

5.7.1.3 Scenario Description

The waters between Moresby Island and Stuart Island mark the northern entrance to Haro Strait, which runs south-southeasterly between the Gulf Islands on the Canadian side and the San Juan Islands on the US side. Arachne Reef is situated at the northern end of Haro Strait, off to the west side of the Strait. It consists of three drying heads, and has a navigation light. A plausible but highly unlikely event would be a powered grounding of a laden tanker on Arachne Reef near Turn Point. Figure 5.5.2 shows a location map of the incident. The northern entrance to Haro Strait has the greatest level of navigation complexity for the entire passage of a Project-related tanker, as well as numerous vessels transiting the Strait. The location also has a very high environmental and socio-economic value with the potential to affect several distinct areas and habitats, including but not limited to Boundary Bay, the Gulf Islands and San Juan Islands, the Salish Sea, and the Juan de Fuca Strait. The event of a powered grounding of a laden Project-related tanker has low probability due to the proposed use of a tethered tug through this part of the route.

The hypothetical incident is given to have occurred at 22:00 on August 17, 2012 and was selected from the 368 independent simulations of the stochastic modelling for a summer spill event. The selection was based on the representativeness of the resulting spill in terms of environmental and human-health consequences. Specifically, the summer season was selected for the mitigation simulation, as warmer water and air temperatures would facilitate more rapid dissolution and/or volatilization of lighter pseudo-components into water or air, respectively. This is conservative, as the concentration in water or air would be increased by rapid dissolution and/or volatilization. At the same time, generally lower wind speeds during the summer would result in less wave action (hence, less vertical mixing of the water column, and higher concentrations of dissolved hydrocarbons in the surface water layer), as well as less dilution of vapours in air.

5.7.2 Transport and Fate

The weathering processes, which can affect spilled oil in a marine environment, were described in detail in Section 5.4. This subsection describes what happens after the hypothetical incident occurs and oil is spilled from a Project-related tanker.

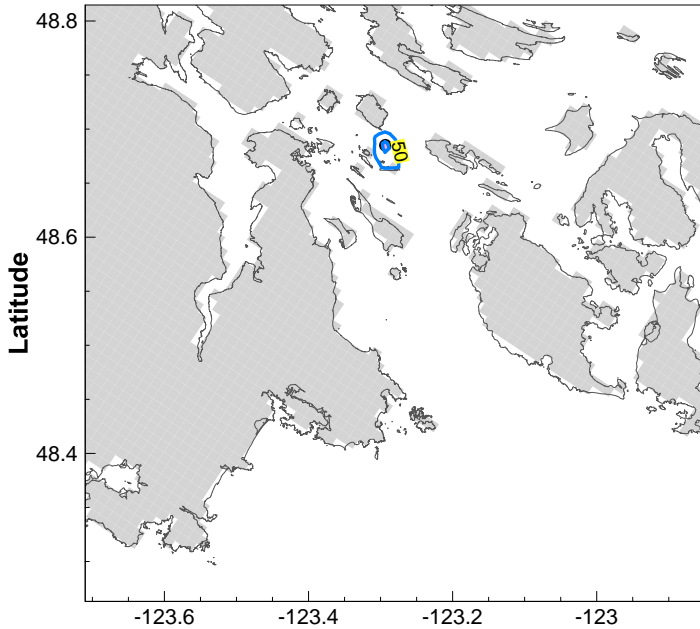
Figure 5.7.3.5 shows the “P₅₀” and “P₉₀” map after 6, 12, 24 and 48 hours. The P₅₀ contour indicates that there is a 50 per cent or greater probability for the area within the P₅₀ contour line to have been contacted by the oil. Similarly, the P₉₀ contour indicates that there is a 90 per cent or greater probability for the area within the P₉₀ contour line to have been contacted by the oil.

These maps were built based on the stochastic modelling described in the EBA Technical Report, Modelling the Fate and Behaviour of Marine Oil Spills for the Trans Mountain Expansion Project (Appendix 8C, TR 8C-12, S9). A total of 368 independent simulations were modelled during the summer period at Arachne Reef. Probability contours were then extracted, based on the combination of those 368 independent simulations.

Figure 5.7.3.6 shows the un-mitigated spill location, in terms of slick thickness as computed by SPILLCALC after 96 hours. Figure 5.7.3.7 shows the mass balance for the un-mitigated case. The key performance indicators (KPI) that will be used to evaluate the effectiveness of response activities are:

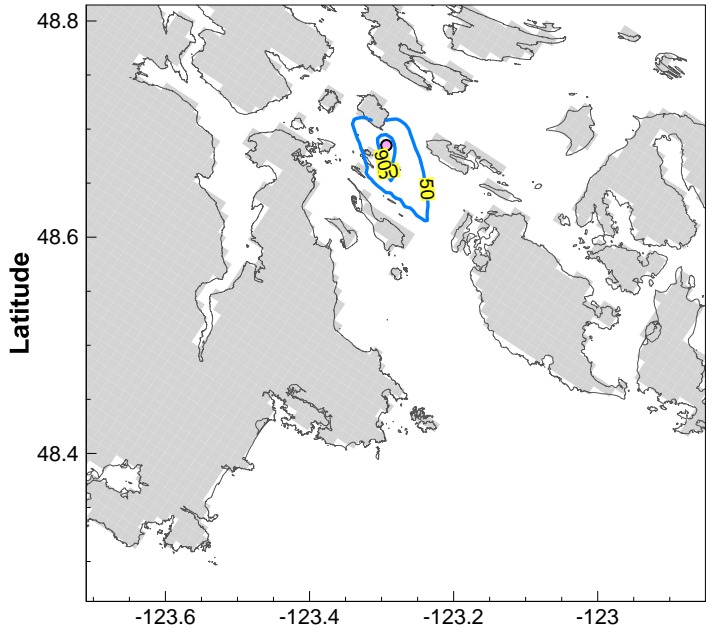
- reduce the extent and thickness of the slick remaining on the water after four days;

- reduce the quantity of oil on water after four days;
- reduce the quantity of oil reaching shore after four days;
- reduce the length of shoreline oiled; and
- account for any oil recovered, ensuring that it is only assessed as recovered once the simulation shows any oil that is contained in a secure tank on a skimmer, barge or supply vessel.



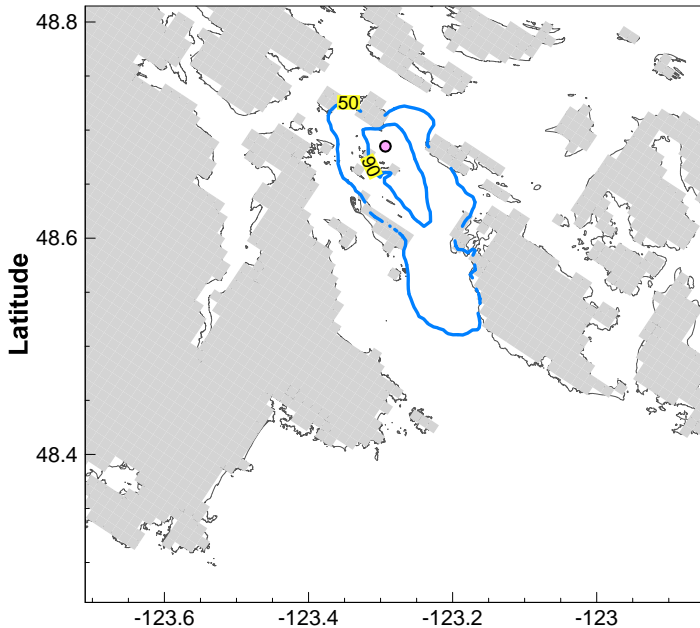
P₅₀ and P₉₀ after 6 Hours

Area within the P₅₀ Contour Line: 8.3 km²
 Area within the P₉₀ Contour Line: 0.5 km²
 Average Thickness within the P₅₀ Contour Line: 217 um
 Average Thickness within the P₉₀ Contour Line: 342 um
 Average Shore Oiled: 3 km



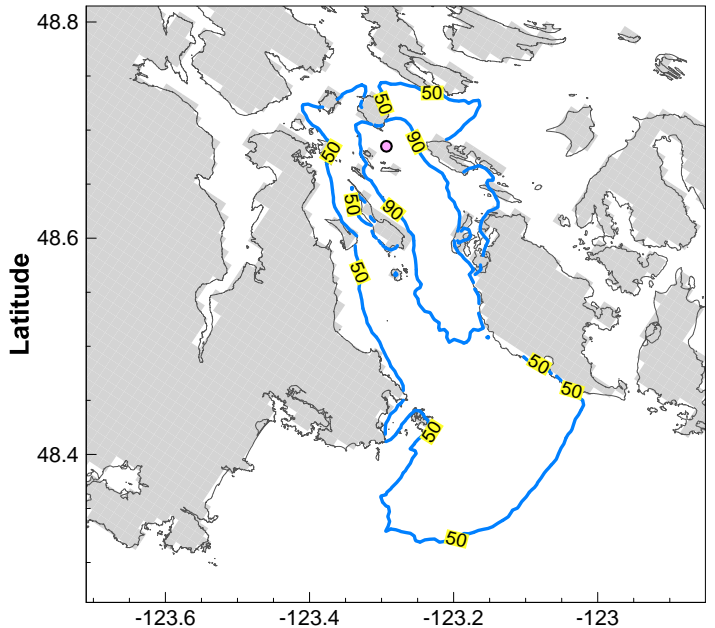
P₅₀ and P₉₀ after 12 Hours

Area within the P₅₀ Contour Line: 47.3 km²
 Area within the P₉₀ Contour Line: 4.3 km²
 Average Thickness within the P₅₀ Contour Line: 94 um
 Average Thickness within the P₉₀ Contour Line: 245 um
 Average Shore Oiled: 11 km



P₅₀ and P₉₀ after 24 Hours

Area within the P₅₀ Contour Line: 196 km²
 Area within the P₉₀ Contour Line: 37.8 km²
 Average Thickness within the P₅₀ Contour Line: 36 um
 Average Thickness within the P₉₀ Contour Line: 78 um
 Average Shore Oiled: 36 km



P₅₀ and P₉₀ after 48 Hours

Area within the P₅₀ Contour Line: 646 km²
 Area within the P₉₀ Contour Line: 132 km²
 Average Thickness within the P₅₀ Contour Line: 10.5 um
 Average Thickness within the P₉₀ Contour Line: 26.7 um
 Average Shore Oiled: 85 km

NOTES

○ Release Location

Probability of oil presence is the percentage of simulations in which oil was present at a given location.
 P₅₀: after X hours, there is 50% or greater probability for the area within the P₅₀ contour line to have been contacted.
 P₉₀: after X hours, there is 90% or greater probability for the area within the P₉₀ contour line to have been contacted.
 Statistical results for each season based on independent spills occurring every 6 hours for three months.
 Tracking time for each spill was 15 days.
 The average thickness is based on a full coverage of each grid cell that contains oil and lies within the contour line.

STATUS
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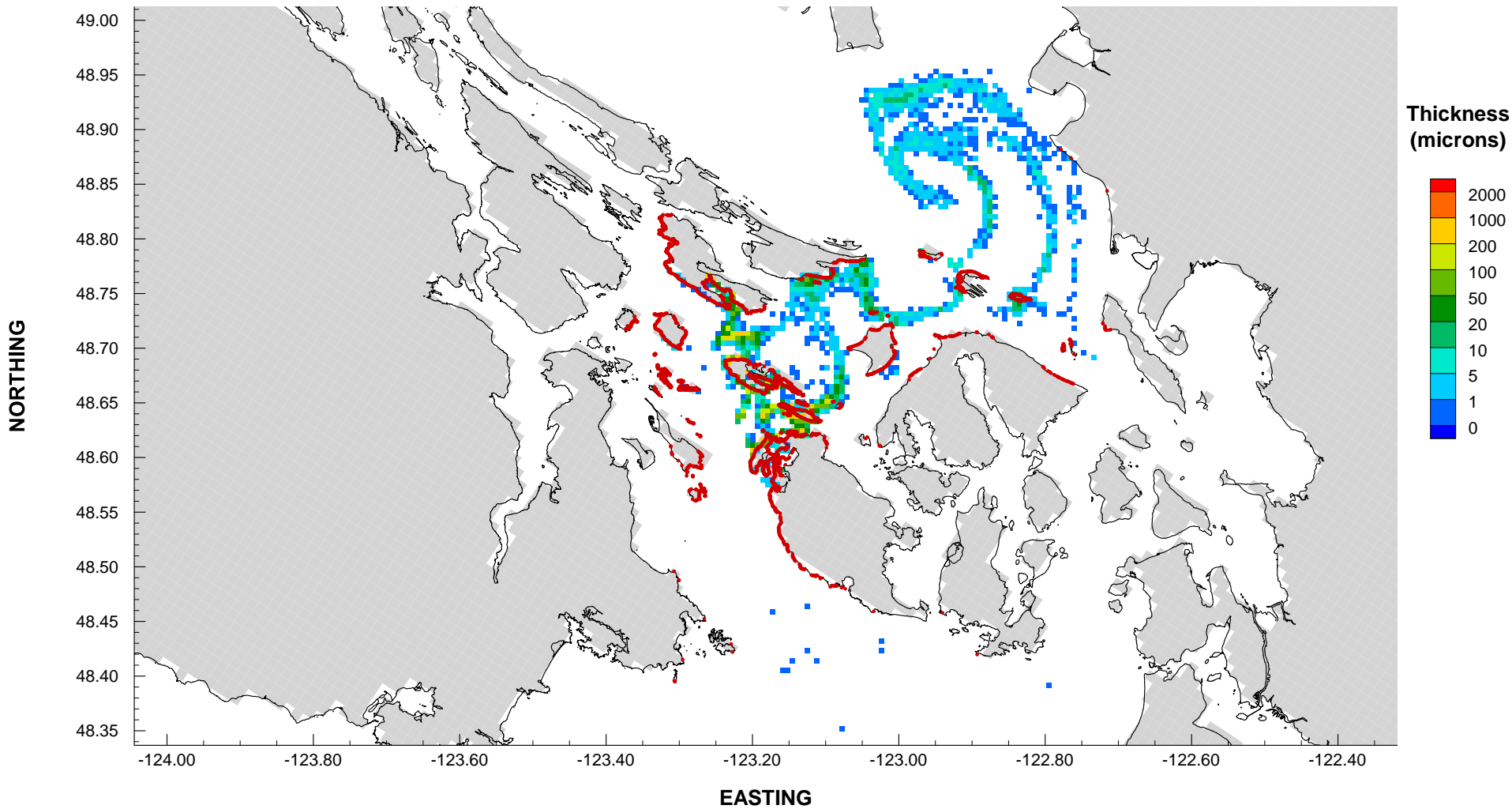
TRANS MOUNTAIN OIL SPILL STUDY

**Summer Stochastic Simulation
 Arachne Reef (16,500 m³)
 P₅₀ and P₉₀ after 6 / 12 / 24 / 48 Hours**

PROJECT NO. V13203022	DWN DP	CKD JAS	APVD -	REV 0
OFFICE EBA-VANC	DATE November 6, 2013			

Figure 5.7.3.5

2012/08/21 22:00



NOTES

- The graph displays the thickness of the oil on water. The thickness of the oil is based on a uniform full coverage of the 500m x 500m model grid cell.
- The oil on shore is displayed as a red line, regardless of the volume retained by the shore. The red shorelines are a visual tool only, to indicate the shoreline being contacted by the oil.

STATUS
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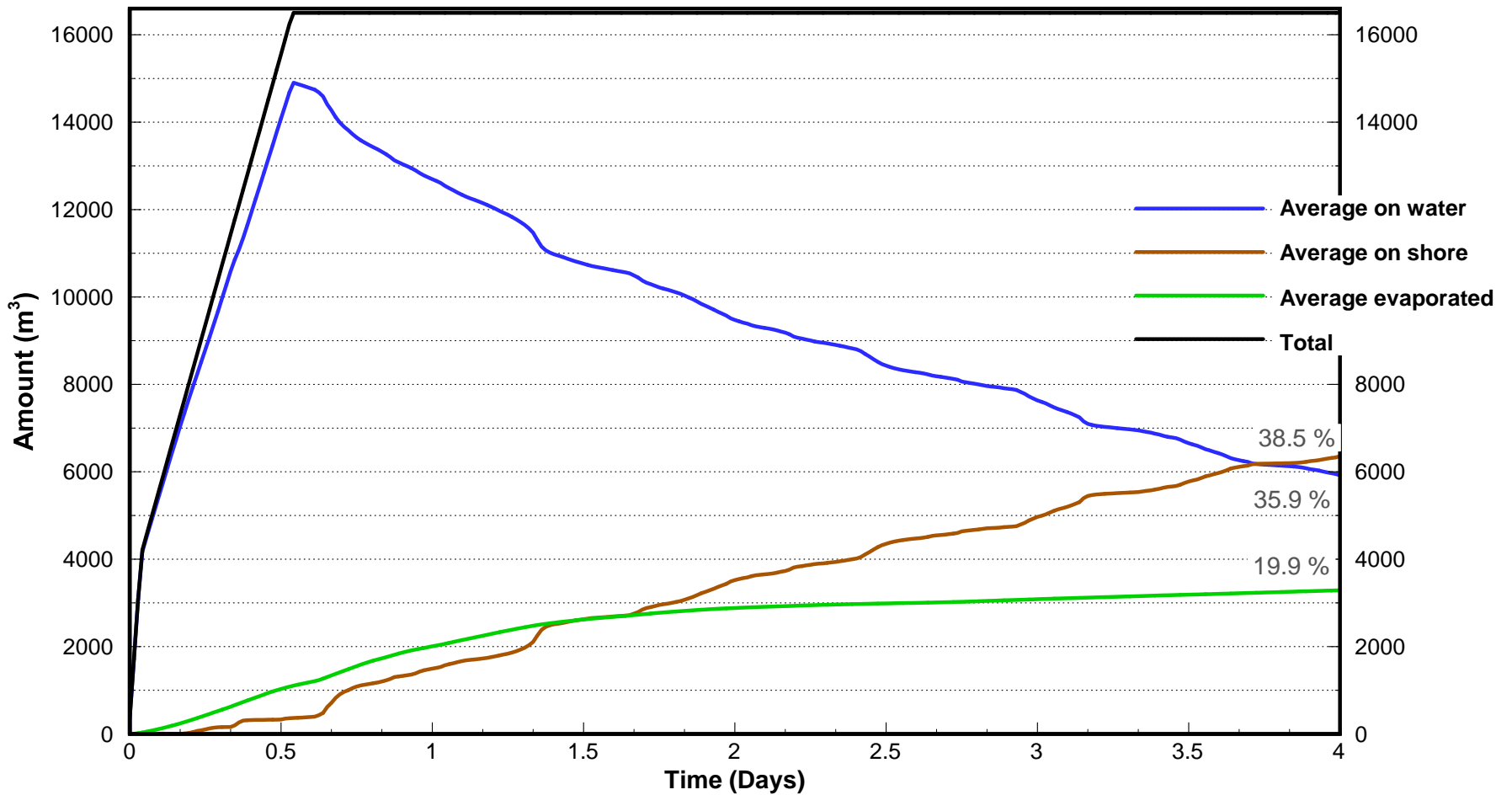
TRANS MOUNTAIN OIL SPILL STUDY

**Unmitigated Simulation at Arachne Reef:
August 17 2012, 10:00pm
Oil Thickness after 96 Hours**



PROJECT NO. V13203022	DWN AH	CKD JAS	APVD JAS	REV 0
OFFICE EBA-VANC	DATE November 4, 2013			

Figure 5.7.3.6



NOTES

- Tracking time for the spill was 15 days.
- The major components of the mass balance are shown above.

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TRANS MOUNTAIN OIL SPILL STUDY

**Unmitigated Simulation at Arachne Reef
August 17, 10:00pm
Major Components of the Mass Balance**



PROJECT NO. V13203022	DWN AH	CKD JAS	APVD -	REV 0
OFFICE EBA-VANC	DATE November 4, 2013			

Figure 5.7.3.7

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5.7.3 Spill Response

Based on the modelled fate and transport of the spilled oil without any mitigation measures applied, EBA developed the following recommended response to the hypothetical spill for the Project.

5.7.3.1 Establishing Outflow, Retention, and Escapement

The Arachne Reef scenario is based on a total volume of 16,500 m³ of oil released over 13 hours, the amount DNV calculated as a credible worst case oil spill for a partly loaded Aframax tanker (TERMPOL 3.15, Volume 8C, TR 8C-12). Resulting from the incident, 25 per cent of the impacted tank volume is assumed to be lost in the first hour (elapsed time from the beginning of the spill) with 1,000 m³ of cargo assumed to flow out of the vessel every hour thereafter until the total spilled volume is reached. Primary containment booms, as the first line of defense, surround the tanker by the end of hour +4 (elapsed time); oil retention and escapement rates from the boom are time-varying due to the variable influences of: 1) currents; 2) entrainment loss; 3) critical accumulation failure; and 4) operational effects. At hour +7 (elapsed time), secondary containment is achieved reducing the escapement outside the double-boom system.

5.7.3.2 Shipboard Emergency Measures

Although shipboard emergency measures were not part of this scenario or factored into the model, for background information it is reasonable to assume that the tanker would have undertaken a certain number of procedures upon recognition that the tanker had run aground. These procedures are described in the Trans Mountain Expansion Project Oil Spill Response Simulation Study, Arachne Reef and Westridge Marine Terminal report (Volume 8C, TR 8C-12, S13).

5.7.3.3 Response Plan

The deployment of the available pieces of equipment over Day 1 for the initial response, and Day 2, 3, and 4 is described in the Trans Mountain Expansion Project Oil Spill Response Simulation Study, Arachne Reef and Westridge Marine Terminal report (Volume 8C, TR 8C-12, S13). The efficiency of the response was maximized through the addition of an offshore supply vessel (OSV) with 1,880 mt (2,000 m³) of integral storage moored in the Sidney area.

A summary of recovery operations at the end of Day 1 reveals the following information:

- fourteen skimmers have performed 44 individual recovery sorties by the end of the day;
- during the first eight hours of the response, the OSV (with 1,880 mt of integral storage) has acted as a temporary storage bridge until the arrival of a large barge;
- in addition to the OSV, Barge #1 (5,000 mt) will be the only other dedicated storage unit during Day 1; and
- eight 40-tonne mini-barges were deployed throughout the day to extend the recovery times of certain skimmers.

A summary of recovery operations at the end of Day 2 reveals the following information:

- seventeen skimmers have performed 61 individual recovery sorties by the end of the day;
- in addition to the OSV (1,880 mt), Barge #1 (5,000 mt) and Barge # 3 (10,000 mt) will be used as dedicated storage units during Day 2; and
- twenty 40-tonne mini-barges were deployed throughout the day to extend the recovery times of certain skimmers.

A summary of recovery operations at the end of Day 3 and Day 4 reveals the following information:

- eighteen skimmers have performed 58 individual recovery sorties by the end of Day 3;
- eighteen skimmers have performed 48 individual recovery sorties by the end of Day 4;
- in addition to the OSV (1,880 mt), three barges (total storage capacity > 17,000 mt) will be used as dedicated storage units during Day 3 and Day 4; and
- twenty 40-tonne mini-barges were deployed throughout the day to extend the recovery times of certain skimmers.

5.7.3.4 Simulation of Proposed Mitigation

The removal of the oil inside the containment area and the removal of the oil lost at sea were modelled based on the response operation plan described in Volume 8C (TR 8C-12, S13). Four days of mitigation were modelled. After 96 hours (*i.e.*, 4 days), Figure 5.7.3.8 clearly shows that much less oil is left on water, compared to Figure 5.7.3.6, which shows the un-mitigated case.

Figure 5.7.3.9 shows the mass balance in the mitigated case. Recovery of the oil was conducted at sea and in the containment area. Of the total oil outflow from the tanker in this simulated accident, 44.5 per cent was recovered from the sea outside the boom and 18.6 per cent was recovered from within the containment area. Table 5.7.1 shows the mass balance in both unmitigated and mitigated cases.

TABLE 5.7.1

MASS BALANCE COMPARISON

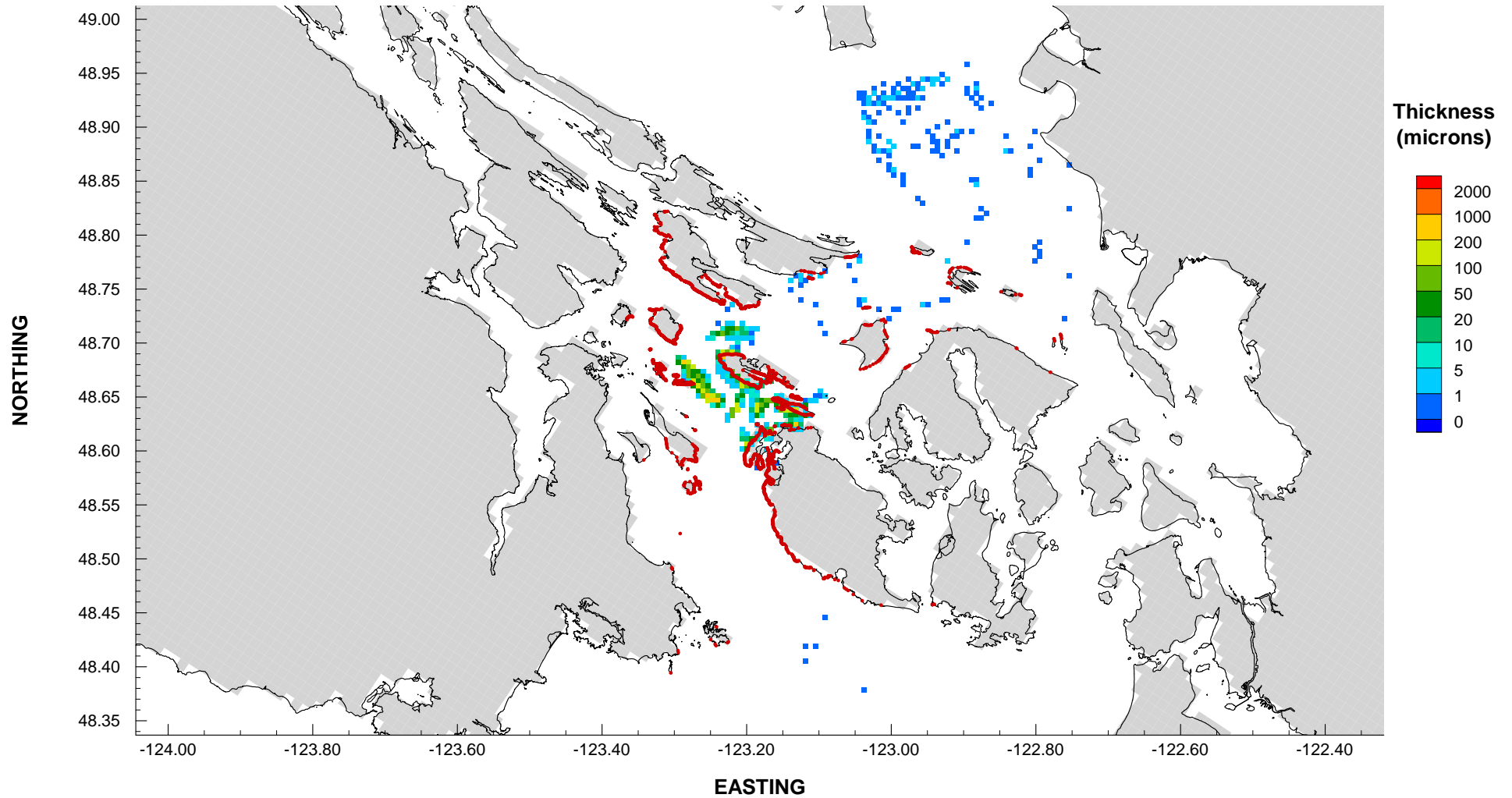
Amount (m₃)	Unmitigated Case	Mitigated Case
On shore after 4 Days	38.5%	15.8%
On shore after 15 Days	70.2%	< 24.6%
Left on water after 4 Days	35.9%	8.8%
Evaporated after 4 Days	19.9%	7.4%
Dissolved after 4 Days	3.8%	3.4%
Biodegraded after 4 Days	1.9%	0.5%
Inside the containment area but not yet recovered	N/A	1%
Recovered from inside the containment boom	N/A	18.6%
Recovered at Sea	N/A	44.5%

After 4 days, there is almost no oil inside the containment boom as a result of the recovery operations. Less than 10 per cent of the spilled oil is left on water. The fraction of spilled oil that contacted shorelines has been reduced from about 70 per cent in the unmitigated case after 15 days, to 25 per cent in the mitigated case (15 per cent of the spilled oil is on shore after 4 days in the mitigated case and 10 per cent is left on water, which is conservatively assumed to end up on shore).

The amount of oil recovered from the water surface during this model investigation represents somewhat more than half of the spill. This amount is very high compared to historical recoveries at large spill incidents. A few reasons explain this high rate of recovery:

- Proper planning when establishing the proposed level of capabilities, with the addition of equipment staging locations and the development of additional bases along the shipping route (Figure 5.5.2).
- Leading-edge tools, primarily an oil spill tracking model using surface currents from a three dimensional hydrodynamic model and waves from a two-dimensional wave model. In an actual spill event, remotely-sensed data would also be available to update information provided by such forecasting tools.
- Input vetting, variable level of synchronization among the different units unloading recovered oil into the storage barges.

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NOTES

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The thickness of the oil is based on a uniform full coverage of the 500m x 500m model grid cell.
- The oil on shore is displayed as a red line, regardless of the volume retained by the shore.
The red shorelines are a visual tool only, to indicate the shoreline being contacted by the oil.

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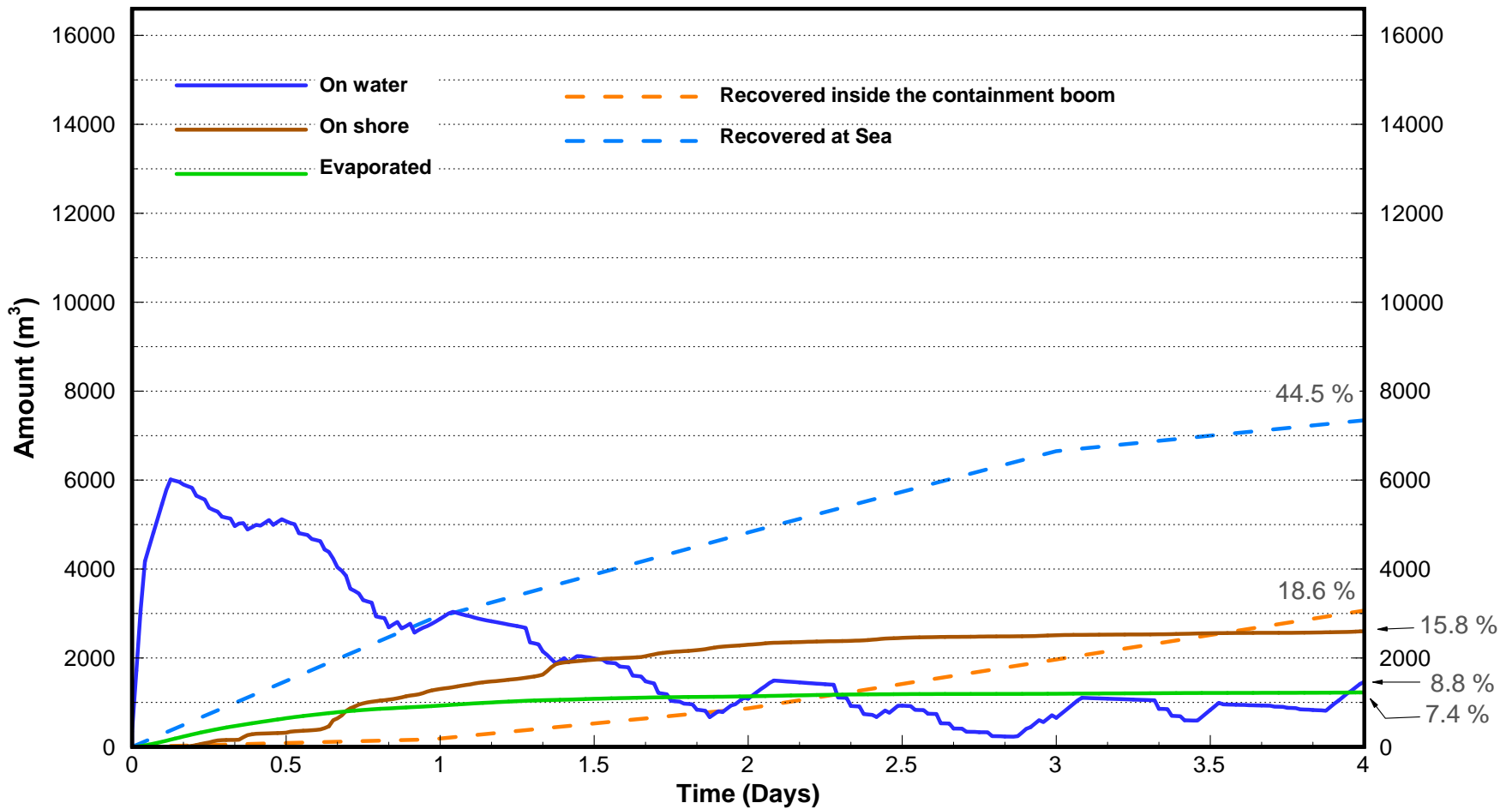
TRANS MOUNTAIN OIL SPILL STUDY

**Mitigated Simulation at Arachne Reef:
August 17 2012, 10:00pm
Oil Thickness after 96 Hours**



PROJECT NO. V13203022	DWN AH	CKD JAS	APVD JAS	REV 0
OFFICE EBA-VANC	DATE November 4, 2013			

Figure 5.7.3.8



NOTES

- Tracking time for the spill was 4 days. The total amount of oil released was 16,500 m³.
- The major components of the mass balance are shown above.

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TRANS MOUNTAIN OIL SPILL STUDY

**Mitigated Simulation at Arachne Reef
August 17 2012, 10:00pm
Major Components of the Mass Balance**

PROJECT NO. V13203022	DWN AH	CKD JAS	APVD -	REV 0
OFFICE EBA-VANC	DATE November 4, 2013			

Figure 5.7.3.9

STATUS
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5.7.4 Summary and Conclusions

It is Trans Mountain's view that the modelling of a hypothetical oil spills involving the credible worst case and smaller spills from a Project-related tanker has been effective to identify where improvements to the existing oil spill preparedness and response capability is necessary to minimize the risk of environmental and socio-economic effects described here. The numerical modelling helped Trans Mountain and WCMRC appreciate the gap between the current mitigation capabilities and the proposed future capabilities, with the improvement that the additional equipment could provide. The understanding of the behaviour of the oil in a marine environment was critical in assessing the mitigation strategy; the approach proved the importance of increasing the number of response bases, the proximity of the different equipment staging locations being key to improved effectiveness. The benefit of improved oil spill preparedness and response is that the volume of oil recovered is much greater than most historical cases.

The mitigation measures simulated in the EBA report, Trans Mountain Expansion Project Oil Spill Response Simulation Study, Arachne Reef and Westridge Marine Terminal report (Volume 8C, TR 8C-12, S13), affirm the premise that oil spill recovery at sea can be effective given adequate equipment, access to equipment staging locations, a timely response, amendable weather conditions, access to good environmental and spill information (through the combination of a 24 hours/day, 7 days/week numerical forecast system and remote sensed data), and the ability to identify and correct inefficiencies before they are replicated throughout the response system. All of the above functionalities and systems contribute to a highly effective and informed ICS system.

Importantly, a good numerical model, especially one that has been fully tuned and validated to the hypothetical spill location, is an ideal tool for forecasting and for planning resource deployment. Remotely sensed data adds to the functionality of the model. In order to meet the expectations of regulatory agencies, government agencies, Aboriginal communities, and the public, and to comply with legislation, it is crucial to implement leading edge technologies as part of the response system, to support the existing planning and training phases.

6.0 CONCLUSIONS

Trans Mountain Pipeline ULC is a Canadian corporation with its head office located in Calgary, Alberta. Trans Mountain is a general partner of Trans Mountain Pipeline L.P., which is operated by KMC, and is fully owned by Kinder Morgan Energy Partners, L.P. Trans Mountain is the holder of the National Energy Board (NEB) certificates for the TMPL system.

The proposed expansion will comprise the following:

- pipeline segments that complete a twinning (or “looping”) of the pipeline in Alberta and BC with about 987 km of new buried pipeline;
- new and modified facilities, including pump stations and tanks; and
- three new berths at the Westridge Marine Terminal in Burnaby, BC, each capable of handling Aframax class vessels.

Work proposed at Westridge includes a new dock complex, with a total of three Aframax-capable berths, as well as a utility dock (for tugs, boom deployment vessels, and emergency response vessels and equipment), followed by the deactivation and demolition of the existing berth.

Application is being made pursuant to Section 52 of the *NEB Act* for the proposed Project. The NEB will undertake a detailed review and hold a Public Hearing to determine if it is in the public interest to recommend a CPCN for construction and operation of the Project. Subject to the outcome of the NEB Hearing process, Trans Mountain plans to begin construction in 2015 and go into service in 2017.

Trans Mountain acknowledges that the proposed Project would result in an increase in tanker traffic transiting the Salish Sea Region as tankers enter from the Pacific approaching or leaving Westridge Marine Terminal. The Salish Sea includes Vancouver Harbour, the Strait of Georgia, Boundary Pass, Haro Strait, and the Strait of Juan de Fuca.

Currently, in a typical month, five vessels are loaded with heavy crude oil, primarily diluted bitumen, at the Westridge Marine Terminal. The expanded system will be capable of serving up to 34 Aframax class vessels per month, with actual demand influenced by market conditions.

Trans Mountain recognizes that this increase in traffic volume corresponds to an increase in the probability of an accidental oil spill from a laden tanker leaving the Westridge Marine Terminal. In addition, Trans Mountain acknowledges that the Project-related increase in tanker traffic may also result in potentially adverse environmental and socio-economic effects.

Although Trans Mountain is not legally responsible for the operation of the tankers calling at the Westridge Marine Terminal, Trans Mountain continues to be an active participant in the maritime community, supporting, and sometimes leading, key initiatives to improve the safety and environmental performance of marine transportation in the Salish Sea Region.

In consideration of the potential effects to the marine environment from the proposed increase in tanker traffic as a result of the Project, Trans Mountain extended its stakeholder engagement program to include coastal communities, beyond the pipeline terminus at Westridge Marine Terminal. Trans Mountain engaged communities on Vancouver Island and the Gulf Islands along established marine shipping corridors transited by oil tanker traffic, as well as communities in and around PMV.

The Project team received feedback from public open houses, workshops, one-on-one meetings, public presentations, online discussion and comment forms that have helped shape aspects of the Project. A summary of the input received through the stakeholder engagement program related to marine issues is provided in Table 3.1.3 of Volume 8A. Overall, engagement activities provided feedback on the following:

- determining the scope and nature of the Environmental and ESA;
- identifying potential mitigation measures to reduce risk, and environmental and socio-economic effects; and
- identifying potential local or regional benefits associated with the Project.

Since May 2012, Trans Mountain has also engaged with Aboriginal communities that may be affected by the increase in Project-related marine vessel traffic based on their traditional and cultural use of marine resources to maintain a traditional lifestyle. Of the 27 marine and inlet Aboriginal communities initially engaged on the Project with Trans Mountain, 20 of these communities have been identified as having an interest in the Project or having interests potentially affected by the increased Project-related marine vessel traffic. In addition to engagement activities, Trans Mountain has initiated TMRU studies with the Aboriginal communities that were interested in participating.

The results of engagement have helped refine the ESA for the Project. With this information, Trans Mountain identified issues, responded to questions and addressed concerns. Engagement has also provided Aboriginal communities with an understanding of the Project.

Although a wide range of issues were raised by Aboriginal community members and representatives throughout the Aboriginal engagement process, recurring themes have emerged, including the following:

- potential environmental effects of spills on the marine environment and the related effects to traditional activities;
- increases of Project-related vessel traffic on traditional hunting and fishing areas, travelways and sacred areas;
- rehabilitation and protection of the Salish Sea;
- effect of increased vessel traffic through Burrard Inlet;
- additional economic incentives including preferred procurement opportunities, revenue sharing, community enhancement opportunities and equity participation; and
- ongoing respectful and meaningful engagement including capacity funding and TMRU study funding.

Results of the engagement have been considered and incorporated throughout the marine transportation assessment, including the mitigation measures and effects assessment.

With the interests from Aboriginal communities and stakeholders in mind, and as part of this Application to the NEB, Trans Mountain undertook an environmental and socio-economic assessment to identify potential adverse environmental and socio-economic effects associated

with the increase in tanker traffic, and measures to mitigate these effects. As well, Trans Mountain voluntarily initiated a voluntary TERMPOL Review Process. This process, led by Transport Canada, results in an assessment of the effects on navigational safety that may result from the proposed increase in Project-related tanker traffic along with recommendations to ameliorate these effects where necessary.

Recognizing that there has been and continues to be tanker traffic carrying oil transiting the Salish Sea Region and calling at the Westridge Marine Terminal, Trans Mountain focused the ESA and TERMPOL studies on the change in tanker traffic that would result from the Project, specifically, the change from 5 tankers per month calling at the Westridge Marine Terminal to the equivalent of 34 Aframax tankers per month.

The ESA addressed the NEB's *List of Issues* (July 29, 2013) for the Project (NEB 2013a), in particular the issue related to marine transportation:

“The potential environmental and socio-economic effects of marine shipping activities that would result from the proposed project, including the potential effects of accidents or malfunctions that may occur.”

The ESA considered the mandatory factors listed in Section 19(1) of the *CEA Act, 2012*, the factors listed in the NEB Filing Manual (NEB 2013c), and pertinent issues and concerns identified through consultation and engagement with Aboriginal communities, landowners, regulatory authorities, stakeholders and the general public. The ESA also considered the NEB's Filing Requirements Related to the Potential Environmental and Socio-Economic Effects of Increased Marine Shipping Activities, Trans Mountain Expansion Project (September 10, 2013) (NEB 2013b), effectively determining the scope of the ESA and the factors to be assessed.

Ten environmental and socio-economic elements potentially interacting with the increased Project-related marine vessel traffic were identified for the purpose of assessing potential effects. These elements included:

- marine sediment and water quality;
- marine air emissions;
- marine GHG emissions;
- marine acoustic environment;
- marine fish and fish habitat;
- marine mammals, marine birds;
- marine species at risk;
- traditional marine resource use;
- marine commercial, recreational, and tourism use; and
- human health risk assessment.

In addition, potential accidents and malfunctions were assessed, as well as the effects of the environment on the Project, and cumulative environmental and socio-economic effects.

Most of the potential environmental and socio-economic residual effects that could arise from increased Project-related marine vessel traffic were considered to be long-term in duration (*i.e.*, lasting for the operational life of the Project), generally of low to medium magnitude and periodic or accidental in nature. There were no situations identified that would result in a significant environmental or socio-economic effect, as defined in Section 4.3, except the potential effect of sensory disturbance of southern resident killer whales and the related effect on traditional marine resource use by Aboriginal communities. Even though the Project contribution to overall sensory disturbance effects would be small, the potential effect of the increase in Project-related marine vessel traffic was determined to be to be high magnitude, high probability and significant but immediately reversible for southern resident killer whales.

DFO's *Recovery Strategy for Northern and Southern Resident Killer Whale* states that: "Both physical and acoustic disturbance from human activities may be key factors causing depletion or preventing recovery of resident killer whale populations" (DFO 2011a). Based on available scientific knowledge, it was concluded that past and current activities (including all forms of mortality, high contaminant loads, reduced prey, and sensory and physical disturbance) have resulted in significant adverse cumulative effects to the southern resident killer whale population. The recent historical decline of the southern resident killer whale population and its current status as endangered support this conclusion. However, given the current state of knowledge, and the ability of threats to interact with one another, it is not possible to completely partition how each threat may be affecting the population.

With or without the Project, the southern resident killer whale population continues to be adversely affected by sensory disturbance caused by all types of marine vessel traffic. The sensory disturbance associated with the Project-related increase in tanker traffic, as stated previously, is a small contribution to existing environmental conditions.

PMV is in the midst of developing a program to look at the current levels of underwater noise in the Strait of Georgia and surrounding waters and to consider options for reducing potential environmental effects of noise from marine vessel traffic on marine mammals. This program will be a collaborative effort, led by PMV, and supported by Transport Canada, DFO, and the CCG. Non-governmental organizations involved in marine-related research will also be invited to collaborate. This initiative will also involve the Chamber of Shipping and Coastal Pilots as key stakeholders, as well as other major marine shipping industry representatives. Trans Mountain is also supportive of opportunities for Aboriginal communities to participate in this initiative.

The program will involve the deployment of a network of hydrophones in the Strait of Georgia and Haro Strait that will be used to measure the acoustic signatures of vessels and to monitor the activities of southern resident killer whales and other cetaceans. Data collected through the program will contribute to the development of mitigation measures aimed at reducing acoustic disturbance to marine mammals. PMV is expected to release more details on the program in early 2014.

Trans Mountain strongly supports this regionally-focused collaborative approach to developing solutions that would be applied to the marine transportation industry as a whole. Trans Mountain met with PMV in late 2013 and expressed its interest in contributing to the development and implementation of the proposed program. Trans Mountain will work with PMV in early 2014 to determine how to participate in this initiative to mitigate industry-wide effects on the southern resident killer whale population and other marine mammals.

Through its extensive engagement activities, Trans Mountain understands that a spill of oil into the marine environment, arising from an incident involving a tanker is a major concern for Aboriginal communities, government and regulatory agencies, the public, and the maritime community. Trans Mountain recognizes that an unmitigated oil spill from a tanker could have immediate to long-term effects on the biophysical and human environment of the Salish Sea.

In light of the increased risk related to the Project and as part of the TERMPOL Review Process, Trans Mountain commissioned a number of studies to understand the effect of the Project on marine navigational safety and management, and to understand what would happen if there were an accident with a Project-related tanker and heavy crude oil were spilled in the marine environment.

An examination of global casualty data indicates there has been an increase in marine safety and subsequent decline in the number of marine vessel incidents, in particular accidents related to oil tankers and specifically, incidents resulting in the release of oil in a marine environment. With respect to accidental oil spills from tankers transiting the West Coast there were no reported spills from oil tankers in the 2001-2009 period of CCG collecting this type of data. Despite the existing safety record for tanker traffic on the West Coast, the increase in Project-related tankers will increase the probability that an accident could occur.

To understand the incremental risk related to the increase in tanker traffic created by the Project, Trans Mountain contracted Det Norske Veritas (DNV) to conduct a quantitative risk assessment. DNV evaluated the existing marine and shipping network of the Burrard Inlet and Salish Sea to identify:

- the possible types of incidents that could result in an oil spill from a laden tanker;
- the navigational hazards along the route a laden oil tanker would transit between the Westridge Marine Terminal and the Pacific Ocean;
- the navigational risk controls currently that are in use in the Salish Sea region and which have been effective at reducing the frequency of navigational incidents;
- the possible types of incidents that could result in an oil spill from a laden tanker;
- the hypothetical accident locations along the previously mentioned tanker route that could result in an oil spill from a laden tanker;
- the potential for enhanced navigational risk controls to reduce the probability of an oil spill from a laden tanker; and
- the probability and consequences of a credible worst case and smaller accidental oil spill (*i.e.*, a “mean-case” oil spill) from a laden tanker.

From the risk assessment DNV concluded the following:

- If the Project did not go into operation by 2018, there would still be a risk of an oil spill from a laden tanker transiting the Salish Sea Region. DNV calculated that the probability of any size of an oil spill would be 1 in 309 years and the

probability of a credible worst case oil spill (*i.e.*, 16,500 m³ of heavy crude oil released) from a laden tanker would be 1 in 3,093 years.

- If the Project were approved and was operational by 2018, but no additional mitigation measures were implemented, DNV calculated that the probability of any size of an oil spill from a laden Project-related tanker would be 1 in 46 years. DNV calculated the probability of a credible worst case spill from a laden Project-related tanker would be 1 in 456 years.
- If the Project were approved and was operational by 2018, and additional mitigation measures were implemented, DNV calculated that the probability of any size of an oil spill from a laden Project-related tanker would be 1 in 237 years. DNV calculated the probability of a credible worst case spill from a laden Project-related tanker would be 1 in 2,366 years.

DNV recommended to Trans Mountain two key measures to improve navigational safety for Project-related tankers, thus reducing the probability of an accidental oil spill from a laden tanker. These two measures included additional tug escort and a Moving Safety Zone around laden tankers. As noted in the bullets above, DNV concluded that, with the implementation of these two key measures, the risk of a credible worst case oil spill from a Project-related tanker would not be substantially more than it is today, without the Project.

Through its updated Tanker Acceptance Criteria, Trans Mountain will require additional tug escort for Project-related tankers for the entire transit between Westridge Marine Terminal and the Pacific Ocean. As well, Trans Mountain is seeking endorsement for the Moving Safety Zone from the Joint Coordinating Group of the CVTS. Lastly, Trans Mountain is seeking endorsement from Transport Canada for both of the proposed additional navigational control measures, both of which could be implemented prior to the operation of the Project and could potentially be applied to all tankers transiting the Salish Sea furthering reducing the probability of a collision.

Although Trans Mountain is not directly and legally responsible for the operation of the vessels calling at the Westridge Marine Terminal, it is an active member in the maritime community and works with maritime agencies to promote best practices and facilitate improvements focussing on the safety, efficiency, and environmental standards of tanker traffic in the Salish Sea. Trans Mountain is a shareholder and member of the Western Canadian Marine Response Corporation (WCMRC) and works closely with WCMRC and other members to ensure that WCMRC remains capable of responding to any oil spill from vessels transferring product or transporting it within their area of jurisdiction.

Trans Mountain continues to work with WCMRC to identify improvements to the existing oil spill response preparedness and response capacity for the Salish Sea region. Trans Mountain recognizes there are complementary initiatives currently underway, led by the BC Government and by the Federal Tanker Expert Safety Panel, which may also result in improvements to the existing emergency preparedness and response capacity in this region. Trans Mountain is supportive of these efforts and will continue to play an active role to support and work with WCMRC, regulatory agencies, Aboriginal groups, and to implement requisite enhancements.

Trans Mountain acknowledges that it is not enough to simply identify the risks and environmental and socio-economic effects of the Project-related increase in tanker traffic; Trans Mountain will continue to play an active role in sharing this information and facilitating the discussion on how to mitigate Project-related environmental and socio-economic effects,

increased risks in the marine environment, and to improve existing emergency preparedness and response measures in preparation for the Project.

7.0 REFERENCES

7.1 Personal Communications

TERA wishes to acknowledge those people identified in the Personal Communications for their assistance in supplying information and comments incorporated into this report.

Bird, O. 2013. Executive Director, Sport Fishing Institute of BC. Delta, BC.

Chenier, D. Office of the Administrator of the Ship-source Oil Pollution Fund. Ottawa, ON.

Eckford, C. (Cptn.). 2013. Manager of Vessel Operations, Seaspan Marine. North Vancouver, BC.

Natland, J. 2013. Manager of Development Strategies, Port Metro Vancouver. Vancouver, BC.

Obermeyer, K. President, Pacific Pilotage Association. Vancouver, BC.

Towers, C. 2013. Owner, Vancouver Whale Watch. Steveston, BC.

7.2 Literature Cited

Administrator of the Ship-source Oil Pollution Fund. 2013. Ship-source Oil Pollution Fund, The Administrator's Annual Report 2012-2013. Ottawa, ON.

Adventures Through Kayaking Outfitters. 2009. Sea Kayaking. Website:
<http://www.atkayaking.com/component/content/article/2>. Accessed: July 2013.

Agness, A.M., J.F. Piatt, J.C. Ha and G.R. Vanblaricom. 2008. Effects of vessel activity on the near-shore ecology of Kittlitz's Murrelets (*Brachyramphus brevirostris*) in Glacier Bay, Alaska. *The Auk* 125(2):346–353.

Ainley, D.G., D.W. Anderson and P.R. Kelly. 1981. Feeding ecology of marine cormorants in southwestern North America. *The Condor* 83(2):120-131.

Ainley, D., D.A. Manuwal, J. Adams and A.C. Thoresen. 2011. Cassin's Auklet (*Ptychoramphus aleuticus*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. Website: <http://bna.birds.cornell.edu/bna/species/050>. Accessed: May 2013.

Allen, B.M., and R.P. Angliss, Ed. 2012. Steller sea lion (*Eumetopias jubatus*): Eastern U. S. Stock. Alaska Marine Mammal Stock Assessments, 2012. National Marine Mammal Laboratory, Alaska Fisheries Science Center. Seattle, WA. NOAA-TM-AFSC-245. 9 pp.

American Trails. 2012. Cascadia Marine Trail, Washington. Website:
<http://www.americantrails.org/nationalrecreationtrails/trailNRT/Cascadia-WA.html>. Accessed: July 2013.

Andrew, R.K., B.M. Howe and J.A. Mercer. 2002. Ocean ambient sound: Comparing the 1960s with the 1990s for a receiver off the California coast. *Acoustics Research Letters Online* 3(2):65–70.

- Au, W.W.L., A.A. Pack, M.O. Lammers, L.M. Herman, M.H Deakos and K. Andrews. 2006. Acoustic properties of humpback whale songs. *Journal of the Acoustical Society of America* 120:1103–1110.
- Badzinski, S.S., R.J. Cannings, T.E. Armenta, J. Komaromi and P.J.A. Davidson. 2008. Monitoring coastal bird populations in BC: the first five years of the Coastal Waterbird Survey (1999-2004). *Coastal Waterbird Survey* 17:1-35.
- Bain, D.E. and M.E. Dahlheim. 1994. Effects of masking noise on detection thresholds of killer whales. Pp. 243-256 in *Marine Mammals and the Exxon Valdez*. T.R. Loughlin (Ed.). Academic Press. N.Y.
- Baker, C.S. and L.M. Herman. 1989. The behavioral responses of summering humpback whales to vessel traffic: Experimental and opportunistic observations. Technical Report NPS-NR-TRS-89-01. United States Department of the Interior, National Park Service. Anchorage, AK.
- Barrett-Lennard, L.G. and G.M. Ellis. 2001. Population structure and genetic variability in Northeastern Pacific killer whales: Towards an assessment of population viability. Canadian Science Advisory Secretariat Research Document. 2001/065. 35 pp. Website: http://www.dfo-mpo.gc.ca/csas-sccs/publications/resdocs-docrech/2001/2001_065-eng.htm. Accessed: July 2013.
- Bassett, C., B. Polagye, M. Holt and J. Thomson. 2012. A vessel noise budget for Admiralty Inlet, Puget Sound, Washington (USA). *Journal of the Acoustical Society of America* 132(6):3706-3719.
- Be Whale Wise. 2013. Website: <http://www.bewhalewise.org/>. Accessed: November 2013.
- Beanlands, G.E., and P.N. Duinker. 1983. An ecological framework for environmental impact assessment in Canada. Institute for Resource and Environmental Studies. Halifax, NS.
- Bejder, L., A. Samuels, H. Whitehead, N. Gales, J. Mann, R. Connor, M. Heithaus, J. Watson-Capps, C. Flaherty and M. Krützen. 2006. Decline in relative abundance of bottlenose dolphins exposed to long-term disturbance. *Conservation Biology* 20(2):1791–1798.
- Bellefleur, D., P. Lee and R.A. Ronconi. 2009. The impact of recreational boat traffic on Marbled Murrelets (*Brachyramphus marmoratus*) off the west coast of Vancouver Island, British Columbia. *Journal of Environmental Management* 90(1):531-538.
- BirdLife International. 2003. Windfarms and birds: An analysis of the effects of wind farms on birds, and guidance on environmental assessment criteria and site selection issues. Proceedings of the Convention on the Conservation of European Wildlife and Natural Habitats. Strasbourg, France.
- BirdLife International. 2012a. Important Bird Area Search. Website: <http://www.birdlife.org/datazone/site/search>. Accessed: August 2013.
- BirdLife International. 2012b. Human disturbance to seabirds at sea. Website: <http://www.birdlife.org/datazone/sowb/casestudy/502>. Accessed: November 2013.

Bird Studies Canada. 2013. British Columbia Coastal Waterbirds Survey. Data accessed from NatureCounts, a node of the Avian Knowledge Network, Bird Studies Canada. Website: <http://www.naturecounts.ca/>. Accessed: February 2013.

Bird Studies Canada. 2013b. NatureCounts - Regional Data Summaries. Website: <http://www.birdscanada.org/birdmon/default/datasummaries.jsp>. Accessed: November 2013.

Bird Studies Canada and Nature Canada. 2012. 2004-2012 Important Bird Areas in Canada Database. Port Rowan, ON. Website: <http://www.sccp.ca/sarnet-records/important-bird-areas-canada-database>. Accessed: May 2013.

Black, A. 2005. Light induced seabird mortality on vessels operating in the Southern Ocean: Incidents and mitigation measures. *Antarctic Science* 17(1):67-68

Black Ball Ferry Line. 2013. About Us. Website: <https://www.cohoferry.com/About-Us>. Accessed: June 2013.

Boersma, P.D. and M.C. Silva. 2000. Fork-tailed Storm-Petrel (*Oceanodroma furcata*). No. 569. *The birds of North America*. A. Poole and F. Gill. Eds. Philadelphia, PA.

Booij, N., I.J. Haagsma, L. Holthuijsen, A. Kieftenburg, R. Ris, A. van der Westhuysen and M. Zijlema. 2006. SWAN User Manual, Cycle III Version 40.51. Delft University of Technology. Delft, The Netherlands, 137 pp.

Bradley, M. 1996. Environmental acoustics pocket handbook. Planning Systems Incorporated., Slidell, LA. 72 pp

British Columbia Cancer Agency. 2011. British Columbia Regional Cancer Control Statistics Report 2011. Vancouver, BC. 112 pp.

British Columbia Coastal Resource Information Management System. 2013. Website: <http://geobc.gov.bc.ca/coastal/index.htm>. Accessed: July 2013.

British Columbia Environmental Assessment Office. 2013. Guideline For The Selection Of Valued Components And Assessment Of Potential Effects. 45 pp.

British Columbia Ministry of Environment. 2013. BC Species and Ecosystems Explorer. BC Ministry of Environment. Victoria, BC. Website: <http://a100.gov.bc.ca/pub/eswp/>. Accessed: May 2013.

British Columbia Ferry Services Inc and B.C. Ferry Authority. 2012. 2011/12 Annual Reports. Website: http://www.bcferries.com/files/AboutBCF/AR/BCF_Annual_Report_2011-2012.pdf. Accessed: May 2013.

British Columbia Ferry Services Inc. 2013a. Maps of our service areas. Website: http://www.bcferries.com/travel_planning/maps/. Accessed: May 2013.

British Columbia Ferry Services Inc. 2013b. All Routes Map. Website: http://www.bcferries.com/files/images/maps/bcf-all_routes_map.pdf. Accessed: November 2013.

- British Columbia Lodging and Campground Association. 2013. Tsawwassen. Website: <http://www.travel-british-columbia.com/vancouver/metro-vancouver/tsawwassen/>. Accessed: September 2013.
- British Columbia Marine Conservation Analysis. 2010. Shipping & Transport - Feature Count. Website: http://bcmca.ca/datafeatures/hu_shippingtrans_featurecount/. Accessed: November 2013.
- British Columbia Marine Conservation Analysis. 2013. Welcome. Website: <http://bcmca.ca/>. Accessed: July 2013.
- British Columbia Marine Conservation Analysis. 2012. Tenures – Log Handling and Storage. Website: http://bcmca.ca/datafiles/individualfiles/bcmca_hu_tenures_loghandlingandstorage_atlas.pdf. Accessed: November 2013.
- British Columbia Marine Trails Association. 2013. Home. Website: <http://www.bcmarinetrails.org/>. Accessed: July 2013.
- British Columbia Ministry of Agriculture. 2011. British Columbia Seafood Industry Year in Review. Website: <http://www.env.gov.bc.ca/omfd/reports/Seafood-YIR-2011.pdf>. Accessed: April 2013.
- British Columbia Ministry of Environment Lands and Parks. 1996. Saanich Inlet Study, Synthesis Report: Technical Version. Victoria, BC.
- British Columbia Ministry of Environment Lands and Parks. 1997. First Nations Water Rights in British Columbia: A Historical Summary of the rights of Beecher Bay First Nation. Prepared by Julie Steinhauer. BC Environment, Water Management Branch. Victoria, BC.
- British Columbia Ministry of Forest, Lands and Natural Resource Operations. 2005. Repetitive Shore Type – Line, Shorezone (Theme). Coastal Resource Information System. Website: http://webmaps.gov.bc.ca/imf5/imf.jsp?site=dss_coastal. Accessed: May 2013.
- British Columbia Ministry of Forests, Lands and Natural Resource Operations. 2012. Develop with Care 2012: Environmental Guidelines for Urban and Rural Land Development in British Columbia. Website: <http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare2012/>. Accessed: November 2013.
- British Columbia Ministry of Jobs, Tourism and Skills Training. 2012. The value of tourism in British Columbia. Website: <http://www.destinationbc.ca/Research/Industry-Performance/Value-of-Tourism.aspx>. Accessed: August 2013.
- British Columbia Oil and Gas Commission. 2009. British Columbia Noise Control Best Practices Guideline. March 17, 2009. Victoria, BC. 26 pp.
- British Columbia Parks. 2013a. Indian Arm Provincial Park. British Columbia Ministry of Environment. Website: http://www.env.gov.bc.ca/bcparks/explore/parkpgs/indian_arm/. Accessed: June 2013.

- British Columbia Parks. 2013b. Discovery Island Marine Park. British Columbia Ministry of Environment. Website: http://www.env.gov.bc.ca/bcparks/explore/parkpgs/discovery_is/. Accessed: June 2013.
- British Columbia Parks. 2013c. Juan de Fuca Provincial Park. British Columbia Ministry of Environment. Website: [http://www.env.gov.bc.ca/bcparks/explore/parkpgs/juan de fuca/](http://www.env.gov.bc.ca/bcparks/explore/parkpgs/juan_de_fuca/). Accessed: June 2013.
- British Columbia Stats. 2013. British Columbia's Fisheries and Aquaculture Sector, 2012 Edition. Prepared for the Department of Fisheries and Oceans Canada. Website: [http://www.bcstats.gov.bc.ca/aboutus/news/13-01-29/British Columbia s Fisheries and Aquaculture Sector.aspx](http://www.bcstats.gov.bc.ca/aboutus/news/13-01-29/British_Columbia_s_Fisheries_and_Aquaculture_Sector.aspx). Accessed: August 2013.
- British Columbia Waterfowl Society. 2012. A Sanctuary in the Heart of the Fraser River Estuary. Delta, BC. Website: <http://www.reifelbirdsanctuary.com/fraser.html>. Accessed: July 2013.
- Brown, R.G.B. 2013. Hinterland Who's Who: Oil Pollution and Birds. Prepared for Environment Canada and the Canadian Wildlife Federation. Website: <http://www.hww.ca/en/issues-and-topics/oil-pollution-and-birds.html>. Accessed: November 2013.
- Bruderer, B., D. Peter and T. Steuri. 1999. Behavior of migrating birds exposed to X-band radar and a bright light beam. *Journal of Experimental Biology* 202(9):1015-1022.
- Burd, B.J., P.A.G. Barnes, C.A. Wright and R.E. Thomson. 2008. A review of subtidal benthic habitats and invertebrate biota of the Strait of Georgia, British Columbia. *Marine Environmental Research* 66:S3 – S38.
- Burrard Inlet Environmental Action Program. 2011. Consolidated Environmental Management Plan for Burrard Inlet. Updated 2011. Website: http://www.bieapfrempp.org/pdf/burrard_inlet_2011_cemp_web_use.pdf. Accessed: April 2013.
- Burrard Inlet Environmental Action Program. 2012. Annual Report: Burrard Inlet Environmental Action Program, Fraser River Estuary Management Program. Burnaby, BC. 35 pp.
- Burton, C.H. 2010. Ground-nesting bald eagle in the Strait of Georgia, British Columbia. *Wildlife Afield* 7(1):126-127.
- Butler, R.W. and J.-P. L. Savard. 1985. Monitoring of the spring migration of waterbirds throughout British Columbia: a pilot study. Canadian Wildlife Service, Pacific and Yukon Region, Delta, BC.
- Cascadia Research. 2008. SPLASH: Structure of Populations, Levels of Abundance and Status of Humpback Whales in the North Pacific. Final Report for Contract AB133F-03-RP-00078. Prepared for U.S. Department of Commerce. Olympia, WA. 57 pp.
- Campbell, R.W., N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser and M.C.E. McNall. 1990. *The Birds of British Columbia. Volume I: Nonpasserines: Introduction, Loons through Waterfowl*. Royal British Columbia Museum. Victoria, BC. 514 pp.

- Canadian Broadcasting Corporation. 2009. Crab Lines Foul Northern Ferry's Propeller Shafts. Website: <http://www.cbc.ca/news/canada/british-columbia/story/2009/09/02/bc-crab-traps-ferries-northern-adventure.html>. Accessed: November 2013
- Canadian Coast Guard. 2013a. Vessel Traffic Services. <http://www.ccg-gcc.gc.ca/e0003910>. Accessed: October 2013.
- Canadian Coast Guard. 2013b. Annual Edition Notices to Mariners 1 to 46: April 2013 to March 2014. Fisheries and Oceans Canada. Website: <http://www.notmar.gc.ca/eng/services/annual/annual-notices-to-mariners-eng.pdf> . Accessed: April 2013.
- Canadian Coast Guard. 2013c. Fishing Vessel Advisory Notice. Website: <http://www.ccg-gcc.gc.ca/e0003900>. Accessed: June 2013.
- Canadian Council of Ministers of the Environment. 2008. Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale. Supporting Technical Document. PN 1399. 412 pp.
- Canadian Environmental Assessment Agency. 2006. Deltaport Third Berth Expansion Project, Comprehensive Study Report. Prepared by Fisheries and Oceans Canada and Environment Canada. 241 pp.
- Canadian Environmental Assessment Agency. 2012. Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners. Website: <http://www.ceaa-acee.gc.ca/default.asp?lang=En&n=A41F45C5-1&offset=1&toc=show>. Accessed: June 2013.
- Canadian Environmental Assessment Agency. 2013. Addressing Cumulative Environmental Effects Under the *Canadian Environmental Assessment Act, 2012*. May 2013. Website: <https://www.ceaa-acee.gc.ca/Content/1/D/A/1DA9E048-4B72-49FA-B585-B340E81DD6AE/CEA OPS May 2013-eng.pdf>. Accessed: November 2013.
- Capital Regional District. 2010. Juan de Fuca Electoral Area Stormwater Quality. Annual Report 2007-2008. Stormwater, Harbours and Watersheds Program, Environmental Services. Victoria, BC. 51 pp.
- Capital Regional District. 2011. Macaulay and Clover Points Wastewater and Marine Environment Program, Annual Report 2011. Marine Programs. Victoria, BC. 219 pp.
- Capital Regional District. 2012. Core Area Stormwater Quality, Annual Report 2008-2011. Stormwater, Harbours and Watersheds Program, Environmental Sustainability. Victoria, BC. 349 pp.
- Capital Regional District. 2013. About. Website: <http://www.crd.bc.ca/>. Accessed: June 2013.
- Carlson, K.T. Ed. 2001. A Stó:lō Coast Salish Historical Atlas. Douglas & McIntyre. Vancouver, BC.
- Carney, K.M. and W.J. Sydeman. 1999. A review of human disturbance effects on nesting colonial waterbirds. *Waterbirds* 22(1):68-79.

- Carney, K.M. and W.J. Sydeman. 2000. Response: Disturbance, habituation, and management of waterbirds. *Waterbirds* 23(2):333-334.
- Center for Whale Research. 2013. Southern Resident Killer Whales. Population Abundance as of July 1, 2013. Website: <http://www.whaleresearch.com/#!/orcas/cto2>. Accessed: July 2013.
- Cerchio, S., and M. Dahlheim. 2001. Variation in feeding vocalizations of humpback whales (*Megaptera*) from Southeast Alaska. *Bioacoustics* 11(4): 277-295
- Chamber of Shipping. 2011. British Columbia Ports Handbook. Website: <http://www.chamber-of-shipping.com/images/docs/BCPortsHandbook2011.pdf>. Accessed: November 2013.
- Chatwin, T.A., M.H. Mather and T.D. Giesbrecht. 2002. Changes in pelagic and double-crested cormorant nesting populations in the Strait of Georgia, British Columbia. *Northwestern Naturalist* 83(3):109-117.
- Choi, M., Y.R. An, K.J. Park, I.S. Lee, D.W. Hwang, J. Kim, and H.B. Moon. 2013. Accumulation of butyltin compounds in finless porpoises (*Neophocaena asiaeorientalis*) from Korean coast: Tracking the effectiveness of TBT regulation over time. *Marine Pollution Bulletin* 66(1-2):78-83.
- City of Vancouver. 2013. Windsurfing, Skimboarding and Standup Paddling. Website: <http://vancouver.ca/parks-recreation-culture/windsurfing-skimboarding-and-standup-paddling.aspx>. Accessed: April 2013.
- Clark, C.W., W.T. Ellison, B.L. Southall, L. Hatch, S.M. Van Parijs, A. Frankel and D. Ponirakis. 2009. Acoustic masking in marine ecosystems: Intuitions, analysis, and implication. *Marine Ecological Progress Series* 395:201-222
- Cleary, J.S. and J.F. Schweigert. 2011. Stock Assessment and Management Advice for the British Columbia Herring Stocks: 2010 Assessment and 2011 Forecasts. Canadian Science Advisory Secretariat Research Document 2011/115. Fisheries and Oceans Canada. Nanaimo, BC. 98 pp.
- Cleary, J.S., J.F. Schweigert and V. Haist. 2009. Stock Assessment and Management Advice for the British Columbia Herring Fishery: 2009 Assessment and 2010 Forecasts. Canadian Science Advisory Secretariat Research Document 2009/079. Fisheries and Oceans Canada. Nanaimo, BC. 89 pp.
- Clipper Navigation Inc. 2013. Schedules and Fares. Website: <http://www.clippervacations.com/schedules-fares/>. Accessed: June 2013.
- Committee on the Status of Endangered Wildlife in Canada. 2002. COSEWIC Assessment and Status Report on the Coho Salmon *Oncorhynchus kisutch* Interior Fraser population in Canada. Ottawa, ON. 42 pp. Website: <http://www.dfo-mpo.gc.ca/Library/327321.pdf>. Accessed: May 2013.
- Committee on the Status of Endangered Wildlife in Canada. 2003a. COSEWIC Assessment and Status Report on the Sockeye Salmon *Oncorhynchus nerka* Cultus population in Canada. Ottawa, ON. 66 pp. Website: <http://www.dfo-mpo.gc.ca/Library/327319.pdf>. Accessed: May 2013.

- Committee on the Status of Endangered Wildlife in Canada. 2003b. COSEWIC Assessment and Status Report on the Sockeye Salmon *Oncorhynchus nerka* Sakinaw population in Canada. Ottawa, ON. 44 pp. Website: <http://www.dfo-mpo.gc.ca/Library/327318.pdf>. Accessed: May 2013.
- Committee on the Status of Endangered Wildlife in Canada 2003c. COSEWIC Assessment and Update Status Report on the Steller Sea Lion *Eumetopias jubatus* in Canada. Ottawa, ON. 54 pp. Website: <http://publications.gc.ca/collections/Collection/CW69-14-365-2004E.pdf>. Accessed: July 2013.
- Committee on the Status of Endangered Wildlife in Canada. 2006. COSEWIC Assessment and Status Report on the Chinook Salmon *Oncorhynchus tshawytscha* Okanagan population in Canada. Ottawa, ON. 48 pp. Website: <http://www.dfo-mpo.gc.ca/Library/327320.pdf>. Accessed: May 2013.
- Committee on the Status of Endangered Wildlife in Canada. 2008. COSEWIC Assessment and Update Status Report on the Killer Whale *Orcinus orca*, Southern Resident population, Northern Resident population, West Coast Transient population, Offshore population, Northwest Atlantic/Eastern Arctic population, in Canada.. Ottawa, ON. 73 pp. Website: http://publications.gc.ca/collections/collection_2009/ec/CW69-14-564-2009E.pdf. Accessed: July 2013.
- Committee on the Status of Endangered Wildlife in Canada. 2011. COSEWIC Assessment and Status Report on the Humpback Whale *Megaptera novaeangliae* in Canada. North Pacific Population, Western North Atlantic Population. Ottawa, ON. 33 pp. Website: <http://www.cascadiaresearch.org/robin/COSEWICHumpback2003.pdf>. Accessed: July 2013.
- Committee on the Status of Endangered Wildlife in Canada. 2013. Status Reports. Website: http://www.cosewic.gc.ca/eng/sct2/index_e.cfm. Accessed: May 2013.
- ConocoPhillips Alaska. 2011. Bird Strike Avoidance and Lighting Plan. Prepared in Support of ConocoPhillips Exploration Drilling Program in the Chukchi Sea within Lease Sale Area 193. Anchorage, AK.
- Corkeron, P.J. 1995. Humpback whales (*Megaptera novaeangliae*) in Hervey Bay, Queensland: Behaviour and responses to whale-watching vessels. Canadian Journal of Zoology 73(7):1290- 1299.
- Corkeron, P.J. 2004. Whale watching, iconography, and marine conservation. Conservation Biology 18(3):847-849.
- Cowichan Tribes. 2013. History. Website: www.cowichantribes.com/about/History. Accessed: March 2013.
- Crewe, T., K. Barry, P. Davidson and D. Lepage. 2012. Coastal waterbird population trends in the Strait of Georgia 1999-2011: Results from the first 12 years of the British Columbia Coastal Waterbird Survey. British Columbia Birds 22:8-35.
- Crocker, M.J. 2007. Handbook of Noise and Vibration Control. Wiley and Sons, New York, NY. 1600 pp.

- Croxall, J.P., S.H.M. Butchart, B. Lascelles, A.J. Stattersfield, B. Sullivan, A. Symes and P. Taylor. 2012. Seabird conservation status, threats and priority actions: A global assessment. *Bird Conservation International* 22(1):1–34.
- Cruise BC. 2013. Study Demonstrates that BC Cruise Ports Continue to be an Economic Hub in Canada. Website: http://www.cruisebc.ca/assets/uploads/cruise_bc_may_2013_final_news_release_862.pdf. Accessed: August 2013.
- Cruise Lines International Association. 2013. Home. Website: <http://nwcruiseship.org/#tab2>. Accessed: July 2013.
- Dalla Rosa L., J.K.B. Ford and A.W. Trites. 2012. Distribution and relative abundance of humpback whales in relation to environmental variables in coastal British Columbia and adjacent waters. *Continental Shelf Research* 36: 89-104.
- Delvigne, G.A.L. and C.E. Sweeney. 1988. Natural dispersion of oil. *Oil & Chemical Pollution* 4(4):281-310.
- Department of National Defence. 1994. EIS: Military Flight Training. An Environmental Impact Statement on Military Flying Activities in Labrador and Quebec. Ottawa, ON.
- Destination BC Corp. 2013. Destination British Columbia. Website: <http://www.hellobc.com/>. Accessed: July 2013.
- Det Norske Veritas. 2012. Risk Assessment Study for Coal Barge Operation: Fraser Surrey Docks. Website: <http://portmetrovancover.com/docs/default-source/projects-project-review/fraser-surrey-docks/d-2012-10-10-fsd-final-dnv-marine-risk-assessment.pdf?sfvrsn=0>. Accessed: November 2013.
- Discover Sooke. 2008. Kayaking on the ocean and rivers of Sooke BC. Website: <http://www.discoversooke.com/kayaking.php>. Accessed: July 2013.
- dive.bc.ca. 2013. Dive Charter Operators and Dive Resorts in British Columbia. Website: <http://dive.bc.ca/links/charters.html#southvanisle>. Accessed: July 2013.
- Dooling, R. 1978. Behavior and psychophysics of hearing in birds. *Journal of the Acoustic Society of America* 64:4.
- Dufour, P. 1980. Effects of noise on wildlife and other animals. United States Environmental Protection Agency, Office of Noise Abatement and Control, Washington, DC.
- Dutch, M., E. Long, S. Aasen, K. Welch and V. Partridge. 2008. Sediment Quality in the Bays and Inlets of the San Juan Islands, Eastern Strait of Juan de Fuca, and Admiralty Inlet (2002 - 2003). Prepared for the Puget Sound Assessment and Monitoring Program, Washington State Department of Ecology.
- Edgell, T.C. and M.W. Demarchi. 2012. California and Steller sea lion use of a major winter haulout in the Salish Sea over 45 years. *Inter-Research Marine Ecology Progress Series* 467:253-262.

Elliot, J.E., L.K. Wilson and B. Wakeford. 2005. Polybrominated diphenyl ether trends in eggs of marine and freshwater birds from British Columbia, Canada, 1979-2002. *Environmental Science and Technology* 39(15):5584-5591.

Emerald Diving. 2008. Local Sites: San Juan Islands. Website: http://www.emeralddiving.com/local_sites_sj.html. Accessed: July 2013.

Environment Canada, 1987. *Marine Weather Hazards along the British Columbia Coast*. 114 pp.

Environment Canada. 2012. *National Inventory Report 1990-2010: Greenhouse Gas Sources and Sinks in Canada*. Gatineau, QC. 539 pp.

Environment Canada. 2013a. *National Air Pollution Surveillance Network: NAPS Annual Raw Data*. Website: <http://www.etc-cte.ec.gc.ca/NapsAnnualRawData/main.aspx>. Accessed: June 2013.

Environment Canada. 2013b. *Canadian Climate Normals or Averages 1971-2000*. Website: http://climate.weatheroffice.gc.ca/climate_normals/index_e.html. Accessed: June 2013.

Environment Canada. 2013c. *Disposal at Sea*. Website: <http://ec.gc.ca/iem-das/Default.asp?lang=En&n=0047B595-1>. Accessed: September 2013.

Erbe, C. 2002. Underwater noise of whale-watching boats and potential effects on killer whales (*Orcinus orca*), based on an acoustic impact model. *Marine Mammal Science* 18(2):394-418.

Esquimalt Nation. 2010a. *Esquimalt Nation Community Plan*. Website: <http://esquimaltnation.ca>. Accessed: March 2013.

Esquimalt Nation. 2010b. *Esquimalt Nation Treaty Definition and Traditional Government Structure, New Relationship Trust Status Report, Period Ending March 10, 2010*. Published by Esquimalt Nation. Victoria, BC.

Federal Environmental Assessment Review Office. 1994a. *The Responsible Authority's Guide to the Canadian Environmental Assessment Act. Part II: The Practitioner's Guide*. November 1994. Hull, QC. 23 pp.

Federal Environmental Assessment Review Office. 1994b. *A Reference Guide for the Canadian Environmental Assessment Act: Addressing Cumulative Environmental Effects*. Hull, QC. 23 pp. Website: http://www.ceaa-acee.gc.ca/9742C481-21D8-4D1F-AB14-555211160443/Addressing_Cumulative_Environmental_Effects.pdf. Accessed: November 2013.

Federal Environmental Assessment Review Office. 1994c. *A Reference Guide for the Canadian Environmental Assessment Act: Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects*. Hull, QC. 23 pp. Website: http://www.ceaa-acee.gc.ca/D213D286-2512-47F4-B9C3-08B5C01E5005/Determining_Whether_a_Project_is_Likely_to_Cause_Significant_Adverse_Environmental_Effects.pdf. Accessed: November 2013.

- Fediuk, K. and B. Thom. 2003. Contemporary & Desired Use of Traditional Resources in a Coast Salish Community: Implications for Food Security and Aboriginal Rights in British Columbia. Presented at the 26th Annual Meeting of the Society for Ethnobiology, Seattle, WA. 21 pp.
- Finley, C.G. and R.D. Revel. 2002. Pipeline Projects and Cumulative Effects Assessment Issues. Pp. 219-231 in *Environmental Concerns in Rights-of-Way Management: Seventh International Symposium*. J.W. Goodrich-Mahoney, D.F. Mutrie and C.A. Guild (Eds.). Elsevier Science Ltd.
- Finneran, J.J. and A.K. Jenkins. 2012. Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis. SSC Pacific. 65 pp.
- First Nations Health Council. 2011. Traditional Food Factsheets. West Vancouver, BC. Website: http://www.fnhc.ca/pdf/Traditional_Food_Facts_Sheets.pdf. Accessed: May 2013.
- First Nations Health Council. 2011b. The Role of Nutrition in Health. Website: http://www.fnhc.ca/index.php/initiatives/community_health/nutrition/. Accessed: November 2013
- Fisheries and Oceans Canada. 2001. Fish Stocks of the Pacific Coast. Fisheries and Oceans Canada. 162 pp.
- Fisheries and Oceans Canada. 2004. Salmon Migration Routes on the North and South Coast 2004. Mapster v3. Website: <http://pacgis01.dfo-mpo.gc.ca/Mapster30/#/SilverMapster>. Accessed: November 2013
- Fisheries and Oceans Canada. 2005. Canada's Policy for Conservation of Wild Pacific Salmon. Fisheries and Oceans Canada. Vancouver, BC. Cat. No. Fs23-476/2005E. 57 pp.
- Fisheries and Oceans Canada. 2007. Recovery Strategy for the Transient Killer Whale (*Orcinus orca*) in Canada. Species at Risk Act Recovery Strategy Series. Vancouver, BC. 58 pp.
- Fisheries and Oceans Canada. 2008. Northern and Southern Resident Killer Whales (*Orcinus orca*) in Canada: Critical Habitat Protection Statement. Website: http://www.sararegistry.gc.ca/virtual_sara/files/ch_killer_Whale_0908_e.pdf. Accessed: July 2013.
- Fisheries and Oceans Canada. 2009a. Buoy Weather Data. Website: <http://www.pac.dfo-mpo.gc.ca/science/oceans/data-donnees/buoydata-donneebouee/index-eng.html#BuoyLocations>. Accessed: May 2013.
- Fisheries and Oceans Canada. 2009b. Critical Habitats of the Northeast Pacific Northern and Southern Resident Populations of the Killer Whale (*Orcinus orca*) Order. Vol. 143, No. 5 — March 4, 2009. SARA Directorate, Fisheries and Oceans Canada. Ottawa, ON. Website: http://www.sararegistry.gc.ca/document/doc1756/SOR-2009-68_e.cfm. Accessed: July 2013.
- Fisheries and Oceans Canada. 2009c. Recovery Potential Assessment of the Humpback Whale, Pacific Population. Canadian Science Advisory Secretariat Science Advisory Report. 2009/048. 10 pp.

- Fisheries and Oceans Canada. 2010a. Management Plan for the Steller Sea Lion (*Eumetopias jubatus*) in Canada. Final. *Species at Risk Act* Management Plan Series. Fisheries and Oceans Canada, Technical Team. Ottawa, ON. 80 pp.
- Fisheries and Oceans Canada. 2010b. Advice Relevant to the Identification of Critical Habitats for North Pacific Humpback Whales (*Megaptera novaeangliae*). Canadian Science Advisory Secretariat Science Response 2009/016. 14 pp.
- Fisheries and Oceans Canada. 2011. Recovery Strategy for the Northern and Southern Resident Killer Whales (*Orcinus orca*) in Canada. *Species at Risk Act* Recovery Strategy Series, Fisheries & Oceans Canada, Ottawa, ON. 93 pp. Website: http://www.sararegistry.gc.ca/document/default_e.cfm?documentID=1341. Accessed: April 2013.
- Fisheries and Oceans Canada. 2012a. Annual Reports of Catch and Value Statistics, Summary Commercial Catch Statistics. Website: <http://www.pac.dfo-mpo.gc.ca/stats/comm/summ-somm/index-eng.html>. Accessed: May 2013.
- Fisheries and Oceans Canada. 2012b. Integrated Fisheries Management Plans. Website: <http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/ifmp-gmp/index-eng.htm>. Accessed: July 2013.
- Fisheries and Oceans Canada. 2012c. Pacific Region Integrated Fisheries Management Plan: Surf Smelt - April 1, 2012 to December 31, 2014. Website: <http://www.dfo-mpo.gc.ca/Library/345701.pdf>. Accessed: April 2013.
- Fisheries and Oceans Canada. 2012d. Pacific Region Integrated Fisheries Management Plan: Pacific Herring – November 7, 2012 to November 6, 2013. Amended February 10, 2013. Website: <http://www.pac.dfo-mpo.gc.ca/fm-gp/ifmp-eng.html>. Accessed: April 2013.
- Fisheries and Oceans Canada. 2013a. Integrated Science Data Management: Wave Data. Website: <http://www.meds-sdmm.dfo-mpo.gc.ca/isdm-gdsi/waves-vagues/index-eng.htm>. Accessed: May 2013.
- Fisheries and Oceans Canada. 2013a. C46146 (Halibut Bank), C46134 (Pat Bay), C46206 (La Perouse Bank). Integrated Science Data Management – Waves. Website: <http://www.meds-sdmm.dfo-mpo.gc.ca/isdm-gdsi/waves-vagues/index-eng.htm>. Accessed: November 2013.
- Fisheries and Oceans Canada. 2013b. Pacific Region Integrated Fisheries Management Plan: Salmon, Southern BC June 1, 2013 to May 31, 2014. Website: <http://www.pac.dfo-mpo.gc.ca/fm-gp/ifmp-eng.html>. Accessed: June 2013.
- Fisheries and Oceans Canada. 2013c. Canadian Science Advisory Secretariat (CSAS) Publications. Website: <http://www.isdm-gdsi.gc.ca/csas-sccs/applications/Publications/index-eng.asp>. Accessed: July 2013.
- Fisheries and Oceans Canada. 2013d. WAVES Online Catalogue. Website: <http://waves-vagues.dfo-mpo.gc.ca/waves-vagues/>. Accessed: July 2013.
- Fisheries and Oceans Canada. 2013e. Mapster v3. Website: <http://www.pac.dfo-mpo.gc.ca/gis-sig/maps-cartes-eng.htm>. Accessed: July 2013.

- Fisheries and Oceans Canada. 2013f. 2012/13 Pacific Region Integrated Fisheries Management Plan: Pacific Herring - November 7, 2012 to November 6, 2013. Website: <http://www.pac.dfo-mpo.gc.ca/fm-gp/mplans/2013/herring-hareng-2012-2013-eng.pdf>. Accessed: March 2013.
- Fisheries and Oceans Canada. 2013g. Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment. Website: http://www.dfo-mpo.gc.ca/oceans-habitat/oceans/im-gi/seismic-sismique/pdf/statement-enonce_e.pdf. Accessed: July 2013.
- Fisheries and Oceans Canada. 2013h. Recovery Strategy for the North Pacific Humpback Whale (*Megaptera novaeangliae*) in Canada [Final]. Humpback Whale (North Pacific Population). Species at Risk Act Recovery Strategy Series. Ottawa, ON. 77 pp.
- Fisheries and Oceans Canada. 2013i. Pacific Region Integrated Fisheries Management Plan: Crab by Trap – January 1, 2013 to December 31, 2013. Website: <http://www.pac.dfo-mpo.gc.ca/fm-gp/ifmp-eng.html>. Accessed: April 2013.
- Fisheries and Oceans Canada. 2013j. Pacific Region Integrated Fisheries Management Plan: Prawn and Shrimp by Trap – May 1, 2013 to April 30, 2014. Website: <http://www.pac.dfo-mpo.gc.ca/fm-gp/ifmp-eng.html>. Accessed: May 2013.
- Fisheries and Oceans Canada. 2013k. Pacific Region Integrated Fisheries Management Plan: Shrimp Trawl – April 1, 2013 to March 31, 2014. Website: <http://www.pac.dfo-mpo.gc.ca/fm-gp/ifmp-eng.html>. Accessed: April 2013.
- Fisheries and Oceans Canada. 2013l. Pacific Region. Website: <http://www.pac.dfo-mpo.gc.ca/index-eng.html>. Accessed: July 2013.
- Fisheries and Oceans Canada. 2013m. Pacific Region Integrated Fisheries Management Plan: Groundfish – Effective February 21, 2013. Website: <http://www.pac.dfo-mpo.gc.ca/fm-gp/ifmp-eng.html>. Accessed: June 2013.
- Fisheries and Oceans Canada. 2013n. Current Valid British Columbia Shellfish Aquaculture License Holders. Website: <http://www.pac.dfo-mpo.gc.ca/aquaculture/licence-permis/docs/shell-conch-processors-transformateurs-eng.html>. Accessed: July 2013.
- Fisheries and Oceans Canada. 2013o. Current Valid Marine Finfish British Columbia Aquaculture License Holders. Website: <http://www.pac.dfo-mpo.gc.ca/aquaculture/licence-permis/docs/finfish-pisciculture-eng.html>. Accessed: July 2013.
- Fisheries and Oceans Canada. 2013p. Be Whale Wise – Marine Wildlife Guidelines for Boaters, Paddlers and Viewers. Website: <http://www.pac.dfo-mpo.gc.ca/fm-gp/species-especies/mammals-mammiferes/view-observer-eng.html>. Accessed: November 2013
- FORCE Technology and Danish Hydraulic Institute. 2012. Wake Waves at Kitkiata Inlet and Principe Channel. Prepared for Northern Gateway Pipelines Inc.
- Ford, J.K.B. 1991. Vocal traditions among resident killer whales, *Orcinus orca*, in coastal waters of British Columbia, Canada. Canadian Journal of Zoology 69(6):1454-1483.

- Ford, J.K.B., G.M. Ellis, L.G. Barrett-Lennard, A.B. Morton, R.S. Palm and K.C. Balcomb, III. 1998. Dietary specialization in two sympatric populations of killer whales (*Orcinus orca*) in coastal British Columbia and adjacent waters. *Canadian Journal of Zoology* 76:1456-1471.
- Ford, J.K.B., G.M. Ellis and K.C. Balcomb. 2000. *Killer Whales: The Natural History and Genealogy of Orcinus Orca in British Columbia and Washington State*, Second Edition. University of British Columbia Press. Vancouver, BC. 104 pp.
- Ford, J.K.B. and G.M. Ellis. 2006. Selective foraging by fish-eating killer whales *Orcinus orca* in British Columbia. *Marine Ecology Progress Series* 316:185-199.
- Ford, J.K.B., A.L. Rambeau, R.M. Abernethy, M.D. Boogaards, L.M. Nichol and L.D. Spaven. 2009. An Assessment of the Potential for Recovery of Humpback Whales off the Pacific Coast of Canada. *Canadian Science Advisory Secretariat Research Document* 2009/015. Fisheries and Oceans Canada. Nanaimo, BC. 37 pp.
- Ford, J.K.B., R.M. Abernethy, A.V. Phillips, J. Calambokidis, G.M. Ellis and L.M. Nichol. 2010. Distribution and Relative Abundance of Cetaceans in Western Canadian Waters from Ship Surveys, 2002-2008. *Canadian Technical Report of Fisheries and Aquatic Sciences* 2913. Fisheries and Oceans Canada. Nanaimo, BC. 59 pp.
- Simon Fraser University. Undated. Fraser River Action Plan. Summary of Reports. Website: <http://www.rem.sfu.ca/research/student-research/frac/>. Accessed: September 2013.
- Frid, A. and L.M. Dill. 2002. Human-caused disturbance stimuli as a form of predation risk. *Conservation Ecology* 6(1):11-25.
- Gardner, J., Ph.D. 2009. First Nations and Marine Protected Areas, Discussion Paper. Prepared for Canadian Parks and Wilderness Society BC Chapter. Vancouver, BC.
- Garel, E., L. López Fernández and M. Collins. 2008. Sediment resuspension events induced by the wake wash of deep-draft vessels. *Geo-Marine Letters* 28(4):205-211.
- Gaydos, J.K. and S.F. Pearson. 2011. Birds and mammals that depend on the Salish Sea: A compilation. *Northwestern Naturalist* 92(2):79-94.
- Gladwin, D.N., D.A. Asherin and K.M. Mancini. 1988. Effects of aircraft noise and sonic booms on fish and wildlife: Results of a survey of U.S. Fish and Wildlife Service endangered species and ecological services field offices, refuges, hatcheries, and research centers. NERC-88/30. Fish and Wildlife Service, National Ecology Research Center, Fort Collins, CO.
- Global Aviation Resource. 2010. Vancouver Harbour Water Airport. Website: <http://www.globalaviationresource.com/reports/2010/vancouverharbour.php>. Accessed: July 2013.
- GoNorthwest. 2013. Washington Activities: Whale Watching. Website: http://www.gonorthwest.com/Washington/Activities/whales/whale_watching.htm. Accessed: July 2013.

- Goudie, R. I., S. Brault, B. Conant, A. V. Kondratyev, M. R. Petersen and K. Vermeer. 1994. The status of sea ducks in the north Pacific Rim: Toward their conservation and management. Transactions of the 59th North American Wildlife and Natural Resources Conference 1994.
- Government of British Columbia. 2012. Requirements for British Columbia to Consider Support for Heavy Oil Pipelines. http://www.env.gov.bc.ca/main/docs/2012/TechnicalAnalysis-HeavyOilPipeline_120723.pdf. Accessed: October 2013.
- Government of Canada. 2013a. Species At Risk Public Registry. Website: http://www.sararegistry.gc.ca/default_e.cfm. Accessed: May 2013.
- Government of Canada. 2013b. Committee on the Status of Endangered Wildlife in Canada. Website: http://www.cosewic.gc.ca/eng/sct5/index_e.cfm. Accessed: May 2013.
- Government of Canada, 2009. Pacific Pilotage Regulations. C.R.C., c.1270. Last amended December 10, 2009. http://laws-lois.justice.gc.ca/PDF/C.R.C.,_c._1270.pdf. Accessed: October 2013.
- Government of Canada. 2013c. Supporting Responsible Energy Development. Website: <http://actionplan.gc.ca/en/initiative/supporting-responsible-energy-development>. Accessed: September 2013.
- Government of the United States. Code of Federal Regulations (CFR). 33 CFR 155.1020 – Definitions. <http://www.law.cornell.edu/cfr/text/33/155.1020>. Accessed: November 2013.
- Greater Vancouver Visitors and Convention Bureau. 2013a. Whale watching. Website: <http://www.tourismvancouver.com/do/activities-attractions/whale-watching/>. Accessed: November 2013.
- Greater Vancouver Visitors and Convention Bureau. 2013b. Things To Do. Website: <http://www.tourismvancouver.com/do/>. Accessed: November 2013.
- GSGislason & Associates Ltd., Archipelago Marine Research Ltd., and Edna Lam Consulting. 2010. Economic Impacts from a Reduced Groundfish Trawl Fishery in British Columbia. Website: <http://www.env.gov.bc.ca/omfd/reports/groundfish-trawl-fishery-economic-impacts.pdf>. Accessed: June 2013.
- Greater Vancouver Visitors and Convention Bureau. 2013. Whale watching. Website: <http://www.tourismvancouver.com/do/activities-attractions/whale-watching/>. Accessed: July 2013.
- Greer, R.D., R.H. Day and R.S. Bergman. 2010. Effects of Ambient Artificial Light on Arctic Marine Fauna. Northern Oil and Gas Research Forum. Website: <http://www.arcus.org/files/meetings/279/presentations/greer.pdf>. Accessed: November 2013.
- Gregg, E.J., J. Calambokidis, L. Convey, J.K.B. Ford, R.I. Perry, L. Spaven and M. Zacharias. 2006. Recovery Strategy for Blue, Fin, and Sei Whales (*Balaenoptera musculus*, *B. physalus*, and *B. borealis*) in Pacific Canadian Waters – PROPOSED. Species at Risk Act Recovery Strategy Series. Fisheries and Oceans Canada. Vancouver, BC. 64 pp.

- Gulf Islands Tourism. 2013. Gulf Islands are a kayaking paradise. Website: <http://gulfislandstourism.com/paradise-for-kayaking/>. Accessed: July 2013.
- Gustafson R.G., W.H. Lenarz, B.B. McCain, C.C. Schmitt, W.S. Grant, T.L. Builder and R.D. Methot. 2000. Status review of Pacific Hake, Pacific Cod, and Walleye Pollock from Puget Sound, Washington. NOAA Technical Memorandum NMFS-NWFSC- 44, 275 pp. Website: <http://www.nwfsc.noaa.gov/publications/scipubs/searchdoc.cfm>. Accessed: June 2013.
- Gustafson R.G., J. Drake, M.J. Ford, J.M. Myers, E.E. Holmes and R.S. Waples. 2006. Status Review of Cherry Point Pacific Herring (*Clupea pallasii*) and Updated Status Review of the Georgia Basin Pacific Herring Distinct Population Segment under the Endangered Species Act. NOAA Technical Memorandum NMFS-NWFSC-76. U.S. Department of Commerce. Seattle, WA. 203 pp.
- Harbour Cruises Ltd. 2013. About Us. Website: <http://www.boatcruises.com/about.php> . Accessed: May 2013.
- Harding, L.E. Ed. 1997. A Marine Ecological Classification System for Canada. Prepared for the Marine Environmental Quality Advisory Group. Environment Canada. 57 pp.
- Harrison P.J., K. Yin, L. Ross, J. Arvai, K. Gordon, L. Bendell-Young, C. Thomas, R. Elner, M. Sewell, and P. Shepherd. 1999. The Delta Foreshore Ecosystem: Past and Present Status of Geochemistry, Benthic Community Production and Shorebird Utilization after Sewage Diversion. Pp. 189-210 in: *Health of the Fraser River aquatic ecosystem*. Gray C., and T. Tuominen (Eds.). Environment Canada, Aquatic and Atmospheric Sciences Division. Vancouver, BC.
- Hart, J.L. 1973. Pacific Fishes of Canada. Fisheries Research Board of Canada. Ottawa, ON. 740 pp.
- Hart, J.L. and A.L. Tester. 1934. Quantitative studies on herring spawning. Transactions of the American Fisheries Society 64(1):307-313.
- Hastings, M.C., and A.N. Popper. 2005. Effects of Sound on Fish. Prepared for California Department of Transportation Contract No. 43A0139, Task Order 1. Jones & Stokes, Sacramento, CA. 82 pp.
- Hay, D.E. 1985. Reproductive Biology of Pacific Herring (*Clupea harengus pallasii*). Canadian Journal of Fisheries and Aquatic Sciences 42 (Suppl. 1):111-126.
- Hay, D.E. and J. Fulton. 1983. Potential secondary production from herring spawning in the Strait of Georgia. Canadian Journal of Fisheries and Aquatic Sciences 40(2):109-113.
- Hay, D.E. and P.B. McCarter. 2012. Herring Spawning Areas of British Columbia: A Review, Geographical Analysis, and Classification. Fisheries and Oceans Canada, Pacific Biological Station. Nanaimo, BC. Website: <http://www.pac.dfo-mpo.gc.ca/science/species-especies/pelagic-pelagique/herring-hareng/herspawnpages/project-eng.html>. Accessed: March 2013.
- Hay, D.E., and D.C. Miller. 1982. A quantitative assessment of herring spawn lost by storm action in French Creek, 1980. Canadian Manuscript of Fisheries and Aquatic Sciences No. 1636.

- Hayward, J. L. and N.A. Verbeek. 2008. Glaucous-winged Gull (*Larus glaucescens*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. Website: <http://bna.birds.cornell.edu/bna/species/059>. Accessed: February 2013.
- Healey, M.C. 1980. Utilization of the Nanaimo River estuary by juvenile chinook salmon, *Oncorhynchus tshawytscha*. Fishery Bulletin 77(3):653–668.
- Heise, K., J. Ford and P. Olesiuk. 2007. Appendix J: Marine mammals and turtles. In *Ecosystem Overview: Pacific North Coast Integrated Management Area (PNCIMA)*. Lucas B.G., S. Verrin and R. Brown (Eds.). Canadian Technical Report of Fisheries and Aquatic Sciences 2667. Fisheries and Oceans Canada. Sidney, BC.
- Hemilä S., S. Nummela, A. Berta and T. Reuter. 2006. High-frequency hearing in phocid and otariid pinnipeds: An interpretation based on inertial and cochlear constraints. Journal of the Acoustical Society of America 120(6):3463–3466.
- Hemmera Envirochem. 2005. Application and Appendices for an Environmental Assessment Certificate for the Deltaport Third Berth Project. Prepared for Vancouver Port Authority.
- Henderson, M.A. and C.C. Graham. 1998. History and Status of Pacific Salmon in British Columbia. North Pacific Anadromous Fish Commission Bulletin No.1:13-22.
- Hentze, N.T. 2006. The effects of boat disturbance on seabirds off southwestern Vancouver Island, British Columbia. B.Sc. Thesis, University of Victoria. Victoria, BC. 54 pp.
- Government of Canada. 2013. Species at Risk Public Registry, List of Wildlife Species at Risk. Website: http://www.sararegistry.gc.ca/sar/listing/schedules_e.cfm?id=1. Accessed: August 2013.
- Her Majesty the Queen in Right of Canada. 2013. Canada Gazette. Part II. Volume 147, No. 7. March 27, 2013. List of Wildlife Species at Risk (Referral back to COSEWIC) Order. SOR/2013-29 to 46 and SI/2013-24 to 28. Website: http://sararegistry.gc.ca/virtual_sara/files/orders/g2-147072.pdf. Accessed: August 2013.
- Hinton, S.A. and R.L. Emmett. 1994. Juvenile Salmonid Stranding in the Lower Columbia River, 1992 and 1993. US Department of Commerce, National Oceanic and Atmospheric Administration Technical Memorandum NMFS-NWFSC-20. 48 pp.
- Hobson, K. A. 1997. Pelagic Cormorant (*Phalacrocorax pelagicus*). The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. Website: <http://bna.birds.cornell.edu/bna/species/282/articles/introduction>. Accessed: February 2013.
- Hoch, M. 2001. Organotin compounds in the environment – an overview. Applied Geochemistry 16(7-8):719-743.
- Holt, M.M., D.P. Noren, V. Veirs, C.K. Emmons and S. Veirs. 2008. Speaking up: Killer whales (*Orcinus orca*) increase their call amplitude in response to vessel noise. Journal of the Acoustical Society of America Express Letters 125(1):EL27–EL32.
- Holt, M.M. 2008. Sound exposure and Southern Resident Killer Whales (*Orcinus orca*): A review of current knowledge and data gaps. U.S. Department of Commerce. NOAA Technical Memorandum NMFS-NWFSC-89. 59 pp.

- Howes, D., J. Harper and E. Owens. 1997. Physical Shore-Zone Mapping System for British Columbia. Website: <http://www.ilmb.gov.bc.ca/risc/pubs/coastal/pysshore/index.htm>. Accessed: February 2013.
- Hul'qumi'num Treaty Group. 2005. Shxunutun's Tu Suleluxwtst: In the Footsteps of our Ancestors: Summary of the Interim Strategic Land Use Plan for the Hul'qumi'num Core Traditional Territory. Ladysmith, BC.
- Humphreys, R.D. and A.S. Hourston. 1978. British Columbia Herring Spawn Deposition Survey Manual. Fisheries and Marine Service Miscellaneous Special Publication No. 38. Ottawa, ON. 40 pp.
- International Maritime Organization. 2013a. International Convention for the Safety of Life at Sea (SOLAS), 1974. [http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-\(SOLAS\),-1974.aspx](http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx). Accessed: October 2013.
- International Maritime Organization. 2013b. Port State Control. http://www.imo.org/blast/mainframe.asp?topic_id=159. Accessed: October 2013.
- International Maritime Organization. 2013c. IMO Res. MEPC. 122(52) "Explanatory notes on matters related to the accidental oil performance under regulation 23 of the revised MARPOL Annex I". As referenced in TERMPOL 3.15, Volume 8C-12.
- International Maritime Organization. 2013. Home. Website: <http://www.imo.org/Pages/home.aspx>. Accessed: June 2013.
- International Monetary Fund. 2013. SDR Valuation. Website: http://www.imf.org/external/np/fin/data/rms_sdrv.aspx. Accessed: October 2013.
- International Oil Pollution Compensation Funds. 2012. Annual Report 2012. <http://www.iopcfunds.org/publications/>. Accessed: October 2013.
- International Organization for Standardization. 1996. International Standard ISO 9613-2, Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation. Geneva, Switzerland.
- International Tanker Owners Pollution Federation Limited. 2013. Models. Website: <http://www.itopf.com/marine-spills/fate/models/>. Accessed: September 2013.
- Island Angler. 2013. Vancouver Island Fishing Reports. Website: <http://www.islandangler.net/fishing%20reports.htm>. Accessed: July 2013.
- Jacques Whitford Ltd. 2006. Environmental Assessment Certificate Application - Vancouver Island Transmission Reinforcement Project, First Nations Interests. Prepared for the British Columbia Transmission Corporation. Burnaby, BC.
- Jamieson, G. and C. Levesque. 2012a. Identification of ecologically and biologically significant areas in the Strait of Georgia and off the west coast of Vancouver Island: Phase I – Identification of Important Areas. CSAP Working Paper 2012/P51.

- Jamieson, G. and C Levesque. 2012b. Identification of ecologically and biologically significant areas on the west coast of Vancouver Island and the Strait of Georgia ecoregions, and in some nearshore areas on the North Coast: Phase II – Designation of EBSAs. CSAP Working Paper 2012/P58.
- Jeffries, S.J., P.J. Gearin, H.R. Huber, D.L. Saul and D.A. Pruett. 2000. Atlas of Seal and Sea Lion Haulout Sites in Washington. Washington Department of Fish and Wildlife, Wildlife Science Division. Olympia, WA. 157 pp.
- Jodice, P.G.R. and R.M. Suryan. 2010. The transboundary nature of seabird ecology. Pp. 139-165 in *Landscape-scale Conservation Planning*. Trombulak, S.C. and R.F. Baldwin (Eds.). Springer Science and Business Media, Springer, Netherlands.
- Johannessen, S.C. and B. McCarter. 2010. Ecosystem Status and Trends Report for the Strait of Georgia Ecozone. Canadian Science Advisory Secretariat Research Document 2010/010. Fisheries and Oceans Canada, Institute of Ocean Sciences. Sidney, BC.
- Juandesooka Enterprises. 2013. Fishing Victoria. Website. <http://fishingvictoria.ca/fishinglocations.html> . Accessed: July 2013.
- Jungius, H. and U. Hirsch. 1979. Herzfrequenzänderungen bei brutvögeln in Galapagos als folge von störungen durch besucher. *Journal of Ornithology* 120:299-310.
- Kastak, D. and R.J. Schusterman. 1998. Low-frequency amphibious hearing in pinnipeds: Methods, measurements, noise, and ecology. *Journal of the Acoustical Society of America* 103(4):2216–2228.
- Kastelein, R.A., R. van Schie, W.C. Verboom and D. de Haan. 2005. Underwater hearing sensitivity of a male and a female Steller sea lion (*Eumetopias jubatus*). *Journal of the Acoustical Society of America* 118(3):1820–1829.
- Kayak Rental Vancouver. 2013. Guided Kayak Tours. Website: <http://www.kayakvancouver.ca/guided-kayak-tours/>. Accessed: May 2013.
- Khelifa, A., M. Fingas and C. Brown, 2008. Effects of Dispersants on Oil-SPM Aggregation and Fate in US Coastal Waters. A final report submitted to the Coastal Response Research Center. Ottawa, ON, 57 pp.
- Kirby, J. 2012. Westshore Terminals looks ahead with optimism. Website: http://www.miningandexploration.ca/britishcolumbia/article/westshore_terminals_looks_ahead_with_optimism/. Accessed: November 2013.
- Knight, R.L. and K. Gutzwiller. 1995. Wildlife and Recreationists: Coexistence Through Management And Research. Island Press. Washington, DC.
- Kucey, L. 2005. Human disturbance and the hauling out behaviour of Steller sea lions (*Eumetopias jubatus*). M.Sc. thesis, University of British Columbia. Vancouver, BC.
- Kucey, L. and A.W. Trites. 2006. A review of the potential effects of disturbance on sea lions: Assessing response and recovery. Pp. 581-589 in *Sea lions of the World*, Trites, A.W., S.K. Atkinson, D.P. DeMaster, L.W. Fritz, T.S. Gelatt, L.D. Rea, and K.M. Wayne (Eds.). University of Alaska, Sea Grant College Program. Fairbanks, AK.

- Laakkonen, H.M., D.L. Lajus, P. Strelkov and R. Vainola. 2013. Phylogeography of amphiboreal fish: Tracing the history of the Pacific herring *Clupea pallasii* in North-East European seas. *BMC Evolutionary Biology* 13:67.
- Labrecque, A.J.M., R.E. Thomson, and M.W. Stacey. 1994. Residual currents in Juan de Fuca Strait. *Atmosphere-Ocean*. 32(2): 375-394.
- Lange, O.S. 1998. *The Wind Came All Ways: A Quest to Understand the Winds, Waves and Weather in the Georgia Basin*. Environment Canada, Atmospheric Environment Service. 122 pp.
- Lange, O.S., 2003. *Living with Weather along the British Columbia Coast: The Veil of Chaos*. Environment Canada. 198 pp.
- Law, R.J., T. Bolam, D. James, J. Barry, R. Deaville, R.J. Reid, R. Penrose and P.D. Jepson. 2012. Butyltin compounds in liver of harbour porpoises (*Phocoena phocoena*) from the UK prior to and following the ban on the use of tributyltin in antifouling paints (1992–2005 and 2009). *Marine Pollution Bulletin* 64(11):2576-2580.
- Le Corre, M., A. Ollivier, S. Ribes and P. Jouventin. 2002. Light-induced mortality of petrels: A 4-year study from Reunion Island (Indian Ocean). *Biological Conservation* 105(1):93-102.
- Leung, K.M, R.P. Kwong, W.C. Ng, T. Horiguchi, J.W. Qiu, R. Yang, M. Song, G. Jiang, G.J. Zheng and P.K.S. Lam. 2006. Ecological risk assessments of endocrine disrupting organotin compounds using marine neogastropods in Hong Kong. *Chemosphere* 65(6):922-938.
- Levings, C. and G. Jamieson. 2001. *Marine and Estuarine Riparian Habitats and Their Role in Coastal Ecosystem, Pacific Region*. Canadian Science Advisory Secretariat Research Document 2001/109. Fisheries and Oceans Canada, Science Branch. 41 pp.
- Levings, C.D., R.E. Foreman and V.J. Tunnicliffe. 1983. Review of the benthos of the Strait of Georgia and contiguous fjords. *Canadian Journal of Fisheries and Aquatic Sciences* 40(7):1120-1141.
- Levings, C.D. and R.M. Thom. 1994. Habitat Changes in Georgia Basin: Implications for Resource Management and Restoration. Pp. 330-351 in: *Review of the Marine Environment and Biota of Strait of Georgia, Puget Sound and Juan de Fuca Strait. Proceedings of the BC/Washington Symposium on the Marine Environment, January 13 & 14, 1994*. Wilson, R.C.H., R.J. Beamish, F. Aitkens and J. Bell (Eds.). *Canadian Technical Report of Fisheries and Aquatic Sciences No. 1948*. Minister of Supply and Services Canada.
- Lewis, J.P. 1987. *An Evaluation of a Census-Related Disturbance of Steller Sea Lions*. University of Alaska. Fairbanks, AK. 92 pp.
- Lindenmayer, D.B., C.R. Margules and D.B. Botkin. 2000. Indicators of biodiversity for ecological sustainable forest management. *Conservation Biology* 14(4):941-950.
- Livingston, P.A. 1993. Importance of predation by groundfish, marine mammals and birds on walleye pollock *Theragra chalcogramma* and Pacific herring *Clupea pallasii* in the eastern Bering Sea. *Marine Ecological Progress Series* 102:205-215.

- Lonely Planet. 2013. Top 10 US travel destinations for 2013. Website: http://www.lonelyplanet.com/usa/pennsylvania/philadelphia/travel-tips-and-articles/77583?utm_source=www.VisitSanJuans.com&utm_medium=Display%2BAd&utm_content=Front%2BPage. Accessed: August 2013.
- Lusseau, D. and L. Bejder. 2007. The long-term consequences of short-term responses to disturbance experiences from whalewatching impact assessment. *International Journal of Comparative Psychology*. 20:228-236.
- Lusseau, D., D.E. Bain, R. Williams and J.C. Smith. 2009. Vessel traffic disrupts the foraging behavior of southern resident killer whales *Orcinus orca*. *Endangered Species Research* 6:211-221.
- MacGillivray, A., G. Warner, and D. Hannay. 2012. Northern Gateway Pipeline Project: Audiogram-Weighted Behavioural Thresholds for Killer Whales. Version 3.0. Technical memorandum by JASCO Applied Sciences for Stantec Consulting Ltd. for Northern Gateway Pipeline Project.
- Mackay, D.I., I.A. Buist, R. Mascarenhas, and S. Paterson. 1980. Oil spill processes and models. Manuscript Report, vol EE-8, Environment Canada. Ottawa, ON.
- Mackay, D. and W. Zagorsky. 1982. Water-in-oil emulsions: a stability hypothesis. Proceedings, 5th Arctic Marine Oilspill Program, Technical Seminar. Environment Canada. pp 61-74.
- MacKay, D. and P.J. Leinonen. 1977. Mathematical Model of the Behaviour of Oil Spills on Water with Natural and Chemical Dispersion. Report Submitted to Environmental Protection Service, Department of Fisheries and the Environment. EPS-3-EC-77-19
- Mallory, M.L., S.A. Robinson, C.E. Hebert and M.R. Forbes. 2010. Seabirds as indicators of aquatic ecosystem conditions: A case for gathering multiple proxies of seabird health. *Marine Pollution Bulletin* 60(1):7-12.
- Martell, S.J.D., J.F. Schweigert, V. Haist and J.S. Cleary. 2011. Moving Towards the Sustainable Fisheries Framework for Pacific Herring: Data, Models, and Alternative Assumptions; Stock Assessment and Management Advice for the British Columbia Pacific Herring Stocks: 2011 Assessment and 2012 Forecasts. Canadian Science Advisory Secretariat Research Document 2011/136. 163 pp.
- Masson, D. 2005. Seasonal water mass analysis for the straits of Juan de Fuca and Georgia. *Atmosphere-Ocean*. 44(1):1-15.
- McCauley, R.D., J. Fewtrell, A.J. Duncan, C. Jenner, M.N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhitya, J. Murdoch and K. McCabe. 2000. Marine Seismic Surveys - A Study of Environmental Implications. Australian Petroleum Production and Exploration Association Journal:692-708.
- McKendry, I. 2006. Background Concentrations of PM_{2.5} and Ozone in British Columbia, Canada. Prepared for British Columbia Ministry of Environment. Vancouver, BC. 27 pp.
- Merkel, F.R. and K.L. Johansen. 2011. Light-induced bird strikes on vessels in South-west Greenland. *Marine Pollution Bulletin* 62:2330–2336.

- Metro Vancouver. 2012. A Profile of First Nations, Tribal Councils, Treaty Groups and Associations with Interests within Metro Vancouver and Member Municipalities. 30 pp.
- Metro Vancouver. 2013. Monthly Reports. GVS&DD Monitoring Results for Operating Certificate, Sampling Location: Lions Gate WWTP Effluent. Monthly Reports. Environmental Management and Quality Control, Liquid Waste Services.
- Miller, P.J.O., N. Biassoni, A. Samuels and P.L. Tyack. 2000. Whale songs lengthen in response to sonar. *Nature* 405:903.
- Ministry of Sustainable Resource Management. 2002. Provincial Marine Protected Areas in British Columbia. Decision Support Services. Victoria, BC.
- Moffatt & Nichol. 2010. Vessel wake study. Prepared for Northern Gateway Pipelines Inc.
- Moffatt & Nichol. 2011. Vessel wake study. Prepared for Kitimat Liquefied Natural Gas Operating General Partnership.
- Montevecchi, W.A. 2006. Influences of artificial light on marine birds. Pp. 94-113 in: *Ecological Consequences of Artificial Night Lighting*. Rich, C. and T. Longcore (Eds.). Springer, Berlin.
- Montreal Gazette. 1979. Mishap cuts grain export. Website: <http://news.google.com/newspapers?nid=1946&dat=19791016&id=eDwyAAAIBAJ&sjid=maQFAAAAIBAJ&pg=4707,2588172>. Accessed: November 2013.
- Moriyasu, M., R. Allain, K. Benhalimaand and R. Claytor. 2004. Effects of Seismic and Marine Noise on Invertebrates: A Literature Review. Canadian Science Advisory Secretariat Research Document 2004/126. Fisheries and Oceans Canada. 50 pp.
- Morton, A.B. and H.K. Symonds. 2002. Displacement of *Orcinus orca* (L.) by high amplitude sound in British Columbia, Canada. *International Council for the Exploration of the Sea Journal of Marine Science* 59:71–80.
- Morton, B. 2009. Recovery from imposex by a population of the dogwhelk, *Nucella lapillus* (Gastropoda: Caenogastropoda), on the southeastern coast of England since May 2004: A 52-month study. *Marine Pollution Bulletin* 58(10):1530-1538.
- MPAtlas. 2013. Home. Website: <http://www.mpatlas.org/>. Accessed: July 2013.
- Mulsow J. and C. Reichmuth. 2010. Psychophysical and electrophysiological aerial audiograms of a Steller sea lion (*Eumetopias jubatus*). *Journal of the Acoustical Society of America* 127(4):2692–2701.
- Mulsow, J., C. Reichmuth, F. Gulland, D.A.S. Rosen, and J.J. Finneran. 2011. Aerial audiograms of several California sea lions (*Zalophus californianus*) and Steller sea lions (*Eumetopias jubatus*) measured using single and multiple simultaneous auditory steady-state response methods. *Journal of Experimental Biology* 214(7):1138-1147.
- Murty, T.S., G.A. McBean and B. McKee. 1983. Explosive cyclogenesis over the northeast Pacific Ocean. *Monthly Weather Review*. 111(5):1131-1135.

Musqueam Indian Band. 2009. We Are of One Heart And Mind: Musqueam Phase 1 Land Use Plan -DRAFT. 53 pp.

National Center for Health Studies. 2013. Health Indicators Warehouse. Website: <http://healthindicators.Gov/Indicators/>. Accessed: November 2013.

National Energy Board. 2013a. Trans Mountain Pipeline ULC – Trans Mountain Expansion: List of Issues. Website: <http://www.neb-one.gc.ca/clf-nsi/rthnb/pplctnsbfrthnb/trnsmntnxpnsn/trnsmntnxpnsn-eng.html#s4>. Accessed: August 2013.

National Energy Board. 2013b. Filing Requirements Related to the Potential Environmental and Socio-Economic Effects of Increased Marine Shipping Activities, Trans Mountain Expansion Project. Website: <https://www.neb-one.gc.ca/ll-eng/livelink.exe?func=ll&objId=1035381&objAction=browse>. Accessed: September 2013.

National Energy Board. 2013c. Filing Manual. Inclusive of Release 2013-03 (August 2013). Calgary, AB.

National Oceanic and Atmospheric Administration. 2006a. Endangered and Threatened Species; Designation of critical habitat for southern resident killer whale. Federal Register Volume 71, Number 229. Pages 69054-69070. Accessed: November 2013.

National Marine Fisheries Service. 2011. 5-Year Review: Summary & Evaluation of Puget Sound Chinook, Hood Canal Summer Chum, Puget Sound Steelhead. National Marine Fisheries Service, Northwest Region, Portland, OR. 51 pp.

National Oceanographic and Atmospheric Administration. 2012. Pacific Herring (*Clupea pallasii*). Website: <http://www.nmfs.noaa.gov/pr/species/fish/pacificherring.htm>. Accessed: March 2013.

National Oceanic and Atmospheric Administration Fisheries. 2013. Interim Sound Threshold Guidance. Website: http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/threshold_guidance.html Accessed: November 2013.

National Research Council. 2003a. Ocean Noise and Marine Mammals. The National Academies Press. Washington, DC.

Nautilus Environmental. 2006. Ambient Monitoring Program for Burrard Inlet. Final Report submitted to Greater Vancouver Regional District, Burnaby, BC.

Nichol, L.M., E.J. Gregr, R. Flinn, J.K.B. Ford, R. Gurney, L. Michaluk and A. Peacock. 2002. British Columbia Commercial Whaling Catch Data 1908 to 1967: A Detailed Description of the B.C. Historical Whaling Database. Canadian Technical Report of Fisheries and Aquatic Sciences. 2371. 85 pp.

Niu, H., Z. Li, K. Lee, P. Kepkay. and J. Mullin. 2011. Modeling the Long Term Fate of Oil-Mineral-Aggregates (OMAs) in the Marine Environment and Assessment of their Potential Risks. 2011 International Oil Spill Conference. 13 pp.

- Northcote, T.G. and P.A. Larkin. 1989. The Fraser River: A Major Salmonine Production System. Pp. 172-204 in *Proceedings of the International Large River Symposium (LARS)*. D.P. Dodge (Ed.). Canadian Special Publication of Fisheries and Aquatic Sciences 106.
- Nowacek, D.P., L.H. Thorne, D.W. Johnston and P.L. Tyack. 2007. Responses of cetaceans to anthropogenic noise. *Mammal Review* 37(2):81–115.
- Nuka Research & Planning Group, LLC. 2013. West Coast Spill Response Study. Website: <http://www.env.gov.bc.ca/main/west-coast-spill-response-study>. Accessed: November 2013.
- Ocean Adventure Centre. 2013. Vancouver Salmon Fishing Charters. Website: http://www.oceanadventurecenter.com/index.php?option=com_content&view=article&id=82&Itemid=490. Accessed: June 2013.
- Oehlmann, J., E. Stroben and P. Fioroni. 1996. New facts about TBT-induced imposex in prosobranchs: general aspects. *Malacol Rev Suppl6 (Mollusc Reprod)*:149-156.
- Olympic Peninsula Tourism Commission. 2012. Fishing Guides and Charters. Website: <http://www.olympicpeninsula.org/things-to-do/fishing-guides-and-charters>. Accessed: July 2013.
- Osborne, R.W., 1999. A historical ecology of Salish Sea “resident” killer whales (*Orcinus orca*): with implications for management. Ph.D. Dissertation, University of Victoria. Victoria, BC. 277 pp.
- Osborne, R.W., J. M. Olson and R.E. Tallmon. 2001. Southern Resident Killer Whale Habitat Use at Different Time Scales Using Sighting and Photo-Identification Records. Abstract of a paper presented to the 14th Biennial Conference on the Biology of Marine Mammals. Vancouver, BC.
- Pacific Fishery Management Council. 2012. Review of 2012 Ocean Salmon Fisheries: Stock Assessment and Fishery Evaluation Document for the Pacific Coast Salmon Fishery Management Plan. Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 101, Portland, Oregon 97220-1384.
- Pacific Pilotage Authority. 2013a. Second Narrows Tankers. Website: <http://www.ppa.gc.ca/text/notice/Web%20Notice%20to%20Industry%20Second%20Narrows%20April%202010.pdf>. Accessed: November 2013
- Pacific Pilotage Authority. 2013b. Operating Rules for Crude Oil Tankers in Product with a Summer Dead Weight Tonnage (SDWT) of 40,000 or Greater. Website: [http://www.ppa.gc.ca/text/notice/Notice to Industry 2013-03 Rules for Crude Oil Tankers Boundary Pass Haro Strait.pdf](http://www.ppa.gc.ca/text/notice/Notice%20to%20Industry%202013-03%20Rules%20for%20Crude%20Oil%20Tankers%20Boundary%20Pass%20Haro%20Strait.pdf). Accessed: May 2013.
- Parks Canada. 2009a. State of the Park Report 2003-2008. Gulf Islands National Park Reserve of Canada. 80 pp.
- Parks Canada. 2009b. Feasibility Study for the Proposed Southern Strait of Georgia National Marine Conservation Area Reserve, Website: www.parkscanada.ca/straitofgeorgia. Accessed: June 2013.

- Parks Canada. 2013a. Gulf Islands National Park Reserve of Canada - Visitors Guide. Website: <http://www.pc.gc.ca/eng/pn-np/bc/gulf/index.aspx>. Accessed: June 2013.
- Parks Canada. 2013b. Feasibility Study for the Proposed Southern Strait of Georgia National Marine Conservation Area Reserve. Website: <http://www.pc.gc.ca/eng/progs/amnc-nmca/dqs-ssg/region-area.aspx>. Accessed: June 2013.
- Partridge, V., S. Weakland, M. Dutch, E. Long and K. Welch. 2013. Sediment Quality in the Whidbey Basin, Changes from 1997 to 2007. Prepared for the Environmental Assessment Program, Marine Monitoring Unit. Washington State Department of Ecology.
- Payne, R.S. and S. McVay. 1971. Songs of humpback whales. *Science* 173(3997):585-597.
- Payne, R. and D. Webb. 1971. Orientation by means of long range acoustic signaling in baleen whales. *Annals of the New York Academy of Sciences* 188:110–142.
- Payne, J.R., B.E. Kirstein, J.R. Clayton, C. Clary, R. Redding, D. McNabb and G. Farmer. 1987. Integration of Suspended Particulate Matter and Oil Transportation Study. Report Submitted to Minerals Management Service by Science Applications International Corporation. San Diego, CA. 215 pp.
- Pearson, W.H., G.E. Johnson, J.R. Skalski, G.D. Williams, K.L. Sobocinski, J.A. Southard, M.C. Miller and R.A. Buchanan. 2006. A Study of Stranding of Juvenile Salmon by Ship Wakes Along the Lower Columbia River Using a Before-and-After Design: Before-Phase Results. Prepared for the US Army Corps of Engineers, Portland District. Portland, OR. 206 pp.
- Pearson, W.H. and J.R. Skalski. 2011. Factors affecting stranding of juvenile salmonids by wakes from ship passage in the Lower Columbia River. *River Research and Applications* 27(7):926-936.
- Peden, A. 2013. An Introduction to the Marine Fish of British Columbia. In: *E-Fauna BC: Electronic Atlas of the Fauna of British Columbia. B. Klinkenberg (Ed.)*. Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia. Vancouver, BC. Website: <http://www.geog.ubc.ca/biodiversity/efauna/IntroductiontotheMarineFishofBritishColumbia.html>. Accessed: May 2013..
- Phillips, C.D., J.W. Bickham, J.C. Patton and T.S. Gelatt. 2009. Systematics of steller sea lions (*Eumetopias jubatus*): Subspecies recognition based on concordance of genetics and morphometrics. *Occasional Papers, Museum of Texas Tech University* 283:1-15.
- Pinnacle Scuba Adventures. 2013. Race Rocks. Website: <http://pinnaclediver.com/dive-sites/race-rocks>. Accessed: May 2013.
- Point Roberts Chamber of Commerce. 2010. Visitor Information. Website: http://pointrobertschamberofcommerce.com/visitor_info.php. Accessed: June 2013.
- Point Roberts Yacht Club. 2013. Point Roberts Yacht Club Racing Program, Sailing Instructions. Website: <http://pointrobertyachtclub.com/images/racingdocs/si2013.pdf>. Accessed: June 2013.

- Popper, A.N. and M.C. Hastings. 2009a. The effects of anthropogenic sources of sound on fishes. *Journal of Fish Biology* 75:455–489.
- Popper, A.N. and M.C. Hastings. 2009b. The effects of human-generated sound on fish. *Integrative Zoology* 4:43-52.
- Port Metro Vancouver. 2012 Statistics Overview 2012. Website: <http://www.portmetrovancover.com/docs/default-source/about-facts-stats/pmv-2012-stats-overview.pdf?sfvrsn=4>. Accessed: August 2013.
- Port Metro Vancouver. 2010. Harbour Operations Manual. Website: <http://www.portmetrovancover.com/en/users/marineoperations/navigation.aspx>. Accessed: April 2013.
- Port Metro Vancouver. 2012a. Cargo Statistics Report: 2012 vs. 2011. Website: http://www.portmetrovancover.com/Libraries/ABOUT_Facts_Stats/2012_Year_End_Stats.sflb.ashx. Accessed: April 2013.
- Port Metro Vancouver. 2012b. Anchorage Procedures. Website: <http://www.portmetrovancover.com/en/users/marineoperations/manualsandregulations.aspx>. Accessed: July 2013.
- Port Metro Vancouver. 2013a. Port Metro Vancouver. Website: <http://www.portmetrovancover.com/en/default.aspx>. Accessed: May 2013.
- Port Metro Vancouver. 2013b. Roberts Bank Terminal 2 Project. Website: <http://www.robertsbankterminal2.com/>. Accessed: November 2013.
- Port of Bellingham. 2013. Passenger Ferries & Charters. Website: <http://portofbellingham.com/index.aspx?NID=206>. Accessed: June 2013.
- Port of Seattle. 2013. Seattle's Downtown Cruise Terminals. Website: <http://www.portseattle.org/Cruise/Pages/default.aspx>. Accessed: June 2013.
- Port Renfrew Online. 2011. Pacheedaht History. Website: <http://www.portrenfrew.com/pacheedaht1.htm>. Accessed: April 2013.
- Port Renfrew Accommodations. 2013. Surfing, Kayaking, Windsurfing and Canoeing. Website: <http://handsomedans.ca/activities/surfing/>. Accessed: July 2013.
- Prince of Whales Whale Watching. 2013. Tour Overview. Website: <http://www.princeofwhales.com/tour-overview/>. Accessed: July 2013.
- United States Environmental Protection Agency. Undated. Puget Sound Georgia Basin Ecosystem Indicator Report. Website: http://www.epa.gov/pugetsound/pdf/Summary_Marine_Water_Quality_Indicator.pdf. Accessed: July 2013.
- Rambeau, A.L. 2008. Determining abundance and stock structure for a widespread migratory animals: The case of humpback whales (*Megaptera novaeangliae*) in British Columbia, Canada. M.Sc Thesis. University of British Columbia. Vancouver, BC.

- Richardson, W.J., C.R. Greene Jr., C.I. Malme and D.H. Thomson. 1995. Marine Mammals and Noise. Academic Press. San Diego, CA. 576 pp.
- Rolland, R.M., S.E. Parks, K.E. Hunt, M.Castellote, P.J. Corkeron, D.P. Nowacek, S.K. Wasser and S.D. Kraus. 2012. Evidence that ship noise increases stress in right whales. Proceedings of the Royal Society. B: Biological Sciences 279:2363–2368.
- Rooper, C.N. 1996. Physical and biological factors affecting Pacific herring egg loss in Prince William Sound, Alaska. M.Sc. Thesis, University of Alaska–Fairbanks. Fairbanks, AK.
- Rooper, C.N., L.J. Haldorson and T.J. Quinn, II. 1999. Habitat factors controlling Pacific herring (*Clupea pallasii*) egg loss in Prince William Sound, Alaska. Canadian Journal of Fisheries and Aquatic Sciences 56(6):1133–1142.
- Rose, A. and T. Corbet. 2004. Land Facing the Sea: A Fact Book. Tsawwassen First Nation. Tsawwassen, BC. 15 pp.
- Ross, B.P., J. Lien and R.W. Furness. 2001. Use of underwater playback to reduce the impact of eiders on mussel farms. ICES Journal of Marine Science 58:517-524.
- Ross, D. 1976. Mechanics of Underwater Noise. Pergamon Press. New York, NY.
- Ross, S. and I. Buist, 1995. Preliminary laboratory study to determine the effect of emulsification on oilspill evaporation. Proceedings of the 18th Arctic Marine Oilspill Program, Technical Seminar. Environment Canada, Edmonton, AB. Pp 61-74.
- Royal BC Museum. 2013. Thunderbird Park. Place of Cultural Sharing. Website: <http://www.royalbcmuseum.bc.ca/exhibits/tbird-park/html/pre/marine.htm>. Accessed: March 2013.
- Royal Victoria Yacht Club. 2013. Swiftsure Facts and Stats. Website: <http://2013.swiftsure.org/files/2013/05/2013-Facts-and-Stats.pdf>. Accessed: June 2013.
- Ruddock, M. and D.P. Whitfield. 2007. A Review of Disturbance Distances in Selected Bird Species. A report from Natural Research (Projects) Ltd. to Scottish Natural Heritage. 181 pp.
- Salmon University. 2013. San Juan Islands. Website: http://www.salmonuniversity.com/san_juans.html. Accessed: July 2013.
- San Juan Islands Visitors Bureau. 2011. Fishing in the San Juan Islands. Website: <http://www.visitsanjuans.com/what-to-do/fishing>. Accessed: July 2013.
- Saucier, F.J. and J. Chassé, 2000: Tidal circulation and buoyancy effects in the St. Lawrence Estuary. Atmosphere-Ocean 38(4):505-556.
- Saulitis, E., C. Matkin, L. Barrett-Lennard, K. Heise and G. Ellis. 2000. Foraging strategies of sympatric killer whale (*Orcinus orca*) populations in Prince William Sound, Alaska. Marine Mammal Science 16(1):94–109.
- Savard, J.P.L., D. Bordage and A. Reed. 1998. Surf Scoter (*Melanitta perspicillata*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. Website: <http://bna.birds.cornell.edu/bna/species/363>. Accessed: May 2013.

- Schusterman, R.J. 1981. Behavioral capabilities of seals and sea lions: A review of their hearing, visual, learning and diving skills. *The Psychological Record*. 31:125-143.
- Schwarz, A.L. and G.L. Greer. 1984. Responses of Pacific herring, *Clupea harengus pallasii*, to some underwater sounds. *Canadian Journal of Fisheries and Aquatic Sciences* 41(8):1183-1192.
- Schweigert, J. and V. Haist. 2007. Stock Assessment for British Columbia Herring in 2006 and Forecasts of the Potential Catch in 2007. Canadian Science Advisory Secretariat Research Document 2007/002. Fisheries and Oceans Canada. Nanaimo, BC. 71 pp.
- Schwemmer, P., B. Mendel, N. Sonntag, V. Dierschke and S. Garthe. 2011. Effects of ship traffic on seabirds in offshore waters: Implications for marine conservation and spatial planning. *Ecological Applications* 21(5):1851–1860.
- Seaspan ULC. 2013. Seaspan Marine. Website: <http://www.seaspan.com/seaspanmarine/index.php>. Accessed: September 2013.
- Searing, G.F. and H.R. Frith. 1997. British Columbia Biological Shore-Zone Mapping System. Resources Information Committee, Province of British Columbia. Website: <http://www.ilmb.gov.bc.ca/risc/pubs/coastal/bioshore/index.htm>. Accessed: May 2013.
- Shangaan Webservices Inc. 2013. Home. Website: <http://www.britishcolumbia.com/>. Accessed: September 2013.
- Sharpe, F.A. 2001. Social foraging of the southeast Alaskan humpback whale, *Megaptera novaeangliae*. Ph.D. Dissertation, Simon Fraser University. Burnaby, BC. 141 pp.
- Shore, V. 2011. Whales, Dolphins, & Porpoises of British Columbia, Canada. Fisheries and Oceans Canada. Ottawa, ON. 46 pp.
- Shuford, W. D. and T. Gardali, Eds. 2008. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Studies of Western Birds No. 1. Western Field Ornithologists, Camarillo, CA, and California Department of Fish and Game, Sacramento, CA.
- Sidney North Saanich Yacht Club. 2010. Patos Island Race. Website: http://www.snsyc.ca/Racing/patos_island_race.aspx. Accessed: July 2013.
- Simonsen, B.O., A. Davis and J. Haggerty. 1995. Saanich Inlet Study Report on First Nations Consultation. BC Ministry of Environment, Lands and Parks Water Quality Branch. Website: <http://www.env.gov.bc.ca/wat/wq/saanich/sisrofnc.html>. Accessed: August 2013.
- Simpson, S. And L. Baines. 2012. Marina, Malahat First Nation at odds over reburial of remains. Cowichan Valley Citizen. Duncan, BC.
- Slabbekoorn, H., N. Bouton, I. van Opzeeland, A. Coers, C. ten Cate and A.N. Popper. 2010. A noisy spring: The impact of globally rising underwater sound levels on fish. *Trends in Ecology and Evolution* 25:419-427.

- Smith, J. 2000. Marine Bird: Monitoring at Race Rocks Ecological Reserve. Prepared for Lester B. Pearson College and the Department of Fisheries and Oceans with support from the Department of the Environment, Canadian Wildlife Service.
- Sport Fishing Institute of British Columbia. 2013. Home page. Website: <http://www.sportfishing.bc.ca/>. Accessed: November 2013.
- Soomere, T., K.E. Parnell and I. Didenkulova. 2009. Implications of fast-ferry wakes for semi-sheltered beaches: A case study at Aegna Island, Baltic Sea. *Journal of Coastal Research*, SI 56 (Proceedings of the 10th International Coastal Symposium):128-132.
- Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran, R.L. Gentry, C.R. Greene Jr., D. Kastak, D.R. Ketten, J.H. Miller, P.E. Nachtigall, W.J. Richardson, J.A. Thomas and P.L. Tyack. 2007. Special Issue: Marine mammal noise exposure criteria. *Aquatic Mammals* 33(4):411-509.
- Southampton Vessel Traffic Services. 2013. Notice to Mariners, No 23 of 2012, Port of Southampton – Precautionary Area (Thorn Channel). <http://www.southamptonvts.co.uk/admin/content/files/NTMs/2012%20No%2023.pdf>. Accessed: November 2013.
- Speckman, S.G., J.F. Piatt, and J.M. Springer. 2004. Small boats disturb fish-holding marbled murrelets. *Northwestern Naturalist* 85:32–34.
- Squamish Nation, Land and Resources Committee. 2001. Xay Temixw Land Use Plan For the Forests and Wilderness of the Squamish Nation Traditional Territory, First Draft. 74 pp.
- State of Alaska. 2013. Alaska Marine Highway System: Our Mission. Website: http://www.dot.state.ak.us/amhs/our_mission.shtml. Accessed: June 2013.
- Statistics Canada. 2012. Census Profile. Website: <http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/index.cfm?Lang=E&fpv=3867>. Accessed: July 2013.
- Statistics Canada. 2013. Health Profile, January 2013. Statistics Canada Catalogue No. 82-228-XWE. Ottawa, ON. Released April 15, 2013. Website: <http://www12.statcan.gc.ca/health-sante/82-228/index.cfm?Lang=E>. Accessed: April, 2013.
- Steidl, R.J. and R.G. Anthony. 2000. Experimental effects of human activity on breeding bald eagles. *Ecological Applications* 10(1):258–268.
- Stevens, V. 1995. Wildlife Diversity in British Columbia: Distribution and Habitat Use of Amphibians, Reptiles, Birds, and Mammals in Biogeoclimatic Zones. Working Paper 04/1995. BC Ministry of Forests, Research Branch and BC Ministry of Environment, Lands and Parks, Wildlife Branch. Victoria, BC. 305 pp.
- Steyn, D.G., B.D Ainslie, C. Reuten and P.L Jackson. 2011. A retrospective analysis of ozone formation in the Lower Fraser Valley, B.C. Prepared for Fraser Valley Regional District, Fraser Basin Council and Metro Vancouver. May 31, 2011
- Stick, K.C. and A. Lindquist. 2009. 2008 Washington State Herring Stock Status Report. Stock Status Report No. FPA 09-05. Washington Department of Fish and Wildlife. 111 pp.

- Stout, H.A., R.G. Gustafson, W.H. Lenarz, B.B McCain, D.M. VanDoornik, T.L. Builder and R.D. Methot. 2001. Status review of Pacific Herring in Puget Sound, Washington. NOAA-NWFSC Tech Memo - 45. US Department of Commerce.
- Stronach, J.A., J.O. Backhaus, and T.S. Murty. 1993. An update on the numerical simulation of oceanographic processes in the waters between Vancouver Island and the mainland: The GF8 model. *Oceanography and Marine Biology: An Annual Review* 31:1-86.
- Stumpf, J.P., N. Denis, T.E. Hamer, G. Johnson and J.Verschuyt. 2011. Flight height distribution and collision risk of the marbled murrelet *Brachyramphus marmoratus*: Methodology and preliminary results. *Marine Ornithology* 39:123–128.
- Suttles, Wayne P. 2006. *The Economic Life of the Coast Salish of Haro and Rosario Straits*, Vol. 5. Garland Publishing Inc. New York & London.
- Taylan, M. 2010. An Overview: Effect of Roughness and Coatings on Ship Resistance. Istanbul Technical University, Faculty of Naval Architecture and Ocean Engineering. Istanbul, Turkey. Website: <http://www.smooth-ships.itu.edu.tr/papers/Paper5k.pdf>. Accessed: November 2013.
- Taylor, F.H.C. 1955. The Pacific Herring (*Clupea pallasii*) along the Pacific coast of Canada. International North Pacific Anadromous Fish Commission Bulletin. Fisheries Research Board of Canada. Ottawa, ON.
- Taylor, F.H.C. 1964. Life history and present status of British Columbia herring stocks. Bulletin No. 143. Fisheries Research Board of Canada. Ottawa, ON.
- Therriault, T.W., D.E. Hay and J.F. Schweigert. 2009. Biologic overview and trends in pelagic forage fish abundance in the Salish Sea (Strait of Georgia, British Columbia). *Marine Ornithology* 37:3-8.
- The Whale Museum. 2011. Annual Monthly Arrivals and Departures from the Salish Sea. Website: <http://www.whale-museum.org/education/library/whalewatch/arrivals.html>. Accessed: July 2013.
- Thompson, R.E., 1981: *Oceanography of the British Columbia Coast*, Canadian Special Publication of Fisheries and Aquatic Sciences 56. Department of Fisheries and Oceans. Ottawa, ON. 291 pp.
- Tkalich, P. and E.S. Chan, 2002. Vertical mixing of oil droplets by breaking waves. *Marine Pollution Bulletin* 44(11):1219-1229.
- Todd, S., P. Stevick, J. Lien., F. Marques and D. Ketten. 1996. Behavioral effects of exposure to underwater explosions in humpback whales (*Megaptera novaeangliae*). *Canadian Journal of Zoology* 74:1661-1672.
- Tourism Victoria. 2013. Fishing. Website: <http://www.tourismvictoria.com/things-to-do/outdoors/fishing/>. Accessed: July 2013.
- TransLink. 2013. TransLink Reports Transit Ridership Heading for a New Record. Website: <http://www.translink.ca/en/About-Us/Media/2011/August/TransLink-reports-transit-ridership-heading-for-a-new-record.aspx>. Accessed: July 2013.

- Transport Canada. 1991. Routing Standards (1991) - TP 1802E. Website: <http://www.tc.gc.ca/eng/marinesafety/tp-tp1802-menu-1295.htm>. Accessed: October 2013.
- Transport Canada. 2006. Making Connections: Shortsea Shipping in Canada. Website: <http://www.tc.gc.ca/media/documents/policy/making-connections.pdf>. Accessed: July 2013.
- Transport Canada. 2010. Anti-fouling Systems. Website: <http://www.tc.gc.ca/eng/marinesafety/oep-environment-sources-antifouling-1964.htm>. Accessed: November 2013.
- Transport Canada. 2013h. Tanker Safety and Spill Prevention. Website: <http://www.tc.gc.ca/eng/marinesafety/menu-4100.htm#p>. Accessed: November 2013.
- Transport Canada. 2013i. Collision Regulations. Website: <http://www.tc.gc.ca/eng/marinesafety/tp-tp14070-2918.htm>. Accessed: September 2013.
- Transport Canada. 2013b. Transportation of Dangerous Goods. Website: <http://www.tc.gc.ca/eng/tdg/marine-safety-103.htm>. Accessed: August 2013.
- Transport Canada. 2013c. Compensating for Response Costs. Website: <http://www.tc.gc.ca/eng/marinesafety/oep-ers-regime-compensation-314.htm>. Accessed: September 2013.
- Transport Canada. 2013d. Ship-source Compensation Funds. Website: <http://www.tc.gc.ca/eng/marinesafety/oep-ers-regime-funds-1119.htm>. Accessed: September 2013.
- Transport Canada. 2013e. Regulatory Framework. Website: <http://www.tc.gc.ca/eng/marinesafety/oep-inspection-psc-framework-920.htm>. Accessed: September 2013.
- Transport Canada. 2013a. Harper Government Announces First Steps Towards World-Class Tanker Safety System. Website: <http://www.tc.gc.ca/eng/mediaroom/releases-2013-h031e-7089.htm>. Accessed: September 2013.
- Transport Canada. 2013f. National Oil Spill Preparedness and Response Regime. Website: <http://www.tc.gc.ca/eng/marinesafety/oep-ers-regime-menu-1780.htm>. Accessed: September 2013.
- Transport Canada. 2013g. Roles and Responsibilities. Website: <http://www.tc.gc.ca/eng/marinesafety/oep-ers-regime-roles-101.htm>. Accessed: September 2013.
- Transportation Safety Board of Canada. 2013. About the TSB. Website: <http://www.bst-tsb.gc.ca/eng/>. Accessed: November 2013.
- TripAdvisor LLC. 2013. San Juan Island Vacations. Website: http://www.tripadvisor.com/Tourism-g1441879-San_Juan_Island_San_Juan_Islands_Washington-Vacations.html. Accessed: August 2013.

- Tyack, P.L. and C.W. Clark. 2000. Communication and acoustic behavior of dolphins and whales. *Springer Handbook of Auditory Research* 12:156–224.
- Tyack, P.L. 2008. Implications for marine mammals of large-scale changes in the marine acoustic environment. *Journal of Mammalogy* 89(3):549-558.
- United States Coast Guard. 2013. VTS Users Manual 2013 Edition. Website: <http://www.uscg.mil/d13/psvts/>. Accessed: July 2013.
- United States Environmental Protection Agency. 2003. Ambient Aquatic Life Water Quality Criteria for Tributyltin (TBT) – Final. Website: http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/tributyltin/upload/2004_01_05_criteria_tributyltin_tbt-final.pdf. Accessed: November 2013.
- United States Environmental Protection Agency. 2013. The National Emissions Inventory. Website: <http://www.epa.gov/ttnchie1/net/2008inventory.html>. Accessed: July 2013.
- United States Fish and Wildlife Service. 2006. Alaska Seabird Information Series: Fork-Tailed Storm-Petrel *Oceanodroma furcata*. Nongame Migratory Birds, Migratory Bird Management. Anchorage, AK. 2 Pp.
- United States Office of Coast Survey. 2013. United States Coast Pilot 7: Chapter 12 (Juan de Fuca Strait and Georgia, Washington). Website: http://www.nauticalcharts.noaa.gov/nsd/coastpilot_w.php?book=7. Accessed: May 2013.
- United States Coast Guard. 2012. Safety Zone Regulations. Website: <http://www.reginfo.gov/public/do/eAgendaViewRule?pubId=201210&RIN=1625-AA00>. Accessed: October 2012.
- United States Coast Guard. 2013. Procedures for the Canada/United States Cooperative Vessel Traffic Services. Website: <http://www.uscg.mil/d13/cvts/proman.asp>. Accessed: September 2013.
- University of British Columbia. 2004. Stratogem. Website: www.stratogem.ubc.ca/index.html. Accessed: September 2013.
- Van Cleve, F.B., G. Bargmann, M. Culver and the MPA Work Group. 2009. Marine Protected Areas in Washington: Recommendations of the Marine Protected Areas Work Group to the Washington State Legislature. Washington Department of Fish and Wildlife. Olympia, WA. 118 pp.
- Vancouver Sun. 2010. Ferries, crab fishermen tangle in conflicts over shipping lanes. Website: <http://www.canada.com/vancouver/news/westcoastnews/story.html?id=3340ddc8-8947-40bc-837c-32d77c8dd15c>. Accessed: September 2013.
- van Dorp, J. 2008. Assessment of Oil Spill Risk due to Potential Increased Vessel Traffic at Cherry Point, Washington (Final Report). Website: http://www.seas.gwu.edu/~dorpjr/tab4/publications_VTRA_Final_Report.html. Accessed: June 2013.
- Velegrakis, A.F., M.I. Vousdoukas, A.M. Vagenas, Th. Karambas, K. Dimou, and Th. Zarkadas. 2007. Field observations of waves generated by passing ships: A note. *Coastal Engineering* 54(4):369-375.

- Verhaegen, Y., E. Monteyne, T. Neudecker, I. Tulp, G. Smagghe, K. Cooreman, P. Roose and K. Parmentier. 2011. Organotins in North Sea brown shrimp (*Crangon crangon* L.) after implementation of the TBT ban. *Chemosphere* 86(10):979-984.
- Vermeer, K. 1981. Food and populations of Surf Scoters in British Columbia. *Wildfowl* 32:107-116.
- Vermeer, K. 1983. Marine Bird Populations in the Strait of Georgia; Comparison with the west coast of Vancouver Island. Canadian Technical Report of Hydrography and Ocean Sciences No. 19. 24 pp.
- Vermeer, K. and N. Bourne. 1984. The White-winged scoter diet in British Columbia waters: Resource partitioning with other scoters. Pp. 30-38 in *Marine birds: Their Feeding Ecology and Commercial Fisheries Relationships*. Nettleship, D.N., G.A. Sanger and P.F. Springer (Eds.). Canadian Wildlife Service Special Publication. Ottawa, ON.
- Wahl, T.R., S.M. Speich, D.A. Manuwal, K.V. Hirsch and C. Miller. 1981. Marine bird populations of the Strait of Juan de Fuca, Strait of Georgia and adjacent waters in 1978 and 1979. Interagency Energy/Environment E&D Program Report, EPA-600/7-81-156. 789 pp.
- Waldichuk, M. 1957. Physical Oceanography of the Strait of Georgia, British Columbia. *Journal of the Fisheries Research Board of Canada* 14(3):321-486.
- Wang, C., J.J. Corbett and J. Firestone. 2008. Improving spatial representation of global ship emissions inventories. *Environmental Science & Technology* 42(1):193-199.
- Ward, D.H. and R.A. Stehn. 1989. Response of Brant and other geese to aircraft disturbances at Izembek Lagoon, Alaska. Final Report 14-12-0001-30332. US Fish and Wildlife Service. Anchorage, AK.
- Ware, D.M. 1985. Life history characteristics, reproductive value, and resilience of Pacific herring (*Clupea harengus pallasii*). *Canadian Journal of Fisheries and Aquatic Sciences* 42 (Suppl. 1):127-137.
- Wartzok, D., J. Altmann, W. Au, K. Ralls, A. Starfield, and P.L. Tyack. 2005. Marine Mammal Populations and Ocean Noise: Determining when Noise Causes Biologically Significant Effects. National Academies Press. Washington, D.C.
- Washington Scuba Alliance. 2011. Links. Website: <http://www.wascuba.org/links.htm>. Accessed: July 2013.
- Washington State Department of Ecology. 2006. Washington State Coastal Atlas. Website: <https://fortress.wa.gov/ecy/coastalatlus/>. Accessed: July 2013.
- Washington State Department of Ecology. 2013a. Marine Water Quality Monitoring. Website: http://www.ecy.wa.gov/programs/eap/mar_wat/flights.html. Accessed: July 2013.
- Washington State Department of Ecology. 2013b. Long-Term Monitoring Data Summaries, Findings, Publications. Website: <http://www.ecy.wa.gov/programs/eap/psamp/HistoricalProfiles/historicalmon.html>. Accessed: September 2013.

- Washington State Department of Ecology. 2013c. Home Page. Website: <http://www.ecy.wa.gov/ecyhome.html>. Accessed: November 2013.
- Washington Department of Fish and Wildlife. 2008. Economic Analysis of the Non-Treaty Commercial and Recreational Fisheries in Washington State. Website: <http://wdfw.wa.gov/publications/00464/wdfw00464.pdf>. Accessed: June 2013.
- Washington Department of Fish and Wildlife. 2013a. Marine Protected Areas within Puget Sound. Website: <http://wdfw.wa.gov/fishing/mpa/>. Accessed: June 2013.
- Washington Department of Fish and Wildlife. 2013b. Fish & Shellfish. Website: <http://wdfw.wa.gov/fishing/mpa/>. Accessed: June 2013.
- Washington Department of Fish and Wildlife. 2013c. Fish Washington. Website: <http://wdfw.wa.gov/index.html>. Accessed: June 2013.
- Washington State Department of Health. 2013. Washington State Cancer Registry Data Online. V2. Website: <https://fortress.wa.gov/doh/wscr/WSCR/Query.mvc/Query>. Accessed: November 2013.
- Washington State Department of Transportation. 2013a. Spring 2013 Sailing Schedule for Anacortes/Sidney B.C. Website: <http://www.wsdot.com/ferries/schedule/ScheduleDetailByRoute.aspx?route=ana-sid>. Accessed: May 2013.
- Washington State Department of Transportation. 2013b. Marine. Website: <http://www.wsdot.wa.gov/Freight/Marine.htm>. Accessed: June 2013.
- Washington State Parks. 2013. Moorage Program and Locations. Website: <http://www.parks.wa.gov/boating/moorage/>. Accessed: July 2013.
- Wenz, G.M. 1962. Acoustic ambient noise in the ocean: Spectra and sources. *Journal of the Acoustical Society of America* 34(12):1936-1956.
- West Vancouver Yacht Club. 2013. 45th Annual Southern Straits Race. Website: <http://www.southernstraits.ca/documents/StraitsCourses.pdf>. Accessed: June 2013.
- Western Canada Marine Response Corporation. 2012. Information Handbook. Version 2.0. Burnaby, BC.
- Western Canada Marine Response Corporation. 2013a. Home. Website: <http://wcmrc.com/>. Accessed: September 2013.
- Western Canada Marine Response Corporation. 2013b. Equipment Plan in Response to the Trans Mountain Expansion Project and Related Increased Tanker Traffic in South Western British Columbia. Revised October 23, 2013.
- Western Canada Marine Response Corporation. 2013c. Remote Base Location Study due to Trans Mountain Expansion Project and Related Increased Tanker Traffic. Revised October 23, 2013.
- Westshore Terminals Ltd. 2013. Westshore Terminals Limited Partnership. Website: <http://www.westshore.com/>. Accessed: September 2013.

- Wever, E.G., P.N. Herman, J.A. Simmons and D.R. Hertzler. 1969. Hearing in the black-footed penguin, *Spheniscus demersus*, as represented by the cochlear potentials. Proceedings of the National Academy of Sciences of the United States of America 63(3):676:680.
- Whatcom County. 2007. Lighthouse Marine Park. Website: <http://www.co.whatcom.wa.us/parks/lighthouse/index.jsp>. Accessed: June 2013.
- Wild Whales. 2006. Be Whale Wise Marine Wildlife Guidelines for Boaters, Paddlers and Viewers (Revised 2006). Website: <http://wildwhales.org/watching-whales/whale-watching-guidelines/>. Accessed: July 2013.
- Williams, G.L. 1993. Coastal/estuarine Fish Habitat Description and Assessment Manual, Part II, Habitat Description Procedures H. M. D. Department of Fisheries and Oceans, Pacific Region. Nanaimo, BC.
- Williams, R., D.E. Bain, J.K.B. Ford and A.W. Trites. 2002a. Behavioural responses of male killer whales to a 'leapfrogging' vessel. Journal of Cetacean Research and Management 4(3):305-310.
- Williams, R., A.W. Trites, and D.E. Bain. 2002b. Behavioural responses of killer whales (*Orcinus orca*) to whalewatching boats: Opportunistic observations and experimental approaches. Journal of Zoology 256(2):255-270.
- Williams, R., D. Lusseau, and P.S. Hammond. 2006. Estimating relative energetic costs of human disturbance to killer whales (*Orcinus orca*). Biological Conservation 133: 301-311.
- Williams R. and L. Thomas. 2007. Distribution and abundance of marine mammals in the coastal waters of BC, Canada. Journal of Cetacean Research and Management 9(1):15-28.
- Williams, R. and P. O'Hara. 2010. Modelling ship strike risk to fin, humpback and killer whales in British Columbia, Canada. Journal of Cetacean Research and Management. 11:1-8
- Williams, R., M. Krkošek, E. Ashe, T.A. Branch, S. Clark, P.S. Hammond, E. Hoyt, D.P. Noren, D. Rosen, and A. Winship. 2011. Competing conservation objectives for predators and prey: Estimating killer whale prey requirements for Chinook salmon. PLoS ONE 6(11):e26738.
- Williams, R., C.W. Clark, D. Ponirakis and E. Ashe. 2013. Acoustic quality of critical habitats for three threatened whale populations. Animal Conservation (early view).
- World Web Technologies Inc. 2013. Richmond Boat Tours. Website: <http://www.richmondbc.worldweb.com/ToursActivities/BoatTours/>. Accessed: June 2013.
- Xie, H., P.D.Yapa and K. Nakata. 2007. Modelling emulsification after an oil spill in the sea. Journal of Marine Systems 68:489-506.
- Yacht Charters .com. 2013. Pacific Northwest Yacht Charters. Website: <http://www.yachtcharters.com/charters/Pacific-Northwest-Yacht-Charters.html>. Accessed: July 2013.

Zaremba, L., E. Wang, and J. Stronach, 2005. The physical limnology of Okanagan Lake. Pp. 48-65 in *Water - Our Limiting Resource: Towards Sustainable Water Management in the Okanagan*. Proceedings of Canadian Water Resources Association B.C. Branch Conference, Feb. 23-25, 2005. Kelowna, BC. 409 pp.

Zhu, X., A.D. Venosa, M.T, Suidan and K. Lee. 2004. Guideline for the Bioremediation of Oil-contaminated Salt Marshes. EPA/600/R-04/074. U.S. Environmental Protection Agency. Cincinnati, OH. 66 pp.

7.3 GIS and Mapping References

Bartnik, V., D. Bernard, J. Dong, A. Jamal, B. Kay, L. Nichol, S. Redman, P.S. Ross, M. Rylko, H. Siegelbaum, R. Smith and G. Thornburn. 2002. Georgia Basin-Puget Sound Ecosystem Indicators Report. Prepared by the Transboundary Georgia Basin-Puget Sound Environmental Indicators Working Group. Available: <http://www.env.gov.bc.ca/spd/docs/gbppei.pdf>. Acquired: July 2013.

Bigg, M.A. 1985. Status of the Steller Sea Lion (*Eumetopias jubatus*) and California Sea Lion (*Zalophus californianus*) in British Columbia. Canadian Special Publication of Fisheries and Aquatic Sciences 77: 20 pp.

British Columbia Cetacean Sightings Network. 2013. Killer Whale and Humpback Whale Sightings Data (digital datasheet). Acquired: April 2013.

British Columbia Marine Conservation Analysis. 2011a. Anchorages and Safe Boat Havens (digital file). Victoria, BC. Available: <http://bcmca.ca/maps-data/data-library-downloadable-sets/>. Acquired: April 2013. Last Update Check: April 12, 2013.

British Columbia Marine Conservation Analysis. 2011b. Marinas and Coastal Facilities (digital file). Victoria, BC. Available: <http://bcmca.ca/maps-data/data-library-downloadable-sets/>. Acquired: April 2013. Last Update Check: April 12, 2013.

British Columbia Marine Conservation Analysis. 2011c. Recreation Boating Route (digital file). Victoria, BC. Available: <http://bcmca.ca/maps-data/data-library-downloadable-sets/>. Acquired: April 2013. Last Update Check: April 12, 2013.

British Columbia Marine Conservation Analysis. 2011d. SCUBA Dive Sites (digital file). Victoria, BC. Available: <http://bcmca.ca/maps-data/data-library-downloadable-sets/>. Acquired: April 2013. Last Update Check: April 12, 2013.

British Columbia Marine Conservation Analysis. 2011e. Sea Kayaking Routes (digital file). Victoria, BC. Available: <http://bcmca.ca/maps-data/data-library-downloadable-sets/>. Acquired: April 2013. Last Update Check: April 12, 2013.

British Columbia Ministry of Energy and Mines. 2013. Borders, 1:20K (digital file). Available: <http://www.em.gov.bc.ca/MINING/GEOSCIENCE/MAPPLACE/GEODATA/Pages/default.aspx>. Acquired: June 2013. Last update check: N/A.

British Columbia Ministry of Forests, Lands and Natural Resource Operations. 1998a. Coastal BC Campsites (digital file). Victoria, BC. Available: <https://apps.gov.bc.ca/pub/dwds/home.so>. Acquired: December 2012. Last Update Check: December 10, 2012.

- British Columbia Ministry of Forests, Lands and Natural Resource Operations. 1998b. Coastal BC Ferry Terminals. Victoria, BC. Available: <https://apps.gov.bc.ca/pub/dwds/home.so>. Acquired: June 2013. Last Update Check: June 26, 2013.
- British Columbia Ministry of Forests, Lands and Natural Resource Operations. 1998c. Coastal BC Marine Kayaking Destinations (digital file). Victoria, BC. Available: <https://apps.gov.bc.ca/pub/dwds/home.so>. Acquired: December 2012. Last Update Check: December 10, 2012.
- British Columbia Ministry of Forests, Lands and Natural Resource Operations. 1998d. Coastal BC Moorages (digital file). Victoria, BC. Available: <https://apps.gov.bc.ca/pub/dwds/home.so>. Acquired: December 2012. Last Update Check: December 10, 2012.
- British Columbia Ministry of Forests, Lands and Natural Resource Operations. 2005. Repetitive Shore Type – Line, Shorezone (digital file). Coastal Resource Information System. Available: http://webmaps.gov.bc.ca/imf5/imf.jsp?site=dss_coastal. Acquired: May 2013. Last update check: N/A.
- British Columbia Ministry of Forests, Lands and Natural Resource Operations. 2007. Tantalus Regional Districts (digital file). Victoria, BC. Available: <https://apps.gov.bc.ca/pub/dwds/home.so>. Acquired: March 2011. Last Update Check: May 21, 2013.
- British Columbia Ministry of Forests, Lands and Natural Resource Operations. 2008a. BC Freshwater Atlas Stream Network (digital file). Victoria, BC. Available: <https://apps.gov.bc.ca/pub/dwds/home.so>. Acquired: July 2011. Last Update Check: January 11, 2013.
- British Columbia Ministry of Forests, Lands and Natural Resource Operations. 2008b. BC Parks, Ecological Reserves, and Protected Areas (digital file). Available: <https://apps.gov.bc.ca/pub/geometadata/metadataDetail.do?recordUID=54259&recordSet=ISO19115>. Acquired: August 2012. Last update check: N/A.
- British Columbia Ministry of Forests, Lands and Natural Resource Operations. 2008c. Freshwater Atlas Bays and Channels (digital file). Victoria, BC. Available: <https://apps.gov.bc.ca/pub/dwds/home.so>. Acquired: July 2012. Last Update Check: October 10, 2013.
- British Columbia Ministry of Forests, Lands and Natural Resource Operations. 2008d. Tantalus Conservancy Areas (digital file). Victoria, BC. Available: <https://apps.gov.bc.ca/pub/dwds/home.so>. Acquired: May 2013. Last Update Check: May 21, 2013.
- British Columbia Ministry of Forests, Lands and Natural Resource Operations. 2008e. Tantalus Crown Tenures (digital file). Victoria, BC. Available: <https://apps.gov.bc.ca/pub/dwds/home.so>. Acquired: May 2013. Last Update Check: May 21, 2013.

- British Columbia Ministry of Forests, Lands and Natural Resource Operations. 2008f. Tantalus Parks, Ecological Reserves and Protected Areas (digital file). Victoria, BC. Available: <https://apps.gov.bc.ca/pub/dwds/home.so>. Acquired: August 2013. Last Update Check: August 1, 2013.
- British Columbia Ministry of Forests, Lands and Natural Resource Operations. 2008g. Tantalus - Wildlife Management Areas (digital files). Available: <https://apps.gov.bc.ca/pub/geometadata/metadataDetail.do?recordUID=54319&recordSet=ISO19115>. Acquired: August 2012. Last update check: August 2012.
- British Columbia Ministry of Forests, Lands and Natural Resource Operations. 2012. Digital Road Atlas (DRA) - Master Partially Attributed Road Data (digital file). Victoria, BC. Available: <https://apps.gov.bc.ca/pub/dwds/home.so>. Acquired: December 2012. Last Update Check: December 17, 2012.
- Bigg, M.A. 1985. Status of the Steller Sea Lion (*Eumetopias jubatus*) and California Sea Lion (*Zalophus californianus*) in British Columbia. Canadian Special Publication of Fisheries and Aquatic Sciences 77: 20 pp.
- Canadian Hydrographic Service. 2011. Chart #3494 (digital file). Acquired: October 2012.
- Coastal Resource Information Management System. 2011. Available: [http://www.data.gov.bc.ca/dbc/catalogue/detail.page?config=dbc&P110=recorduid:173508&recorduid=173508&title=Bird Colonies - Coastal Resource Information Management System \(CRIMS\)](http://www.data.gov.bc.ca/dbc/catalogue/detail.page?config=dbc&P110=recorduid:173508&recorduid=173508&title=Bird%20Colonies%20-%20Coastal%20Resource%20Information%20Management%20System%20(CRIMS)). Acquired: April 2013 Last update check: N/A.
- Crude Quality Inc. 2013. Crude Comparisons. Available: <http://crudemonitor.ca/home.php>. Accessed: October 2013.
- Edgell, T.C. and M.W. Demarchi. 2012. California and Steller sea lion use of a major winter haulout in the Salish Sea over 45 years. Marine Ecology Progress Series 467:253-262.
- Environment Canada. 1972. Alaksen National Wildlife Area. Available: <http://www.ec.gc.ca/ap-pa/default.asp?lang=En&n=73907575-1>. Acquired: March 2013. Last update check: March 2013.
- Environment Canada (Canadian Wildlife Service). 2008. British Columbia Seabird Colony Inventory (digital dataset). Canadian Wildlife Service, Pacific and Yukon Region, British Columbia. Acquired: April 2013. Last update check: N/A.
- ESRI. 2005. US States (digital data). Redlands, CA. Available: <http://www.esri.com/data/data-maps>, data came with ArcGIS software. Acquired: September 2006. Last update check: N/A.
- ESRI Inc. 2013. World Shaded Relief map service (digital file). Redlands, CA. Available: via ArcGIS Online, visit <http://www.arcgis.com/home/item.html?id=9c5370d0b54f4de1b48a3792d7377ff2>. Acquired: June 2013. Last Accessed: October, 2013.
- Fingas, M. 2012. The Basics of Oil Spill Cleanup, Third Edition. CRC Press. Boca Raton, FL. 286 pp.

- Fisheries and Oceans Canada. 2005. Recreational Fish Fishery (digital file). Victoria, BC. Available: <https://apps.gov.bc.ca/pub/dwds/home.so>. Acquired: December 2012. Last Update Check: December 10, 2012.
- Fisheries and Oceans Canada. 2008. Rockfish Conservation Areas – Pacific Region. Available: www.pac.dfo-mpo.gc.ca/fm-gp/maps-cartes/rca-ac/areas-secteurs/sg-dq-eng.html. Acquired: August 2012. Last update check: N/A.
- Fisheries and Oceans Canada. 2010. Management Plan for the Steller Sea Lion (*Eumetopias jubatus*) in Canada [Final]. Species at Risk Act Management Plan Series. Fisheries and Oceans Canada, Ottawa, ON. 75 pp.
- Fisheries and Oceans Canada. 2011. Recovery Strategy for the northern and southern resident killer whales (*Orcinus orca*) in Canada. Species at Risk Act Recovery Strategy Series, Fisheries & Oceans Canada, Ottawa, ON. 89 pp.
- Fisheries and Oceans Canada. 2012a. Pacific Herring Important Areas. MAPSTER v3 layer. Available: <http://pacgis01.dfo-mpo.gc.ca/Mapster30/#/SilverMapster> (digital file). Acquired: May 2013. Last update check: N/A.
- Fisheries and Oceans Canada. 2012b. Pacific Salmon Important Areas. MAPSTER v3 layer. Available: <http://pacgis01.dfo-po.gc.ca/Mapster30/#/SilverMapster> (digital file). Acquired: May 2013. Last Update Check: N/A.
- Fisheries and Oceans Canada. 2012c. Pacific Salmon Migration Routes. MAPSTER v3 layer. Available: <http://pacgis01.dfo-mpo.gc.ca/Mapster30/#/SilverMapster> (digital file). Acquired: September 2012. Last Update Check: N/A.
- Fisheries and Oceans Canada, 2013a. Evaluation of proposed ecologically and biologically significant areas in marine waters of British Columbia. DFO Canadian Science Advisory Secretariat Scientific Advisory Report. 2012/075.
- Fisheries and Oceans Canada. 2013b. Recovery Strategy for the North Pacific Humpback Whale (*Megaptera novaeangliae*) in Canada (Final Version). Humpback Whale (North Pacific Population). Species at Risk Act Recovery Strategy Series. Ottawa, ON. 77 pp.
- Government of Canada. 2013. Aboriginal Lands, Canada (digital file). Edmonton, AB. Available: <http://www.geobase.ca>. Acquired: November 2013. Last Update Check: November 7, 2013.
- Government of Canada (Canadian Hydrographic Service). 2011. Bathymetry. Nautical Chart #3494 (digital file). Vancouver, BC. Acquired: October 2012.
- Government of Canada (Canadian Hydrographic Service). 2013. Nautical Chart (digital file). Vancouver, BC. Available: <http://www.charts.gc.ca>. Provided by KMC, April 2013. Last Update Check: N/A.
- Hall, A.H. 2004. Seasonal Abundance, distribution and prey species of harbour porpoise (*Phocoena phocoena*) in southern Vancouver Island waters. Thesis (M.S.c) University of Victoria, Victoria, B.C.

- Hay, D.E. and P.B. McCarter. 2012. Herring spawning areas of British Columbia: A review, geographic analysis and classification. Volumes 1-6. Canadian Manuscript Reports of Fisheries and Aquatic Sciences 2019. Revised Edition. Available: <http://www.pac.dfo-mpo.gc.ca/science/species-especes/pelagic-pelagique/herring-hareng/herspawn/pages/project-eng.htm>. Accessed: July 2013. Last update check: N/A.
- IHS Inc. 2004a. IHS Hydro Line Data (digital file). Calgary, AB. Available: <http://energy.ihs.com/Solutions/Regions/Canada/>. Acquired: June 2011. Last Update Check: October 28, 2013.
- IHS Inc. 2004b. IHS Hydro Region Data (digital file). Calgary, AB. Available: <http://energy.ihs.com/Solutions/Regions/Canada/>. Acquired: June 2011. Last Update Check: October 28, 2013.
- IHS Inc. 2010. IHS Provincial Boundaries (digital file). Calgary, AB. Available: <http://energy.ihs.com/Solutions/Regions/Canada/>. Acquired: June 2011. Last Update Check: October 28, 2013.
- IHS Inc. 2011. IHS First Nations (digital file). Calgary, AB. Available: <http://energy.ihs.com/Solutions/Regions/Canada/>. Acquired: June 2011. Last Update Check: October 28, 2013.
- IHS Inc. 2013a. IHS Cities and Towns (digital file). Calgary, AB. Available: <http://energy.ihs.com/Solutions/Regions/Canada/>. Acquired: July 2013. Last Update Check: October 28, 2013.
- IHS Inc. 2013b. IHS First Nations (digital file). Calgary, AB. Available: <http://energy.ihs.com/Solutions/Regions/Canada/>. Acquired: October 2013. Last Update Check: October 23, 2013.
- IHS Inc. 2013c. IHS Road Segments (digital file). Calgary, AB. Available: <http://energy.ihs.com/Solutions/Regions/Canada/>. Acquired: November 20, 2013. Update Interval: Monthly.
- Important Bird Areas Canada. 2011. Available: <http://www.ibacanada.com/mapviewer.jsp?lang=EN>. Acquired: August 2012. Last update check: N/A.
- Jeffries, S.J., P.J. Gearin, H.R. Huber, D.L. Saul, and D.A. Pruett. 2000. Atlas of Seal and Sea Lion Haulout Sites in Washington. Washington Department of Fish and Wildlife, Wildlife Science Division. Olympia WA. 157 pp.
- Kinder Morgan Canada. 2012. Baseline Routing (digital file). Calgary, AB. Received via FTP. Acquired: May 9, 2012. Last Update Check: N/A.
- Moffatt & Nichol. 2013a. Marine Vessel Route - Inbound (digital file). Vancouver, BC. Received via email. Acquired: March 15, 2013. Last Update Check: N/A.
- Moffatt & Nichol. 2013b. Marine Vessel Route - Outbound (digital file). Vancouver, BC. Received via email. Acquired: March 15, 2013. Last Update Check: N/A.
- NASA Geospatial Interoperability Program. 2005. Landsat7 Panchromatic Mosaic Imagery (digital file). Available: <http://onearth.jpl.nasa.gov>. Acquired: January 2007.

National Audubon Society. May 2013. Important Bird Areas Database, Boundary Digital Data Set. Ivyland, Pennsylvania.

National Hydrology Network. 2007. Watercourse layers (digital files). Available: <http://www.geobase.ca/geobase/en/data/nhn/description.html>. Acquired: August 2013. Last update check: N/A.

National Oceanic and Atmospheric Administration Fisheries Service. 2012. Steller Sea Lion Haulouts in Washington. Available: http://www.nwr.noaa.gov/publications/gis_maps/maps/marine_mammals/stellerhaulouts/wa10_22_12.pdf. Acquired: June 2013. Last update check: N/A.

National Resources Canada. 2005. National Parks – National Framework Canada Lands, Administrative Boundaries Level 1 (digital file). Geographic Data Discovery Service. Available: <https://apps.gov.bc.ca/pub/geometadata/metadataDetail.do?recordUID=33892&recordSet=ISO19115>. Acquired: June 2010. Last update check: N/A.

National Topographic Data Base. 2007. GeoGratis (API) – Product Selection. Natural Resources Canada. Available: <http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/-/urn:iso:series:national-topographic-data-base-ntdb>. Acquired: September 2012. Last update check: N/A

Natural Resources Canada. 2003. Canadian Geographical Names (digital file). Ottawa, ON. Available: <http://geobase.ca/geobase/en/data/cgn/index.html>. Acquired: June 2013. Last Update Check: June 13, 2013.

Natural Resources Canada. 2010. North American Atlas – Hydrography (digital file). Ottawa, ON. Available: <http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/4a778c9f-00b1-5fce-aa2f-42a90d19eb24.html>. Acquired: June 2012. Last Update Check: June 20, 2013.

Natural Resources Canada. 2012. CanVec -Transportation - 1020009 Railway (digital file). Sherbrooke, QC. Available: <http://geogratis.cgdi.gc.ca/geogratis/en/download/topographic.html>. Acquired: June 2012. Last Update Check: November 2012.

Natural Resources Canada. 2013a. National Framework Canada Lands Administrative Boundaries Level 1 (digital file). Ottawa, ON. Available: <http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/eb3757cc-d08b-5e62-9a44-3a8534ff3249.html>. Acquired: October 2013. Last Update Check: October 11, 2013.

Natural Resources Canada. 2013b. National Road Network - Alberta (digital file). Sherbrooke, QC. Available: <http://www.geobase.ca/geobase/en/data/nrn/index.html>. Acquired: September 2013. Last Update Check: September 6, 2013.

Natural Resources Canada. 2013c. National Road Network - British Columbia (digital file). Sherbrooke, QC. Available: <http://www.geobase.ca/geobase/en/data/nrn/index.html>. Acquired: September 2013. Last Update Check: September 6, 2013.

National Oceanic and Atmospheric Administration Fisheries Service. 2012. Steller Sea Lion Haulouts in Washington. Available: http://www.nwr.noaa.gov/publications/gis_maps/maps/marine_mammals/stellerhaulouts_wa10_22_12.pdf. Acquired: June 2013. Last update check: N/A.

Parks Canada. 2012. Marine Protected Areas (MPAs). Available: <http://www.env.gov.bc.ca/omfd/ocean-resources/mpa.html>. Acquired: September 2012. Last update check: N/A.

Parks Canada. 2013. Southern Strait of Georgia National Marine Conservation Area Reserve – Boundary Concept. Available: <http://www.pc.gc.ca/eng/progs/amnc-nmca/dgs-ssg/region-area.aspx>. Acquired: August 2013. Last update check: N/A.

TERA Environmental Consultants. 2008. Hillshade. Derived from Natural Resources Canada, Earth Sciences Sector, Centre for Topographic Information. 2000-2008. Canadian Digital Elevation Data 250k (digital files). Sherbrooke, QC. Available: <http://www.geobase.ca/geobase/en/data/cded/index.html>. Acquired: 2008. Last Update Check: December 2010.

United States National Imagery and Mapping Agency. 2000. Vector Map Level 0, Digital Chart of the World, Water Courses (digital file). Bethesda, MD. Available: http://geoengine.nima.mil/ftpdir/archive/vpf_data/v0noa.tar.gz. Acquired: September 2009. Last Update Check: September 18, 2013.

Universal Pegasus International. 2013. Rev 6 Routing (digital file). Calgary, AB. Received via FTP. Acquired: August 23, 2013. Last Update Check: N/A.

Washington State Department of Ecology. 1994. Washington State Base Map: Outline of State Boundary and Water Features (digital file). Available: <http://www.ecy.wa.gov/services/gis/data/data.htm>. Acquired: May 2009. Last update check: N/A.

Washington State Department of Ecology. 2006. Shore Zone Themes – Washington State Coastal Atlas (digital file). Nearshore Habitat Program, Aquatic Resources Division. Available: <https://fortress.wa.gov/ecy/coastalatlas/>. Acquired: July 2013. Last update check: N/A.

Washington State Department of Fish and Wildlife. 1989. Seabird Colonies of Washington State. Steven M. Speich, et al. Available: http://wdfw.wa.gov/conservation/phs/maps_data/. Acquired: October 2013. Last update check: N/A.

Washington State Department of Natural Resources. 2006. Shore Zone Themes – Washington State Coastal Atlas (digital file). Nearshore Habitat Program, Aquatic Resources Division. Available: <https://fortress.wa.gov/ecy/coastalatlas/>. Acquired: July 2013. Last update check: N/A.