMSI)
- Navigation status and destination with estimated time of arrival
- Radio call sign
- Speed and course over ground
- Longitude and Latitude, position accuracy and True Heading
- Type of ship/cargo
- Dimensions and draft of ship

158 A few examples AIS ship finders on the web are: sailwx (<http://www.sailwx.info>), Live Maritime (<http://alester.homedns.org/overview.php>), Metro Port Vancouver (<http://www.portmetrovanancouver.com/en/users/InteractivePortMap.aspx>)

159 The link to *National Information System on Marine Navigation* (INNAV) is <http://www.innav.gc.ca/home.aspx>

160 Ocean Networks Canada (ONC) is a world-leading organization supporting ocean discovery and technological innovation. ONC is a not-for-profit society, established in 2007 by the University of Victoria. The ONC Centre for Enterprise and Engagement as a federal centre of excellence for commercialization and research. (<http://www.oceannetworks.ca>)

161 The US list of R&D proposals and projects is managed by the *Interagency Coordinating Committee on Oil Pollution Research* [ICOPR]) of the *Coastal Response Research Center* located at the University of New Hampshire

162 Refer to *Pacific States/BC Oil Spill Task Force's* project reports at: <http://www.oilspilltaskforce.org/notesreports/projectreports.htm>

163 For more information on human dimensions impacts refer to: [Social Disruption from Oil Spills and Spill Response: Characterizing Effects, Vulnerabilities, and the Adequacy of Existing Data to Inform Decision-Making](#) Dr. Thomas Webler, and Dr. Seth Tuler, Social and Environmental Research Institute.